

APPENDIX G
DATA VALIDATION MEMORANDA

DRAFT



DATA QUALITY ASSURANCE/QUALITY CONTROL REVIEW

PROJECT NO. 0863.01.03 | APRIL 10, 2017 | GRAYS HARBOR HISTORICAL
SEAPORT AUTHORITY

This report reviews the analytical results for sediment samples collected by the Maul Foster & Alongi, Inc. (MFA) project team on the property located at 500 North Custer Street in Aberdeen, Washington. The samples were collected in November 2013.

Analytical Resources, Incorporated (ARI) performed the analyses. ARI report XN64_XO00_GHHSA_rpt, which contains reports XN64 and XO00, and report XQ70_MFA_GHHSA_rpt, which contains XQ70, were reviewed. Three of the sediment samples were processed by ARI to obtain pore water and were reported in XO00. Follow-up analyses were performed on XN64 samples and reported in XQ70. The analyses performed and samples analyzed are listed below. Some analyses may not have been performed on all samples.

Analysis	Reference
Ammonia Nitrogen	USEPA 350.1 Modified
Diesel and Motor Oil	NWTPH-Dx
Dioxins/Furans	USEPA 1613B
Gasoline	NWTPH-G
Grain Size	PSEP 1986
Polychlorinated Biphenyls	USEPA 8082A
Pore Water Conductivity	USEPA 120.1
Pore Water Salinity	SM 2520B
Preserved and Total Solids	SM 2540G
Semivolatile Organic Compounds	USEPA 8270D/8270D SIM
Total Mercury	USEPA 7471A
Total Metals	USEPA 6010C
TOC	Plumb
Total Sulfides	USEPA 376.2
Total Volatile Solids	SM 2540E

NWTPH = Northwest Total Petroleum Hydrocarbons.

Plumb = Procedures for handling and chemical analysis of sediment and water samples (Plumb, 1981).

PSEP = Puget Sound Estuary Protocols.

SIM = selective ion monitoring.

SM = Standard Methods for the Examination of Water and Wastewater.

TOC = total organic carbon.

USEPA = U.S. Environmental Protection Agency.

Samples Analyzed		
SDG XN64	SDG XO00	SDG XQ70
CR01-10cm	CR01-10cm (pore water)	CR04-10cm
CR02-10cm	CR02-10cm (pore water)	CR05-10cm
CR03-10cm	CR03-10cm (pore water)	CR05-2.5
CR04-10cm	-	CR04-2.5
CR05-10cm	-	-
CR06-10cm	-	-
CR04-5	-	-
CR06-2.5	-	-

SDG = sample delivery group.

DATA QUALIFICATIONS

Analytical results were evaluated according to applicable sections of USEPA procedures (USEPA, 2008, 2010, 2011), appropriate laboratory and method-specific guidelines (ARI, 2013; USEPA, 1986), and the dioxin rules memorandum developed by MFA and approved by the Washington State Department of Ecology (MFA, 2012).

Data validation procedures were modified, as appropriate, to accommodate quality control (QC) requirements for methods not specifically addressed by the functional guidelines (e.g., total volatile solids).

Any result reported as exceeding the calibration range of the instrument was qualified as an estimate and assigned a “J” flag.

USEPA Method 1613B results reported as estimated maximum potential concentrations (EMPCs) were qualified by the reviewer with “U” (non-detect) at the reported EMPC value.

In report XQ70, the USEPA Method 1613B OCDD results for samples CR05-2.5 and CR04-2.5 exceeded the instrument calibration range. National Functional Guidelines for dioxin/furan data review state that laboratories are not required to take action when OCDD exceeds instrument calibration range (USEPA, 2011) The OCDD results were qualified “J” as estimated.

All data are considered acceptable for their intended use with the appropriate data qualifiers assigned.

HOLDING TIMES, PRESERVATION, AND SAMPLE STORAGE

Holding Times

In report XN64, the USEPA Method 8270D results for phenol, pentachlorophenol, and butylbenzylphthalate from samples CR04-10cm, CR04-5, CR05-10cm, and CR06-10cm were extracted and analyzed six days after the recommended 14-day holding time. All detected results have been qualified “J” as estimated, and all non-detect results have been qualified “UJ” as estimated.

In report XQ70, samples CR04-10cm, CR05-10cm, CR05-2.5, and CR04-2.5 were extracted for analysis by NWTPH-Dx, USEPA Method 8082A, and USEPA Method 8270D/8270D SIM after the recommended 14-day holding time. Samples CR05-2.5 and CR04-2.5 were prepared and analyzed for USEPA Method 7471A total mercury after the recommended 28-day holding time. All detected results have been qualified “J” as estimated, and all non-detect results have been qualified “UJ” as estimated.

The remaining extractions and analyses were performed within the recommended holding time criteria.

Preservation and Sample Storage

The samples were preserved and stored appropriately.

BLANKS

Method Blanks

Laboratory method blank analyses were performed at the required frequencies. For purposes of data qualification, the method blanks were associated with all samples prepared in the analytical batch.

If an analyte was detected in a sample and in the associated method blank at less than ten times the method blank concentration, the sample result was qualified. USEPA Method 1613B sample results were qualified if sample concentrations were less than five times the associated method blank concentration. Reporting limits were elevated to the concentrations detected in the samples, and results were qualified as not detected “U” at the elevated method reporting limit (MRL).

For USEPA Method 1613B, if an analyte was detected in a sample and in the associated method blank below the reporting limit but above the estimated detection limit, sample detections below the level found in the method blank were qualified as “U” at the reporting limit.

In report XN64 and XQ70, the USEPA Method 1613B method blanks had detections for some analytes below the MRL and some detections for 1,2,3,4,6,7,8-HpCDD and OCDD above the MRL. All associated sample results were greater than five times the method blank concentrations; thus, no results were qualified.

In report XN64, the USEPA Method 376.2 sulfide method blank prepared on November 12, 2013, had a total sulfide detection of 0.17 milligram per kilogram (mg/kg). All associated sample detections were greater than ten times the method blank detection; thus, no results were qualified.

All remaining laboratory method blanks were non-detect.

Trip Blanks

Trip blanks were not submitted for this sampling event, as volatile organic compounds were not analyzed.

Equipment Rinsate Blanks

Equipment rinsate blanks were not collected for this sampling event. Equipment was decontaminated after each sample was collected in accordance with the sediment sampling and analysis plan (MFA, 2013).

SURROGATE RECOVERY RESULTS

When appropriate, individual samples were spiked with surrogate compounds to evaluate laboratory performance.

In report XN64, NWTPH-Gx surrogate recoveries for sample CR06-2.5 exceeded the lower percent recovery limits for both trifluorotoluene and bromobenzene. The associated result was qualified by the reviewer as follows:

Sample	Component	Original Result (mg/kg)	Qualified Result (mg/kg)
CR06-2.5	Gasoline	54 U	54 UJ

The reviewer took no action based on minor surrogate outliers or surrogate percent recoveries that were outside acceptance limits because of dilutions necessary to quantify high concentrations of target analytes present in the samples. The laboratory appropriately documented and qualified surrogate outliers. Associated batch quality assurance and QC for samples with surrogate outliers were within acceptance limits.

All remaining surrogate recoveries were within acceptance limits.

LABELED ANALOG STANDARD RECOVERY RESULTS

All USEPA Method 1613B Modified samples were spiked with C13 labeled analog standards to quantify the recovery of individual target compounds. All C13 labeled analog standard recoveries were within acceptance limits.

MATRIX SPIKE/MATRIX SPIKE DUPLICATE RESULTS

Matrix spike/matrix spike duplicate (MS/MSD) results are used to evaluate laboratory precision and accuracy. All MS/MSD samples were extracted and analyzed at the required frequency.

In report XN64, the USEPA Method 7471A MS exceeded the upper percent recovery acceptance limit for total mercury. The exceedance was minor and the laboratory control sample (LCS) had acceptable recovery; thus, no results were qualified.

In report XN64, the case narrative states that the USEPA 376.2 sulfide matrix duplicate exceeded relative percent difference (RPD) acceptance criteria. The matrix duplicate RPD results were not included in the QC report. The remaining batch QC had acceptable recoveries, and the laboratory stated that sample heterogeneity likely was the cause of the RPD exceedance. No results were qualified.

In report XN64, the case narrative states that the Method Plumb (1981) MS had low percent recovery for TOC and that a re-prepared MS also had low recovery. The LCS had acceptable recovery, which indicates matrix interference. The following results were qualified “J” as estimated:

Report	Sample	Component	Original Result (%)	Qualified Result (%)
XN64	CR06-10cm	TOC	35.6	35.6 J
XN64	CR04-10cm	TOC	31.4	31.4 J
XN64	CR05-10cm	TOC	13.6	13.6 J
XN64	CR06-2.5	TOC	49.5	49.5 J
XN64	CR04-5	TOC	16.5	16.5 J
XN64	CR01-10cm	TOC	2.06	2.06 J
XN64	CR02-10cm	TOC	3.21	3.21 J
XN64	CR03-10cm	TOC	2.91	2.91 J

All recoveries were within acceptance limits for percent recovery and RPDs.

LABORATORY DUPLICATE RESULTS

Duplicate results are used to evaluate laboratory precision. All duplicate samples were extracted and analyzed at the required frequency. Laboratory duplicate RPDs for USEPA Method 6010C were assessed against the RPD acceptance limit of 35 percent for soil laboratory duplicates, as presented in the National Functional Guidelines for inorganic data review (USEPA, 2010). Minor laboratory duplicate RPD exceedances and exceedances for results near the reporting limit were not qualified by the reviewer.

In report XN64, the USEPA Method 6010C laboratory duplicate exceeded RPD acceptance criteria for total chromium, total copper, and total mercury. The exceedance for total mercury was minor and the associated results were not qualified. The associated batch QC had acceptable recoveries; however, the total chromium and total copper RPD exceedances were significant. The following results were qualified:

Report	Sample	Component	Original Result (mg/kg)	Qualified Result (mg/kg)
XN64	CR06-2.5	Total Chromium	26	26 J
XN64	CR06-2.5	Total Copper	96	96 J
XN64	CR01-10cm	Total Chromium	40	40 J

Report	Sample	Component	Original Result (mg/kg)	Qualified Result (mg/kg)
XN64	CR01-10cm	Total Copper	58	58 J
XN64	CR02-10cm	Total Chromium	38.5	38.5 J
XN64	CR02-10cm	Total Copper	56.3	56.3 J
XN64	CR03-10cm	Total Chromium	48	48 J
XN64	CR03-10cm	Total Copper	65.4	65.4 J

All remaining laboratory duplicate RPDs were within acceptance limits.

LABORATORY CONTROL SAMPLE/LABORATORY CONTROL SAMPLE DUPLICATE RESULTS

An LCS/laboratory control sample duplicate (LCSD) is spiked with target analytes to provide information on laboratory precision and accuracy. The LCS/LCSD samples were extracted and analyzed at the required frequency.

In report XN64, the USEPA Method 8270D SIM LCS exceeded the instrument calibration range for pentachlorophenol. The LCS percent recovery was within acceptance limits, and the associated sample detections were already qualified as estimated because they were below the MRL; thus, no results were qualified by the reviewer.

All remaining LCS/LCSD analytes were within acceptance limits for percent recovery and RPD.

FIELD DUPLICATE RESULTS

Field duplicate samples measure both field and laboratory precision. No field duplicate samples were submitted for analysis.

CONTINUING CALIBRATION VERIFICATION RESULTS

Continuing calibration verification (CCV) results are used to demonstrate instrument precision and accuracy through the end of the sample batch.

National Functional Guidelines for low/medium volatile and semivolatile data review (USEPA, 2008) state that results associated with closing CCV percent drift exceedances between 50 percent and -50 percent do not require qualification. However USEPA Method 8270D states that when CCV percent drift acceptance criteria are met for at least 80 percent of the compounds, non-detects may be reported for compounds that exceed acceptance limits if the laboratory demonstrates that quantitation limit sensitivity can still be achieved. Detected compounds associated with CCV percent drift exceedances may be reported as estimated values.

In report XN64, the USEPA Method 8270D SIM CCV exceeded percent drift criteria for benzyl alcohol and butylbenzylphthalate. In report XQ70, the USEPA Method 8270D and

8270D SIM CCVs also exceeded percent drift criteria for several compounds. Associated sample detections above the MRL were qualified with “J” as estimated. USPEA Method 8270D results associated with report XQ70 were already qualified “J” due to holding time exceedances, as noted above.

Report	Sample	Component	Original Result (µg/kg)	Qualified Result (µg/kg)
XN64	CR02-10cm	Benzyl Alcohol	43 Q	43 J
XN64	CR03-10cm	Benzyl Alcohol	43 Q	43 J

µg/kg = micrograms per kilogram.

Based on available information, all other CCVs were within acceptance limits for percent recovery.

REPORTING LIMITS

ARI used routine reporting limits for non-detect results, except when samples required dilutions because of limited sample or extract volume, high analyte concentrations, and/or matrix interferences.

Detections below the MRL were reported for some analyses: results for USEPA Method 1613B were reported to estimated detection limits, and results for USEPA Methods 8082A, 8270D, and 8270D SIM were reported to method detection limits. Some NWTPH-Gx, USEPA Method 8082A, and USEPA Method 8270D reporting limits were raised because of chromatographic interference or matrix interference. All samples in report XQ70 were diluted 1:5 for USEPA Method 8270D/8270D SIM analyses due to matrix interference.

DATA PACKAGE

The data packages were reviewed for transcription errors, omissions, and anomalies.

In report XN64, the case narrative states that the USEPA Method 7471A MS exceeded the lower acceptance limit for total mercury; however, the MS exceeded the upper acceptance limit.

In report XO00, conductivity was not indicated on the chain of custody but was analyzed for pore water extracts of samples CR01-10cm, CR02-10cm, and CR03-10cm.

All samples submitted for pore water extraction (CR01-10cm, CR02-10cm, CR03-10cm, and CR04-5) produced insufficient volume for USEPA Method 376.2 sulfides analysis. The volume of extracted pore water was sufficient to perform the remaining analyses.

No additional issues were found.

REFERENCES

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- USEPA. 1986. Test methods for evaluating solid waste: physical/chemical methods. EPA-530/SW-846. U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response. September (revision 6, February 2007).
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- USEPA. 2011. USEPA contract laboratory program, national functional guidelines for chlorinated dibenzo-p-dioxins (CDDs) and chlorinated dibenzofurans (CDFs) data review. EPA-540-R-11-016. U.S. Environmental Protection Agency, Office of Superfund Remediation and Technology Innovation. September.

DATA QUALITY ASSURANCE/QUALITY CONTROL REVIEW

PROJECT NO. 1044.02.01 | APRIL 10, 2017 | GRAYS HARBOR HISTORICAL SEAPORT AUTHORITY

Maul Foster & Alongi, Inc. (MFA) conducted an independent review of the quality of analytical results for groundwater, sediment, soil, and stormwater samples collected at the leased tideland and in-water portion of the Seaport Landing site, located adjacent to the Chehalis River at 500 North Custer Street in Aberdeen, Washington. The samples were collected on October 12 through 16, 2015, and January 12, 2016.

Analytical Resources, Inc. (ARI) in Tukwila, Washington, and NVL Laboratories (NVL) in Seattle, Washington, performed the analyses. ARI report numbers AON0, AON1, AON2, AON3, AOT3, AOV8, AOV9, AOW1, AOW2, ART5, ASF7, and AUD1 were reviewed. The analyses performed and samples analyzed are listed below. Additional samples were submitted to ARI on hold and were archived at -18 degrees Celsius (°C). Portions of samples reported in AOV8, AOV9, and AOW2 were subcontracted to NVL for asbestos analysis and results are appended to AOV8, AOV9, and AOW2, respectively. Report ART5 is a follow-up to report AOW1 and contains results originally requested, but not reported in AOW1. Report ASF7 is a follow-up to report AOV9 and contains results for tests requested in addition to those reported in AOV9.

Analysis	Reference
Ammonia Nitrogen	USEPA 350.1 Modified
Asbestos	EPA 600/M4-82-020 and 600R-93/116
Diesel and Motor Oil	NWTPH-Dx
Dioxins and Furans	USEPA 1613B*
Grain Size	PSEP
Polychlorinated Biphenyls (PCBs)	USEPA 8082A
Semivolatile Organic Compounds (SVOCs)	USEPA 8270D / 8270D-SIM
Sulfide	SM 4500-S2D
Total and Dissolved Mercury	USEPA 7470A/7471A
Total and Dissolved Metals	USEPA 200.8/6010C
Total Organic Carbon (TOC)	Plumb, 1981
Total Solids/Preserved Total Solids/Total Volatile Solids	SM 2540G

NWTPH = Northwest Total Petroleum Hydrocarbons.

PSEP = Puget Sound Estuary Protocols (PSEP, 1997).

SIM = selective ion monitoring.

SM = Standard Methods for the Examination of Water and Wastewater.

USEPA = U.S. Environmental Protection Agency.

* The following acronyms are used to report USEPA Method 1613B congener results:

TCDD = Tetrachlorodibenzo-p-dioxin
TCDF = Tetrachlorodibenzofuran
PeCDD = Pentachlorodibenzo-p-dioxin
PeCDF = Pentachlorodibenzofuran
HxCDD = Hexachlorodibenzo-p-dioxin
HxCDF = Hexachlorodibenzofuran
HpCDD = Heptachlorodibenzo-p-dioxin
HpCDF = Heptachlorodibenzofuran
OCDD = Octachlorodibenzo-p-dioxin
OCDF = Octachlorodibenzofuran

Samples Analyzed				
Report AON0	Report AON1	Report AON2	Report AON3	Report AOV8
CR-07-SSD-COMP	CR11-14-SBSD-COMP	CR09a-SSD-COMP	CR20-S-5.0	CR17-D-SSD
CR23-S-3.0	CR-24-SSD-COMP	CR09b-SSD-COMP	CR21-S-5.0	CR17-D-SBSD
CR22-S-3.0	CR11-SBSD-23	-	CR21-GW-10	CR08A-SBSD
CR23-GW-6.0	CR12-SBSD-15	-	CR20-GW-5.0	CR10-SSD-COMP
CR22-GW-9.0	CR13-SBSD-11	-	Seep-01	CR08a-SSD-COMP
-	CR14-SBSD-12	-	-	-
Report AOT3	Report AOV9	Report AOW1	Report AOW2	Report ART5
CR19D-SSD-CONV	CR08b-SBSD	CR19F-SBSD	CR15C-SSD	CR18B-SBSD
-	CR26-SBSD	CR19F-SBSD-DUP	CR15C-SBSD	CR18B-SSD
-	-	CR19F-SSD	CR08b-SSD-COMP	-
-	-	SR18B-SBSD	-	-
-	-	SR18B-SSD	-	-
Report ASF7	Report AUD1	-	-	--
CR08b-SBSD	Storm-01	-	-	-
CR26-SBSD	-	-	-	-

DATA QUALIFICATIONS

Analytical results were evaluated according to applicable sections of USEPA procedures (USEPA, 2014a,b,c) and appropriate laboratory and method-specific guidelines (ARI, 2014; USEPA, 1986).

Data validation procedures were modified, as appropriate, to accommodate quality control requirements for methods not specifically addressed by the functional guidelines (e.g., NW1PH-Dx).

Where appropriate, the data were qualified using the following qualifiers:

J The analyte was positively identified but the associated numerical value is an approximate concentration because either there was an issue with the quality of the data generated or the concentration of the analyte was between the reporting limit (RL) and half the RL or the estimated detection limit (EDL).

J+ The result is an estimated value but may be biased high.

U Analysis was conducted, but the analyte was not detected at or above the selected RL. The value may represent an adjusted RL or the sample-specific EDL.

UJ The analyte was not detected (see definition of “U” and “J” qualifiers above). The reported value should be considered approximate.

R The sample results are unusable because certain quality control criteria were not met. The analyte may or may not be present in the sample.

GENERAL ASSESSMENT

Results for total and dissolved metals in water were reviewed to identify inconsistencies in any one sample. All total metals results were greater than dissolved metals results or within a reasonable relative percent difference (RPD).

ARI did not use second column confirmation for 2,3,7,8-TCDF. The reviewer confirmed that the analytical column used for USEPA Method 1613B analysis met requirements for 2,3,7,8-TCDD and 2,3,7,8-TCDF isomer specificity, therefore not requiring second column confirmation.

In reports AON1, AON2, AON3, AOV8, AOV9, AOW1, AOW2, and AUD1, USEPA Method 1613B detected results that were reported as estimated maximum potential concentrations (EMPC) were assigned by the reviewer a “U” qualifier (non-detect) at the reported EMPC value. Results detected below the RL were flagged by ARI with “J EMPC” and were also assigned by the reviewer a “U” qualifier at the reported EMPC value. In reports AON2 and AOW1, the 1,2,3,7,8-PeCDF results for samples CR09a-SSD-COMP and CR19F-SSD were flagged by ARI with “X” in addition to “EMPC,” due to polychlorinated diphenyl ether interference. Qualified results are summarized below.

Report	Sample	Component	Laboratory-Reported Result (pg/g)	Result of Record (pg/g)
AON0	CR23-S-3.0	2,3,7,8-TCDF	0.0538 J EMPC	0.0538 U
AON0	CR23-S-3.0	1,2,3,6,7,8-HxCDF	0.153 J EMPC	0.153 U
AON0	CR23-S-3.0	1,2,3,7,8,9-HxCDF	0.155 J EMPC	0.155 U
AON0	CR23-S-3.0	1,2,3,4,7,8-HxCDD	0.193 J EMPC	0.193 U
AON0	CR23-S-3.0	1,2,3,4,7,8,9-HpCDF	0.221 J EMPC	0.221 U
AON0	CR23-S-3.0	Total TCDF	0.103 EMPC	0.103 U
AON0	CR23-S-3.0	Total TCDD	11.4 EMPC	11.4 U

Report	Sample	Component	Laboratory-Reported Result (pg/g)	Result of Record (pg/g)
AON0	CR23-S-3.0	Total HxCDF	5.78 EMPC	5.78 U
AON0	CR23-S-3.0	Total HxCDD	27.3 EMPC	27.3 U
AON0	CR23-S-3.0	Total HpCDF	10.2 EMPC	10.2 U
AON0	CR22-S-3.0	2,3,7,8-TCDD	1.41 J EMPC	1.41 U
AON0	CR22-S-3.0	1,2,3,4,7,8,9-HpCDF	12.5 EMPC	12.5 U
AON0	CR22-S-3.0	Total TCDF	5.25 EMPC	5.25 U
AON0	CR22-S-3.0	Total TCDD	13.6 EMPC	13.6 U
AON0	CR22-S-3.0	Total PeCDF	48.6 EMPC	48.6 U
AON0	CR22-S-3.0	Total HpCDF	695 EMPC	695 U
AON1	CR11-SBSD-23	1,2,3,6,7,8-HxCDF	0.0339 J EMPC	0.0339 U
AON1	CR11-SBSD-23	1,2,3,7,8,9-HxCDF	0.112 J EMPC	0.112 U
AON1	CR11-SBSD-23	1,2,3,4,7,8-HxCDD	0.255 J EMPC	0.255 U
AON1	CR11-SBSD-23	1,2,3,6,7,8-HxCDD	0.631 J EMPC	0.631 U
AON1	CR11-SBSD-23	1,2,3,4,6,7,8-HpCDF	0.317 J EMPC	0.317 U
AON1	CR11-SBSD-23	Total TCDF	0.303 EMPC	0.303 U
AON1	CR11-SBSD-23	Total TCDD	7.61 EMPC	7.61 U
AON1	CR11-SBSD-23	Total PeCDF	0.111 EMPC	0.111 U
AON1	CR11-SBSD-23	Total HxCDF	0.599 EMPC	0.599 U
AON1	CR11-SBSD-23	Total HxCDD	18.1 EMPC	18.1 U
AON1	CR11-SBSD-23	Total HpCDF	1.28 EMPC	1.28 U
AON2	CR09a-SSD-COMP	1,2,3,7,8-PeCDF	0.383 JX EMPC	0.383 U
AON2	CR09a-SSD-COMP	2,3,4,7,8-PeCDF	0.379 J EMPC	0.379 U
AON2	CR09a-SSD-COMP	1,2,3,4,7,8-HxCDF	0.991 EMPC	0.991 U
AON2	CR09a-SSD-COMP	Total TCDF	6.42 EMPC	6.42 U
AON2	CR09a-SSD-COMP	Total TCDD	8.55 EMPC	8.55 U
AON2	CR09a-SSD-COMP	Total PeCDF	10.6 EMPC	10.6 U
AON2	CR09a-SSD-COMP	Total PeCDD	12.4 EMPC	12.4 U
AON2	CR09a-SSD-COMP	Total HxCDF	22.2 EMPC	22.2 U
AON2	CR09a-SSD-COMP	Total HxCDD	48.3 EMPC	48.3 U
AON2	CR09b-SSD-COMP	2,3,7,8-TCDD	2.06 EMPC	2.06 U
AON2	CR09b-SSD-COMP	2,3,4,7,8-PeCDF	0.528 EMPC	0.528 U
AON2	CR09b-SSD-COMP	1,2,3,4,7,8-HxCDF	1.16 EMPC	1.16 U
AON2	CR09b-SSD-COMP	Total TCDF	12.5 EMPC	12.5 U
AON2	CR09b-SSD-COMP	Total TCDD	15.4 EMPC	15.4 U
AON2	CR09b-SSD-COMP	Total PeCDF	16.5 EMPC	16.5 U
AON2	CR09b-SSD-COMP	Total PeCDD	21.0 EMPC	21.0 U
AON2	CR09b-SSD-COMP	Total HxCDF	30.8 EMPC	30.8 U
AON2	CR09b-SSD-COMP	Total HxCDD	72.3 EMPC	72.3 U
AON2	CR09b-SSD-COMP	Total HpCDF	58.9 EMPC	58.9 U
AON3	CR20-S-5.0	1,2,3,7,8-PeCDF	4.85 EMPC	4.85 U
AON3	CR20-S-5.0	Total TCDF	50.9 EMPC	50.9 U
AON3	CR20-S-5.0	Total TCDD	79.6 EMPC	79.6 U

Report	Sample	Component	Laboratory-Reported Result (pg/g)	Result of Record (pg/g)
AON3	CR20-S-5.0	Total PeCDF	316 EMPC	316 U
AON3	CR20-S-5.0	Total HxCDF	1340 EMPC	1340 U
AON3	CR20-S-5.0	Total HxCDD	843 EMPC	843 U
AON3	CR20-S-5.0	Total HpCDF	3080 EMPC	3080 U
AON3	CR21-S-5.0	2,3,7,8-TCDF	0.657 J EMPC	0.657 U
AON3	CR21-S-5.0	2,3,7,8-TCDD	0.467 J EMPC	0.467 U
AON3	CR21-S-5.0	2,3,4,7,8-PeCDF	0.727 J EMPC	0.727 U
AON3	CR21-S-5.0	Total TCDF	7.08 EMPC	7.08 U
AON3	CR21-S-5.0	Total TCDD	4.89 EMPC	4.89 U
AON3	CR21-S-5.0	Total PeCDF	36.3 EMPC	36.3 U
AON3	CR21-S-5.0	Total PeCDD	14.9 EMPC	14.9 U
AON3	CR21-S-5.0	Total HxCDF	95.5 EMPC	95.5 U
AOV8	CR17-D-SSD	2,3,7,8-TCDF	0.406 J EMPC	0.406 U
AOV8	CR17-D-SSD	1,2,3,7,8-PeCDF	0.213 J EMPC	0.213 U
AOV8	CR17-D-SSD	2,3,4,7,8-PeCDF	0.239 J EMPC	0.239 U
AOV8	CR17-D-SSD	2,3,4,6,7,8-HxCDF	0.443 J EMPC	0.443 U
AOV8	CR17-D-SSD	1,2,3,7,8,9-HxCDF	0.324 J EMPC	0.324 U
AOV8	CR17-D-SSD	1,2,3,4,7,8-HxCDD	0.736 J EMPC	0.736 U
AOV8	CR17-D-SSD	1,2,3,4,7,8,9-HpCDF	0.483 J EMPC	0.483 U
AOV8	CR17-D-SSD	Total TCDF	4.27 EMPC	4.27 U
AOV8	CR17-D-SSD	Total TCDD	12.4 EMPC	12.4 U
AOV8	CR17-D-SSD	Total PeCDF	4.66 EMPC	4.66 U
AOV8	CR17-D-SSD	Total PeCDD	16.7 EMPC	16.7 U
AOV8	CR17-D-SSD	Total HxCDF	10.8 EMPC	10.8 U
AOV8	CR17-D-SSD	Total HxCDD	45.8 EMPC	45.8 U
AOV8	CR17-D-SSD	Total HpCDF	21.2 EMPC	21.2 U
AOV8	CR08A-SBSD	1,2,3,7,8,9-HxCDF	0.258 J EMPC	0.258 U
AOV8	CR08A-SBSD	1,2,3,4,7,8-HxCDD	0.583 J EMPC	0.583 U
AOV8	CR08A-SBSD	1,2,3,4,7,8,9-HpCDF	0.250 J EMPC	0.250 U
AOV8	CR08A-SBSD	Total TCDF	0.656 EMPC	0.656 U
AOV8	CR08A-SBSD	Total TCDD	12.0 EMPC	12.0 U
AOV8	CR08A-SBSD	Total PeCDF	0.428 EMPC	0.428 U
AOV8	CR08A-SBSD	Total PeCDD	12.7 EMPC	12.7 U
AOV8	CR08A-SBSD	Total HxCDF	1.27 EMPC	1.27 U
AOV8	CR08A-SBSD	Total HxCDD	33.2 EMPC	33.2 U
AOV8	CR08A-SBSD	Total HpCDF	3.43 EMPC	3.43 U
AOV8	CR08a-SSD-COMP	1,2,3,7,8-PeCDF	0.483 J EMPC	0.483 U
AOV8	CR08a-SSD-COMP	1,2,3,4,7,8,9-HpCDF	2.10 EMPC	2.10 U
AOV8	CR08a-SSD-COMP	Total TCDF	10.9 EMPC	10.9 U
AOV8	CR08a-SSD-COMP	Total TCDD	23.9 EMPC	23.9 U
AOV8	CR08a-SSD-COMP	Total PeCDF	12.8 EMPC	12.8 U
AOV8	CR08a-SSD-COMP	Total PeCDD	25.9 EMPC	25.9 U

Report	Sample	Component	Laboratory-Reported Result (pg/g)	Result of Record (pg/g)
AOV8	CR08a-SSD-COMP	Total HxCDF	44.0 EMPC	44.0 U
AOV8	CR08a-SSD-COMP	Total HxCDD	147 EMPC	147 U
AOV8	CR08a-SSD-COMP	Total HpCDF	126 EMPC	126 U
AOV9	CR08b-SBSD	1,2,3,7,8-PeCDF	0.288 J EMPC	0.288 U
AOV9	CR08b-SBSD	1,2,3,4,6,7,8-HpCDF	0.295 J EMPC	0.295 U
AOV9	CR08b-SBSD	OCDF	0.802 J EMPC	0.802 U
AOV9	CR08b-SBSD	Total TCDF	10.7 EMPC	10.7 U
AOV9	CR08b-SBSD	Total TCDD	21.4 EMPC	21.4 U
AOV9	CR08b-SBSD	Total PeCDF	2.08 EMPC	2.08 U
AOV9	CR08b-SBSD	Total PeCDD	21.9 EMPC	21.9 U
AOV9	CR08b-SBSD	Total HxCDF	0.888 EMPC	0.888 U
AOV9	CR08b-SBSD	Total HxCDD	45.4 EMPC	45.4 U
AOV9	CR08b-SBSD	Total HpCDF	0.643 EMPC	0.643 U
AOW1	CR19F-SSD	1,2,3,7,8-PeCDF	0.613 JX EMPC	0.613 U
AOW1	CR19F-SSD	1,2,3,7,8,9-HxCDF	0.571 J EMPC	0.571 U
AOW1	CR19F-SSD	Total TCDF	25.6 EMPC	25.6 U
AOW1	CR19F-SSD	Total TCDD	20.6 EMPC	20.6 U
AOW1	CR19F-SSD	Total PeCDF	23.6 EMPC	23.6 U
AOW1	CR19F-SSD	Total PeCDD	26.4 EMPC	26.4 U
AOW1	CR19F-SSD	Total HxCDF	40.2 EMPC	40.2 U
AOW1	CR19F-SSD	Total HxCDD	93.0 EMPC	93.0 U
AOW1	CR19F-SSD	Total HpCDF	62.7 EMPC	62.7 U
AOW1	CR18B-SSD	2,3,7,8-TCDF	0.381 J EMPC	0.381 U
AOW1	CR18B-SSD	1,2,3,7,8-PeCDF	0.157 J EMPC	0.157 U
AOW1	CR18B-SSD	2,3,4,7,8-PeCDF	0.183 J EMPC	0.183 U
AOW1	CR18B-SSD	1,2,3,4,7,8-HxCDF	0.424 J EMPC	0.424 U
AOW1	CR18B-SSD	1,2,3,6,7,8-HxCDF	0.294 J EMPC	0.294 U
AOW1	CR18B-SSD	Total TCDF	4.57 EMPC	4.57 U
AOW1	CR18B-SSD	Total TCDD	15.9 EMPC	15.9 U
AOW1	CR18B-SSD	Total PeCDF	4.65 EMPC	4.65 U
AOW1	CR18B-SSD	Total PeCDD	20.5 EMPC	20.5 U
AOW1	CR18B-SSD	Total HxCDF	8.92 EMPC	8.92 U
AOW1	CR18B-SSD	Total HxCDD	46.9 EMPC	46.9 U
AOW2	CR15C-SSD	2,3,4,7,8-PeCDF	0.505 J EMPC	0.505 U
AOW2	CR15C-SSD	1,2,3,4,7,8-HxCDF	1.25 EMPC	1.25 U
AOW2	CR15C-SSD	2,3,4,6,7,8-HxCDF	1.21 EMPC	1.21 U
AOW2	CR15C-SSD	1,2,3,4,7,8,9-HpCDF	0.959 J EMPC	0.959 U
AOW2	CR15C-SSD	Total TCDF	13.7 EMPC	13.7 U
AOW2	CR15C-SSD	Total TCDD	20.3 EMPC	20.3 U
AOW2	CR15C-SSD	Total PeCDF	12.6 EMPC	12.6 U
AOW2	CR15C-SSD	Total HxCDF	28.1 EMPC	28.1 U
AOW2	CR15C-SSD	Total HxCDD	76.1 EMPC	76.1 U

Report	Sample	Component	Laboratory-Reported Result (pg/g)	Result of Record (pg/g)
AOW2	CR15C-SSD	Total HpCDF	60.7 EMPC	60.7 U
AOW2	CR08b-SSD-COMP	Total TCDF	21.7 EMPC	21.7 U
AOW2	CR08b-SSD-COMP	Total TCDD	25.0 EMPC	25.0 U
AOW2	CR08b-SSD-COMP	Total PeCDF	35.9 EMPC	35.9 U
AOW2	CR08b-SSD-COMP	Total HxCDF	119 EMPC	119 U
AOW2	CR08b-SSD-COMP	Total HpCDF	243 EMPC	243 U

EMPC = estimated maximum potential concentration.

J = the result is an estimated value.

pg/g = picograms per gram.

U = the result is non-detect.

Report	Sample	Component	Laboratory-Reported Result (pg/L)	Result of Record (pg/L)
AUD1	Storm-01	2,3,7,8-TCDF	0.872 J EMPC	0.872 U
AUD1	Storm-01	1,2,3,7,8-PeCDF	1.13 J EMPC	1.13 U
AUD1	Storm-01	1,2,3,6,7,8-HxCDF	1.38 J EMPC	1.38 U
AUD1	Storm-01	2,3,4,6,7,8-HxCDF	2.26 J EMPC	2.26 U
AUD1	Storm-01	1,2,3,7,8,9-HxCDF	0.949 J EMPC	0.949 U
AUD1	Storm-01	1,2,3,4,7,8-HxCDD	0.795 J EMPC	0.795 U
AUD1	Storm-01	1,2,3,4,7,8,9-HpCDF	2.67 J EMPC	2.67 U
AUD1	Storm-01	Total TCDF	9.23 EMPC	9.23 U
AUD1	Storm-01	Total TCDD	39.8 EMPC	39.8 U
AUD1	Storm-01	Total PeCDF	30.1 EMPC	30.1 U
AUD1	Storm-01	Total PeCDD	18.6 EMPC	18.6 U
AUD1	Storm-01	Total HxCDF	88.0 EMPC	88.0 U
AUD1	Storm-01	Total HxCDD	100 EMPC	100 U
AUD1	Storm-01	Total HpCDF	130 EMPC	130 U

EMPC = estimated maximum potential concentration.

J = the result is an estimated value.

pg/L = picograms per liter.

U = the result is non-detect.

In reports AON0, AOV8, and AOW2, the USEPA Method 1613B OCDD result for samples CR22-S-3.0 and CR08a-SSD-COMP exceeded the instrument calibration range. The results have been qualified as estimated by the reviewer as follows:

Report	Sample	Component	Laboratory-Reported Result (pg/g)	Result of Record (ug/kg)
AON0	CR22-S-3.0	OCDD	30800	30800 J
AOV8	CR08a-SSD-COMP	OCDD	13700	13700 J
AOW2	CR0b-SSD-COMP	OCDD	22200	22200 J

J = the result is an estimated value.
ug/kg = micrograms per kilogram.

In report AON3, the laboratory flagged USEPA Method 8082A Aroclor 1254 results for sample CR20-S-5.0 due to primary and confirmation column relative percent differences (RPDs) greater than or equal to 40 percent. The laboratory did not detect chromatographic interference. The results were qualified “J”, as estimated, by the reviewer. Qualifications are as follows:

Report	Sample	Component	Laboratory-Reported Result (ug/kg)	Result of Record (ug/kg)
AON3	CR20-S-5.0	Aroclor 1254	710	710 J
AON3	CR21-S-5.0	Aroclor 1254	73	73 J

J = the result is an estimated value.
ug/kg = micrograms per kilogram.

In report AOT3, the preserved (fixed) total solids result was greater than the total solids result. The preserved total solids value was within 20 percent of the total solids value; thus, no results were qualified.

The data are considered acceptable for their intended use, with the appropriate data qualifiers assigned.

HOLDING TIMES, PRESERVATION, AND SAMPLE STORAGE

Holding Times

All TOC analysis dates exceeded the recommended 14-day holding time; however, samples from reports AON1, AON2, AOV8, AOW1, and AOW2 were prepared for analysis within 14 days of sample collection. Samples from report ASF7 were prepared from containers frozen at the time of receipt. No data required qualification.

USEPA Method 8270D and 8270D SIM extractions were conducted one to two days past the 14-day recommended holding times for sediment samples associated with reports AOV9 and AOW2. The reviewer confirmed with ARI that the affected samples were extracted from containers stored at -18°C from the time of login. Sediment sample storage at -18°C

extends USEPA Method 8270D and 8270D-SIM holding time to one year. No qualification was required.

Remaining extractions and analyses were performed within the recommended holding time criteria.

Preservation and Sample Storage

The samples were preserved and stored appropriately.

BLANKS

Method Blanks

Laboratory method blank analyses were performed at the required frequencies. For purposes of data qualification, the method blanks were associated with all samples prepared in the analytical batch.

If an analyte was detected in a sample and in the associated method blank, the sample result was qualified if the concentration was less than five times the method blank concentration for USEPA Method 1613B results and less than ten times the method blank concentration for remaining analysis results. Method reporting limits (MRLs) were elevated to the concentration detected in the samples and results were qualified as not detected “U” at the elevated MRL. The reviewer did not qualify remaining results.

Sample results less than five times the MRL were qualified by the reviewer with “J+”, as estimated with a positive bias, if sample results were also within ten times a method blank concentration that was below the MRL.

For USEPA Method 1613B results, analytes detected in a sample and in the associated method blank below the MRL but above the EDL were qualified as “U” at the reporting limit. Method blank detections flagged as EMPCs did not result in qualification.

In report AON3, the USEPA Method 1613B method blank had detections for some analytes below the MRL and a detection of OCDD above the MRL. All associated sample results were above the MRL and greater than five times the method blank concentrations; thus, no results were qualified.

In reports AON0, AON1, and AON2, the soil and sediment matrix USEPA Method 1613B method blank (MB-102315) had several detections below the MRL and a detection for OCDD above the MRL. The following results were qualified

Report	Sample	Component	Laboratory-Reported Result (pg/g)	Result of Record (pg/g)
AON0	CR23-S-3.0	2,3,4,6,7,8-HxCDF	0.133 J	0.133 U

J = the result is an estimated value.
 pg/g = pictograms per gram.
 U = the result is non-detect.

In report AOV8, the sediment matrix USEPA Method 1613B method blank (MB-102615) had detections of some analytes below the MRL and detections of 1,2,3,4,6,7,8-HpCDD and OCDD above the MRL. All associated sample results were either qualified based on EMPC, were non-detect, or were greater than five times the method blank concentration; thus, no results were qualified.

In reports AOV9, AOW1, and AOW2, the sediment matrix USEPA Method 8270D method blank (MB-103015) had a detection of diethylphthalate above the reporting limit, at 21 ug/kg. Associated samples were qualified by the reviewer as follows:

Report	Sample	Component	Laboratory-Reported Result (ug/kg)	Result of Record (ug/kg)
AOV9	CR26-SBSD	Diethylphthalate	20	20 U
AOW1	CR19F-SBSD	Diethylphthalate	24	24 U
AOW1	CR19F-SBSD-DUP	Diethylphthalate	38	38 U
AOW1	CR19F-SSD	Diethylphthalate	22	22 U
AOW1	SR18B-SBSD	Diethylphthalate	20	20 U
AOW1	SR18B-SSD	Diethylphthalate	40	40 U
AOW2	CR15C-SSD	Diethylphthalate	21	21 U
AOW2	CR15C-SBSD	Diethylphthalate	26	26 U
AOW2	CR08b-SSD-COMP	Diethylphthalate	36	36 U

J = the result is an estimated value.
 U = the result is non-detect.
 ug/kg = micrograms per kilogram.

In reports AOV9, AOW1, and AOW2, the sediment matrix USEPA Method 1613B method blank (MB-102615) had a detection of 1,2,3,7,8,9-HxCDF below the MRL and detections of 1,2,3,4,6,7,8-HpCDD and OCDD above the MRL. The following results were qualified:

Report	Sample	Component	Laboratory-Reported Result (pg/g)	Result of Record (pg/g)
AOV9	CR08b-SBSD	1,2,3,7,8,9-HxCDF	0.146 J	0.146 U
AOV9	CR08b-SBSD	OCDD	45.4	45.4 U
AOW1	CR18B-SSD	1,2,3,7,8,9-HxCDF	0.226 J	0.226 U

Report	Sample	Component	Laboratory-Reported Result (pg/g)	Result of Record (pg/g)
AOW2	CR15C-SSD	1,2,3,7,8,9-HxCDF	0.338 J	0.338 U

J = the result is an estimated value.

pg/g = pictograms per gram.

U = the result is non-detect.

In report AOT3, the USEPA Method 8270D sediment matrix method blank (MB-102815) had a detection for phenol below the reporting limit, at 17 ug/kg. The associated sample, CR19D-SSD-CONV, had a phenol detection above the reporting limit, at 93 ug/kg. The reviewer qualified the result as estimated with a positive bias (J+) as follows:

Report	Sample	Component	Laboratory-Reported Result (ug/kg)	Result of Record (ug/kg)
AOT3	CR19D-SSD-CONV	Phenol	93	93 J+

J+ = the result is an estimated value with a positive bias.

U = the result is non-detect.

ug/kg = micrograms per kilogram.

All remaining method blanks were non-detect.

Trip Blanks

Trip blanks were not submitted for analysis.

Equipment Rinsate Blanks

Equipment rinsate blanks were not submitted for analysis.

SURROGATE RECOVERY RESULTS

The samples were spiked with surrogate compounds to evaluate laboratory performance on individual samples. The laboratory appropriately documented and qualified surrogate outliers. Associated batch quality assurance/quality control for samples with surrogate outliers were within acceptance limits, except where otherwise noted. Sample results associated with surrogate percent recovery exceedances caused by dilutions were not qualified by the reviewer.

In report AON0, the USEPA Method 8270D surrogate p-terphenyl-d14 result was below the lower percent recovery acceptance limit of 28 percent, at 24.9 percent for sample CR23-GW-6.0. The surrogate p-terphenyl-d14 is a base/neutral surrogate, and the remaining base/neutral surrogates for sample CR23-GW-6.0 were within percent recovery acceptance limits. No results were qualified.

In report AON0, the NWTPH-Dx surrogate o-terphenyl result was below the lower percent recovery acceptance limit of 50 percent, at 47.6 percent for sample CR23-GW-6.0. Associated sample results were qualified "J" as estimated by the reviewer as follows:

Report	Sample	Component	Laboratory-Reported Result (mg/L)	Result of Record (mg/L)
AON0	CR23-GW-6.0	Diesel	3.4	3.4 J
AON0	CR23-GW-6.0	Motor Oil	3.2	3.2 J

J = the result is an estimated value.

mg/L = milligrams per liter.

In report AON3, the USEPA Method 8082A surrogate decachlorobiphenyl exceeded the upper percent recovery acceptance limit of 120 percent, at 126 percent due to co-elution with some Aroclors compounds. The exceedance was minor, and the remaining surrogate had acceptable percent recovery; thus, no results were qualified.

All remaining surrogate recoveries were within acceptance limits.

LABELED ANALOG RECOVERY RESULTS

In reports AON0, AON2, AON3, AOV8, AOV9, AOW1, and AOW2, USEPA Method 1613B samples were spiked with carbon-13 (C13) labeled analog standards to quantify the relative response of analytes in each sample. All C13 labeled analog standard recoveries were within acceptance limits.

MATRIX SPIKE/MATRIX SPIKE DUPLICATE RESULTS

Matrix spike/matrix spike duplicate (MS/MSD) results are used to evaluate laboratory precision and accuracy. All MS/MSD samples were extracted and analyzed at the required frequency. Control limits were not included with most MS/MSD results. The reviewer confirmed that MS/MSDs met percent recovery and RPD acceptance criteria, with the following exceptions:

In reports AON1, sediment matrix USEPA Method 8270D MS/MSD results for 4-methylphenol were above the upper percent recovery acceptance limit, with percent recoveries of 162 percent and 139 percent, respectively. The MS/MSD results for N-nitrosodiphenylamine were below lower percent recovery acceptance limits, at 24.5 percent and 12.2 percent, respectively. The RPD for N-nitrosodiphenylamine exceeded the control limit, at 67 percent. The associated laboratory control sample (LCS) had acceptable percent recoveries for both compounds. The sample used to prepare the MS/MSD was qualified by the reviewer as follows:

Report	Sample	Component	Laboratory-Reported Result (ug/kg)	Result of Record (ug/kg)
AON1	CR12-SBSD-15	4-Methylphenol	870	870 J
AON1	CR12-SBSD-15	N-Nitrosodiphenylamine	20 U	20 UJ

J = the result is an estimated value.

ug/kg = micrograms per kilogram.

UJ = the result is non-detect and an estimated value.

In report AON1, sediment matrix USEPA Method 8270D-SIM MS/MSD results for N-nitrosodiphenylamine were below lower percent recovery acceptance limits, at 28.4 percent and 14.5 percent, respectively. The RPD for N-nitrosodiphenylamine exceeded the control limit, at 64.6 percent. The associated LCS had acceptable percent recovery. The sample used to prepare the MS/MSD was qualified as follows:

Report	Sample	Component	Laboratory-Reported Result (ug/kg)	Result of Record (ug/kg)
AON1	CR12-SBSD-15	N-Nitrosodiphenylamine	4.9 U	4.9 UJ

ug/kg = micrograms per kilogram.

UJ = the result is non-detect and an estimated value.

In report AON3, the soil matrix USEPA Method 6010C MS result for total chromium was below the lower percent recovery acceptance limit of 75 percent, at -5.4 percent. The associated LCS met percent recovery acceptance limits for total chromium. The associated laboratory duplicate exceeded RPD acceptance limits for total chromium. Associated samples are qualified in the laboratory duplicate section below.

In report AOV8, the sediment matrix USEPA Method 8270D-SIM MS/MSD results for pentachlorophenol and the MS result for 2,4-dimethylphenol were flagged with “E” by ARI due to concentrations exceeding the instrument calibration range. The reviewer confirmed that the same MS/MSD extract was analyzed by both 8270D dual scan and 8270D-SIM. The MS/MSD met percent recovery acceptance limits for pentachlorophenol and 2,4-dimethylphenol by both USEPA Method 8270D and 8270D-SIM, and analytical results for the same samples reported by both methods were consistent; thus, no results were qualified.

All remaining MS/MSD results were within acceptance limits for percent recovery and RPDs.

LABORATORY DUPLICATE RESULTS

Duplicate results are used to evaluate laboratory precision. All duplicate samples were extracted and analyzed at the required frequency. Laboratory duplicate results that had concentrations less than five times the reporting limit were not evaluated.

In report AON3, the soil matrix USEPA Method 6010C laboratory duplicate prepared with sample CR20-S-5.0 exceeded the RPD control limit of 20 percent for total chromium, at 119 percent. The associated LCS met percent recovery acceptance limits. The MS prepared with the same sample also exceeded total chromium control limits. The sample used to prepare the laboratory duplicate is likely heterogeneous. Since the matrix of sample CR20-S-5.0 is expected to be similar to the matrix of site soils, both sample results were qualified “J” as estimated by the reviewer as follows:

Report	Sample	Component	Laboratory-Reported Result (mg/kg)	Result of Record (mg/kg)
AON3	CR20-S-5.0	Total Chromium	71	71 J
AON3	CR21-S-5.0	Total Chromium	32	32 J

Report	Sample	Component	Laboratory-Reported Result (mg/kg)	Result of Record (mg/kg)
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J = the result is an estimated value.
mg/kg = milligrams per kilogram.

The laboratory duplicates for solid matrix USEPA Method 6010C and 7471A batches prepared on November 2, 2015 were associated with results reported in AOV8, AOV9, AOW1, and AOW2. The laboratory duplicate results were reported only in AOW1 and met RPD control limits.

All remaining laboratory duplicate RPDs were within acceptance limits.

LABORATORY CONTROL SAMPLE/LABORATORY CONTROL SAMPLE DUPLICATE RESULTS

Laboratory control sample/laboratory control sample duplicates (LCS/LCSD) are spiked with target analytes to provide information on laboratory precision and accuracy. The LCS/LCSD samples were extracted and analyzed at the required frequency. Control limits were not included with most LCS/LCSD results. The reviewer confirmed that LCS/LCSDs met percent recovery and RPD acceptance criteria, with the following exceptions:

In reports AON0 and AON3, the soil and sediment matrix USEPA Method 8270D LCS result for 4-chloroaniline was below the lower percent recovery acceptance limit of 11 percent, at 3.8 percent; the result for 3-nitroaniline was below the lower percent recovery acceptance limit of 22 percent, at 5.7 percent; and the LCS result for 3,3'-dichlorobenzidine was 0 percent. All associated sample results were non-detect. Due to the low LCS percent recoveries, the results have been qualified with "R" as rejected by the reviewer as shown in the table below. Qualifications are as follows:

Report	Sample	Component	Laboratory-Reported Result (ug/kg)	Result of Record (ug/kg)
AON0	CR07-SSD-COMP	4-Chloroaniline	97 U	97 R
AON0	CR07-SSD-COMP	3-Nitroaniline	97 U	97 R
AON0	CR07-SSD-COMP	3,3'-Dichlorobenzidine	97 U	97 R
AON0	CR23-S-3.0	4-Chloroaniline	93 U	93 R
AON0	CR23-S-3.0	3-Nitroaniline	93 U	93 R
AON0	CR23-S-3.0	3,3'-Dichlorobenzidine	93 U	93 R
AON0	CR22-S-3.0	4-Chloroaniline	190 U	190 R
AON0	CR22-S-3.0	3-Nitroaniline	190 U	190 R
AON0	CR22-S-3.0	3,3'-Dichlorobenzidine	190 U	190 R
AON3	CR20-S-5.0	4-Chloroaniline	1400 U	1400 R
AON3	CR20-S-5.0	3-Nitroaniline	1400 U	1400 R
AON3	CR20-S-5.0	3,3'-Dichlorobenzidine	1400 U	1400 R
AON3	CR21-S-5.0	4-Chloroaniline	460 U	460 R
AON3	CR21-S-5.0	3-Nitroaniline	460 U	460 R
AON3	CR21-S-5.0	3,3'-Dichlorobenzidine	460 U	460 R

Report	Sample	Component	Laboratory-Reported Result (ug/kg)	Result of Record (ug/kg)
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ug/kg = micrograms per kilogram.
R = the result is rejected.

In reports AON0 and AON3, the groundwater and surface water matrix USEPA Method 8270D LCSD result for 2,2'-oxybis (1-chloropropane) was below the lower percent recovery acceptance limit of 47 percent, at 44.4 percent. The LCS result was within the percent recovery acceptance limit; thus, no results were qualified. The LCS/LCSD exceeded RPD acceptance limits of 30 percent for phenol, bis(2-chloroethyl)ether, and 2-chlorophenol. Associated samples were non-detect; thus, no results were qualified.

In reports AON1, AOV8, AOV9, AOW1, and AOW2, the USEPA Method 8270D-SIM LCS results for pentachlorophenol were flagged with "E" by ARI due to concentrations exceeding the instrument calibration range. The reviewer confirmed that the same LCS extract was analyzed by both 8270D dual scan and 8270D-SIM. The LCS met percent pentachlorophenol percent recovery acceptance limits for both methods. The pentachlorophenol results reported by both methods for the same samples were consistent; thus, no results were qualified.

All remaining LCS/LCSD results were within acceptance limits for percent recovery and RPD.

FIELD DUPLICATE RESULTS

One field duplicate was submitted for analysis with report AOW1 (CRF19F-SBSD/CRF19F-SBSD-DUP). MFA uses acceptance criteria of 100 percent RPD for results that are less than five times the MRL or 50 percent RPD for results that are greater than five times the MRL. Non-detect data are not used in the evaluation of field duplicate results. All field duplicate analytes were within the acceptance criteria.

CONTINUING CALIBRATION VERIFICATION RESULTS

Continuing calibration verification (CCV) results are used to demonstrate instrument precision and accuracy throughout the sample batch. ARI reported CCV-qualified results. CCV exceedances associated with quality control samples and surrogate results that met percent recovery acceptance limits were not qualified by the reviewer.

In reports AON1 and AON2, the solid matrix USEPA Method 8270D-SIM CCV analyzed on November 5, 2015 exceeded percent drift acceptance limits for pentachlorophenol. All associated results were qualified as estimated by the reviewer with "UJ" for non-detect results and "J" for detected results, as follows:

Report	Sample	Component	Laboratory-Reported Result (ug/kg)	Result of Record (ug/kg)
AON1	CR-24-SSD-COMP	Pentachlorophenol	86 Q	86 J

Report	Sample	Component	Laboratory-Reported Result (ug/kg)	Result of Record (ug/kg)
AON1	CR11-SBSD-23	Pentachlorophenol	19 U	19 UJ
AON1	CR12-SBSD-15	Pentachlorophenol	20 U	20 UJ
AON1	CR13-SBSD-11	Pentachlorophenol	20 U	20 UJ
AON1	CR14-SBSD-12	Pentachlorophenol	20 U	20 UJ
AON2	CR09a-SSD-COMP	Pentachlorophenol	19 U	19 UJ
AON2	CR09b-SSD-COMP	Pentachlorophenol	19 U	19 UJ

In reports AON0 and AON3, the solid matrix USEPA Method 8270D CCV analyzed on October 28, 2015 exceeded percent drift acceptance limits for phenol, carbazole, and 3,3'-dichlorobenzidine. Associated sample results have been qualified as estimated by the reviewer with "J," except for 3,3'-dichlorobenzidine results, which were already qualified in the LCS/LCSD section. Results detected below the reporting limit were already flagged by the laboratory as estimated; no additional qualification was required. Qualified results are as follows:

Report	Sample	Component	Laboratory-Reported Result (ug/kg)	Result of Record (ug/kg)
AON0	CR-07-SSD-COMP	Carbazole	24	24 J
AON0	CR23-S-3.0	Phenol	19 U	19 UJ
AON0	CR23-S-3.0	Carbazole	19 U	19 UJ
AON0	CR22-S-3.0	Phenol	38 U	38 UJ
AON0	CR22-S-3.0	Carbazole	38 U	38 UJ
AON3	CR20-S-5.0	Phenol	280 U	280 UJ
AON3	CR20-S-5.0	Carbazole	280 U	280 UJ
AON3	CR21-S-5.0	Phenol	92 U	92 UJ
AON3	CR21-S-5.0	Carbazole	92 U	92 UJ

J = the result is an estimated value.

U = the result is non-detect.

ug/kg = micrograms per kilogram.

UJ = the result is non-detect and an estimated value.

In reports AON0 and AON3, the aqueous matrix USEPA Method 8270D CCV analyzed on October 23, 2015 exceeded percent drift acceptance limits for benzoic acid, hexachlorocyclopentadiene, 2,4-dinitrophenol, 4-nitrophenol, and pentachlorophenol. Associated sample results that were non-detect have been qualified as estimated by the reviewer with "UJ." Sample results reported between one-half of the MRL and the MRL are estimated values and were not additionally qualified by the reviewer. Qualified results are summarized as follows:

Report	Sample	Component	Laboratory-Reported Result (ug/L)	Result of Record (ug/L)
AON0	CR23-GW-6.0	Hexachlorocyclopentadiene	5.0 U	5.0 UJ
AON0	CR23-GW-6.0	2,4-Dinitrophenol	20 U	20 UJ
AON0	CR23-GW-6.0	4-Nitrophenol	10 U	10 UJ

Report	Sample	Component	Laboratory-Reported Result (ug/L)	Result of Record (ug/L)
AON0	CR23-GW-6.0	Pentachlorophenol	10 U	10 UJ
AON0	CR22-GW-9.0	Benzoic acid	20 U	20 UJ
AON0	CR22-GW-9.0	Hexachlorocyclopentadiene	5.0 U	5.0 UJ
AON0	CR22-GW-9.0	2,4-Dinitrophenol	20 U	20 UJ
AON0	CR22-GW-9.0	4-Nitrophenol	10 U	10 UJ
AON0	CR22-GW-9.0	Pentachlorophenol	10 U	10 UJ
AON3	CR21-GW-10	Benzoic acid	20 U	20 UJ
AON3	CR21-GW-10	Hexachlorocyclopentadiene	5.0 U	5.0 UJ
AON3	CR21-GW-10	2,4-Dinitrophenol	20 U	20 UJ
AON3	CR21-GW-10	4-Nitrophenol	10 U	10 UJ
AON3	CR21-GW-10	Pentachlorophenol	10 U	10 UJ
AON3	CR20-GW-5.0	Benzoic acid	20 U	20 UJ
AON3	CR20-GW-5.0	Hexachlorocyclopentadiene	5.0 U	5.0 UJ
AON3	CR20-GW-5.0	2,4-Dinitrophenol	20 U	20 UJ
AON3	CR20-GW-5.0	4-Nitrophenol	10 U	10 UJ
AON3	CR20-GW-5.0	Pentachlorophenol	10 U	10 UJ
AON3	Seep-01	Benzoic acid	20 U	20 UJ
AON3	Seep-01	Hexachlorocyclopentadiene	5.0 U	5.0 UJ
AON3	Seep-01	2,4-Dinitrophenol	20 U	20 UJ
AON3	Seep-01	4-Nitrophenol	10 U	10 UJ
AON3	Seep-01	Pentachlorophenol	10 U	10 UJ

UJ = the result is non-detect and an estimated value.
ug/L = micrograms per liter.

In reports AON0 and AON3, ARI reported in the case narrative that a USEPA Method 8082A CCV exceeded the percent drift acceptance limit for Aroclor 1242. The reviewer confirmed that the CCV was associated with aqueous matrix samples. The CCVs analyzed on the secondary column met percent drift acceptance criteria, and ARI quantified results from the secondary column; thus, no qualification was required.

In reports AOV8 and AOV9, the solid matrix USEPA Method 8270D CCV analyzed on October 30, 2015 exceeded percent drift acceptance limits for 4-methylphenol and benzoic acid. Associated sample results detected below the reporting limit were already flagged by the laboratory as estimated; no additional qualification was required. Remaining qualified results are summarized below. The CCV also exceeded percent drift acceptance limits for some compounds that were not reported, and no action was required by the reviewer for these exceedances. Qualifications are as follows:

Report	Sample	Component	Laboratory-Reported Result (ug/kg)	Result of Record (ug/kg)
AOV8	CR17-D-SSD	4-Methylphenol	19 U	19 UJ
AOV8	CR17-D-SBSD	4-Methylphenol	120	120 J
AOV8	CR17-D-SSD	Benzoic Acid	230	230 J

Report	Sample	Component	Laboratory-Reported Result (ug/kg)	Result of Record (ug/kg)
AOV8	CR08A-SBSD	4-Methylphenol	190	190 J
AOV8	CR10-SSD-COMP	4-Methylphenol	160	160 J
AOV8	CR10-SSD-COMP	Benzoic Acid	210	210 J
AOV8	CR08a-SSD-COMP	4-Methylphenol	28	28 J
AOV9	CR08b-SBSD	4-Methylphenol	560	560 J
AOV9	CR08b-SBSD	Benzoic Acid	290	290 J

J = the result is an estimated value.

ug/kg = micrograms per kilogram.

UJ = the result is non-detect and an estimated value.

In reports AOV9, AOW1, and AOW2, the solid matrix USEPA Method 8270D-SIM CCV analyzed on November 5, 2015 exceeded percent drift acceptance limits for pentachlorophenol. Associated sample results that were non-detect have been qualified as estimated by the reviewer with "UJ." Associated sample results detected below the reporting limit were already flagged by the laboratory as estimated; no additional qualification was required. Qualified results are summarized below.

Report	Sample	Component	Laboratory-Reported Result (ug/kg)	Result of Record (ug/kg)
AOV9	CR26-SBSD	Pentachlorophenol	20 U	20 UJ
AOW1	CR19F-SBSD	Pentachlorophenol	20 U	20 UJ
AOW1	CR19F-SBSD-DUP	Pentachlorophenol	20 U	20 UJ
AOW2	CR15C-SSD	Pentachlorophenol	20 U	20 UJ
AOW2	CR15C-SBSD	Pentachlorophenol	20 U	20 UJ

ug/kg = micrograms per kilogram.

UJ = the result is non-detect and an estimated value.

In reports AOW1 and AOW2, the solid matrix USEPA Method 8270D CCV analyzed on November 14, 2015 exceeded percent drift acceptance limits for benzoic acid, diethylphthalate, and pentachlorophenol. Associated sample results detected below the MRL were already flagged by the laboratory as estimated; no additional qualification was required. Diethylphthalate results were already qualified by the reviewer in the method blank section above. Remaining qualified results are summarized below:

Report	Sample	Component	Laboratory-Reported Result (ug/kg)	Result of Record (ug/kg)
AOW1	CR18B-SBSD	Benzoic Acid	210	210 J
AOW1	CR18B-SBSD	Pentachlorophenol	99 U	99 UJ
AOW1	CR18B-SSD	Pentachlorophenol	99 U	99 UJ
AOW2	CR15C-SSD	Benzoic Acid	250	250 J
AOW2	CR15C-SSD	Pentachlorophenol	98 U	98 UJ
AOW2	CR15C-SBSD	Pentachlorophenol	98 U	98 UJ
AOW2	CR08b-SSD-COMP	Benzoic Acid	330	330 J

Report	Sample	Component	Laboratory-Reported Result (ug/kg)	Result of Record (ug/kg)
AOW2	CR08b-SSD-COMP	Pentachlorophenol	96 U	96 UJ

J = the result is an estimated value.
 ug/kg = micrograms per kilogram.
 UJ = the result is non-detect and an estimated value.

In report AUD1, ARI noted in the cover letter that USEPA Method 8270D CCV results for benzoic acid were above the acceptance limit for percent difference. The non-detect sample result has been qualified with “J” as estimated by the reviewer:

Report	Sample	Component	Laboratory-Reported Result (ug/L)	Result of Record (ug/L)
AUD1	Storm-01	Benzoic Acid	22 U	22 UJ

ug/L = micrograms per liter.
 U = the result is non-detect.
 UJ = the result is non-detect; RL posted is an estimated value.

The reviewer confirmed with ARI that remaining CCVs not reported by the laboratory were within acceptance limits for percent recovery.

REPORTING LIMITS

ARI evaluated USEPA Methods 6010C, 7470A, 7471A, 8082A, 8270D, and 8270D-SIM results to one-half the MRL. Non-detect results were reported at the MRL. ARI evaluated USEPA Method 1613B results to EDLs. Remaining results, including NWTIPH-Dx, were evaluated and reported to MRLs. Results reported between MRL and one-half of the MRL or between the EDL and MRL were qualified by the laboratory with “J” as estimated. Some reporting limits were additionally raised due to matrix interference. NVL evaluated asbestos results to the 1 percent visual estimation detection limit.

Samples requiring dilutions because of high analyte concentrations and/or matrix interferences had elevated EDLs and/or RLs.

DATA PACKAGE

The data packages were reviewed for transcription errors, omissions, and anomalies.

In report AON2, sample CR09b-SSD-COMP was incorrectly transcribed by ARI during login as CRO96-SSD-COMP. The sample name was corrected for the final report; however, USEPA Method 8270D and 8270D-SIM, and 8082A surrogate recovery summary pages in report AON2 display the incorrect sample name.

In report AON3, sample Seep-01 was not recorded on the chain of custody. The sample name, collection date and time, and analyses were provided by MFA after samples were received by ARI. A record of the request is included with the report.

USEPA Method 8270D analysis was added to samples in report AOW1 after samples were received by the laboratory. A record of the added analysis was not included with the final report.

In report AOW1, USEPA Method 8082A analysis was requested but not performed for samples CR18B-SBSD and CR18B-SSD. The results are reported in report ART5.

In report AUD1, total suspended solids analysis requested on the chain of custody was canceled due to insufficient sample volume. No additional action was required.

No additional issues were found.

DRAFT

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- USEPA. 2014c. USEPA contract laboratory program, national functional guidelines for Superfund organic methods data review. EPA 540/R-014/002. U.S. Environmental Protection Agency, Office of Superfund Remediation and Technology Innovation. August.

APPENDIX B
SEDIMENTATION AND HYDRAULICS ANALYSIS

DRAFT



Memorandum

To: Maul Foster Alongi

From: Tim Tschetter EIT, Larry Karpack PE

Date: March 5, 2020

Re: Seaport Landing Sedimentation and Hydraulic Analysis - Draft

SUMMARY

This memorandum summarizes hydraulic and sedimentation analyses performed by Watershed Science and Engineering (WSE) to support Maul Foster Alongi's (MFA) Remedial Investigation (RI) for in-water portions of the Seaport Landing site. The site, owned by the Grays Harbor Seaport Authority, is located in Aberdeen, Washington near Grays Harbor at the mouth of the Chehalis River (Figure 1). The RI seeks to fill data gaps related to chemical and physical (woodwaste) contamination for in-water sediments. WSE's work included two tasks: 1) review of historical aerial imagery and topographic datasets to determine if the project site has undergone recent erosion or sediment deposition, and 2) use of a 2D hydraulic model to investigate hydraulic conditions at the site for present day and future hydrologic conditions.

The aerial imagery analysis shows that the in-water portion of the Seaport Landing site has been relatively stable over the past 75 years. Comparison of recent survey data from the site suggests there has been up to 1 foot of sediment erosion since 2009, but this erosion is spatially variable and not thought to be indicative of a long term trend at the site. Results from the hydraulic model indicate that the site is regularly exposed to flow velocities less than 2 feet per second during daily tidal cycles, and that flow velocities do not increase substantially during floods on the Chehalis River. These velocities are not expected to cause any significant erosion of sediment from in-water portions of the site.

ANALYSIS

HISTORICAL AERIAL IMAGERY

Aerial imagery from 1942 to 2017 were reviewed to document erosion, sedimentation, and channel migration that may have occurred at the site. The dates and sources of the imagery reviewed are listed in Table 1. The aerial imagery analysis indicated that the riverbanks and channel geometry have been relatively stable at the project site for the period of photographic record, and that no systematic channel widening, narrowing or migration has occurred. Figure 2 compares the 1953 and 2017 imagery, which shows the current bank position at the project site has not changed appreciably since 1953. Near the project reach some localized changes in bank position are visible. These are generally associated with changes in land use, such as the small boat moorage visible in the 1953 image immediately across the river from the project site (upstream of the present Olympic Gateway Plaza). That site is no longer maintained as a moorage and has notably accumulated sediment in the 2017 image. It should be noted that a major limitation in the aerial imagery analysis is that the position of the shoreline location varies in different images due to variations in tidal water levels, making detailed comparisons of the water's edge infeasible. However, we believe the conclusions stated above are still valid.

Table 1. Historical Aerial Imagery Reviewed

Date	Source
1942	Sanborn
10/1/1953	USGS
7/13/1974	USGS
7/10/1990	NAPP/USGS
4/1/2006	USGS
8/27/2017	USGS

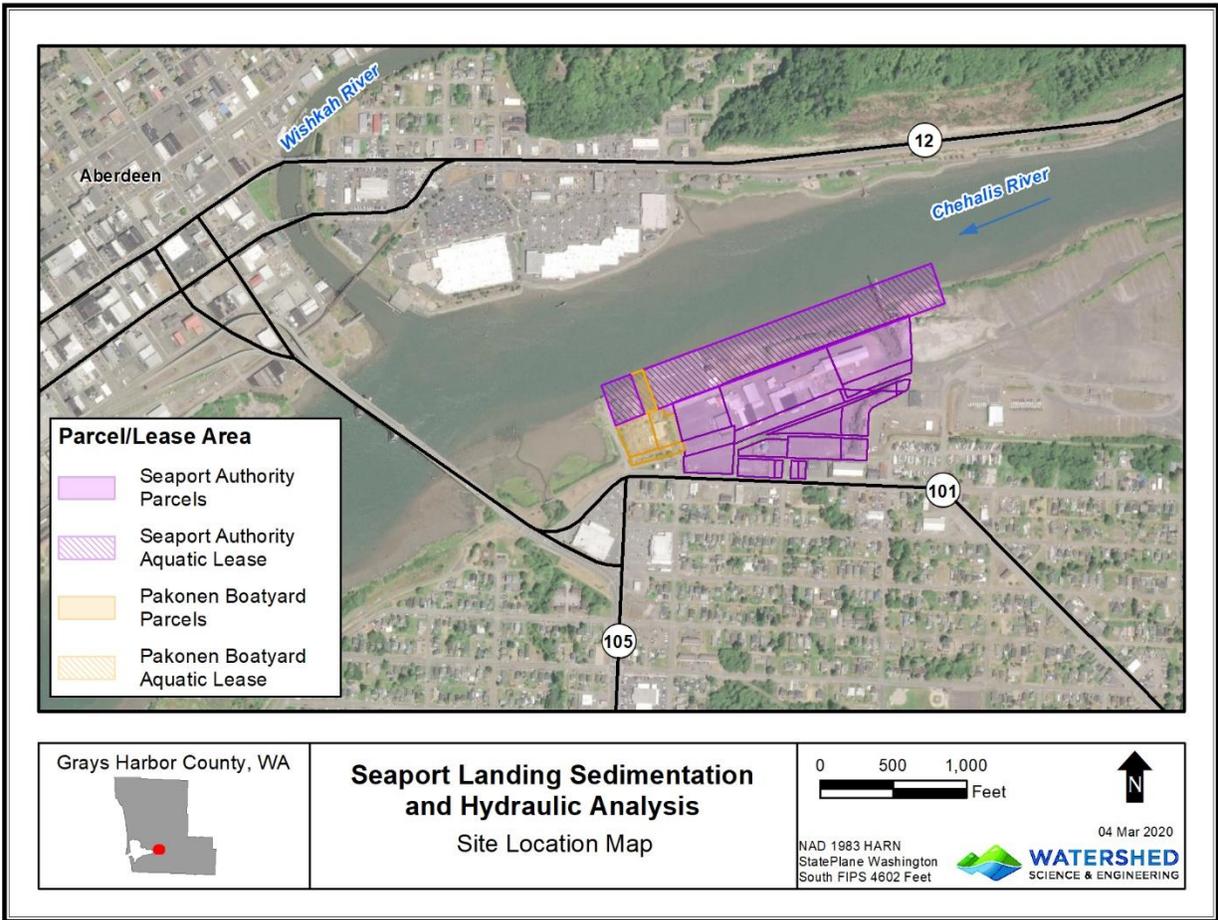


Figure 1 – Seaport Landing site location map

TOPOGRAPHIC COMPARISON

WSE compared 2016 survey data for the Seaport Landing project site versus 2009 LiDAR elevation data to investigate vertical ground elevation changes during this seven-year period. The 2016 survey included both topographic and bathymetric data. Because traditional LiDAR does not provide useful data for submerged surfaces, the LiDAR data coverage area is limited by the tidal water level at the time of the survey, which was approximately 2 feet NAVD88. From the 2016 survey, there were 563 survey points above this 2 foot elevation threshold. These points were grouped for analysis based on land cover and location (see Figure 3), and then compared to the LiDAR elevation at the survey point location. The results

of this analysis are summarized in Table 2. The root mean square (RMS) of the elevation difference is provided as an indicator of the variability in elevation changes within each classification. Elevation comparisons of this type are most appropriate in areas with low slope, where small horizontal position errors will not result in large changes in elevation. For this reason, survey points in steep slope areas were classified as a separate group. Forty-four points were surveyed on paved surfaces. For these points the mean elevation difference between the 2009 and 2016 data was 0.01 feet and the RMS was 0.11 feet indicating that the vertical datum the two datasets is the same and that the survey and LiDAR elevations are generally in close agreement with each other.

Table 2. Survey point elevation change from 2009 to 2016

Classification Group	# Points	Mean Elevation Difference 2009 to 2016 (ft)	Root Mean Square of Elevation Difference (ft)
Paved Surfaces	44	0.01	0.11
Tidal Unvegetated	41	-0.67	0.84
Tidal Vegetated	48	-1.00	1.40
Pocket Beach	32	-0.35	0.46
Tidal Inlet East	20	-0.18	0.48
Tidal Inlet West	23	-0.06	0.47
High-Slope	355	-0.69	1.82

The elevation data analysis shows that on average the ground surface for in-water portions of the Seaport Landing property has lowered slightly between 2009 and 2016. This is presumed to be the result of erosion of the bed sediments as we are not aware of any excavation or other anthropogenic changes on the site during this period.

Survey points in the unvegetated tidal area have the lowest elevations and show an average change in elevation of -0.67 feet between 2009 and 2016. The points classified as tidal-vegetated show an average change of -1.00 feet with an RMS of 1.4 feet meaning that there is significant variability in the results for these points. Three small inlets off the channel were classified independently; the Tidal Inlet East, the Pocket Beach, and the Tidal Inlet West. The average elevation changes for these areas were -0.18 feet, -0.35 feet, and -0.06 feet respectively.

While comparisons of the 2009 and 2016 elevation data indicate that in-water portions of the Seaport Landing property are generally lower in 2016 than in 2009 the magnitude of change is less than, and sometimes much less than, 1 foot and taken together with the aerial imagery evaluation we do not think this indicates a significant long term trend. WSE did not visit the project site to look for signs of active or historical erosion.

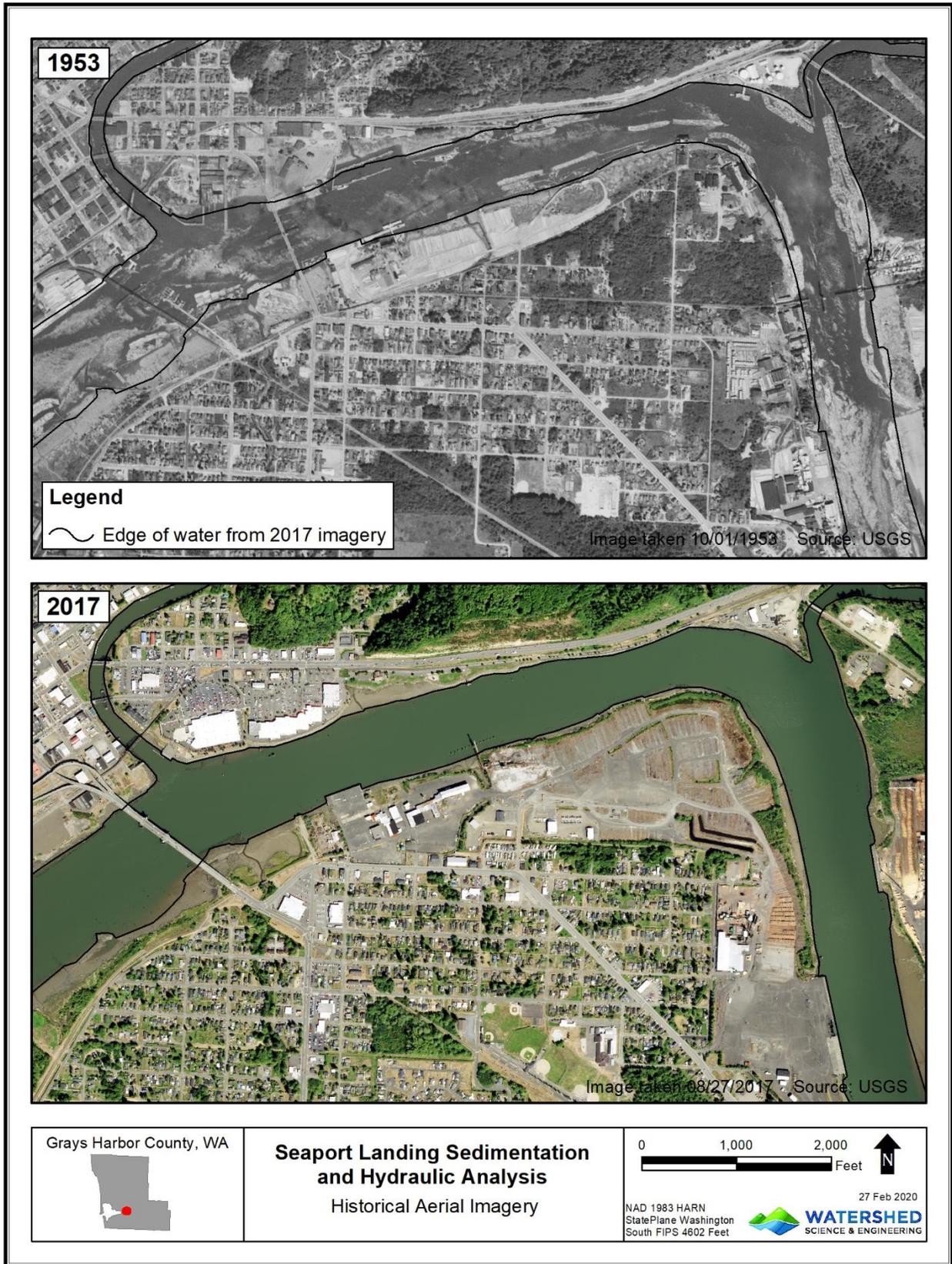


Figure 2 – Comparison of historical aerial imagery

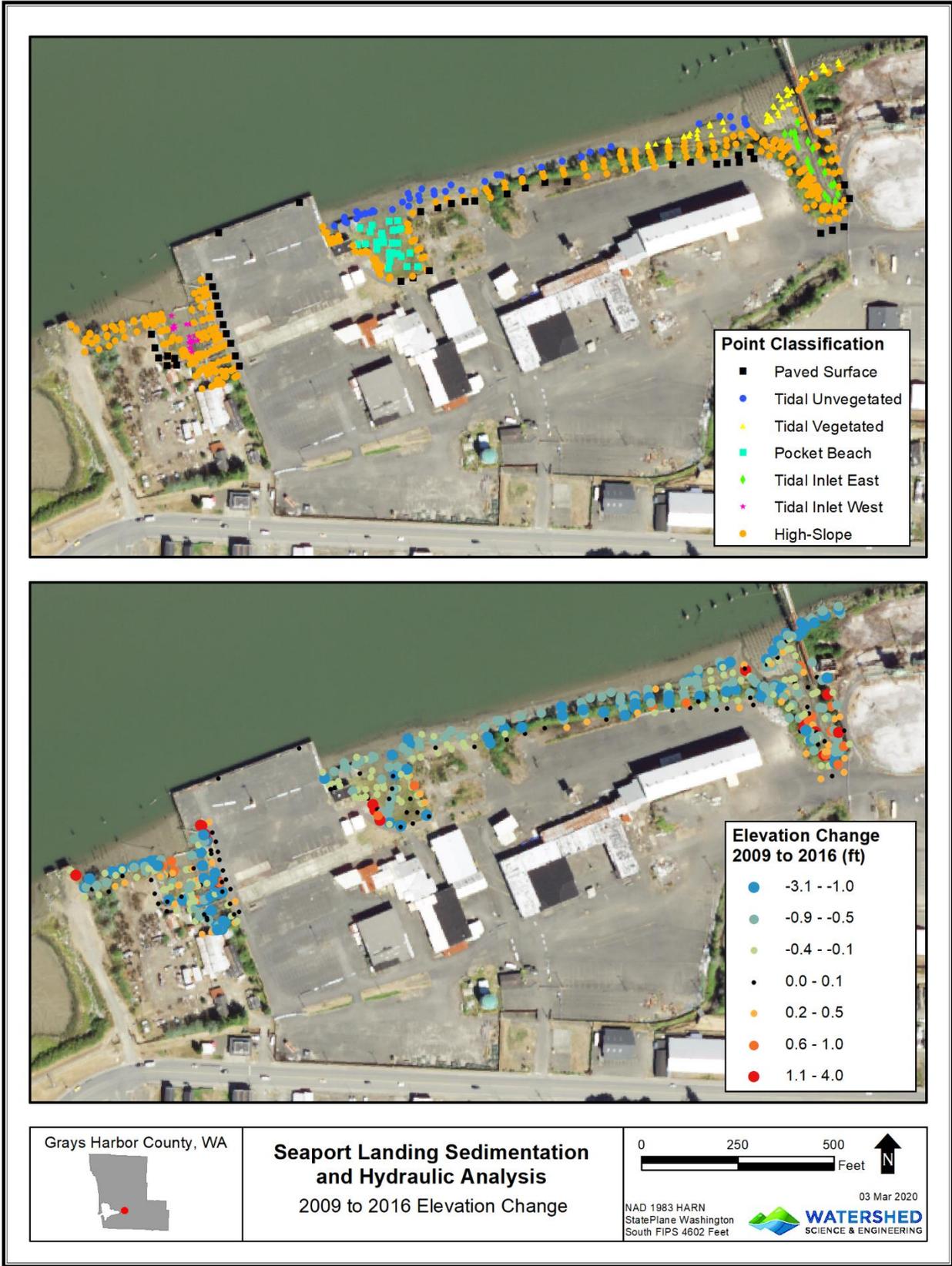


Figure 3 – 2009 to 2016 elevation change based on comparison of 2009 LiDAR with 2016 survey.

HYDRAULIC MODELING

MODEL DEVELOPMENT

To evaluate hydraulic conditions for the project site, WSE updated an existing unsteady two-dimensional (2D) RiverFlow2D hydraulic model of the Chehalis River developed for the Chehalis Basin Strategy - Reducing Flood Damage and Restoring Aquatic Species (see <http://chehalisbasinstrategy.com/>). The model encompasses approximately 30 miles of the mainstem Chehalis River and floodplain from Grays Harbor to Porter (Figure 4). Details of the hydraulic model development and calibration can be found in WSE (2019a).

For this project WSE updated the model terrain to include the 2016 bathymetric survey of the project site. The model does not include the timber piles in the channel near the project site, and the modeling does not consider the hydraulic effects of wind waves or boat generated waves. In order to eliminate uncertainty surrounding the coincidence of riverine peak flows and tidal water levels, the model was run with steady state hydrologic (riverine) inflows and an unsteady downstream tidal boundary. This method of analysis simulates the highest velocity flow conditions expected at the site by sustaining the peak flood discharge across all phases of the tidal cycle. Riverine inflows were specified at the upstream model extents on the Chehalis, Satsop, and Wynoochee Rivers. The modeled tidal boundary time series was developed from an observed tidal cycle recorded at the Aberdeen tide gage (NOAA ID# 9441187) on November 8-9th 2006. This tidal sequence was selected as it included a strong ebb tide that ranged from near the highest to lowest astronomical tides (+10.75 feet to -4.38 feet NAVD88, respectively). The model was run with riverine inflows corresponding to the following scenarios: mean annual flows (MAF), 2-year flood, and 10-year flood. Results from the simulations were reviewed to assess hydraulic conditions on the project site and potential effects on sedimentation.

The hydraulic model was then modified to investigate potential hydraulic changes due to predicted climate change. For the climate change scenarios, riverine inflows were increased by 26% based on earlier hydrologic modeling performed by WSE for the Chehalis Basin (WSE, 2019b). That analysis found that the predicted change in peak flows in the Chehalis Basin could average 26% by the late 21st century¹. Tidal water levels were increased by 1.0 feet corresponding to the median predicted sea level rise at Aberdeen by the year 2078 (Miller et al, 2018).

¹ In the Chehalis Basin study the late 21st century was defined as the 45 year period from 2045 to 2099, a period centered on year 2078

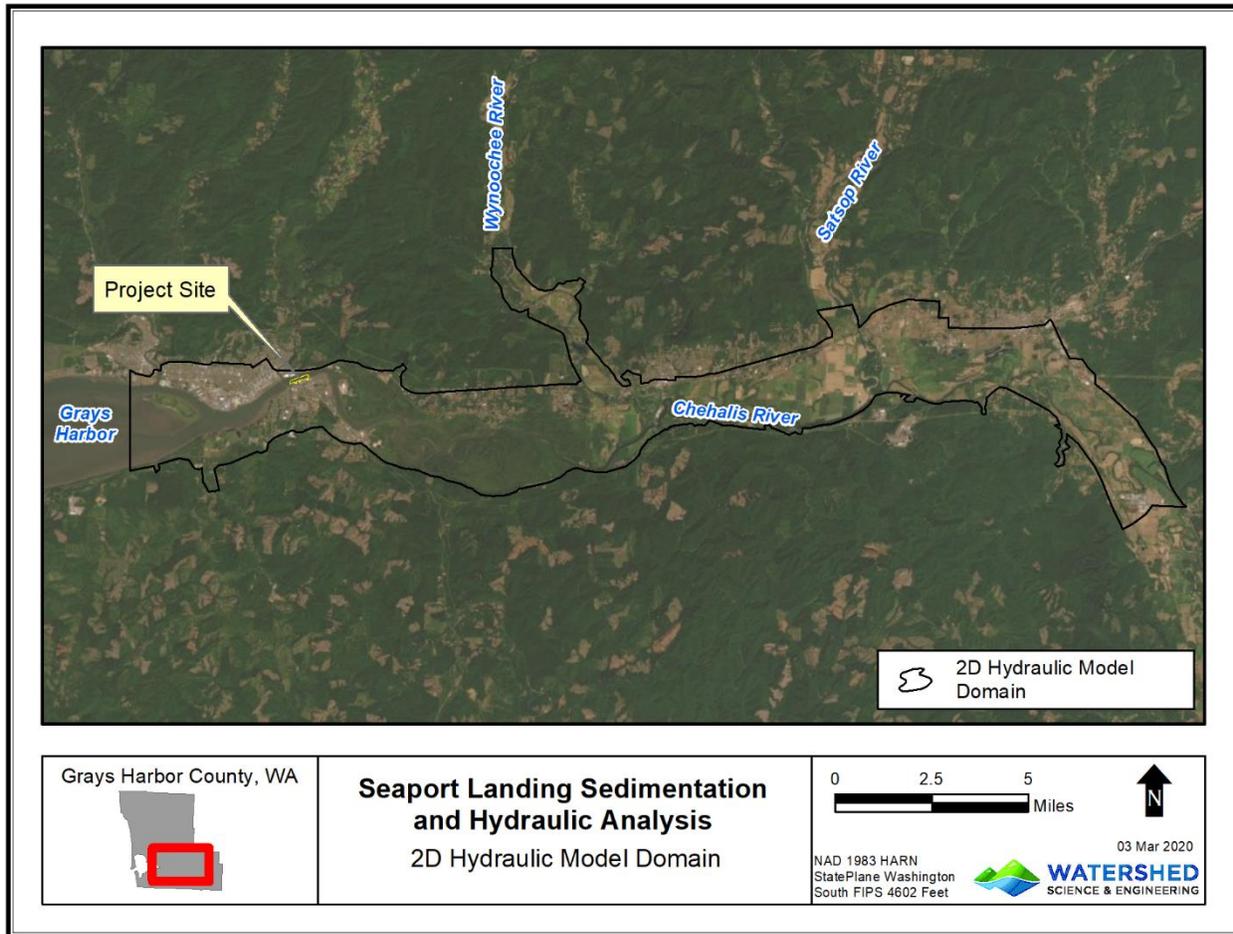


Figure 4 – 2D hydraulic model domain

MODEL RESULTS

Six simulations were completed with the hydraulic model: three using existing condition hydrologic inputs, and three using inflows modified to account for climate change. The results from these six simulations are summarized in Table 3. Velocity data is shown for two locations: one near the channel bank approximately 200 feet downstream of Tidal Inlet East at an elevation of 2 feet NAVD88, and the second location is in the center of the main channel at the project site (bed surface is at ~-36 feet NAVD88 at this location).

The discharge results presented in Table 3 show that tidal flux accounts for 35% to 93% of the peak discharge in the Chehalis River at the project site for each of the six modeled events. The peak outflowing discharge was greater than 100,000 cfs for all simulations, including the mean annual flow simulation, where the total upstream inflow in the model was less than 8,000 cfs. Additional simulations with MAF flows found that even smaller tidal fluctuations resulted in peak flows greater than 50,000 cfs on both the flood and ebb (incoming and outgoing) tides. The hydraulic simulations show that the Chehalis River near the project site experiences large tidally driven discharges daily, even in the absence of large river flood events.

Table 3. Results from 2D hydraulic model

Scenario	Total Inflow (cfs)	Peak discharge at site (cfs)	Tidal flow Increase (cfs)	Peak Velocity near bank @ 2ft elevation (fps)	Peak Velocity at channel center (fps)
Baseline (historical) hydrologic conditions					
Mean Annual Flow (MAF)	7458	107227	99769	1.5	4.0
2-year	67677	125272	57595	2.0	6.3
10-year	84093	134687	50594	2.2	7.0
Late century climate change hydrologic conditions					
Mean Annual Flow (MAF)	9397	119623	110226	1.7	4.7
2-year	85273	145882	60609	2.4	7.3
10-year	105958	160346	54388	2.6	7.9

Simulated peak velocities range from 1.5 to 2.6 feet per second (fps) near the bank on the Seaport Landing site, and from 4.0 to 7.9 fps near the center of the Chehalis River channel. The near bank velocities seen in all of the simulations are similar, which indicates that hydraulic forces are dominated by daily tidal cycles and are not significantly influenced by river flows during extreme flood events. Near-bank velocities are generally less than half of the velocity near the channel centerline due to the site’s location on the inside of a bend and the fact that near-bank locations (at approximately elevation 2 feet NAVD88) are either very shallow or dry when the channel velocity is peaking on the ebb flood, as seen at hour 47 in Figure 5. The climate change simulations (Figure 6) show that peak discharges and velocity will increase at the site, but that the increases are not very large.

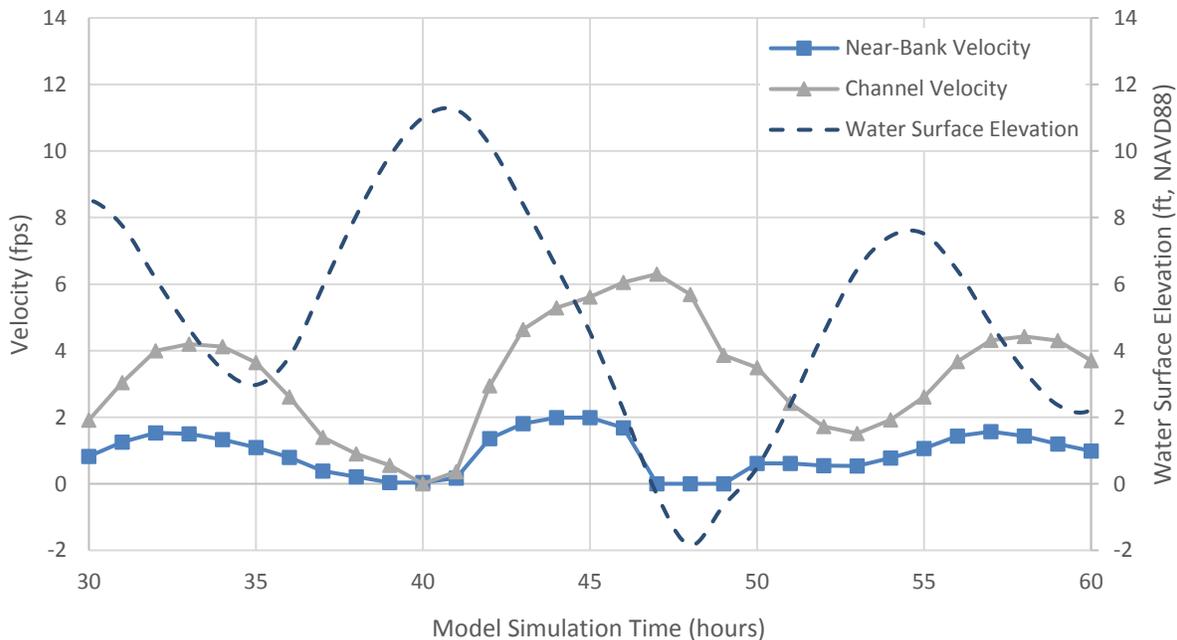


Figure 5 – Modeled water surface elevations and flow velocities during the 2-year event (baseline conditions)

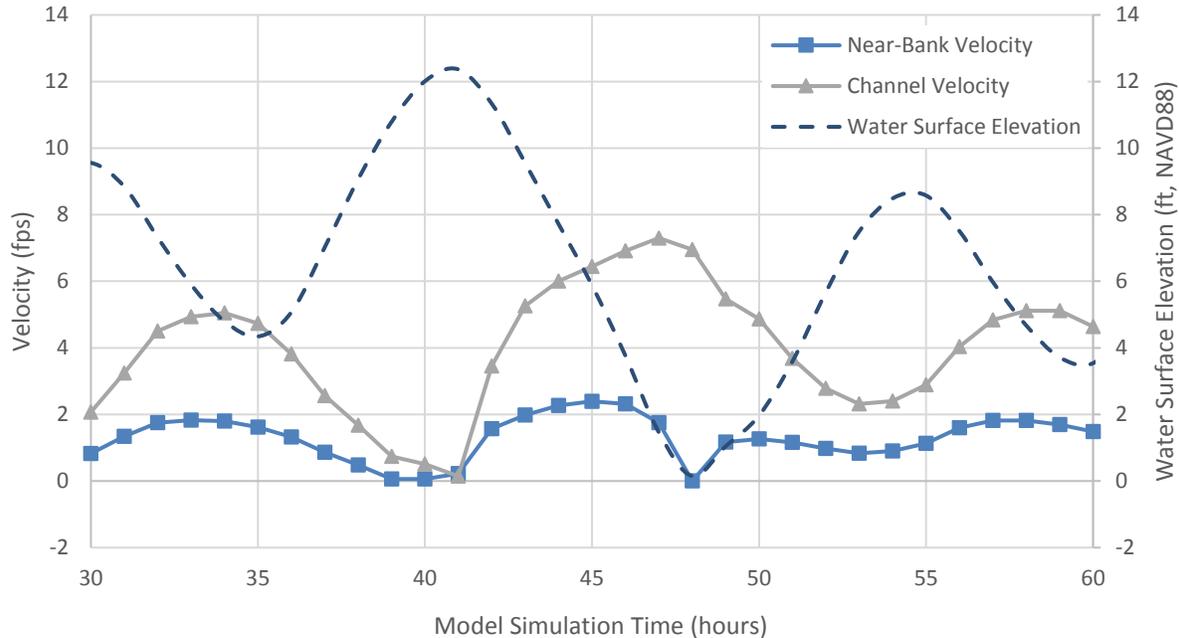


Figure 6 – Modeled water surface elevations and flow velocities during the 2-year event (with climate change)

DISCUSSION AND CONCLUSION

Review of aerial imagery by WSE indicates that the Chehalis River in the vicinity of the Seaport Landing site has been relatively stable over the past 75 years. Comparison of recent LiDAR and survey data suggests there has been up to 1 foot of sediment erosion from in-river portions of the Seaport Landing site between 2009 and 2016, but considering the findings of the aerial imagery analysis this is not believed to indicate a long term erosion trend on the property. The hydraulic modeling indicates that the site is exposed to moderate flow velocities on a daily basis during normal tidal cycles, and that flow velocities remain moderate even during large floods on the Chehalis River. In WSE’s opinion significant erosion of the site due to tidal or riverine flow is unlikely. It should be noted that erosion of the bed sediments on the Seaport Landing property may be possible as a result of waves, generated either by wind in Grays Harbor or by boat traffic on the Chehalis River. Waves were not considered in the current analysis and WSE does not have additional insight into to the potential for wave induced erosion.

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APPENDIX C
CRITICAL AREAS REPORT

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MAUL FOSTER ALONGI

GRAYS HARBOR HISTORICAL SEAPORT AUTHORITY CRITICAL AREAS REPORT

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MAUL FOSTER ALONGI

GRAYS HARBOR HISTORICAL SEAPORT AUTHORITY CRITICAL AREAS REPORT

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CHAD WALLIN
BIOLOGIST

OCTOBER 2019

DATE

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1 INTRODUCTION

Grette Associates is under contract with Maul Foster Alongi (MFA) to prepare a critical areas report that summarizes the critical areas reconnaissance performed at the Grays Harbor Historical Seaport Authority facility located along the Chehalis River (Figure 1) within the City of Aberdeen.

The purpose of this report is to document all wetlands and fish and wildlife habitat conservation areas (FWHCAs) that are located within the subject property to satisfy the reporting requirements defined in Chapter 14.50 of the City of Aberdeen's Shoreline Master Program (SMP).

Figure 1. Vicinity map



2 FEATURE SUMMARY

Two Grette Associates biologist visited the subject property on September 3, 2019 to conduct an assessment to identify all wetlands and FWHCAs within the subject property.

Grette Associates collected wetland delineation data and delineated three wetland features (Wetland A, B-1, and B-2; Appendix A) that contained all three wetland criteria defined in the U.S. Army Corps of Engineers (USACE) *Federal Wetland Delineation Manual* (1987), and the USACE's *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region (Version 2.0)* (2010). Wetlands were rated according to Appendix 2 of the SMP and the

Washington State Department of Ecology’s (Ecology) *Washington State Wetland Rating System for Western WA – 2014 Update* (Hruby 2014). Wetland delineation summaries, field datasheets and wetland rating forms are presented in Appendices B, C and D, respectively. A summary of the delineated wetlands is provided in Table 1.

In addition to the wetland delineation, two natural water features (Chehalis River and Shannon Slough) were identified within the subject property. An ordinary high water mark (OHWM) determination using the guidance in Ecology’s *Determining OHWM for Shoreline Management Act Compliance in Washington State* (Anderson et al. 2016) was completed for the Chehalis River and Shannon Slough (Table 2).

Table 1. Wetland delineation summary

Feature	Size (Approximate)	Cowardin Class ¹	Hydrology Modifier	HGM Class	Wetland Category	Buffer Width ²
A	18,500 sq. ft.	REM	Regularly Flooded	Freshwater Tidal Fringe ³	III	80 ft.
B-1	24,000 sq. ft.	REM	Regularly Flooded	Freshwater Tidal Fringe ³	III	80 ft.
B-2	23,500 sq. ft.	REM	Regularly Flooded	Riverine	III	80 ft.

¹ Classification based on Cowardin et al. (1979).

² Buffers are based on Appendix 2 of the SMP. Per Chapter 15.50.914 of the SMP, any substantial development that provides a disconnect to a wetland feature is considered a buffer interruption.

³ Per Hruby 2014, freshwater tidal fringe wetlands are rated using the riverine rating form.

Table 2. Natural water feature identification summary

Feature	Water Type ¹	Buffer ²
Chehalis River	S	0-150 ft. ³
Shannon Slough	Np	75 ft.

¹ Natural water features were rated according to Chapter 14.50 of the SMP and WAC 222-16-030.

² Buffers are based on Appendix 2 of the SMP. Per Chapter 15.50.918 of the SMP, any substantial development that provides a disconnect to a stream is considered a buffer interruption.

³ Shoreline buffer range from 0-150 feet based on the nature of the proposed land use.

3 BACKGROUND

3.1 Existing Conditions

The subject property is the historic industrial site where the Weyerhaeuser Timber Company operated their Aberdeen sawmill. With the exception of a narrow band of vegetation along portions of the shoreline that is dominated by native and non-native species, the subject property is devoid of vegetation.

Please note that the road crossing associated within Shannon Slough that is located within the subject property has been recently improved and the improvements are not reflected on any aerial images associated with this report. The improvements appear to include narrowing of the access road, culvert replacement, and bank stabilization.

3.2 National Wetlands Inventory

The U.S. Fish and Wildlife Service’s National Wetlands Inventory (NWI) was queried to determine if previously-identified wetlands are present within the subject property (USFWS 2019). According to the NWI Interactive Online Mapper, with the exception of

the Chehalis River and Shannon Slough, no aquatic features area mapped in the vicinity of the subject property (Appendix E).

3.3 Sensitive Wildlife and Plants

The Washington Department of Fish and Wildlife's (WDFW) Priority Habitats and Species (PHS) database on-line mapper was queried to determine if state or federally listed fish or wildlife species occur near the subject property (WDFW 2019a). According to the PHS database, no priority habitats or species are mapped by PHS in the upland areas within the subject property (Appendix E).

Additionally, WDFW's SalmonScape on-line mapper was queried to determine what listed SalmonScape species are identified by WDFW to occur within the Chehalis River (WDFW 2019b). According to SalmonScape, the Chehalis River is mapped as providing habitat for numerous listed SalmonScape species (Appendix E).

The Washington Department of Natural Resources' (WDNR) Wetlands of High Conservation Value mapper was queried to determine if the subject parcels occurs in a location reported to contain high quality natural heritage wetland occurrences or occurrences of natural heritage features commonly associated with wetlands (WDNR 2019a). According to WDNR's mapper, there are no records of rare plants or high quality native ecosystems occurring on or in the vicinity of the subject property (Appendix E).

3.4 State Water Classification System

The Washington Department of Natural Resources' (WDNR) Forest Practice Application Mapping Tool on-line mapper was queried to identify the water typing of any streams mapped by WDNR (WDNR 2019b). According to WDNR, the Chehalis River is mapped as *Shorelines of the State* and Shannon Slough is mapped as a non-fish habitat stream (Appendix E).

4 METHODS

4.1 Wetland Determination

The subject property was traversed and data were collected to confirm wetland boundaries. The identified wetlands were delineated according to the procedures described in the USACE's *Federal Wetland Delineation Manual* (1987), and the USACE's *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region (Version 2.0)* (2010). Paired data plots and soil test pits were excavated to evaluate wetland and upland conditions. Guidance from the USACE's *Regional Supplement* was used to evaluate the data at each data point.

The boundary of the wetland was established based on changes in vegetation, field indicators of hydric soils, water levels at or below 12 inches, topographic changes, and best professional judgment. Data plots were established in and adjacent to the wetland. The location of the wetland boundaries were recorded with a dGPS device.

Plants were determined to be more or less associated with wetlands based on their wetland indicator (FAC) status. The percent dominance for each plant strata was determined using the 50-20 Rule, which is the recommended method for selecting dominant species from a plant community in instances where quantitative data are

available (USACE 2010). In utilizing this rule, dominants are the most abundant species that individually or collectively accounts for more than 50 percent of the total coverage of vegetation in the stratum plus any other species that, by itself accounts for at least 20 percent of the total.

4.1.1 Hydrophytic Vegetation

The U.S. Fish and Wildlife Service (USFWS) and the NWI have established a rating system that has been applied to commonly occurring plant species on the basis of their frequency of occurrence in wetlands (Table 3). Species indicator status expresses the range in which plants may occur in wetlands and non-wetlands (uplands). Under this system, vegetation is considered hydrophytic when there is an indicator status of facultative (FAC), facultative wetland (FACW) or obligate wetland (OBL) (Table 3). The hydrophytic vegetation criterion for wetland determination is met when *more than* 50 percent of the dominant species in the plant community are FAC or wetter. The Corps' *National Wetland Plant List* (Lichvar 2016) was used to determine vegetation indicator status.

Table 3. Definitions for USFWS plant indicator status

Plant Indicator Status Category	Indicator Status Abbreviation	Definition (Estimated Probability of Occurrence)
Obligate Upland	UPL	Occur rarely (<1 percent) in wetlands, and almost always (>99 percent) in uplands
Facultative Upland	FACU	Occur sometimes (1 percent to <33 percent) in wetlands, but occur more often (>67 percent to 99 percent) in uplands
Facultative	FAC	Similar likelihood (33 percent to 67 percent) of occurring in both wetlands and uplands
Facultative Wetland	FACW	Occur usually in wetlands (>67 percent to 99 percent), but also occur in uplands (1 percent to 33 percent)
Obligate Wetland	OBL	Occur almost always (>99 percent) in wetlands, but rarely occur in uplands (<1 percent)
Not Listed	NL	Not listed due to insufficient information to determine status

4.1.2 Wetland Hydrology

Evidence of permanent or periodic inundation (water marks, drift lines, drainage patterns), or soil saturation to the surface for 14 consecutive days or more during the growing season meets the hydrology criterion. Oxidized root channels in the top 12 inches and hydrogen sulfide are primary indicators and water-stained leaves and geomorphic position are secondary indicators of wetland hydrology.

4.1.3 Hydric Soils

Soils that are saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions in the upper soil horizons are considered hydric soils. Field indicators include histosols, the presence of a histic epipedon, a sulfidic odor, low soil chroma, and gleying. Soil conditions were compared to the Field Indicators of Hydric Soils detailed in the USACE's *Regional Supplement*.

4.2 Ordinary High Water Mark Determination

An OHWM determination using the guidance in Ecology's *Determining OHWM for Shoreline Management Act Compliance in Washington State* (Anderson et al. 2016) was

completed for the portion of the Chehalis River and Shannon Slough within the subject property.

Please note that portions of Shannon Slough upstream of the culvert (Appendix A) were not safely accessible due to site conditions. Therefore, representative elevations were recorded using a dGPS device and utilized to determine wetland boundaries and the OHWM in this area.

5 WETLAND RESULTS

Three wetland features were identified within the subject property (Appendix A).

5.1 Wetlands A and B-1

Wetlands A and B-1 are freshwater tidal wetlands that are situated along the Chehalis River (Appendix A). These features receive daily inundation due to fluctuating river levels that are influenced from tide cycles associated with the Pacific Ocean. While this marine and freshwater interaction is taking place in the Chehalis River, the marine water (saltwater wedge) and/or estuarine environment does not appear to extend up river to the point where the subject property is located. Based on the lack of salt tolerant vegetation observed in Wetlands A and B-1 (see below), the wetlands are classified as freshwater tidal wetlands (Hruby 2014).

5.1.1 Vegetation

Vegetation observed within Wetland A and B-1 predominantly consists of soft rush (*Juncus effusus*), slough sedge (*Carex obnupta*), and Pacific silverweed (*Potentilla pacifica*). According to Hruby (2014), these species generally are not associated with estuarine wetlands. Furthermore, cattail (*Typha latifolia*) was observed in portions of Wetland A which is sensitive to brackish environments (Hruby 2014).

5.1.2 Hydrology

Hydrologic support for Wetlands A and B-1 is primarily provided by daily tidal inundation and shallow groundwater. These wetland features are situated below the OHWM of the Chehalis River within the tidally influenced area along the shoreline.

5.1.3 Hydric Soils

During Grette Associates' soils evaluation a strong hydrogen sulfide odor was observed. Per the USACE's *Regional Supplement* (2010), observing a hydrogen sulfide odor while investigating soils is a primary hydric soils indicator.

5.2 Wetland B-2

Historically, Wetland B-2 was likely a continuation of Wetland B-1 (freshwater tidal wetland); however, during the development of the subject property a road crossing was constructed in Shannon Slough to provide internal access to other portions of the sawmill facilities. The current crossing configuration includes a tidal flap gate that prevents fresh waters from back-flooding up Shannon Slough during tidal exchanges. Given its geomorphic location, Wetland B-2 is classified as a riverine wetland. Wetland B-2 is located along the margins of Shannon Slough and situated in areas that are permanently flooded and/or seasonally flooded by fluctuating water depths within the slough

(Appendix A). Please note that the open water area associated with Shannon Slough is incorporated within Wetland B-2 for mapping purposes.

5.2.1 Vegetation

Vegetation observed within Wetland B-2 largely consists of soft rush and slough sedge.

5.2.2 Hydrology

Hydrologic support for Wetland B-2 is primarily provided by permanent and/or seasonal inundation and shallow groundwater. This feature is located along the edge of Shannon Slough and at the approximate stagnant elevation of the water within the slough.

5.2.3 Hydric Soils

During Grette Associates’ site assessment Wetland B-2 was largely inundated by the waters associated with Shannon Slough. As a result, soils were not investigated. Hydric soils are those soils that are saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions in the upper soil horizons (USACE 2010). Given that this wetland feature is permanently and/or regularly inundated, the soils within Wetland B-2 meet the definition of a hydric soil.

5.3 Wetland Categorization

To determine the categorization of the wetlands based on function, the wetland classification guidelines in Ecology’s wetland rating system (Hruby 2014) were used. Based on this guidance, each wetland was given a score for each of three functions: Water Quality, Hydrology, and Habitat (Table 4).

Table 4. Wetland rating and categorization summary

Feature	Cowardin Class ¹	HGM Class	Water Quality	Hydrology	Habitat	Total	Category
Wetland A	REM	Freshwater Tidal Fringe ²	8	6	4	18	III
Wetland B-1	REM	Freshwater Tidal Fringe	8	6	4	18	III
Wetland B-2	REM	Riverine	8	5	4	17	III

¹ Classification based on Cowardin et al. (1979).

² Per Hruby 2014, freshwater tidal fringe wetlands are rated using the riverine rating form.

Per Section 14.50.914 of the SMP, Category III wetlands with low habitat value are subject to an 80-foot wetland buffer. A high land use was assumed when determining wetland buffer widths. Furthermore, per 14.50.914(A) of the SMP, buffers shall not include areas that are disconnected functionally from a wetland; therefore, the substantial improvements function as a buffer interruption and the extent of said buffer ends at the edged on the developed area.

6 FISH AND WILDLIFE HABITAT CONSERVATION AREA RESULTS

Per Section 14.50.917 of the SMP, FWHCAs are typically those areas that support regulated fish and wildlife species or the habitats that play a critical role in sustaining said species. This section is intended to document all FWHCAs that were identified within the subject property.

6.1 Chehalis River

According to WDFW (2019a and 2019b), the Chehalis River provides habitat for numerous salmonid species. Provided below in Table 5 is the list of FWHCA species that are typically known to occur within the Chehalis River basin.

Table 5. FWHCA species summary

FWHCA Species	State Status	Federal Status
Chinook salmon (<i>Oncorhynchus tshawytscha</i>)	Candidate	-
Coho salmon (<i>O. kisutch</i>)	Candidate	-
Chum salmon (<i>O. keta</i>)	Candidate	-
Steelhead trout (<i>O. mykiss</i>)	Candidate	-
Resident Coastal Cutthroat Trout (<i>O. clarki</i>)	-	-
Bull trout (<i>Salvelinus confluentus</i>)	Candidate	Threatened

In addition to being classified as a FWHCA, the Chehalis River is a *Water of the State*. Therefore, the river is subject to the buffer regulations defined in Section 14.50.430.2 of the SMP. Per said section, the shoreline buffer ranges from 0 feet to 150 feet depending on proposed land use. More specifically, water dependent structures and uses are not subject to a shoreline buffer whereas water-related/water-enjoyment mixed use structures and uses are subject to a 75-foot shoreline buffer and non-water oriented structures and uses are subject to a 150-foot shoreline buffer. Buffer determinations assumed high land use and the *Industrial and Port Development* shoreline environmental designation. Per 14.50.918 of the SMP, buffers shall not include areas that are disconnected functionally from a stream; therefore, the substantial improvements function as a buffer interruption and the extent of said buffer ends at the edged on the developed area.

6.2 Shannon Slough

Based on the queried databases summarized above in Section 3, Shannon Slough is not considered a FWHCA. Furthermore, there is no mapped distribution of any anadromous fish species within the slough and WDNR (2019b) maps Shannon Slough as a non-fish habitat stream. Based on this information, Shannon Slough likely does not provide habitat for fish and is classified as a non-fish habitat natural water feature. Per Section 14.50.918 of the SMP, perennial non-fish habitat natural water features are classified as a Type Np stream and are subject to a 75-foot buffer. Per 14.50.918 of the SMP, buffers shall not include areas that are disconnected functionally from a stream; therefore, the substantial improvements function as a buffer interruption and the extent of said buffer ends at the edged on the developed area.

7 REGULATORY CONSIDERATIONS

Critical areas are regulated by agencies at the local, state, and federal levels. At the local level, wetlands and streams and their associated buffers within 200 feet of *Waters of the State* are regulated under the City of Aberdeen's SMP.

At the state level, wetlands are regulated by the Washington Department of Ecology through the Federal Clean Water Act (Section 401). The requirement for a Water Quality Certification from Ecology for wetland impacts is triggered by an applicant's applying for a federal Clean Water Act Section 404 permit from the USACE. Ecology may also

issue an Administrative Order, allowing them wetland regulatory authority without a federal nexus.

Additionally, WDFW regulates work within state waters to protect fish life under the State's Hydraulic Code (Chapter 77.55 RCW) through the Hydraulic Project Approval (HPA) process.

At the federal level, impacts (specifically dredging or filling) to wetlands are regulated by the Environmental Protection Agency through the USACE. The USACE administers the federal Clean Water Act (Section 404) for projects involving dredging or filling in Waters of the US (lakes, streams, marine waters, and most non-isolated wetlands).

While it is the regulatory agencies that make the final determination regarding jurisdictional status, project proponents can infer jurisdiction using the guidance provided by each agency or local government. This inference can be used to design a project based on the anticipated regulatory constraints within the project area. However, it is the project proponent's responsibility to contact each potential regulating agency and confirm their regulatory status and requirements.

8 DISCLAIMER

The findings and conclusions documented in this report have been prepared for specific application to this proposed project site. They have been developed in a manner consistent with that level of care and skill normally exercised by members of the environmental science profession currently practicing under similar conditions in the area. Our work was also performed in accordance with the terms and conditions set forth in our proposal. The conclusions and recommendations presented in this report are professional opinions based on an interpretation of information currently available to us and are made within the operation scope, budget, and schedule of this project. No warranty, expressed or implied, is made. In addition, changes in government codes, regulations, or laws may occur. Because of such changes, our observations and conclusions applicable to this site may need to be revised wholly or in part.

Wetland boundaries are based on conditions present at the time of the site visit and considered preliminary until the flagged wetland and/or drainage boundaries are validated by the appropriate jurisdictional agencies. Validation of the boundaries by the regulating agencies provide a certification, typically in writing, that the wetland boundaries verified are the boundaries that will be regulated by the agencies until a specific date or until the regulations are modified. Only the regulating agencies can provide this certification.

Since wetlands are dynamic communities affected by both natural and human activities, changes in wetland boundaries may be expected. Because of such changes, our observations and conclusions applicable to this site may need to be revised wholly or in part.

9 BIOLOGIST QUALIFICATIONS

9.1 Chad Wallin

Chad Wallin is a Biologist with extensive training in wetland science and ecology restoration. Chad also has professional experience in stream and fish restoration, marine monitoring, mitigation monitoring, and fish and wildlife assessments.

Chad has earned a Bachelor's of Arts degree in Environmental Studies from the University of Washington along with certificates in ecology restoration and wetland science.

For a list of representative projects, please contact him at Grette Associates.

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MAUL FOSTER ALONGI

GRAYS HARBOR HISTORICAL SEAPORT AUTHORITY CRITICAL AREAS REPORT

APPENDIX A: CRITICAL AREAS MAP

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LEGEND



APPROX. ASSESSMENT
AREA BOUNDARY



APPROX. CATEGORY III
WETLAND BOUNDARY



APPROX. 80 FT. CATEGORY III
WETLAND BUFFER





WETLAND A

CHEHALIS RIVER

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PROJECT #: 411.006
 DESIGNED BY: CW
 CHECKED BY: MB

DATE: 10/17/19
 DATE: 10/17/19

CLIENT:
MFA

SITE ADDRESS: ABERDEEN, WA

DRAWING SCALE: NTS

MAUL FOSTER ALONGI
GRAYS HARBOR HISTORICAL SEAPORT AUTHORITY
CRITICAL AREAS REPORT

OBLIQUE VIEW

SHEET
2
OF
3



WETLAND B-2

WETLAND B-1

CHEHALIS RIVER

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MAUL FOSTER ALONGI
GRAYS HARBOR HISTORICAL SEAPORT AUTHORITY
CRITICAL AREAS REPORT

SITE ADDRESS: ABERDEEN, WA
 DRAWING SCALE: NTS

OBLIQUE VIEW

SHEET
3
OF
3

MAUL FOSTER ALONGI

GRAYS HARBOR HISTORICAL SEAPORT AUTHORITY CRITICAL AREAS REPORT

APPENDIX B: WETLAND SUMMARY

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WETLAND A SUMMARY		
Approximate Size (sq. ft.):	18,500	
Cowardin Classification ¹ :	REM	
HGM Classification ² :	Freshwater Tidal	
Wetland Category ³ :	III	
Wetland Buffer Width ⁴ :	80 ft.	
Sample Plot Total ⁵ :	2	
Hydrophytic Vegetation Present (Y/N)?	Yes	
Hydric Soil Indicator?	<i>Hydrogen Sulfide</i>	
Wetland Hydrology Present?	Yes	
Summary of Findings		
Dominant Vegetation:	Vegetation observed within Wetland A predominantly consists of soft rush, slough sedge, and Pacific silverweed.	
Soil Profile:	Hydrologic support for Wetlands A is primarily provided by daily tidal inundation and shallow groundwater. These wetland features are situated below the OHHM of the Chehalis River within the tidally influenced area along the shoreline.	
Primary Hydrological Support:	Hydrologic support for Wetlands A is primarily provided by daily tidal inundation and shallow groundwater.	
Wetland Data Plot:	Upland Data Plot:	
		
Notes: ¹ Classification based on Cowardin et al. (1979). ² HGM classification based on Brinson, M.M. (1993). ³ Wetland rating was determined based on the guidelines defined in the local municipal code. ⁴ Wetland buffer was determined based on the local municipal code. ⁵ Sample plot total includes the collective amount of wetland and upland samples plots examined to define the wetland boundary.		

WETLAND B-1 SUMMARY

Approximate Size (sq. ft.):	24,000	
Cowardin Classification¹:	REM	
HGM Classification²:	Freshwater Tidal	
Wetland Category³:	III	
Wetland Buffer Width⁴:	80 ft.	
Sample Plot Total⁵:	2	
Hydrophytic Vegetation Present (Y/N)?	Yes	
Hydric Soil Indicator?	<i>Hydrogen Sulfide</i>	
Wetland Hydrology Present?	Yes	

Summary of Findings

Dominant Vegetation:	Vegetation observed within Wetland B-1 predominantly consists of soft rush, slough sedge, and Pacific silverweed.
Soil Profile:	Hydrologic support for Wetlands B-1 is primarily provided by daily tidal inundation and shallow groundwater. These wetland features are situated below the OHHM of the Chehalis River within the tidally influenced area along the shoreline.
Primary Hydrological Support:	Hydrologic support for Wetlands B-1 is primarily provided by daily tidal inundation and shallow groundwater.

Wetland Data Plot:



Upland Data Plot:



Notes:

- ¹ Classification based on Cowardin et al. (1979).
- ² HGM classification based on Brinson, M.M. (1993).
- ³ Wetland rating was determined based on the guidelines defined in the local municipal code.
- ⁴ Wetland buffer was determined based on the local municipal code.
- ⁵ Sample plot total includes the collective amount of wetland and upland samples plots examined to define the wetland boundary.

WETLAND B-2 SUMMARY

Approximate Size (sq. ft.):	23,500	
Cowardin Classification¹:	REM	
HGM Classification²:	Riverine	
Wetland Category³:	III	
Wetland Buffer Width⁴:	80 ft.	
Sample Plot Total⁵:	2	
Hydrophytic Vegetation Present (Y/N)?	Yes	
Hydric Soil Indicator?	<i>Other</i>	
Wetland Hydrology Present?	Yes	

Summary of Findings

Dominant Vegetation:	Vegetation observed within Wetland B-2 largely consists of soft rush and slough sedge.
Soil Profile:	During Grette Associates' site assessment Wetlands B-2 was largely inundated by the waters associated with Shannon Slough. As a result, soils were not investigated. Hydric soils are those soils that are saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions in the upper soil horizons (USACE 2010).
Primary Hydrological Support:	Hydrologic support for Wetlands B-2 is primarily provided by permanent and/or seasonal inundation and shallow groundwater.

Wetland Data Plot:	Upland Data Plot:
N/A	N/A

Notes:
¹ Classification based on Cowardin et al. (1979).
² HGM classification based on Brinson, M.M. (1993).
³ Wetland rating was determined based on the guidelines defined in the local municipal code.
⁴ Wetland buffer was determined based on the local municipal code.
⁵ Sample plot total includes the collective amount of wetland and upland samples plots examined to define the wetland boundary.

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GRAYS HARBOR HISTORICAL SEAPORT AUTHORITY CRITICAL AREAS REPORT

APPENDIX C: WETLAND DATASHEETS

DRAFT

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GRAYS HARBOR HISTORICAL SEAPORT AUTHORITY CRITICAL AREAS REPORT

APPENDIX D: WETLAND RATING FORM

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APPENDIX E: QUERIED DATABASE FIGURES

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GRAYS HARBOR HISTORICAL SEAPORT AUTHORITY CRITICAL AREAS REPORT

APPENDIX A: CRITICAL AREAS MAP

DRAFT

LEGEND



APPROX. ASSESSMENT
AREA BOUNDARY



APPROX. CATEGORY III
WETLAND BOUNDARY



APPROX. 80 FT. CATEGORY III
WETLAND BUFFER





WETLAND A

CHEHALIS RIVER

Grette Associates LLC
 ENVIRONMENTAL CONSULTANTS
 2102 North 30th Street, Suite A
 TACOMA, WA 98403
 (253) 572-9300
 gretteassociates.com

PROJECT #: 411.006
 DESIGNED BY: CW
 CHECKED BY: MB
 DATE: 10/17/19
 DATE: 10/17/19

CLIENT:
 MFA

MAUL FOSTER ALONGI
GRAYS HARBOR HISTORICAL SEAPORT AUTHORITY
CRITICAL AREAS REPORT

SITE ADDRESS: ABERDEEN, WA
 DRAWING SCALE: NTS

OBLIQUE VIEW

SHEET
2
OF
3



WETLAND B-2

WETLAND B-1

CHEHALIS RIVER

Grette Associates LLC
 ENVIRONMENTAL CONSULTANTS
 2102 North 30th Street, Suite A
 TACOMA, WA 98403
 (253) 572-9300
 grettesassociates.com

CLIENT: MFA
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MAUL FOSTER ALONGI
GRAYS HARBOR HISTORICAL SEAPORT AUTHORITY
CRITICAL AREAS REPORT

SITE ADDRESS: ABERDEEN, WA
 DRAWING SCALE: NTS

OBLIQUE VIEW

SHEET
3
OF
3

MAUL FOSTER ALONGI

GRAYS HARBOR HISTORICAL SEAPORT AUTHORITY CRITICAL AREAS REPORT

APPENDIX B: WETLAND SUMMARY

DRAFT

WETLAND A SUMMARY

Approximate Size (sq. ft.):	18,500	
Cowardin Classification¹:	REM	
HGM Classification²:	Freshwater Tidal	
Wetland Category³:	III	
Wetland Buffer Width⁴:	80 ft.	
Sample Plot Total⁵:	2	
Hydrophytic Vegetation Present (Y/N)?	Yes	
Hydric Soil Indicator?	<i>Hydrogen Sulfide</i>	
Wetland Hydrology Present?	Yes	

Summary of Findings

Dominant Vegetation:	Vegetation observed within Wetland A predominantly consists of soft rush, slough sedge, and Pacific silverweed.
Soil Profile:	Hydrologic support for Wetlands A is primarily provided by daily tidal inundation and shallow groundwater. These wetland features are situated below the OHHM of the Chehalis River within the tidally influenced area along the shoreline.
Primary Hydrological Support:	Hydrologic support for Wetlands A is primarily provided by daily tidal inundation and shallow groundwater.

Wetland Data Plot:



Upland Data Plot:



Notes:

- ¹ Classification based on Cowardin et al. (1979).
- ² HGM classification based on Brinson, M.M. (1993).
- ³ Wetland rating was determined based on the guidelines defined in the local municipal code.
- ⁴ Wetland buffer was determined based on the local municipal code.
- ⁵ Sample plot total includes the collective amount of wetland and upland samples plots examined to define the wetland boundary.

WETLAND B-1 SUMMARY

Approximate Size (sq. ft.):	24,000	
Cowardin Classification¹:	REM	
HGM Classification²:	Freshwater Tidal	
Wetland Category³:	III	
Wetland Buffer Width⁴:	80 ft.	
Sample Plot Total⁵:	2	
Hydrophytic Vegetation Present (Y/N)?	Yes	
Hydric Soil Indicator?	<i>Hydrogen Sulfide</i>	
Wetland Hydrology Present?	Yes	

Summary of Findings

Dominant Vegetation:	Vegetation observed within Wetland B-1 predominantly consists of soft rush, slough sedge, and Pacific silverweed.
Soil Profile:	Hydrologic support for Wetlands B-1 is primarily provided by daily tidal inundation and shallow groundwater. These wetland features are situated below the OHHM of the Chehalis River within the tidally influenced area along the shoreline.
Primary Hydrological Support:	Hydrologic support for Wetlands B-1 is primarily provided by daily tidal inundation and shallow groundwater.

Wetland Data Plot:	Upland Data Plot:
	

Notes:

- ¹ Classification based on Cowardin et al. (1979).
- ² HGM classification based on Brinson, M.M. (1993).
- ³ Wetland rating was determined based on the guidelines defined in the local municipal code.
- ⁴ Wetland buffer was determined based on the local municipal code.
- ⁵ Sample plot total includes the collective amount of wetland and upland samples plots examined to define the wetland boundary.

WETLAND B-2 SUMMARY

Approximate Size (sq. ft.):	23,500	
Cowardin Classification¹:	REM	
HGM Classification²:	Riverine	
Wetland Category³:	III	
Wetland Buffer Width⁴:	80 ft.	
Sample Plot Total⁵:	2	
Hydrophytic Vegetation Present (Y/N)?	Yes	
Hydric Soil Indicator?	<i>Other</i>	
Wetland Hydrology Present?	Yes	

Summary of Findings

Dominant Vegetation:	Vegetation observed within Wetland B-2 largely consists of soft rush and slough sedge.
Soil Profile:	During Grette Associates' site assessment Wetlands B-2 was largely inundated by the waters associated with Shannon Slough. As a result, soils were not investigated. Hydric soils are those soils that are saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions in the upper soil horizons (USACE 2010).
Primary Hydrological Support:	Hydrologic support for Wetlands B-2 is primarily provided by permanent and/or seasonal inundation and shallow groundwater.

Wetland Data Plot:	Upland Data Plot:
N/A	N/A

Notes:
¹ Classification based on Cowardin et al. (1979).
² HGM classification based on Brinson, M.M. (1993).
³ Wetland rating was determined based on the guidelines defined in the local municipal code.
⁴ Wetland buffer was determined based on the local municipal code.
⁵ Sample plot total includes the collective amount of wetland and upland samples plots examined to define the wetland boundary.

MAUL FOSTER ALONGI

GRAYS HARBOR HISTORICAL SEAPORT AUTHORITY CRITICAL AREAS REPORT

APPENDIX C: WETLAND DATASHEETS

DRAFT

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project Site: Way Co, Aberdeen City/County: Aberdeen / G.H. Sampling Date: 7/3/17
 Applicant/Owner: _____ State: WA Sampling Point: SP-1
 Investigator(s): Whitler Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): slope / plateau Local relief (concave, convex, none): _____ Slope (%): _____
 Subregion (LRR): _____ Lat: _____ Long: _____ Datum: _____
 Soil Map Unit Name: _____ NWI classification: _____
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes No (If no, explain in Remarks.)
 Are Vegetation , Soil , or Hydrology , significantly disturbed? Are "Normal Circumstances" present? Yes No
 Are Vegetation , Soil , or Hydrology , naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Is the Sampled Area within a Wetland?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Hydric Soil Present?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>		Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Wetland Hydrology Present?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>		
Remarks: <u>Data collected in total area below OTHM. Wetland 1 (W1)</u>			

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: <u>30'</u>)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test Worksheet:
1. _____	_____	_____	_____	Number of Dominant Species That Are OBL, FACW, or FAC: <u>3</u> (A) Total Number of Dominant Species Across All Strata: <u>3</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>3</u> (A/B)
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
50% = _____, 20% = _____	_____	= Total Cover		Prevalence Index worksheet: Total % Cover of: _____ Multiply by: OBL species _____ x1 = _____ FACW species _____ x2 = _____ FAC species _____ x3 = _____ FACU species _____ x4 = _____ UPL species _____ x5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____
Sapling/Shrub Stratum (Plot size: <u>15'</u>)				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
50% = _____, 20% = _____	_____	= Total Cover		
Herb Stratum (Plot size: <u>5'</u>)				
1. <u>POPA</u>	<u>20%</u>	<u>Y</u>	<u>OBL</u>	
2. <u>CAOB</u>	<u>20%</u>	<u>Y</u>	<u>OBL</u>	
3. <u>JUBA</u>	<u>20%</u>	<u>Y</u>	<u>FACW</u>	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
11. _____	_____	_____	_____	
50% = _____, 20% = _____	<u>60%</u>	= Total Cover		
Woody Vine Stratum (Plot size: _____)				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
50% = _____, 20% = _____	_____	= Total Cover		
% Bare Ground in Herb Stratum _____				
Hydrophytic Vegetation Indicators: <input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input checked="" type="checkbox"/> 2 - Dominance Test is >50% <input type="checkbox"/> 3 - Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> 5 - Wetland Non-Vascular Plants ¹ <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain)				
¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.				
Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>				
Remarks: _____				

Project Site: _____

Sampling Point: SP-1

SOIL

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		

¹Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. ²Location: PL=Pore Lining, M=Matrix

<p>Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)</p> <p><input type="checkbox"/> Histosol (A1)</p> <p><input type="checkbox"/> Histic Epipedon (A2)</p> <p><input type="checkbox"/> Black Histic (A3)</p> <p><input checked="" type="checkbox"/> Hydrogen Sulfide (A4)</p> <p><input type="checkbox"/> Depleted Below Dark Surface (A11)</p> <p><input type="checkbox"/> Thick Dark Surface (A12)</p> <p><input type="checkbox"/> Sandy Mucky Mineral (S1)</p> <p><input type="checkbox"/> Sandy Gleyed Matrix (S4)</p> <p><input type="checkbox"/> Sandy Redox (S5)</p> <p><input type="checkbox"/> Stripped Matrix (S6)</p> <p><input type="checkbox"/> Loamy Mucky Mineral (F1) (except MLRA 1)</p> <p><input type="checkbox"/> Loamy Gleyed Matrix (F2)</p> <p><input type="checkbox"/> Depleted Matrix (F3)</p> <p><input type="checkbox"/> Redox Dark Surface (F6)</p> <p><input type="checkbox"/> Depleted Dark Surface (F7)</p> <p><input type="checkbox"/> Redox Depressions (F8)</p>	<p>Indicators for Problematic Hydric Soils³:</p> <p><input type="checkbox"/> 2 cm Muck (A10)</p> <p><input type="checkbox"/> Red Parent Material (TF2)</p> <p><input type="checkbox"/> Very Shallow Dark Surface (TF12)</p> <p><input type="checkbox"/> Other (Explain in Remarks)</p> <p>³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.</p>
---	--

<p>Restrictive Layer (if present):</p> <p>Type: _____</p> <p>Depth (inches): _____</p>	<p>Hydric Soils Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/></p>
---	--

Remarks: _____

HYDROLOGY

<p>Wetland Hydrology Indicators:</p> <p>Primary Indicators (minimum of one required; check all that apply)</p> <p><input type="checkbox"/> Surface Water (A1)</p> <p><input type="checkbox"/> High Water Table (A2)</p> <p><input type="checkbox"/> Saturation (A3)</p> <p><input type="checkbox"/> Water Marks (B1)</p> <p><input type="checkbox"/> Sediment Deposits (B2)</p> <p><input checked="" type="checkbox"/> Drift Deposits (B3)</p> <p><input type="checkbox"/> Algal Mat or Crust (B4)</p> <p><input type="checkbox"/> Iron Deposits (B5)</p> <p><input type="checkbox"/> Surface Soil Cracks (B6)</p> <p><input type="checkbox"/> Inundation Visible on Aerial Imagery (B7)</p> <p><input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)</p> <p><input type="checkbox"/> Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B)</p> <p><input type="checkbox"/> Salt Crust (B11)</p> <p><input type="checkbox"/> Aquatic Invertebrates (B13)</p> <p><input checked="" type="checkbox"/> Hydrogen Sulfide Odor (C1)</p> <p><input type="checkbox"/> Oxidized Rhizospheres along Living Roots (C3)</p> <p><input type="checkbox"/> Presence of Reduced Iron (C4)</p> <p><input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6)</p> <p><input type="checkbox"/> Stunted or Stresses Plants (D1) (LRR A)</p> <p><input type="checkbox"/> Other (Explain in Remarks)</p>	<p>Secondary Indicators (2 or more required)</p> <p><input type="checkbox"/> Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B)</p> <p><input type="checkbox"/> Drainage Patterns (B10)</p> <p><input type="checkbox"/> Dry-Season Water Table (C2)</p> <p><input type="checkbox"/> Saturation Visible on Aerial Imagery (C9)</p> <p><input type="checkbox"/> Geomorphic Position (D2)</p> <p><input type="checkbox"/> Shallow Aquitard (D3)</p> <p><input type="checkbox"/> FAC-Neutral Test (D5)</p> <p><input type="checkbox"/> Raised Ant Mounds (D6) (LRR A)</p> <p><input type="checkbox"/> Frost-Heave Hummocks (D7)</p>
---	--

<p>Field Observations:</p> <p>Surface Water Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____</p> <p>Water Table Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____</p> <p>Saturation Present? (includes capillary fringe) Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Depth (inches): <u>surface</u></p>	<p>Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/></p>
---	---

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Data collected @ low tide.

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project Site: Key Co - Aberdeen City/County: Aberdeen/G.H. Sampling Date: 7/3/14
 Applicant/Owner: _____ State: WA Sampling Point: SP-2
 Investigator(s): Wahlin Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): flat Local relief (concave, convex, none): _____ Slope (%): _____
 Subregion (LRR): _____ Lat: _____ Long: _____ Datum: _____
 Soil Map Unit Name: _____ NWI classification: _____
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes No (If no, explain in Remarks.)
 Are Vegetation , Soil , or Hydrology , significantly disturbed? Are "Normal Circumstances" present? Yes No
 Are Vegetation , Soil , or Hydrology , naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	Is the Sampled Area within a Wetland?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Hydric Soil Present?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>		Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Wetland Hydrology Present?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>		Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Remarks: <u>Data collected in old storage area upstope of OHW</u>					

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: <u>30'</u>)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test Worksheet:																
1. _____	_____	_____	_____	Number of Dominant Species That Are OBL, FACW, or FAC: <u>2</u> (A) Total Number of Dominant Species Across All Strata: <u>2</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>66%</u> (A/B)																
2. _____	_____	_____	_____																	
3. _____	_____	_____	_____																	
4. _____	_____	_____	_____																	
50% = _____, 20% = _____ = Total Cover				Prevalence Index worksheet: <table style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 50%;">Total % Cover of:</th> <th style="width: 50%;">Multiply by:</th> </tr> <tr> <td>OBL species _____</td> <td>x1 = _____</td> </tr> <tr> <td>FACW species _____</td> <td>x2 = _____</td> </tr> <tr> <td>FAC species _____</td> <td>x3 = _____</td> </tr> <tr> <td>FACU species _____</td> <td>x4 = _____</td> </tr> <tr> <td>UPL species _____</td> <td>x5 = _____</td> </tr> <tr> <td>Column Totals: _____ (A)</td> <td>_____ (B)</td> </tr> <tr> <td colspan="2" style="text-align: center;">Prevalence Index = B/A = _____</td> </tr> </table>	Total % Cover of:	Multiply by:	OBL species _____	x1 = _____	FACW species _____	x2 = _____	FAC species _____	x3 = _____	FACU species _____	x4 = _____	UPL species _____	x5 = _____	Column Totals: _____ (A)	_____ (B)	Prevalence Index = B/A = _____	
Total % Cover of:	Multiply by:																			
OBL species _____	x1 = _____																			
FACW species _____	x2 = _____																			
FAC species _____	x3 = _____																			
FACU species _____	x4 = _____																			
UPL species _____	x5 = _____																			
Column Totals: _____ (A)	_____ (B)																			
Prevalence Index = B/A = _____																				
Sapling/Shrub Stratum (Plot size: <u>15'</u>) 1. <u>Scotch larch</u> <u>75%</u> <u>Y</u> <u>FACU</u> 2. <u>RUB</u> <u>25%</u> <u>Y</u> <u>FAC</u> 3. _____ 4. _____ 5. _____ 50% = _____, 20% = _____ = Total Cover <u>50%</u>																				
Herb Stratum (Plot size: <u>5'</u>) 1. <u>Agrostis sp.</u> <u>40%</u> <u>Y</u> <u>FAC</u> 2. _____ 3. _____ 4. _____ 5. _____ 6. _____ 7. _____ 8. _____ 9. _____ 10. _____ 11. _____ 50% = _____, 20% = _____ = Total Cover <u>40%</u>																				
Woody Vine Stratum (Plot size: _____) 1. _____ 2. _____ 50% = _____, 20% = _____ = Total Cover _____ % Bare Ground in Herb Stratum _____																				
Hydrophytic Vegetation Indicators: <input type="checkbox"/> 1 – Rapid Test for Hydrophytic Vegetation <input checked="" type="checkbox"/> 2 – Dominance Test is >50% <input type="checkbox"/> 3 – Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> 4 – Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> 5 – Wetland Non-Vascular Plants ¹ <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.																				
Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>																				
Remarks: _____																				

Project Site: _____

Sampling Point: SP-2

SOIL

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
<u>0-3</u>	_____	_____	_____	_____	_____	_____	<u>Rock</u>	<u>old gravel area</u>
_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____

¹Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. ²Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)				Indicators for Problematic Hydric Soils³:			
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> 2 cm Muck (A10)		<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Stripped Matrix (S6)	<input type="checkbox"/> Red Parent Material (TF2)	
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Loamy Mucky Mineral (F1) (except MLRA 1)	<input type="checkbox"/> Very Shallow Dark Surface (TF12)		<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	<input type="checkbox"/> Other (Explain in Remarks)	
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Depleted Matrix (F3)			<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Redox Dark Surface (F6)		
<input type="checkbox"/> Sandy Mucky Mineral (S1)	<input type="checkbox"/> Depleted Dark Surface (F7)			<input type="checkbox"/> Sandy Gleyed Matrix (S4)	<input type="checkbox"/> Redox Depressions (F8)		

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):
 Type: Gravel Surface
 Depth (inches): _____
 Remarks: _____

Hydric Soils Present? Yes No

HYDROLOGY

Wetland Hydrology Indicators:			Secondary Indicators (2 or more required)		
Primary Indicators (minimum of one required; check all that apply)					
<input type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Water-Stained Leaves (B9)	<input type="checkbox"/> Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B)	<input type="checkbox"/> Drainage Patterns (B10)	<input type="checkbox"/> Dry-Season Water Table (C2)	<input type="checkbox"/> Saturation Visible on Aerial Imagery (C9)
<input type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> Salt Crust (B11)	<input type="checkbox"/> Aquatic Invertebrates (B13)	<input type="checkbox"/> Geomorphic Position (D2)	<input type="checkbox"/> Shallow Aquitard (D3)	<input type="checkbox"/> FAC-Neutral Test (D5)
<input type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Hydrogen Sulfide Odor (C1)	<input type="checkbox"/> Oxidized Rhizospheres along Living Roots (C3)	<input type="checkbox"/> Raised Ant Mounds (D6) (LRR A)	<input type="checkbox"/> Frost-Heave Hummocks (D7)	
<input type="checkbox"/> Water Marks (B1)	<input type="checkbox"/> Presence of Reduced Iron (C4)	<input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6)			
<input type="checkbox"/> Sediment Deposits (B2)	<input type="checkbox"/> Stunted or Stresses Plants (D1) (LRR A)	<input type="checkbox"/> Other (Explain in Remarks)			
<input type="checkbox"/> Drift Deposits (B3)					
<input type="checkbox"/> Algal Mat or Crust (B4)					
<input type="checkbox"/> Iron Deposits (B5)					
<input type="checkbox"/> Surface Soil Cracks (B6)					
<input type="checkbox"/> Inundation Visible on Aerial Imagery (B7)					
<input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)					

Field Observations:

Surface Water Present? Yes No Depth (inches): _____

Water Table Present? Yes No Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes No Depth (inches): _____

Wetland Hydrology Present? Yes No

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

 Remarks: _____

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project Site: Way Co - Aberdeen City/County: Aberdeen (GA) Sampling Date: 9/13/17
 Applicant/Owner: _____ State: WA Sampling Point: SP-3
 Investigator(s): Walt Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): slope - down Local relief (concave, convex, none): _____ Slope (%): _____
 Subregion (LRR): _____ Lat: _____ Long: _____ Datum: _____
 Soil Map Unit Name: _____ NWI classification: _____
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes No (If no, explain in Remarks.)
 Are Vegetation , Soil , or Hydrology , significantly disturbed? Are "Normal Circumstances" present? Yes No
 Are Vegetation , Soil , or Hydrology , naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Is the Sampled Area within a Wetland?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Hydric Soil Present?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>		Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Wetland Hydrology Present?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>		
Remarks: <u>Data collected below OTHW</u> <u>Wetland 2 (W2)</u>			

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: <u>30'</u>)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test Worksheet:																
1. _____	_____	_____	_____	Number of Dominant Species That Are OBL, FACW, or FAC: <u>2</u> (A) Total Number of Dominant Species Across All Strata: <u>2</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100%</u> (A/B)																
2. _____	_____	_____	_____																	
3. _____	_____	_____	_____																	
4. _____	_____	_____	_____																	
50% = _____, 20% = _____	_____	= Total Cover	_____	Prevalence Index worksheet: <table style="width: 100%; border: none;"> <tr> <td style="text-align: center;"><u>Total % Cover of:</u></td> <td style="text-align: center;"><u>Multiply by:</u></td> </tr> <tr> <td>OBL species _____</td> <td>x1 = _____</td> </tr> <tr> <td>FACW species _____</td> <td>x2 = _____</td> </tr> <tr> <td>FAC species _____</td> <td>x3 = _____</td> </tr> <tr> <td>FACU species _____</td> <td>x4 = _____</td> </tr> <tr> <td>UPL species _____</td> <td>x5 = _____</td> </tr> <tr> <td>Column Totals: _____ (A)</td> <td>_____ (B)</td> </tr> <tr> <td colspan="2" style="text-align: center;">Prevalence Index = B/A = _____</td> </tr> </table>	<u>Total % Cover of:</u>	<u>Multiply by:</u>	OBL species _____	x1 = _____	FACW species _____	x2 = _____	FAC species _____	x3 = _____	FACU species _____	x4 = _____	UPL species _____	x5 = _____	Column Totals: _____ (A)	_____ (B)	Prevalence Index = B/A = _____	
<u>Total % Cover of:</u>	<u>Multiply by:</u>																			
OBL species _____	x1 = _____																			
FACW species _____	x2 = _____																			
FAC species _____	x3 = _____																			
FACU species _____	x4 = _____																			
UPL species _____	x5 = _____																			
Column Totals: _____ (A)	_____ (B)																			
Prevalence Index = B/A = _____																				
Sapling/Shrub Stratum (Plot size: <u>15'</u>) 1. _____ 2. _____ 3. _____ 4. _____ 5. _____ 50% = _____, 20% = _____ = Total Cover																				
Herb Stratum (Plot size: <u>5'</u>) 1. <u>POPA</u> 40% OBL 2. <u>CAOB</u> 50% OBL 3. _____ 4. _____ 5. _____ 6. _____ 7. _____ 8. _____ 9. _____ 10. _____ 11. _____ 50% = _____, 20% = _____ = Total Cover																				
Woody Vine Stratum (Plot size: _____) 1. _____ 2. _____ 50% = _____, 20% = _____ = Total Cover % Bare Ground in Herb Stratum _____																				
Hydrophytic Vegetation Indicators: <input type="checkbox"/> 1 – Rapid Test for Hydrophytic Vegetation <input checked="" type="checkbox"/> 2 – Dominance Test is >50% <input type="checkbox"/> 3 – Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> 4 – Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> 5 – Wetland Non-Vascular Plants ¹ <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.																				
Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>																				
Remarks: _____																				

Project Site: _____

Sampling Point: SP-3

SOIL

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		

¹Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. ²Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.) <input type="checkbox"/> Histosol (A1) <input type="checkbox"/> Histic Epipedon (A2) <input type="checkbox"/> Black Histic (A3) <input checked="" type="checkbox"/> Hydrogen Sulfide (A4) <input type="checkbox"/> Depleted Below Dark Surface (A11) <input type="checkbox"/> Thick Dark Surface (A12) <input type="checkbox"/> Sandy Mucky Mineral (S1) <input type="checkbox"/> Sandy Gleyed Matrix (S4)		<input type="checkbox"/> Sandy Redox (S5) <input type="checkbox"/> Stripped Matrix (S6) <input type="checkbox"/> Loamy Mucky Mineral (F1) (except MLRA 1) <input type="checkbox"/> Loamy Gleyed Matrix (F2) <input type="checkbox"/> Depleted Matrix (F3) <input type="checkbox"/> Redox Dark Surface (F6) <input type="checkbox"/> Depleted Dark Surface (F7) <input type="checkbox"/> Redox Depressions (F8)		Indicators for Problematic Hydric Soils³: <input type="checkbox"/> 2 cm Muck (A10) <input type="checkbox"/> Red Parent Material (TF2) <input type="checkbox"/> Very Shallow Dark Surface (TF12) <input type="checkbox"/> Other (Explain in Remarks)	
---	--	---	--	---	--

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):
 Type: _____
 Depth (inches): _____

Hydric Soils Present? Yes No

Remarks:

HYDROLOGY

Wetland Hydrology Indicators: Primary Indicators (minimum of one required; check all that apply)		Secondary Indicators (2 or more required)	
<input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Saturation (A3) <input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Sediment Deposits (B2) <input checked="" type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)	<input type="checkbox"/> Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B) <input type="checkbox"/> Salt Crust (B11) <input type="checkbox"/> Aquatic Invertebrates (B13) <input checked="" type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Oxidized Rhizospheres along Living Roots (C3) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Stunted or Stresses Plants (D1) (LRR A) <input type="checkbox"/> Other (Explain in Remarks)	<input type="checkbox"/> Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> FAC-Neutral Test (D5) <input type="checkbox"/> Raised Ant Mounds (D6) (LRR A) <input type="checkbox"/> Frost-Heave Hummocks (D7)	

Field Observations:

Surface Water Present? Yes No Depth (inches): _____

Water Table Present? Yes No Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes No Depth (inches): surface

Wetland Hydrology Present? Yes No

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
Tidal area

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project Site: Aberdeen WayCo. City/County: Aberdeen/GH. Sampling Date: 9/3/19
 Applicant/Owner: _____ State: CA Sampling Point: SP-4
 Investigator(s): Walker Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): _____ Slope (%): _____
 Subregion (LRR): _____ Lat: _____ Long: _____ Datum: _____
 Soil Map Unit Name: _____ NWI classification: _____
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes No (If no, explain in Remarks.)
 Are Vegetation , Soil , or Hydrology , significantly disturbed? Are "Normal Circumstances" present? Yes No
 Are Vegetation , Soil , or Hydrology , naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Is the Sampled Area within a Wetland?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Hydric Soil Present?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>		Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Wetland Hydrology Present?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>		Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Remarks: <u>Data collected along old hillslope / or bank above stream</u>					

VEGETATION – Use scientific names of plants

Stratum	Absolute % Cover	Dominant Species?	Indicator Status	Notes
Tree Stratum (Plot size: 30')				
1. <u>THPL</u>	<u>20%</u>	<u>Y</u>	<u>FAC</u>	Dominance Test Worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>2</u> (A) Total Number of Dominant Species Across All Strata: <u>3</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>66%</u> (A/B)
2. <u>PSMB</u>	<u>10%</u>	<u>Y</u>	<u>FACU</u>	
3. _____	_____	_____	_____	Prevalence Index worksheet: Total % Cover of: _____ Multiply by: OBL species _____ x1 = _____ FACW species _____ x2 = _____ FAC species _____ x3 = _____ FACU species _____ x4 = _____ UPL species _____ x5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____
4. _____	_____	_____	_____	
50% = _____, 20% = _____ = Total Cover				
Sapling/Shrub Stratum (Plot size: 15')				
1. <u>RUDE</u>	<u>50%</u>	<u>Y</u>	<u>FAC</u>	Hydrophytic Vegetation Indicators: <input type="checkbox"/> 1 – Rapid Test for Hydrophytic Vegetation <input checked="" type="checkbox"/> 2 – Dominance Test is >50% <input type="checkbox"/> 3 – Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> 4 – Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> 5 – Wetland Non-Vascular Plants ¹ <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
2. <u>RONU</u>	<u>20%</u>	<u>N</u>	<u>FAC</u>	
3. <u>Scotch banyan</u>	<u>20%</u>	<u>N</u>	<u>FACU</u>	Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	Remarks:
50% = _____, 20% = _____ = Total Cover				
Herb Stratum (Plot size: 5')				
1. _____	_____	_____	_____	Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	Remarks:
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	Remarks:
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	Remarks:
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	Remarks:
10. _____	_____	_____	_____	
11. _____	_____	_____	_____	Remarks:
50% = _____, 20% = _____ = Total Cover				
Woody Vine Stratum (Plot size: _____)				
1. _____	_____	_____	_____	Remarks:
2. _____	_____	_____	_____	
50% = _____, 20% = _____ = Total Cover				
% Bare Ground in Herb Stratum _____				

Project Site: _____

Sampling Point: SP4

SOIL

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		

¹Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. ²Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> 2 cm Muck (A10)
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Stripped Matrix (S6)	<input type="checkbox"/> Red Parent Material (TF2)
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Loamy Mucky Mineral (F1) (except MLRA 1)	<input type="checkbox"/> Very Shallow Dark Surface (TF12)
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	<input checked="" type="checkbox"/> Other (Explain in Remarks)
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Depleted Matrix (F3)	
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Redox Dark Surface (F6)	
<input type="checkbox"/> Sandy Mucky Mineral (S1)	<input type="checkbox"/> Depleted Dark Surface (F7)	
<input type="checkbox"/> Sandy Gleyed Matrix (S4)	<input type="checkbox"/> Redox Depressions (F8)	

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):
 Type: Fillslope/Rede
 Depth (inches): Surface

Hydric Soils Present? Yes No

Remarks:
Plot @ fillslope of paved area

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)	Secondary Indicators (2 or more required)
<input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B) <input type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Saturation (A3) <input type="checkbox"/> Salt Crust (B11) <input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Aquatic Invertebrates (B13) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Oxidized Rhizospheres along Living Roots (C3) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Stunted or Stresses Plants (D1) (LRR A) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input type="checkbox"/> Other (Explain in Remarks) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)	<input type="checkbox"/> Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> FAC-Neutral Test (D5) <input type="checkbox"/> Raised Ant Mounds (D6) (LRR A) <input type="checkbox"/> Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Depth (inches): _____	Wetland Hydrology Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Water Table Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Depth (inches): _____	
Saturation Present? (includes capillary fringe) Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Depth (inches): _____	

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

MAUL FOSTER ALONGI

GRAYS HARBOR HISTORICAL SEAPORT AUTHORITY CRITICAL AREAS REPORT

APPENDIX D: WETLAND RATING FORM

DRAFT

Wetland name or number A

RATING SUMMARY – Western Washington

Name of wetland (or ID #): Wetland A - Chehalis River Date of site visit: 9/3/19
 Rated by Walker Trained by Ecology? Yes No Date of training 2014
 HGM Class used for rating Riverine Wetland has multiple HGM classes? Y N

NOTE: Form is not complete without the figures requested (figures can be combined).
 Source of base aerial photo/map Google Earth

OVERALL WETLAND CATEGORY III (based on functions or special characteristics)

1. Category of wetland based on FUNCTIONS

- Category I – Total score = 23 - 27
 Category II – Total score = 20 - 22
 Category III – Total score = 16 - 19
 Category IV – Total score = 9 - 15

FUNCTION	Improving Water Quality	Hydrologic	Habitat	
<i>Circle the appropriate ratings</i>				
Site Potential	H (M) L	H (M) L	H M (L)	
Landscape Potential	(H) M L	(H) M L	H M (L)	
Value	(H) M L	H M (L)	H (M) L	TOTAL
Score Based on Ratings	8	6	4	18

Score for each function based on three ratings (order of ratings is not important)

- 9 = H,H,H
- 8 = H,H,M
- 7 = H,H,L
- 7 = H,M,M
- 6 = H,M,L
- 6 = M,M,M
- 5 = H,L,L
- 5 = M,M,L
- 4 = M,L,L
- 3 = L,L,L

2. Category based on SPECIAL CHARACTERISTICS of wetland

CHARACTERISTIC	CATEGORY
Estuarine	I II
Wetland of High Conservation Value	I
Bog	I
Mature Forest	I
Old Growth Forest	I
Coastal Lagoon	I II
Interdunal	I II III IV
None of the above	I

Wetland name or number A

Maps and figures required to answer questions correctly for Western Washington

Depressional Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	D 1.3, H 1.1, H 1.4	1
Hydroperiods	D 1.4, H 1.2	1
Location of outlet (<i>can be added to map of hydroperiods</i>)	D 1.1, D 4.1	1
Boundary of area within 150 ft of the wetland (<i>can be added to another figure</i>)	D 2.2, D 5.2	1
Map of the contributing basin	D 4.3, D 5.3	1
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	2
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	D 3.1, D 3.2	3
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	D 3.3	4

Riverine Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	H 1.1, H 1.4	
Hydroperiods	H 1.2	
Ponded depressions	R 1.1	
Boundary of area within 150 ft of the wetland (<i>can be added to another figure</i>)	R 2.4	
Plant cover of trees, shrubs, and herbaceous plants	R 1.2, R 4.2	
Width of unit vs. width of stream (<i>can be added to another figure</i>)	R 4.1	
Map of the contributing basin	R 2.2, R 2.3, R 5.2	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	R 3.1	
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	R 3.2, R 3.3	

Lake Fringe Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	L 1.1, L 4.1, H 1.1, H 1.4	
Plant cover of trees, shrubs, and herbaceous plants	L 1.2	
Boundary of area within 150 ft of the wetland (<i>can be added to another figure</i>)	L 2.2	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	L 3.1, L 3.2	
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	L 3.3	

Slope Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	H 1.1, H 1.4	
Hydroperiods	H 1.2	
Plant cover of dense trees, shrubs, and herbaceous plants	S 1.3	
Plant cover of dense, rigid trees, shrubs, and herbaceous plants (<i>can be added to figure above</i>)	S 4.1	
Boundary of 150 ft buffer (<i>can be added to another figure</i>)	S 2.1, S 5.1	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	S 3.1, S 3.2	
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	S 3.3	

HGM Classification of Wetlands in Western Washington

For questions 1-7, the criteria described must apply to the entire unit being rated.

If the hydrologic criteria listed in each question do not apply to the entire unit being rated, you probably have a unit with multiple HGM classes. In this case, identify which hydrologic criteria in questions 1-7 apply, and go to Question 8.

1. Are the water levels in the entire unit usually controlled by tides except during floods?

NO – go to 2

YES – the wetland class is **Tidal Fringe** – go to 1.1

- 1.1 Is the salinity of the water during periods of annual low flow below 0.5 ppt (parts per thousand)?

NO – Saltwater Tidal Fringe (Estuarine)

YES – Freshwater Tidal Fringe

*If your wetland can be classified as a Freshwater Tidal Fringe use the forms for **Riverine** wetlands. If it is Saltwater Tidal Fringe it is an **Estuarine** wetland and is not scored. This method **cannot** be used to score functions for estuarine wetlands.*

2. The entire wetland unit is flat and precipitation is the only source (>90%) of water to it. Groundwater and surface water runoff are NOT sources of water to the unit.

NO – go to 3

YES – The wetland class is **Flats**

*If your wetland can be classified as a Flats wetland, use the form for **Depressional** wetlands.*

3. Does the entire wetland unit **meet all** of the following criteria?

The vegetated part of the wetland is on the shores of a body of permanent open water (without any plants on the surface at any time of the year) at least 20 ac (8 ha) in size;

At least 30% of the open water area is deeper than 6.6 ft (2 m).

NO – go to 4

YES – The wetland class is **Lake Fringe** (Lacustrine Fringe)

4. Does the entire wetland unit **meet all** of the following criteria?

The wetland is on a slope (*slope can be very gradual*),

The water flows through the wetland in one direction (unidirectional) and usually comes from seeps. It may flow subsurface, as sheetflow, or in a swale without distinct banks,

The water leaves the wetland **without being impounded**.

NO – go to 5

YES – The wetland class is **Slope**

NOTE: Surface water does not pond in these type of wetlands except occasionally in very small and shallow depressions or behind hummocks (depressions are usually <3 ft diameter and less than 1 ft deep).

5. Does the entire wetland unit **meet all** of the following criteria?

The unit is in a valley, or stream channel, where it gets inundated by overbank flooding from that stream or river,

The overbank flooding occurs at least once every 2 years.

Wetland name or number A

NO – go to 6

YES – The wetland class is Riverine

NOTE: The Riverine unit can contain depressions that are filled with water when the river is not flooding

6. Is the entire wetland unit in a topographic depression in which water ponds, or is saturated to the surface, at some time during the year? *This means that any outlet, if present, is higher than the interior of the wetland.*

NO – go to 7

YES – The wetland class is Depressional

7. Is the entire wetland unit located in a very flat area with no obvious depression and no overbank flooding? The unit does not pond surface water more than a few inches. The unit seems to be maintained by high groundwater in the area. The wetland may be ditched, but has no obvious natural outlet.

NO – go to 8

YES – The wetland class is Depressional

8. Your wetland unit seems to be difficult to classify and probably contains several different HGM classes. For example, seeps at the base of a slope may grade into a riverine floodplain, or a small stream within a Depressional wetland has a zone of flooding along its sides. **GO BACK AND IDENTIFY WHICH OF THE HYDROLOGIC REGIMES DESCRIBED IN QUESTIONS 1-7 APPLY TO DIFFERENT AREAS IN THE UNIT** (make a rough sketch to help you decide). Use the following table to identify the appropriate class to use for the rating system if you have several HGM classes present within the wetland unit being scored.

NOTE: Use this table only if the class that is recommended in the second column represents 10% or more of the total area of the wetland unit being rated. If the area of the HGM class listed in column 2 is less than 10% of the unit; classify the wetland using the class that represents more than 90% of the total area.

HGM classes within the wetland unit being rated	HGM class to use in rating
Slope + Riverine	Riverine
Slope + Depressional	Depressional
Slope + Lake Fringe	Lake Fringe
Depressional + Riverine along stream within boundary of depression	Depressional
Depressional + Lake Fringe	Depressional
Riverine + Lake Fringe	Riverine
Salt Water Tidal Fringe and any other class of freshwater wetland	Treat as ESTUARINE

*If you are still unable to determine which of the above criteria apply to your wetland, or if you have **more than 2 HGM classes** within a wetland boundary, classify the wetland as Depressional for the rating.*

Wetland name or number A

RIVERINE AND FRESHWATER TIDAL FRINGE WETLANDS
Water Quality Functions - Indicators that the site functions to improve water quality

R 1.0. Does the site have the potential to improve water quality?		
R 1.1. Area of surface depressions within the Riverine wetland that can trap sediments during a flooding event:		
Depressions cover $> \frac{3}{4}$ area of wetland	points = 8	2
Depressions cover $> \frac{1}{2}$ area of wetland	points = 4	
Depressions present but cover $< \frac{1}{2}$ area of wetland	points = <u>2</u>	
No depressions present	points = 0	
R 1.2. Structure of plants in the wetland (areas with $> 90\%$ cover at person height, not Cowardin classes)		
Trees or shrubs $> \frac{2}{3}$ area of the wetland	points = 8	6
Trees or shrubs $> \frac{1}{3}$ area of the wetland	points = 6	
Herbaceous plants (> 6 in high) $> \frac{2}{3}$ area of the wetland	points = <u>6</u>	
Herbaceous plants (> 6 in high) $> \frac{1}{3}$ area of the wetland	points = 3	
Trees, shrubs, and ungrazed herbaceous $< \frac{1}{3}$ area of the wetland	points = 0	
Total for R 1	Add the points in the boxes above	8

Rating of Site Potential If score is: 12-16 = H ~~X~~ 6-11 = M 0-5 = L Record the rating on the first page

R 2.0. Does the landscape have the potential to support the water quality function of the site?		
R 2.1. Is the wetland within an incorporated city or within its UGA?	Yes = 2 No = 0	2
R 2.2. Does the contributing basin to the wetland include a UGA or incorporated area?	Yes = 1 No = 0	1
R 2.3. Does at least 10% of the contributing basin contain tilled fields, pastures, or forests that have been clearcut within the last 5 years?	Yes = 1 No = 0	1
R 2.4. Is $> 10\%$ of the area within 150 ft of the wetland in land uses that generate pollutants?	Yes = 1 No = 0	1
R 2.5. Are there other sources of pollutants coming into the wetland that are not listed in questions R 2.1-R 2.4 Other sources _____	Yes = 1 No = 0	0
Total for R 2	Add the points in the boxes above	5

Rating of Landscape Potential If score is: ~~X~~ 3-6 = H 1 or 2 = M 0 = L Record the rating on the first page

R 3.0. Is the water quality improvement provided by the site valuable to society?		
R 3.1. Is the wetland along a stream or river that is on the 303(d) list or on a tributary that drains to one within 1 mi?	Yes = 1 No = 0	0
R 3.2. Is the wetland along a stream or river that has TMDL limits for nutrients, toxics, or pathogens?	Yes = <u>1</u> No = 0	1
R 3.3. Has the site been identified in a watershed or local plan as important for maintaining water quality? (answer YES if there is a TMDL for the drainage in which the unit is found)	Yes = <u>2</u> No = 0	2
Total for R 3	Add the points in the boxes above	3

Rating of Value If score is: ~~X~~ 2-4 = H 1 = M 0 = L Record the rating on the first page

Wetland name or number A

RIVERINE AND FRESHWATER TIDAL FRINGE WETLANDS
Hydrologic Functions - Indicators that site functions to reduce flooding and stream erosion

R 4.0. Does the site have the potential to reduce flooding and erosion?		
R 4.1. Characteristics of the overbank storage the wetland provides: <i>Estimate the average width of the wetland perpendicular to the direction of the flow and the width of the stream or river channel (distance between banks). Calculate the ratio: (average width of wetland)/(average width of stream between banks).</i> If the ratio is more than 20 If the ratio is 10-20 If the ratio is 5-<10 If the ratio is 1-<5 If the ratio is < 1	points = 9 points = 6 points = 4 points = 2 points = 1	/
R 4.2. Characteristics of plants that slow down water velocities during floods: <i>Treat large woody debris as forest or shrub. Choose the points appropriate for the best description (polygons need to have >90% cover at person height. These are NOT Cowardin classes).</i> Forest or shrub for > ¹ / ₃ area OR emergent plants > ² / ₃ area Forest or shrub for > ¹ / ₁₀ area OR emergent plants > ¹ / ₃ area Plants do not meet above criteria	points = 7 points = 4 points = 0	7
Total for R 4	Add the points in the boxes above	8

Rating of Site Potential If score is: 12-16 = H ~~6-11 = M~~ 0-5 = L *Record the rating on the first page*

R 5.0. Does the landscape have the potential to support the hydrologic functions of the site?

R 5.1. Is the stream or river adjacent to the wetland downcut?	Yes = 0 No = 1	/
R 5.2. Does the up-gradient watershed include a UGA or incorporated area?	Yes = 1 No = 0	/
R 5.3. Is the up-gradient stream or river controlled by dams?	Yes = 0 No = 1	/
Total for R 5	Add the points in the boxes above	3

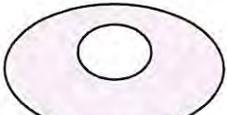
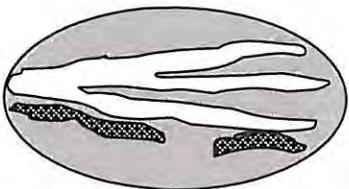
Rating of Landscape Potential If score is: ~~3 = H~~ 1 or 2 = M 0 = L *Record the rating on the first page*

R 6.0. Are the hydrologic functions provided by the site valuable to society?

R 6.1. Distance to the nearest areas downstream that have flooding problems? <i>Choose the description that best fits the site.</i> The sub-basin immediately down-gradient of the wetland has flooding problems that result in damage to human or natural resources (e.g., houses or salmon redds) Surface flooding problems are in a sub-basin farther down-gradient No flooding problems anywhere downstream	points = 2 points = 1 points = 0	∅
R 6.2. Has the site been identified as important for flood storage or flood conveyance in a regional flood control plan?	Yes = 2 No = 0	∅
Total for R 6	Add the points in the boxes above	∅

Rating of Value If score is: 2-4 = H 1 = M ~~0 = L~~ *Record the rating on the first page*

Wetland name or number A

These questions apply to wetlands of all HGM classes.	
HABITAT FUNCTIONS - Indicators that site functions to provide important habitat	
H 1.0. Does the site have the potential to provide habitat?	
<p>H 1.1. Structure of plant community: <i>Indicators are Cowardin classes and strata within the Forested class.</i> Check the Cowardin plant classes in the wetland. <i>Up to 10 patches may be combined for each class to meet the threshold of ¼ ac or more than 10% of the unit if it is smaller than 2.5 ac. Add the number of structures checked.</i></p> <p><input type="checkbox"/> Aquatic bed 4 structures or more: points = 4</p> <p><input checked="" type="checkbox"/> Emergent 3 structures: points = 2</p> <p><input type="checkbox"/> Scrub-shrub (areas where shrubs have > 30% cover) 2 structures: points = 1</p> <p><input type="checkbox"/> Forested (areas where trees have > 30% cover) 1 structure: points = 0</p> <p><i>If the unit has a Forested class, check if:</i></p> <p><input type="checkbox"/> The Forested class has 3 out of 5 strata (canopy, sub-canopy, shrubs, herbaceous, moss/ground-cover) that each cover 20% within the Forested polygon</p>	3
<p>H 1.2. Hydroperiods</p> <p>Check the types of water regimes (hydroperiods) present within the wetland. The water regime has to cover more than 10% of the wetland or ¼ ac to count (<i>see text for descriptions of hydroperiods</i>).</p> <p><input type="checkbox"/> Permanently flooded or inundated 4 or more types present: points = 3</p> <p><input type="checkbox"/> Seasonally flooded or inundated 3 types present: points = 2</p> <p><input type="checkbox"/> Occasionally flooded or inundated 2 types present: points = 1</p> <p><input type="checkbox"/> Saturated only 1 type present: points = 0</p> <p><input type="checkbox"/> Permanently flowing stream or river in, or adjacent to, the wetland</p> <p><input type="checkbox"/> Seasonally flowing stream in, or adjacent to, the wetland</p> <p><input type="checkbox"/> Lake Fringe wetland 2 points</p> <p><input checked="" type="checkbox"/> Freshwater tidal wetland 2 points</p>	2
<p>H 1.3. Richness of plant species</p> <p>Count the number of plant species in the wetland that cover at least 10 ft². <i>Different patches of the same species can be combined to meet the size threshold and you do not have to name the species. Do not include Eurasian milfoil, reed canarygrass, purple loosestrife, Canadian thistle</i></p> <p>If you counted: > 19 species points = 2</p> <p>5 - 19 species points = 1</p> <p>< 5 species points = 0</p>	1
<p>H 1.4. Interspersion of habitats</p> <p>Decide from the diagrams below whether interspersion among Cowardin plants classes (described in H 1.1), or the classes and unvegetated areas (can include open water or mudflats) is high, moderate, low, or none. <i>If you have four or more plant classes or three classes and open water, the rating is always high.</i></p> <div style="display: flex; justify-content: space-around; align-items: flex-end;"> <div style="text-align: center;">  <p>None = 0 points</p> </div> <div style="text-align: center;">  <p>Low = 1 point</p> </div> <div style="text-align: center;">  <p>Moderate = 2 points</p> </div> </div> <div style="display: flex; justify-content: space-around; align-items: flex-end; margin-top: 20px;"> <div style="text-align: center;">  </div> <div style="text-align: center;">  </div> <div style="text-align: center;">  </div> </div> <p>All three diagrams in this row are HIGH = 3 points</p>	3

Wetland name or number A

3

<p>H 1.5. Special habitat features:</p> <p>Check the habitat features that are present in the wetland. <i>The number of checks is the number of points.</i></p> <p><input checked="" type="checkbox"/> Large, downed, woody debris within the wetland (> 4 in diameter and 6 ft long).</p> <p><input type="checkbox"/> Standing snags (dbh > 4 in) within the wetland</p> <p><input type="checkbox"/> Undercut banks are present for at least 6.6 ft (2 m) and/or overhanging plants extends at least 3.3 ft (1 m) over a stream (or ditch) in, or contiguous with the wetland, for at least 33 ft (10 m)</p> <p><input type="checkbox"/> Stable steep banks of fine material that might be used by beaver or muskrat for denning (> 30 degree slope) OR signs of recent beaver activity are present (<i>cut shrubs or trees that have not yet weathered where wood is exposed</i>)</p> <p><input checked="" type="checkbox"/> At least 1/4 ac of thin-stemmed persistent plants or woody branches are present in areas that are permanently or seasonally inundated (<i>structures for egg-laying by amphibians</i>)</p> <p><input checked="" type="checkbox"/> Invasive plants cover less than 25% of the wetland area in every stratum of plants (<i>see H 1.1 for list of strata</i>)</p>		3
Total for H 1	Add the points in the boxes above	6

Rating of Site Potential If score is: 15-18 = H 7-14 = M ~~0-6 = L~~ Record the rating on the first page

<p>H 2.0. Does the landscape have the potential to support the habitat functions of the site?</p>		
<p>H 2.1. Accessible habitat (include <i>only habitat that directly abuts wetland unit</i>).</p> <p>Calculate: $10 - 25\%$ % undisturbed habitat + [(% moderate and low intensity land uses)/2] = $10/20\%$</p> <p>If total accessible habitat is:</p> <p>> 1/3 (33.3%) of 1 km Polygon points = 3</p> <p>20-33% of 1 km Polygon points = 2</p> <p>10-19% of 1 km Polygon points = 1</p> <p>< 10% of 1 km Polygon = River area points = 0</p>	1	
<p>H 2.2. Undisturbed habitat in 1 km Polygon around the wetland.</p> <p>Calculate: 10% % undisturbed habitat + [(% moderate and low intensity land uses)/2] = 10% %</p> <p>Undisturbed habitat > 50% of Polygon points = 3</p> <p>Undisturbed habitat 10-50% and in 1-3 patches points = 2</p> <p>Undisturbed habitat 10-50% and > 3 patches points = 1</p> <p>Undisturbed habitat < 10% of 1 km Polygon points = 0</p>	1	
<p>H 2.3. Land use intensity in 1 km Polygon: If</p> <p>> 50% of 1 km Polygon is high intensity land use points = (-2)</p> <p>≤ 50% of 1 km Polygon is high intensity points = 0</p>	-2	
Total for H 2	Add the points in the boxes above	0

Rating of Landscape Potential If score is: 4-6 = H 1-3 = M ~~0-1 = L~~ Record the rating on the first page

<p>H 3.0. Is the habitat provided by the site valuable to society?</p>	
<p>H 3.1. Does the site provide habitat for species valued in laws, regulations, or policies? <i>Choose only the highest score that applies to the wetland being rated.</i></p> <p>Site meets ANY of the following criteria: points = 2</p> <ul style="list-style-type: none"> <input type="checkbox"/> It has 3 or more priority habitats within 100 m (see next page) <input type="checkbox"/> It provides habitat for Threatened or Endangered species (any plant or animal on the state or federal lists) <input type="checkbox"/> It is mapped as a location for an individual WDFW priority species <input type="checkbox"/> It is a Wetland of High Conservation Value as determined by the Department of Natural Resources <input type="checkbox"/> It has been categorized as an important habitat site in a local or regional comprehensive plan, in a Shoreline Master Plan, or in a watershed plan <p>Site has 1 or 2 priority habitats (listed on next page) within 100 m points = 1</p> <p>Site does not meet any of the criteria above points = 0</p>	1

Rating of Value If score is: 2 = H ~~1 = M~~ 0 = L Record the rating on the first page

Wetland name or number A

WDFW Priority Habitats

Priority habitats listed by WDFW (see complete descriptions of WDFW priority habitats, and the counties in which they can be found, in: Washington Department of Fish and Wildlife. 2008. Priority Habitat and Species List. Olympia, Washington. 177 pp. <http://wdfw.wa.gov/publications/00165/wdfw00165.pdf> or access the list from here: <http://wdfw.wa.gov/conservation/phs/list/>)

Count how many of the following priority habitats are within 330 ft (100 m) of the wetland unit: **NOTE:** This question is independent of the land use between the wetland unit and the priority habitat.

- **Aspen Stands:** Pure or mixed stands of aspen greater than 1 ac (0.4 ha).
- **Biodiversity Areas and Corridors:** Areas of habitat that are relatively important to various species of native fish and wildlife (full descriptions in WDFW PHS report).
- **Herbaceous Balds:** Variable size patches of grass and forbs on shallow soils over bedrock.
- **Old-growth/Mature forests:** Old-growth west of Cascade crest – Stands of at least 2 tree species, forming a multi-layered canopy with occasional small openings; with at least 8 trees/ac (20 trees/ha) > 32 in (81 cm) dbh or > 200 years of age. Mature forests – Stands with average diameters exceeding 21 in (53 cm) dbh; crown cover may be less than 100%; decay, decadence, numbers of snags, and quantity of large downed material is generally less than that found in old-growth; 80-200 years old west of the Cascade crest.
- **Oregon White Oak:** Woodland stands of pure oak or oak/conifer associations where canopy coverage of the oak component is important (full descriptions in WDFW PHS report p. 158 – see web link above).
- Riparian:** The area adjacent to aquatic systems with flowing water that contains elements of both aquatic and terrestrial ecosystems which mutually influence each other.
- **Westside Prairies:** Herbaceous, non-forested plant communities that can either take the form of a dry prairie or a wet prairie (full descriptions in WDFW PHS report p. 161 – see web link above).
- Instream:** The combination of physical, biological, and chemical processes and conditions that interact to provide functional life history requirements for instream fish and wildlife resources.
- **Nearshore:** Relatively undisturbed nearshore habitats. These include Coastal Nearshore, Open Coast Nearshore, and Puget Sound Nearshore. (full descriptions of habitats and the definition of relatively undisturbed are in WDFW report – see web link on previous page).
- **Caves:** A naturally occurring cavity, recess, void, or system of interconnected passages under the earth in soils, rock, ice, or other geological formations and is large enough to contain a human.
- **Cliffs:** Greater than 25 ft (7.6 m) high and occurring below 5000 ft elevation.
- **Talus:** Homogenous areas of rock rubble ranging in average size 0.5 - 6.5 ft (0.15 - 2.0 m), composed of basalt, andesite, and/or sedimentary rock, including riprap slides and mine tailings. May be associated with cliffs.
- **Snags and Logs:** Trees are considered snags if they are dead or dying and exhibit sufficient decay characteristics to enable cavity excavation/use by wildlife. Priority snags have a diameter at breast height of > 20 in (51 cm) in western Washington and are > 6.5 ft (2 m) in height. Priority logs are > 12 in (30 cm) in diameter at the largest end, and > 20 ft (6 m) long.

Note: All vegetated wetlands are by definition a priority habitat but are not included in this list because they are addressed elsewhere.

Wetland name or number A

CATEGORIZATION BASED ON SPECIAL CHARACTERISTICS

Wetland Type	Category
<i>Check off any criteria that apply to the wetland. Circle the category when the appropriate criteria are met.</i>	
SC 1.0. Estuarine wetlands Does the wetland meet the following criteria for Estuarine wetlands? — The dominant water regime is tidal, — Vegetated, and — With a salinity greater than 0.5 ppt	
Yes – Go to SC 1.1 No = Not an estuarine wetland	
SC 1.1. Is the wetland within a National Wildlife Refuge, National Park, National Estuary Reserve, Natural Area Preserve, State Park or Educational, Environmental, or Scientific Reserve designated under WAC 332-30-151?	Cat. I
Yes = Category I No - Go to SC 1.2	
SC 1.2. Is the wetland unit at least 1 ac in size and meets at least two of the following three conditions? — The wetland is relatively undisturbed (has no diking, ditching, filling, cultivation, grazing, and has less than 10% cover of non-native plant species. (If non-native species are <i>Spartina</i> , see page 25) — At least ¾ of the landward edge of the wetland has a 100 ft buffer of shrub, forest, or un-grazed or un-mowed grassland. — The wetland has at least two of the following features: tidal channels, depressions with open water, or contiguous freshwater wetlands.	Cat. I Cat. II
Yes = Category I No = Category II	
SC 2.0. Wetlands of High Conservation Value (WHCV) SC 2.1. Has the WA Department of Natural Resources updated their website to include the list of Wetlands of High Conservation Value?	Cat. I
Yes – Go to SC 2.2 No – Go to SC 2.3	
SC 2.2. Is the wetland listed on the WDNR database as a Wetland of High Conservation Value?	Cat. I
Yes = Category I No = Not a WHCV	
SC 2.3. Is the wetland in a Section/Township/Range that contains a Natural Heritage wetland? http://www1.dnr.wa.gov/nhp/refdesk/datasearch/wnhpwetlands.pdf	Cat. I
Yes – Contact WNHP/WDNR and go to SC 2.4 No = Not a WHCV	
SC 2.4. Has WDNR identified the wetland within the S/T/R as a Wetland of High Conservation Value and listed it on their website?	Cat. I
Yes = Category I No = Not a WHCV	
SC 3.0. Bogs Does the wetland (or any part of the unit) meet both the criteria for soils and vegetation in bogs? <i>Use the key below. If you answer YES you will still need to rate the wetland based on its functions.</i>	
SC 3.1. Does an area within the wetland unit have organic soil horizons, either peats or mucks, that compose 16 in or more of the first 32 in of the soil profile?	Cat. I
Yes – Go to SC 3.3 No – Go to SC 3.2	
SC 3.2. Does an area within the wetland unit have organic soils, either peats or mucks, that are less than 16 in deep over bedrock, or an impermeable hardpan such as clay or volcanic ash, or that are floating on top of a lake or pond?	Cat. I
Yes – Go to SC 3.3 No = Is not a bog	
SC 3.3. Does an area with peats or mucks have more than 70% cover of mosses at ground level, AND at least a 30% cover of plant species listed in Table 4?	Cat. I
Yes = Is a Category I bog No – Go to SC 3.4	
NOTE: If you are uncertain about the extent of mosses in the understory, you may substitute that criterion by measuring the pH of the water that seeps into a hole dug at least 16 in deep. If the pH is less than 5.0 and the plant species in Table 4 are present, the wetland is a bog.	
SC 3.4. Is an area with peats or mucks forested (> 30% cover) with Sitka spruce, subalpine fir, western red cedar, western hemlock, lodgepole pine, quaking aspen, Engelmann spruce, or western white pine, AND any of the species (or combination of species) listed in Table 4 provide more than 30% of the cover under the canopy?	Cat. I
Yes = Is a Category I bog No = Is not a bog	

Wetland name or number A

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Wetland name or number B-1

RATING SUMMARY – Western Washington

Name of wetland (or ID #): Wetland B-1 - Shannon Slough Date of site visit: 9/3/19
 Rated by Waltke Trained by Ecology? Yes No Date of training 2014
 HGM Class used for rating Riverine Wetland has multiple HGM classes? Y N

NOTE: Form is not complete without the figures requested (figures can be combined).

Source of base aerial photo/map Google Earth

OVERALL WETLAND CATEGORY III (based on functions L or special characteristics)

1. Category of wetland based on FUNCTIONS

- Category I – Total score = 23 - 27
 Category II – Total score = 20 - 22
 Category III – Total score = 16 - 19
 Category IV – Total score = 9 - 15

FUNCTION	Improving Water Quality	Hydrologic	Habitat	
<i>Circle the appropriate ratings</i>				
Site Potential	H <u>M</u> L	H <u>M</u> L	H M <u>L</u>	
Landscape Potential	<u>H</u> M L	<u>H</u> M L	H M <u>L</u>	
Value	<u>H</u> M L	H M <u>L</u>	H <u>M</u> L	TOTAL
Score Based on Ratings	<u>8</u>	<u>6</u>	<u>4</u>	<u>18</u>

Score for each function based on three ratings (order of ratings is not important)

- 9 = H,H,H
- 8 = H,H,M
- 7 = H,H,L
- 7 = H,M,M
- 6 = H,M,L
- 6 = M,M,M
- 5 = H,L,L
- 5 = M,M,L
- 4 = M,L,L
- 3 = L,L,L

2. Category based on SPECIAL CHARACTERISTICS of wetland

CHARACTERISTIC	CATEGORY
Estuarine	I II
Wetland of High Conservation Value	I
Bog	I
Mature Forest	I
Old Growth Forest	I
Coastal Lagoon	I II
Interdunal	I II III IV
None of the above	<u>X</u>

Wetland name or number B-1

Maps and figures required to answer questions correctly for Western Washington

Depressional Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	D 1.3, H 1.1, H 1.4	1
Hydroperiods	D 1.4, H 1.2	1
Location of outlet (<i>can be added to map of hydroperiods</i>)	D 1.1, D 4.1	1
Boundary of area within 150 ft of the wetland (<i>can be added to another figure</i>)	D 2.2, D 5.2	1
Map of the contributing basin	D 4.3, D 5.3	1
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	2
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	D 3.1, D 3.2	3
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	D 3.3	4

Riverine Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	H 1.1, H 1.4	
Hydroperiods	H 1.2	
Ponded depressions	R 1.1	
Boundary of area within 150 ft of the wetland (<i>can be added to another figure</i>)	R 2.4	
Plant cover of trees, shrubs, and herbaceous plants	R 1.2, R 4.2	
Width of unit vs. width of stream (<i>can be added to another figure</i>)	R 4.1	
Map of the contributing basin	R 2.2, R 2.3, R 5.2	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	R 3.1	
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	R 3.2, R 3.3	

Lake Fringe Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	L 1.1, L 4.1, H 1.1, H 1.4	
Plant cover of trees, shrubs, and herbaceous plants	L 1.2	
Boundary of area within 150 ft of the wetland (<i>can be added to another figure</i>)	L 2.2	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	L 3.1, L 3.2	
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	L 3.3	

Slope Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	H 1.1, H 1.4	
Hydroperiods	H 1.2	
Plant cover of dense trees, shrubs, and herbaceous plants	S 1.3	
Plant cover of dense, rigid trees, shrubs, and herbaceous plants (<i>can be added to figure above</i>)	S 4.1	
Boundary of 150 ft buffer (<i>can be added to another figure</i>)	S 2.1, S 5.1	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	S 3.1, S 3.2	
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	S 3.3	

Wetland name or number B-1

NO – go to 6

YES – The wetland class is Riverine

NOTE: The Riverine unit can contain depressions that are filled with water when the river is not flooding

6. Is the entire wetland unit in a topographic depression in which water ponds, or is saturated to the surface, at some time during the year? *This means that any outlet, if present, is higher than the interior of the wetland.*

NO – go to 7

YES – The wetland class is Depressional

7. Is the entire wetland unit located in a very flat area with no obvious depression and no overbank flooding? The unit does not pond surface water more than a few inches. The unit seems to be maintained by high groundwater in the area. The wetland may be ditched, but has no obvious natural outlet.

NO – go to 8

YES – The wetland class is Depressional

8. Your wetland unit seems to be difficult to classify and probably contains several different HGM classes. For example, seeps at the base of a slope may grade into a riverine floodplain, or a small stream within a Depressional wetland has a zone of flooding along its sides. **GO BACK AND IDENTIFY WHICH OF THE HYDROLOGIC REGIMES DESCRIBED IN QUESTIONS 1-7 APPLY TO DIFFERENT AREAS IN THE UNIT** (make a rough sketch to help you decide). Use the following table to identify the appropriate class to use for the rating system if you have several HGM classes present within the wetland unit being scored.

NOTE: Use this table only if the class that is recommended in the second column represents 10% or more of the total area of the wetland unit being rated. If the area of the HGM class listed in column 2 is less than 10% of the unit; classify the wetland using the class that represents more than 90% of the total area.

HGM classes within the wetland unit being rated	HGM class to use in rating
Slope + Riverine	Riverine
Slope + Depressional	Depressional
Slope + Lake Fringe	Lake Fringe
Depressional + Riverine along stream within boundary of depression	Depressional
Depressional + Lake Fringe	Depressional
Riverine + Lake Fringe	Riverine
Salt Water Tidal Fringe and any other class of freshwater wetland	Treat as ESTUARINE

*If you are still unable to determine which of the above criteria apply to your wetland, or if you have **more than 2 HGM classes** within a wetland boundary, classify the wetland as Depressional for the rating.*

Wetland name or number B-1

RIVERINE AND FRESHWATER TIDAL FRINGE WETLANDS		
Water Quality Functions - Indicators that the site functions to improve water quality		
R 1.0. Does the site have the potential to improve water quality?		
R 1.1. Area of surface depressions within the Riverine wetland that can trap sediments during a flooding event:		
Depressions cover $> \frac{3}{4}$ area of wetland	points = 8	2
Depressions cover $> \frac{1}{2}$ area of wetland	points = 4	
Depressions present but cover $< \frac{1}{2}$ area of wetland	points = 2	
No depressions present	points = 0	
R 1.2. Structure of plants in the wetland (areas with $> 90\%$ cover at person height, not Cowardin classes)		
Trees or shrubs $> \frac{2}{3}$ area of the wetland	points = 8	6
Trees or shrubs $> \frac{1}{3}$ area of the wetland	points = 6	
Herbaceous plants (> 6 in high) $> \frac{2}{3}$ area of the wetland	points = 6	
Herbaceous plants (> 6 in high) $> \frac{1}{3}$ area of the wetland	points = 3	
Trees, shrubs, and ungrazed herbaceous $< \frac{1}{3}$ area of the wetland	points = 0	
Total for R 1	Add the points in the boxes above	8

Rating of Site Potential If score is: 12-16 = H ~~6-11 = M~~ 0-5 = L

Record the rating on the first page

R 2.0. Does the landscape have the potential to support the water quality function of the site?		
R 2.1. Is the wetland within an incorporated city or within its UGA?	Yes = 2 No = 0	2
R 2.2. Does the contributing basin to the wetland include a UGA or incorporated area?	Yes = 1 No = 0	1
R 2.3. Does at least 10% of the contributing basin contain tilled fields, pastures, or forests that have been clearcut within the last 5 years?	Yes = 1 No = 0	1
R 2.4. Is $> 10\%$ of the area within 150 ft of the wetland in land uses that generate pollutants?	Yes = 1 No = 0	1
R 2.5. Are there other sources of pollutants coming into the wetland that are not listed in questions R 2.1-R 2.4 Other sources _____	Yes = 1 No = 0	0
Total for R 2	Add the points in the boxes above	5

Rating of Landscape Potential If score is: ~~3-6 = H~~ 1 or 2 = M 0 = L

Record the rating on the first page

R 3.0. Is the water quality improvement provided by the site valuable to society?		
R 3.1. Is the wetland along a stream or river that is on the 303(d) list or on a tributary that drains to one within 1 mi?	Yes = 1 No = 0	0
R 3.2. Is the wetland along a stream or river that has TMDL limits for nutrients, toxics, or pathogens?	Yes = 1 No = 0	1
R 3.3. Has the site been identified in a watershed or local plan as important for maintaining water quality? (answer YES if there is a TMDL for the drainage in which the unit is found) ✓	Yes = 2 No = 0	2
Total for R 3	Add the points in the boxes above	3

Rating of Value If score is: ~~2-4 = H~~ 1 = M 0 = L

Record the rating on the first page

Wetland name or number B-1

RIVERINE AND FRESHWATER TIDAL FRINGE WETLANDS
Hydrologic Functions - Indicators that site functions to reduce flooding and stream erosion

R 4.0. Does the site have the potential to reduce flooding and erosion?		
<p>R 4.1. Characteristics of the overbank storage the wetland provides: <i>Estimate the average width of the wetland perpendicular to the direction of the flow and the width of the stream or river channel (distance between banks). Calculate the ratio: (average width of wetland)/(average width of stream between banks).</i></p> <p>If the ratio is more than 20 points = 9 If the ratio is 10-20 points = 6 If the ratio is 5-<10 points = 4 If the ratio is 1-<5 points = 2 If the ratio is < 1 points = <u>1</u></p>	1	
<p>R 4.2. Characteristics of plants that slow down water velocities during floods: <i>Treat large woody debris as forest or shrub. Choose the points appropriate for the best description (polygons need to have >90% cover at person height. These are NOT Cowardin classes).</i></p> <p>Forest or shrub for >¹/₃ area OR emergent plants >²/₃ area points = <u>7</u> Forest or shrub for >¹/₁₀ area OR emergent plants >¹/₃ area points = 4 Plants do not meet above criteria points = 0</p>	8	
<p>Total for R 4 Add the points in the boxes above</p>		9

Rating of Site Potential If score is: 12-16 = H 6-11 = M 0-5 = L *Record the rating on the first page*

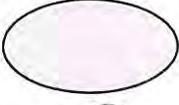
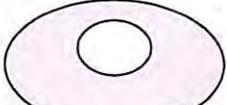
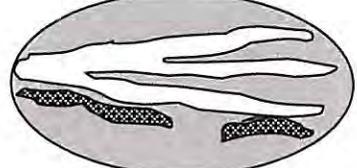
R 5.0. Does the landscape have the potential to support the hydrologic functions of the site?		
R 5.1. Is the stream or river adjacent to the wetland downcut?	Yes = 0 No = <u>1</u>	1
R 5.2. Does the up-gradient watershed include a UGA or incorporated area?	Yes = <u>1</u> No = 0	1
R 5.3. Is the up-gradient stream or river controlled by dams?	Yes = 0 No = <u>1</u>	1
<p>Total for R 5 Add the points in the boxes above</p>		3

Rating of Landscape Potential If score is: 3 = H 1 or 2 = M 0 = L *Record the rating on the first page*

R 6.0. Are the hydrologic functions provided by the site valuable to society?		
<p>R 6.1. Distance to the nearest areas downstream that have flooding problems? <i>Choose the description that best fits the site.</i></p> <p>The sub-basin immediately down-gradient of the wetland has flooding problems that result in damage to human or natural resources (e.g., houses or salmon redds) points = 2 Surface flooding problems are in a sub-basin farther down-gradient points = 1 No flooding problems anywhere downstream points = <u>0</u></p>	0	
<p>R 6.2. Has the site been identified as important for flood storage or flood conveyance in a regional flood control plan?</p> <p>Yes = 2 No = <u>0</u></p>	0	
<p>Total for R 6 Add the points in the boxes above</p>		0

Rating of Value If score is: 2-4 = H 1 = M 0 = L *Record the rating on the first page*

Wetland name or number B-1

These questions apply to wetlands of all HGM classes.	
HABITAT FUNCTIONS - Indicators that site functions to provide important habitat	
H 1.0. Does the site have the potential to provide habitat?	
<p>H 1.1. Structure of plant community: <i>Indicators are Cowardin classes and strata within the Forested class. Check the Cowardin plant classes in the wetland. Up to 10 patches may be combined for each class to meet the threshold of ¼ ac or more than 10% of the unit if it is smaller than 2.5 ac. Add the number of structures checked.</i></p> <p><input type="checkbox"/> Aquatic bed 4 structures or more: points = 4</p> <p><input checked="" type="checkbox"/> Emergent 3 structures: points = 2</p> <p><input type="checkbox"/> Scrub-shrub (areas where shrubs have > 30% cover) 2 structures: points = 1</p> <p><input type="checkbox"/> Forested (areas where trees have > 30% cover) 1 structure: points = 0</p> <p><i>If the unit has a Forested class, check if:</i></p> <p><input type="checkbox"/> The Forested class has 3 out of 5 strata (canopy, sub-canopy, shrubs, herbaceous, moss/ground-cover) that each cover 20% within the Forested polygon</p>	0
<p>H 1.2. Hydroperiods</p> <p>Check the types of water regimes (hydroperiods) present within the wetland. The water regime has to cover more than 10% of the wetland or ¼ ac to count (<i>see text for descriptions of hydroperiods</i>).</p> <p><input type="checkbox"/> Permanently flooded or inundated 4 or more types present: points = 3</p> <p><input type="checkbox"/> Seasonally flooded or inundated 3 types present: points = 2</p> <p><input type="checkbox"/> Occasionally flooded or inundated 2 types present: points = 1</p> <p><input type="checkbox"/> Saturated only 1 type present: points = 0</p> <p><input type="checkbox"/> Permanently flowing stream or river in, or adjacent to, the wetland</p> <p><input type="checkbox"/> Seasonally flowing stream in, or adjacent to, the wetland</p> <p><input type="checkbox"/> Lake Fringe wetland 2 points</p> <p><input checked="" type="checkbox"/> Freshwater tidal wetland 2 points</p>	2
<p>H 1.3. Richness of plant species</p> <p>Count the number of plant species in the wetland that cover at least 10 ft². <i>Different patches of the same species can be combined to meet the size threshold and you do not have to name the species. Do not include Eurasian milfoil, reed canarygrass, purple loosestrife, Canadian thistle</i></p> <p>If you counted: > 19 species points = 2</p> <p>5 - 19 species points = 1</p> <p>< 5 species points = 0</p>	1
<p>H 1.4. Interspersion of habitats</p> <p>Decide from the diagrams below whether interspersion among Cowardin plants classes (described in H 1.1), or the classes and unvegetated areas (can include open water or mudflats) is high, moderate, low, or none. <i>If you have four or more plant classes or three classes and open water, the rating is always high.</i></p> <div style="display: flex; justify-content: space-around; align-items: flex-end;"> <div style="text-align: center;">  <p>None = 0 points</p> </div> <div style="text-align: center;">  <p>Low = 1 point</p> </div> <div style="text-align: center;">  <p>Moderate = 2 points</p> </div> <div style="text-align: center;">  </div> </div> <div style="display: flex; justify-content: space-around; align-items: flex-end; margin-top: 20px;"> <div style="text-align: center;">  </div> <div style="text-align: center;">  </div> <div style="text-align: center;">  </div> </div> <p>All three diagrams in this row are HIGH = 3 points</p>	0

Wetland name or number B-1

3

<p>H 1.5. Special habitat features:</p> <p>Check the habitat features that are present in the wetland. <i>The number of checks is the number of points.</i></p> <p><input checked="" type="checkbox"/> Large, downed, woody debris within the wetland (> 4 in diameter and 6 ft long).</p> <p><input type="checkbox"/> Standing snags (dbh > 4 in) within the wetland</p> <p><input type="checkbox"/> Undercut banks are present for at least 6.6 ft (2 m) and/or overhanging plants extends at least 3.3 ft (1 m) over a stream (or ditch) in, or contiguous with the wetland, for at least 33 ft (10 m)</p> <p><input type="checkbox"/> Stable steep banks of fine material that might be used by beaver or muskrat for denning (> 30 degree slope) OR signs of recent beaver activity are present (<i>cut shrubs or trees that have not yet weathered where wood is exposed</i>)</p> <p><input checked="" type="checkbox"/> At least 1/4 ac of thin-stemmed persistent plants or woody branches are present in areas that are permanently or seasonally inundated (<i>structures for egg-laying by amphibians</i>)</p> <p><input checked="" type="checkbox"/> Invasive plants cover less than 25% of the wetland area in every stratum of plants (<i>see H 1.1 for list of strata</i>)</p>		3
Total for H 1	Add the points in the boxes above	6

Rating of Site Potential If score is: 15-18 = H 7-14 = M ~~0-6~~ = L Record the rating on the first page

<p>H 2.0. Does the landscape have the potential to support the habitat functions of the site?</p>		
<p>H 2.1. Accessible habitat (include <i>only habitat that directly abuts wetland unit</i>).</p> <p>Calculate: <u>15%</u> % undisturbed habitat + [(% moderate and low intensity land uses)/2] <u>1</u> = <u>15%</u></p> <p>If total accessible habitat is:</p> <p>> 1/3 (33.3%) of 1 km Polygon points = 3</p> <p>20-33% of 1 km Polygon points = 2</p> <p>10-19% of 1 km Polygon points = <u>1</u></p> <p>< 10% of 1 km Polygon points = 0</p>		1
<p>H 2.2. Undisturbed habitat in 1 km Polygon around the wetland.</p> <p>Calculate: <u>10%</u> % undisturbed habitat + [(% moderate and low intensity land uses)/2] <u>1</u> = <u>10%</u></p> <p>Undisturbed habitat > 50% of Polygon points = 3</p> <p>Undisturbed habitat 10-50% and in 1-3 patches points = 2</p> <p>Undisturbed habitat 10-50% and > 3 patches points = 1</p> <p>Undisturbed habitat < 10% of 1 km Polygon points = 0</p>		1
<p>H 2.3. Land use intensity in 1 km Polygon: If</p> <p>> 50% of 1 km Polygon is high intensity land use points = (- 2)</p> <p>≤ 50% of 1 km Polygon is high intensity points = 0</p>		-2
Total for H 2	Add the points in the boxes above	0

Rating of Landscape Potential If score is: 4-6 = H 1-3 = M ~~0~~ = L Record the rating on the first page

<p>H 3.0. Is the habitat provided by the site valuable to society?</p>		
<p>H 3.1. Does the site provide habitat for species valued in laws, regulations, or policies? <i>Choose only the highest score that applies to the wetland being rated.</i></p> <p>Site meets ANY of the following criteria: points = 2</p> <ul style="list-style-type: none"> <input type="checkbox"/> It has 3 or more priority habitats within 100 m (see next page) <input type="checkbox"/> It provides habitat for Threatened or Endangered species (any plant or animal on the state or federal lists) <input type="checkbox"/> It is mapped as a location for an individual WDFW priority species <input type="checkbox"/> It is a Wetland of High Conservation Value as determined by the Department of Natural Resources <input type="checkbox"/> It has been categorized as an important habitat site in a local or regional comprehensive plan, in a Shoreline Master Plan, or in a watershed plan <p>Site has <u>1</u> or <u>2</u> priority habitats (listed on next page) within 100 m points = 1</p> <p>Site does not meet any of the criteria above points = 0</p>		1

Rating of Value If score is: 2 = H ~~1~~ = M 0 = L Record the rating on the first page

Wetland name or number B-1

WDFW Priority Habitats

Priority habitats listed by WDFW (see complete descriptions of WDFW priority habitats, and the counties in which they can be found, in: Washington Department of Fish and Wildlife, 2008. Priority Habitat and Species List. Olympia, Washington. 177 pp. <http://wdfw.wa.gov/publications/00165/wdfw00165.pdf> or access the list from here: <http://wdfw.wa.gov/conservation/phs/list/>)

Count how many of the following priority habitats are within 330 ft (100 m) of the wetland unit: **NOTE:** *This question is independent of the land use between the wetland unit and the priority habitat.*

- **Aspen Stands:** Pure or mixed stands of aspen greater than 1 ac (0.4 ha).
- **Biodiversity Areas and Corridors:** Areas of habitat that are relatively important to various species of native fish and wildlife (*full descriptions in WDFW PHS report*).
- **Herbaceous Balds:** Variable size patches of grass and forbs on shallow soils over bedrock.
- **Old-growth/Mature forests:** Old-growth west of Cascade crest – Stands of at least 2 tree species, forming a multi-layered canopy with occasional small openings; with at least 8 trees/ac (20 trees/ha) > 32 in (81 cm) dbh or > 200 years of age. Mature forests – Stands with average diameters exceeding 21 in (53 cm) dbh; crown cover may be less than 100%; decay, decadence, numbers of snags, and quantity of large downed material is generally less than that found in old-growth; 80-200 years old west of the Cascade crest.
- **Oregon White Oak:** Woodland stands of pure oak or oak/conifer associations where canopy coverage of the oak component is important (*full descriptions in WDFW PHS report p. 158 – see web link above*).
- Riparian:** The area adjacent to aquatic systems with flowing water that contains elements of both aquatic and terrestrial ecosystems which mutually influence each other.
- **Westside Prairies:** Herbaceous, non-forested plant communities that can either take the form of a dry prairie or a wet prairie (*full descriptions in WDFW PHS report p. 161 – see web link above*).
- Instream:** The combination of physical, biological, and chemical processes and conditions that interact to provide functional life history requirements for instream fish and wildlife resources.
- **Nearshore:** Relatively undisturbed nearshore habitats. These include Coastal Nearshore, Open Coast Nearshore, and Puget Sound Nearshore. (*full descriptions of habitats and the definition of relatively undisturbed are in WDFW report – see web link on previous page*).
- **Caves:** A naturally occurring cavity, recess, void, or system of interconnected passages under the earth in soils, rock, ice, or other geological formations and is large enough to contain a human.
- **Cliffs:** Greater than 25 ft (7.6 m) high and occurring below 5000 ft elevation.
- **Talus:** Homogenous areas of rock rubble ranging in average size 0.5 - 6.5 ft (0.15 - 2.0 m), composed of basalt, andesite, and/or sedimentary rock, including riprap slides and mine tailings. May be associated with cliffs.
- **Snags and Logs:** Trees are considered snags if they are dead or dying and exhibit sufficient decay characteristics to enable cavity excavation/use by wildlife. Priority snags have a diameter at breast height of > 20 in (51 cm) in western Washington and are > 6.5 ft (2 m) in height. Priority logs are > 12 in (30 cm) in diameter at the largest end, and > 20 ft (6 m) long.

Note: All vegetated wetlands are by definition a priority habitat but are not included in this list because they are addressed elsewhere.

Wetland name or number B-1

CATEGORIZATION BASED ON SPECIAL CHARACTERISTICS

Wetland Type	Category
<i>Check off any criteria that apply to the wetland. Circle the category when the appropriate criteria are met.</i>	
SC 1.0. Estuarine wetlands Does the wetland meet the following criteria for Estuarine wetlands? — The dominant water regime is tidal, — Vegetated, and — With a salinity greater than 0.5 ppt	
Yes – Go to SC 1.1 No = Not an estuarine wetland	
SC 1.1. Is the wetland within a National Wildlife Refuge, National Park, National Estuary Reserve, Natural Area Preserve, State Park or Educational, Environmental, or Scientific Reserve designated under WAC 332-30-151?	Cat. I
Yes = Category I No - Go to SC 1.2	
SC 1.2. Is the wetland unit at least 1 ac in size and meets at least two of the following three conditions? — The wetland is relatively undisturbed (has no diking, ditching, filling, cultivation, grazing, and has less than 10% cover of non-native plant species. (If non-native species are <i>Spartina</i> , see page 25) — At least ¾ of the landward edge of the wetland has a 100 ft buffer of shrub, forest, or un-grazed or un-mowed grassland. — The wetland has at least two of the following features: tidal channels, depressions with open water, or contiguous freshwater wetlands.	Cat. I Cat. II
Yes = Category I No = Category II	
SC 2.0. Wetlands of High Conservation Value (WHCV) SC 2.1. Has the WA Department of Natural Resources updated their website to include the list of Wetlands of High Conservation Value?	Cat. I
Yes – Go to SC 2.2 No – Go to SC 2.3	
SC 2.2. Is the wetland listed on the WDNR database as a Wetland of High Conservation Value?	
Yes = Category I No = Not a WHCV	
SC 2.3. Is the wetland in a Section/Township/Range that contains a Natural Heritage wetland? http://www1.dnr.wa.gov/nhp/refdesk/datasearch/wnhpwetlands.pdf	
Yes – Contact WNHP/WDNR and go to SC 2.4 No = Not a WHCV	
SC 2.4. Has WDNR identified the wetland within the S/T/R as a Wetland of High Conservation Value and listed it on their website?	
Yes = Category I No = Not a WHCV	
SC 3.0. Bogs Does the wetland (or any part of the unit) meet both the criteria for soils and vegetation in bogs? <i>Use the key below. If you answer YES you will still need to rate the wetland based on its functions.</i>	
SC 3.1. Does an area within the wetland unit have organic soil horizons, either peats or mucks, that compose 16 in or more of the first 32 in of the soil profile?	Cat. I
Yes – Go to SC 3.3 No – Go to SC 3.2	
SC 3.2. Does an area within the wetland unit have organic soils, either peats or mucks, that are less than 16 in deep over bedrock, or an impermeable hardpan such as clay or volcanic ash, or that are floating on top of a lake or pond?	
Yes – Go to SC 3.3 No = Is not a bog	
SC 3.3. Does an area with peats or mucks have more than 70% cover of mosses at ground level, AND at least a 30% cover of plant species listed in Table 4?	
Yes = Is a Category I bog No – Go to SC 3.4	
NOTE: If you are uncertain about the extent of mosses in the understory, you may substitute that criterion by measuring the pH of the water that seeps into a hole dug at least 16 in deep. If the pH is less than 5.0 and the plant species in Table 4 are present, the wetland is a bog.	
SC 3.4. Is an area with peats or mucks forested (> 30% cover) with Sitka spruce, subalpine fir, western red cedar, western hemlock, lodgepole pine, quaking aspen, Engelmann spruce, or western white pine, AND any of the species (or combination of species) listed in Table 4 provide more than 30% of the cover under the canopy?	
Yes = Is a Category I bog No = Is not a bog	

Wetland name or number B-1

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Wetland name or number BZ

RATING SUMMARY – Western Washington

Name of wetland (or ID #): Wetland B-Z - Shannon Slayton Date of site visit: 9/3/19
 Rated by Walt Trained by Ecology? Yes No Date of training 2014
 HGM Class used for rating Riverine Wetland has multiple HGM classes? Y N

NOTE: Form is not complete without the figures requested (figures can be combined).
 Source of base aerial photo/map _____

OVERALL WETLAND CATEGORY III (based on functions or special characteristics)

1. Category of wetland based on FUNCTIONS

- _____ Category I – Total score = 23 - 27
 _____ Category II – Total score = 20 - 22
 Category III – Total score = 16 - 19
 _____ Category IV – Total score = 9 - 15

FUNCTION	Improving Water Quality	Hydrologic	Habitat	
<i>Circle the appropriate ratings</i>				
Site Potential	H <input type="radio"/> M <input checked="" type="radio"/> L	H <input type="radio"/> M <input checked="" type="radio"/> L	H <input type="radio"/> M <input checked="" type="radio"/> L	
Landscape Potential	<input checked="" type="radio"/> H <input type="radio"/> M <input type="radio"/> L	H <input type="radio"/> M <input checked="" type="radio"/> L	H <input type="radio"/> M <input checked="" type="radio"/> L	
Value	<input checked="" type="radio"/> H <input type="radio"/> M <input type="radio"/> L	H <input type="radio"/> M <input checked="" type="radio"/> L	H <input type="radio"/> M <input checked="" type="radio"/> L	TOTAL
Score Based on Ratings	8	5	4	17

Score for each function based on three ratings (order of ratings is not important)

- 9 = H,H,H
- 8 = H,H,M
- 7 = H,H,L
- 7 = H,M,M
- 6 = H,M,L
- 6 = M,M,M
- 5 = H,L,L
- 5 = M,M,L
- 4 = M,L,L
- 3 = L,L,L

2. Category based on SPECIAL CHARACTERISTICS of wetland

CHARACTERISTIC	CATEGORY
Estuarine	I II
Wetland of High Conservation Value	I
Bog	I
Mature Forest	I
Old Growth Forest	I
Coastal Lagoon	I II
Interdunal	I II III IV
None of the above	<input checked="" type="checkbox"/>

Wetland name or number B-2

Maps and figures required to answer questions correctly for Western Washington

Depressional Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	D 1.3, H 1.1, H 1.4	1
Hydroperiods	D 1.4, H 1.2	1
Location of outlet (<i>can be added to map of hydroperiods</i>)	D 1.1, D 4.1	1
Boundary of area within 150 ft of the wetland (<i>can be added to another figure</i>)	D 2.2, D 5.2	2
Map of the contributing basin	D 4.3, D 5.3	1
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	2
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	D 3.1, D 3.2	3
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	D 3.3	4

Riverine Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	H 1.1, H 1.4	
Hydroperiods	H 1.2	
Ponded depressions	R 1.1	
Boundary of area within 150 ft of the wetland (<i>can be added to another figure</i>)	R 2.4	
Plant cover of trees, shrubs, and herbaceous plants	R 1.2, R 4.2	
Width of unit vs. width of stream (<i>can be added to another figure</i>)	R 4.1	
Map of the contributing basin	R 2.2, R 2.3, R 5.2	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	R 3.1	
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	R 3.2, R 3.3	

Lake Fringe Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	L 1.1, L 4.1, H 1.1, H 1.4	
Plant cover of trees, shrubs, and herbaceous plants	L 1.2	
Boundary of area within 150 ft of the wetland (<i>can be added to another figure</i>)	L 2.2	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	L 3.1, L 3.2	
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	L 3.3	

Slope Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	H 1.1, H 1.4	
Hydroperiods	H 1.2	
Plant cover of dense trees, shrubs, and herbaceous plants	S 1.3	
Plant cover of dense, rigid trees, shrubs, and herbaceous plants (<i>can be added to figure above</i>)	S 4.1	
Boundary of 150 ft buffer (<i>can be added to another figure</i>)	S 2.1, S 5.1	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	S 3.1, S 3.2	
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	S 3.3	

Wetland name or number BZ

HGM Classification of Wetlands in Western Washington

For questions 1-7, the criteria described must apply to the entire unit being rated.

If the hydrologic criteria listed in each question do not apply to the entire unit being rated, you probably have a unit with multiple HGM classes. In this case, identify which hydrologic criteria in questions 1-7 apply, and go to Question 8.

1. Are the water levels in the entire unit usually controlled by tides except during floods?

NO - go to 2

YES - the wetland class is **Tidal Fringe** - go to 1.1

1.1 Is the salinity of the water during periods of annual low flow below 0.5 ppt (parts per thousand)?

NO - Saltwater Tidal Fringe (Estuarine)

YES - Freshwater Tidal Fringe

*If your wetland can be classified as a Freshwater Tidal Fringe use the forms for **Riverine** wetlands. If it is Saltwater Tidal Fringe it is an **Estuarine** wetland and is not scored. This method **cannot** be used to score functions for estuarine wetlands.*

2. The entire wetland unit is flat and precipitation is the only source (>90%) of water to it. Groundwater and surface water runoff are NOT sources of water to the unit.

NO - go to 3

YES - The wetland class is **Flats**

*If your wetland can be classified as a Flats wetland, use the form for **Depressional** wetlands.*

3. Does the entire wetland unit **meet all** of the following criteria?

The vegetated part of the wetland is on the shores of a body of permanent open water (without any plants on the surface at any time of the year) at least 20 ac (8 ha) in size;

At least 30% of the open water area is deeper than 6.6 ft (2 m).

NO - go to 4

YES - The wetland class is **Lake Fringe** (Lacustrine Fringe)

4. Does the entire wetland unit **meet all** of the following criteria?

The wetland is on a slope (*slope can be very gradual*),

The water flows through the wetland in one direction (unidirectional) and usually comes from seeps. It may flow subsurface, as sheetflow, or in a swale without distinct banks,

The water leaves the wetland **without being impounded**.

NO - go to 5

YES - The wetland class is **Slope**

NOTE: Surface water does not pond in these type of wetlands except occasionally in very small and shallow depressions or behind hummocks (depressions are usually <3 ft diameter and less than 1 ft deep).

5. Does the entire wetland unit **meet all** of the following criteria?

The unit is in a valley, or stream channel, where it gets inundated by overbank flooding from that stream or river,

The overbank flooding occurs at least once every 2 years.

Wetland name or number B-2

NO – go to 6

YES – The wetland class is **Riverine**
NOTE: The Riverine unit can contain depressions that are filled with water when the river is not flooding

6. Is the entire wetland unit in a topographic depression in which water ponds, or is saturated to the surface, at some time during the year? *This means that any outlet, if present, is higher than the interior of the wetland.*

NO – go to 7

YES – The wetland class is **Depressional**

7. Is the entire wetland unit located in a very flat area with no obvious depression and no overbank flooding? The unit does not pond surface water more than a few inches. The unit seems to be maintained by high groundwater in the area. The wetland may be ditched, but has no obvious natural outlet.

NO – go to 8

YES – The wetland class is **Depressional**

8. Your wetland unit seems to be difficult to classify and probably contains several different HGM classes. For example, seeps at the base of a slope may grade into a riverine floodplain, or a small stream within a Depressional wetland has a zone of flooding along its sides. **GO BACK AND IDENTIFY WHICH OF THE HYDROLOGIC REGIMES DESCRIBED IN QUESTIONS 1-7 APPLY TO DIFFERENT AREAS IN THE UNIT** (make a rough sketch to help you decide). Use the following table to identify the appropriate class to use for the rating system if you have several HGM classes present within the wetland unit being scored.

NOTE: Use this table only if the class that is recommended in the second column represents 10% or more of the total area of the wetland unit being rated. If the area of the HGM class listed in column 2 is less than 10% of the unit; classify the wetland using the class that represents more than 90% of the total area.

HGM classes within the wetland unit being rated	HGM class to use in rating
Slope + Riverine	Riverine
Slope + Depressional	Depressional
Slope + Lake Fringe	Lake Fringe
Depressional + Riverine along stream within boundary of depression	Depressional
Depressional + Lake Fringe	Depressional
Riverine + Lake Fringe	Riverine
Salt Water Tidal Fringe and any other class of freshwater wetland	Treat as ESTUARINE

*If you are still unable to determine which of the above criteria apply to your wetland, or if you have **more than 2 HGM classes** within a wetland boundary, classify the wetland as Depressional for the rating.*

Wetland name or number BZ

RIVERINE AND FRESHWATER TIDAL FRINGE WETLANDS		
Water Quality Functions - Indicators that the site functions to improve water quality		
R 1.0. Does the site have the potential to improve water quality?		
R 1.1. Area of surface depressions within the Riverine wetland that can trap sediments during a flooding event:		
Depressions cover $> \frac{3}{4}$ area of wetland	points = 8	<u>0</u>
Depressions cover $> \frac{1}{2}$ area of wetland	points = 4	
Depressions present but cover $< \frac{1}{2}$ area of wetland	points = 2	
No depressions present	points = <u>0</u>	
R 1.2. Structure of plants in the wetland (areas with $> 90\%$ cover at person height, not Cowardin classes)		
Trees or shrubs $> \frac{2}{3}$ area of the wetland	points = 8	<u>6</u>
Trees or shrubs $> \frac{1}{3}$ area of the wetland	points = 6	
Herbaceous plants (> 6 in high) $> \frac{2}{3}$ area of the wetland	points = <u>6</u>	
Herbaceous plants (> 6 in high) $> \frac{1}{3}$ area of the wetland	points = 3	
Trees, shrubs, and ungrazed herbaceous $< \frac{1}{3}$ area of the wetland	points = 0	
Total for R 1		<u>6</u>
Rating of Site Potential If score is: <u>12-16 = H</u> <u>6-11 = M</u> 0-5 = L <i>Record the rating on the first page</i>		

R 2.0. Does the landscape have the potential to support the water quality function of the site?		
R 2.1. Is the wetland within an incorporated city or within its UGA?	Yes = 2 No = 0	<u>2</u>
R 2.2. Does the contributing basin to the wetland include a UGA or incorporated area?	Yes = 1 No = 0	<u>1</u>
R 2.3. Does at least 10% of the contributing basin contain tilled fields, pastures, or forests that have been clearcut within the last 5 years?	Yes = 1 No = 0	<u>0</u>
R 2.4. Is $> 10\%$ of the area within 150 ft of the wetland in land uses that generate pollutants?	Yes = 1 No = 0	<u>1</u>
R 2.5. Are there other sources of pollutants coming into the wetland that are not listed in questions R 2.1-R 2.4 Other sources _____	Yes = 1 No = 0	<u>0</u>
Total for R 2		<u>4</u>
Rating of Landscape Potential If score is: <u>3-6 = H</u> 1 or 2 = M 0 = L <i>Record the rating on the first page</i>		

R 3.0. Is the water quality improvement provided by the site valuable to society?		
R 3.1. Is the wetland along a stream or river that is on the 303(d) list or on a tributary that drains to one within 1 mi?	Yes = 1 No = 0	<u>0</u>
R 3.2. Is the wetland along a stream or river that has TMDL limits for nutrients, toxics, or pathogens?	Yes = 1 No = 0	<u>1</u>
R 3.3. Has the site been identified in a watershed or local plan as important for maintaining water quality? (answer YES if there is a TMDL for the drainage in which the unit is found)	Yes = 2 No = 0	<u>2</u>
Total for R 3		<u>3</u>
Rating of Value If score is: <u>2-4 = H</u> 1 = M 0 = L <i>Record the rating on the first page</i>		

Wetland name or number B-2

RIVERINE AND FRESHWATER TIDAL FRINGE WETLANDS
Hydrologic Functions - Indicators that site functions to reduce flooding and stream erosion

R 4.0. Does the site have the potential to reduce flooding and erosion?		
R 4.1. Characteristics of the overbank storage the wetland provides: <i>Estimate the average width of the wetland perpendicular to the direction of the flow and the width of the stream or river channel (distance between banks). Calculate the ratio: (average width of wetland)/(average width of stream between banks).</i> If the ratio is more than 20 If the ratio is 10-20 If the ratio is 5-<10 If the ratio is 1-<5 If the ratio is < 1	points = 9 points = 6 points = 4 points = <u>2</u> points = 1	2
R 4.2. Characteristics of plants that slow down water velocities during floods: <i>Treat large woody debris as forest or shrub. Choose the points appropriate for the best description (polygons need to have >90% cover at person height. These are NOT Cowardin classes).</i> Forest or shrub for > ¹ / ₃ area OR emergent plants > ¹ / ₃ area Forest or shrub for > ¹ / ₁₀ area OR emergent plants > ¹ / ₃ area Plants do not meet above criteria	points = <u>7</u> points = 4 points = 0	7
Total for R 4	Add the points in the boxes above	9

Rating of Site Potential If score is: 12-16 = H X 6-11 = M 0-5 = L Record the rating on the first page

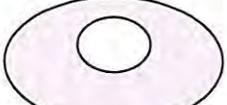
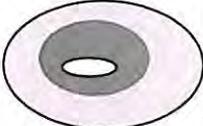
R 5.0. Does the landscape have the potential to support the hydrologic functions of the site?		
R 5.1. Is the stream or river adjacent to the wetland downcut?	<u>Ditch like feature</u> Yes = 0 No = 1	0
R 5.2. Does the up-gradient watershed include a UGA or incorporated area?	Yes = 1 No = 0	1
R 5.3. Is the up-gradient stream or river controlled by dams?	<u>controlled structure upstream</u> Yes = 0 No = 1	0
Total for R 5	Add the points in the boxes above	1

Rating of Landscape Potential If score is: 3 = H X 1 or 2 = M 0 = L Record the rating on the first page

R 6.0. Are the hydrologic functions provided by the site valuable to society?		
R 6.1. Distance to the nearest areas downstream that have flooding problems? <i>Choose the description that best fits the site.</i> The sub-basin immediately down-gradient of the wetland has flooding problems that result in damage to human or natural resources (e.g., houses or salmon redds) Surface flooding problems are in a sub-basin farther down-gradient No flooding problems anywhere downstream	points = 2 points = 1 points = <u>0</u>	0
R 6.2. Has the site been identified as important for flood storage or flood conveyance in a regional flood control plan?	Yes = 2 (No) = 0	0
Total for R 6	Add the points in the boxes above	0

Rating of Value If score is: 2-4 = H 1 = M X 0 = L Record the rating on the first page

Wetland name or number B-2

These questions apply to wetlands of all HGM classes.	
HABITAT FUNCTIONS - Indicators that site functions to provide important habitat	
H 1.0. Does the site have the potential to provide habitat?	
<p>H 1.1. Structure of plant community: <i>Indicators are Cowardin classes and strata within the Forested class.</i> Check the Cowardin plant classes in the wetland. <i>Up to 10 patches may be combined for each class to meet the threshold of ¼ ac or more than 10% of the unit if it is smaller than 2.5 ac. Add the number of structures checked.</i></p> <p><input type="checkbox"/> Aquatic bed 4 structures or more: points = 4</p> <p><input checked="" type="checkbox"/> Emergent 3 structures: points = 2</p> <p><input type="checkbox"/> Scrub-shrub (areas where shrubs have > 30% cover) 2 structures: points = 1</p> <p><input type="checkbox"/> Forested (areas where trees have > 30% cover) 1 structure: points = 0</p> <p><i>If the unit has a Forested class, check if:</i></p> <p><input type="checkbox"/> The Forested class has 3 out of 5 strata (canopy, sub-canopy, shrubs, herbaceous, moss/ground-cover) that each cover 20% within the Forested polygon</p>	0
<p>H 1.2. Hydroperiods</p> <p>Check the types of water regimes (hydroperiods) present within the wetland. The water regime has to cover more than 10% of the wetland or ¼ ac to count (<i>see text for descriptions of hydroperiods</i>).</p> <p><input checked="" type="checkbox"/> Permanently flooded or inundated 4 or more types present: points = 3</p> <p><input checked="" type="checkbox"/> Seasonally flooded or inundated 3 types present: points = 2</p> <p><input type="checkbox"/> Occasionally flooded or inundated 2 types present: points = 1</p> <p><input type="checkbox"/> Saturated only 1 type present: points = 0</p> <p><input type="checkbox"/> Permanently flowing stream or river in, or adjacent to, the wetland</p> <p><input type="checkbox"/> Seasonally flowing stream in, or adjacent to, the wetland</p> <p><input type="checkbox"/> Lake Fringe wetland 2 points</p> <p><input type="checkbox"/> Freshwater tidal wetland 2 points</p>	1
<p>H 1.3. Richness of plant species</p> <p>Count the number of plant species in the wetland that cover at least 10 ft². <i>Different patches of the same species can be combined to meet the size threshold and you do not have to name the species. Do not include Eurasian milfoil, reed canarygrass, purple loosestrife, Canadian thistle</i></p> <p>If you counted: > 19 species points = 2</p> <p>5 - 19 species points = 1</p> <p>< 5 species points = 0</p>	1
<p>H 1.4. Interspersion of habitats</p> <p>Decide from the diagrams below whether interspersion among Cowardin plants classes (described in H 1.1), or the classes and unvegetated areas (can include open water or mudflats) is high, moderate, low, or none. <i>If you have four or more plant classes or three classes and open water, the rating is always high.</i></p> <div style="display: flex; justify-content: space-around; align-items: flex-end;"> <div style="text-align: center;">  <p>None = 0 points</p> </div> <div style="text-align: center;">  <p>Low = 1 point</p> </div> <div style="text-align: center;">  <p>Moderate = 2 points</p> </div> <div style="text-align: center;">  </div> </div> <div style="display: flex; justify-content: space-around; align-items: flex-end; margin-top: 20px;"> <div style="text-align: center;">  </div> <div style="text-align: center;">  </div> <div style="text-align: center;">  </div> </div> <p>All three diagrams in this row are HIGH = 3points</p>	0

Wetland name or number B-2

2

<p>H 1.5. Special habitat features:</p> <p>Check the habitat features that are present in the wetland. <i>The number of checks is the number of points.</i></p> <p><input type="checkbox"/> Large, downed, woody debris within the wetland (> 4 in diameter and 6 ft long).</p> <p><input type="checkbox"/> Standing snags (dbh > 4 in) within the wetland</p> <p><input type="checkbox"/> Undercut banks are present for at least 6.6 ft (2 m) and/or overhanging plants extends at least 3.3 ft (1 m) over a stream (or ditch) in, or contiguous with the wetland, for at least 33 ft (10 m)</p> <p><input type="checkbox"/> Stable steep banks of fine material that might be used by beaver or muskrat for denning (> 30 degree slope) OR signs of recent beaver activity are present (<i>cut shrubs or trees that have not yet weathered where wood is exposed</i>)</p> <p><input checked="" type="checkbox"/> At least 1/4 ac of thin-stemmed persistent plants or woody branches are present in areas that are permanently or seasonally inundated (<i>structures for egg-laying by amphibians</i>)</p> <p><input checked="" type="checkbox"/> Invasive plants cover less than 25% of the wetland area in every stratum of plants (<i>see H 1.1 for list of strata</i>)</p>		2
Total for H 1	Add the points in the boxes above	4

Rating of Site Potential If score is: 15-18 = H 7-14 = M X 0-6 = L Record the rating on the first page

<p>H 2.0. Does the landscape have the potential to support the habitat functions of the site?</p>		
<p>H 2.1. Accessible habitat (include <i>only habitat that directly abuts wetland unit</i>).</p> <p>Calculate: $\pm 15\%$ % undisturbed habitat + [(% moderate and low intensity land uses)/2] = $\pm 15\%$ %</p> <p>If total accessible habitat is:</p> <p>> 1/3 (33.3%) of 1 km Polygon points = 3</p> <p>20-33% of 1 km Polygon points = 2</p> <p>10-19% of 1 km Polygon points = 1</p> <p>< 10% of 1 km Polygon points = 0</p>		1
<p>H 2.2. Undisturbed habitat in 1 km Polygon around the wetland.</p> <p>Calculate: ± 10 % undisturbed habitat + [(% moderate and low intensity land uses)/2] = 10 %</p> <p>Undisturbed habitat > 50% of Polygon points = 3</p> <p>Undisturbed habitat 10-50% and in 1-3 patches points = 2</p> <p>Undisturbed habitat 10-50% and > 3 patches points = 1</p> <p>Undisturbed habitat < 10% of 1 km Polygon points = 0</p>		1
<p>H 2.3. Land use intensity in 1 km Polygon: If</p> <p>> 50% of 1 km Polygon is high intensity land use points = (-2)</p> <p>≤ 50% of 1 km Polygon is high intensity points = 0</p>		-2
Total for H 2	Add the points in the boxes above	0

Rating of Landscape Potential If score is: 4-6 = H 1-3 = M X < 1 = L Record the rating on the first page

<p>H 3.0. Is the habitat provided by the site valuable to society?</p>		
<p>H 3.1. Does the site provide habitat for species valued in laws, regulations, or policies? <i>Choose only the highest score that applies to the wetland being rated.</i></p> <p>Site meets ANY of the following criteria: points = 2</p> <ul style="list-style-type: none"> <input type="checkbox"/> It has 3 or more priority habitats within 100 m (see next page) <input type="checkbox"/> It provides habitat for Threatened or Endangered species (any plant or animal on the state or federal lists) <input type="checkbox"/> It is mapped as a location for an individual WDFW priority species <input type="checkbox"/> It is a Wetland of High Conservation Value as determined by the Department of Natural Resources <input type="checkbox"/> It has been categorized as an important habitat site in a local or regional comprehensive plan, in a Shoreline Master Plan, or in a watershed plan <p>Site has 1 or 2 priority habitats (listed on next page) within 100 m points = 1</p> <p>Site does not meet any of the criteria above points = 0</p>		1

Rating of Value If score is: 2 = H X 1 = M 0 = L Record the rating on the first page

Wetland name or number _____

WDFW Priority Habitats

Priority habitats listed by WDFW (see complete descriptions of WDFW priority habitats, and the counties in which they can be found, in: Washington Department of Fish and Wildlife, 2008. Priority Habitat and Species List. Olympia, Washington. 177 pp. <http://wdfw.wa.gov/publications/00165/wdfw00165.pdf> or access the list from here: <http://wdfw.wa.gov/conservation/phs/list/>)

Count how many of the following priority habitats are within 330 ft (100 m) of the wetland unit: **NOTE:** This question is independent of the land use between the wetland unit and the priority habitat.

- **Aspen Stands:** Pure or mixed stands of aspen greater than 1 ac (0.4 ha).
- **Biodiversity Areas and Corridors:** Areas of habitat that are relatively important to various species of native fish and wildlife (*full descriptions in WDFW PHS report*).
- **Herbaceous Balds:** Variable size patches of grass and forbs on shallow soils over bedrock.
- **Old-growth/Mature forests:** Old-growth west of Cascade crest – Stands of at least 2 tree species, forming a multi-layered canopy with occasional small openings; with at least 8 trees/ac (20 trees/ha) > 32 in (81 cm) dbh or > 200 years of age. Mature forests – Stands with average diameters exceeding 21 in (53 cm) dbh; crown cover may be less than 100%; decay, decadence, numbers of snags, and quantity of large downed material is generally less than that found in old-growth; 80-200 years old west of the Cascade crest.
- **Oregon White Oak:** Woodland stands of pure oak or oak/conifer associations where canopy coverage of the oak component is important (*full descriptions in WDFW PHS report p. 158 – see web link above*).
- ✓ **Riparian:** The area adjacent to aquatic systems with flowing water that contains elements of both aquatic and terrestrial ecosystems which mutually influence each other.
- **Westside Prairies:** Herbaceous, non-forested plant communities that can either take the form of a dry prairie or a wet prairie (*full descriptions in WDFW PHS report p. 161 – see web link above*).
- ✓ **Instream:** The combination of physical, biological, and chemical processes and conditions that interact to provide functional life history requirements for instream fish and wildlife resources.
- **Nearshore:** Relatively undisturbed nearshore habitats. These include Coastal Nearshore, Open Coast Nearshore, and Puget Sound Nearshore. (*full descriptions of habitats and the definition of relatively undisturbed are in WDFW report – see web link on previous page*).
- **Caves:** A naturally occurring cavity, recess, void, or system of interconnected passages under the earth in soils, rock, ice, or other geological formations and is large enough to contain a human.
- **Cliffs:** Greater than 25 ft (7.6 m) high and occurring below 5000 ft elevation.
- **Talus:** Homogenous areas of rock rubble ranging in average size 0.5 - 6.5 ft (0.15 - 2.0 m), composed of basalt, andesite, and/or sedimentary rock, including riprap slides and mine tailings. May be associated with cliffs.
- **Snags and Logs:** Trees are considered snags if they are dead or dying and exhibit sufficient decay characteristics to enable cavity excavation/use by wildlife. Priority snags have a diameter at breast height of > 20 in (51 cm) in western Washington and are > 6.5 ft (2 m) in height. Priority logs are > 12 in (30 cm) in diameter at the largest end, and > 20 ft (6 m) long.

Note: All vegetated wetlands are by definition a priority habitat but are not included in this list because they are addressed elsewhere.

Wetland name or number B2

CATEGORIZATION BASED ON SPECIAL CHARACTERISTICS

Wetland Type	Category
<i>Check off any criteria that apply to the wetland. Circle the category when the appropriate criteria are met.</i>	
SC 1.0. Estuarine wetlands Does the wetland meet the following criteria for Estuarine wetlands? — The dominant water regime is tidal, — Vegetated, and — With a salinity greater than 0.5 ppt Yes – Go to SC 1.1 No = Not an estuarine wetland	
SC 1.1. Is the wetland within a National Wildlife Refuge, National Park, National Estuary Reserve, Natural Area Preserve, State Park or Educational, Environmental, or Scientific Reserve designated under WAC 332-30-151? Yes = Category I No - Go to SC 1.2	Cat. I
SC 1.2. Is the wetland unit at least 1 ac in size and meets at least two of the following three conditions? — The wetland is relatively undisturbed (has no diking, ditching, filling, cultivation, grazing, and has less than 10% cover of non-native plant species. (If non-native species are <i>Spartina</i> , see page 25) — At least ¾ of the landward edge of the wetland has a 100 ft buffer of shrub, forest, or un-grazed or un-mowed grassland. — The wetland has at least two of the following features: tidal channels, depressions with open water, or contiguous freshwater wetlands. Yes = Category I No = Category II	Cat. I Cat. II
SC 2.0. Wetlands of High Conservation Value (WHCV) SC 2.1. Has the WA Department of Natural Resources updated their website to include the list of Wetlands of High Conservation Value? Yes – Go to SC 2.2 No – Go to SC 2.3 SC 2.2. Is the wetland listed on the WDNR database as a Wetland of High Conservation Value? Yes = Category I No = Not a WHCV SC 2.3. Is the wetland in a Section/Township/Range that contains a Natural Heritage wetland? http://www1.dnr.wa.gov/nhp/refdesk/datasearch/wnhpwetlands.pdf Yes – Contact WNHP/WDNR and go to SC 2.4 No = Not a WHCV SC 2.4. Has WDNR identified the wetland within the S/T/R as a Wetland of High Conservation Value and listed it on their website? Yes = Category I No = Not a WHCV	Cat. I
SC 3.0. Bogs Does the wetland (or any part of the unit) meet both the criteria for soils and vegetation in bogs? <i>Use the key below. If you answer YES you will still need to rate the wetland based on its functions.</i> SC 3.1. Does an area within the wetland unit have organic soil horizons, either peats or mucks, that compose 16 in or more of the first 32 in of the soil profile? Yes – Go to SC 3.3 No – Go to SC 3.2 SC 3.2. Does an area within the wetland unit have organic soils, either peats or mucks, that are less than 16 in deep over bedrock, or an impermeable hardpan such as clay or volcanic ash, or that are floating on top of a lake or pond? Yes – Go to SC 3.3 No = Is not a bog SC 3.3. Does an area with peats or mucks have more than 70% cover of mosses at ground level, AND at least a 30% cover of plant species listed in Table 4? Yes = Is a Category I bog No – Go to SC 3.4 NOTE: If you are uncertain about the extent of mosses in the understory, you may substitute that criterion by measuring the pH of the water that seeps into a hole dug at least 16 in deep. If the pH is less than 5.0 and the plant species in Table 4 are present, the wetland is a bog. SC 3.4. Is an area with peats or mucks forested (> 30% cover) with Sitka spruce, subalpine fir, western red cedar, western hemlock, lodgepole pine, quaking aspen, Engelmann spruce, or western white pine, AND any of the species (or combination of species) listed in Table 4 provide more than 30% of the cover under the canopy? Yes = Is a Category I bog No = Is not a bog	Cat. I

Wetland name or number B-2

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Wellhead A
- Freshwater Tidal: EYA
- Chelais River Basin

Wellhead B-1
- Freshwater Tidal: EYA
- Chelais River Basin

Wellhead B-2
= River: EYA

Ehubst

Google Earth

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101

Flow Control Structure

700 ft

N Evans St

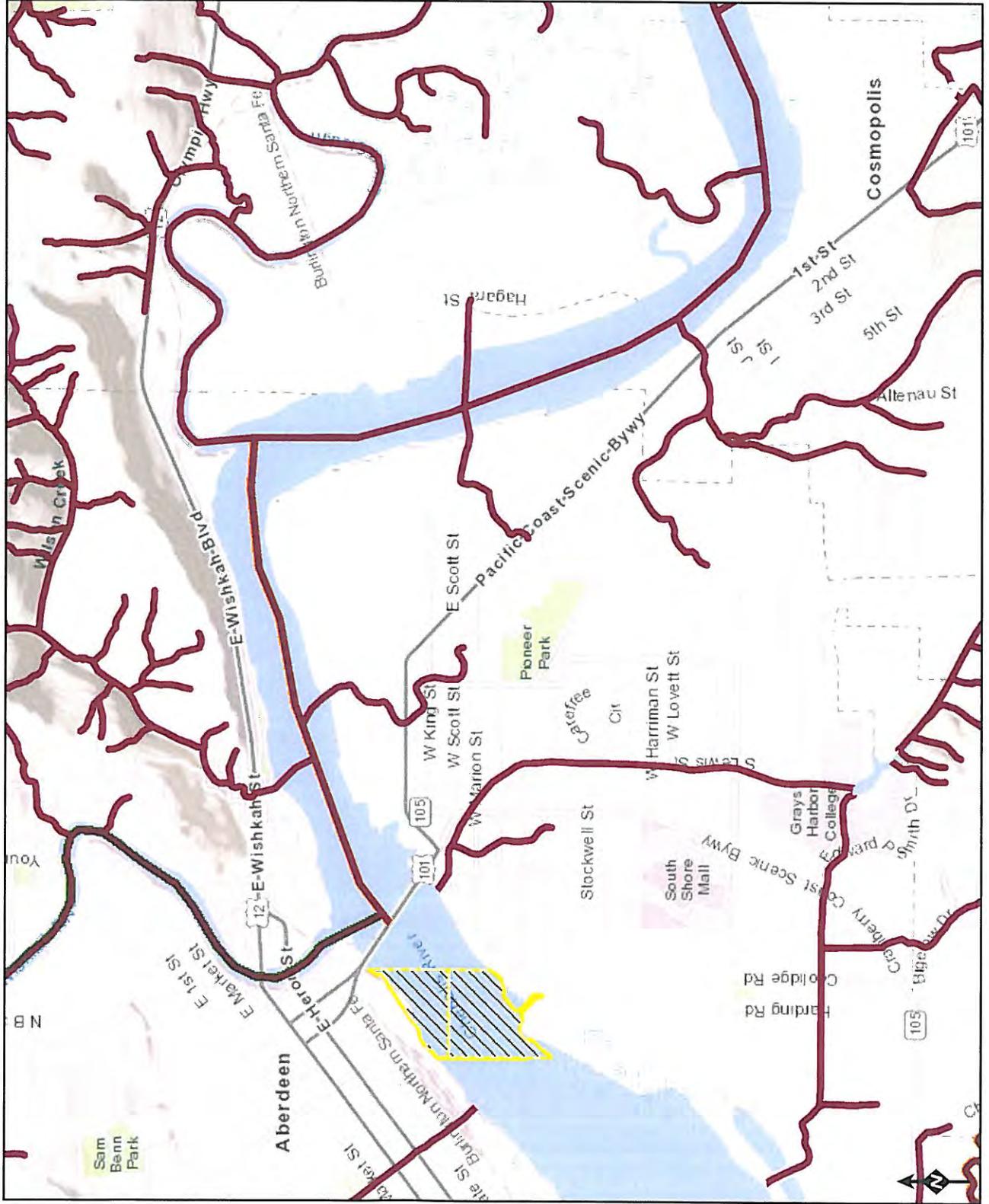


Figure 1



Figure 7

Water Quality Atlas Map



Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and

Figure 3



Grays Harbor County

Ecology homepage > Water & Shorelines > Water improvement > Total Maximum Daily Load process > Directory of projects > Grays Harbor County

Water quality improvement projects

Select the waterbody or pollutant name to find more information about the specific project.

Waterbody Name(s)	Pollutant(s)	Status	Project Lead(s)
Chehalis River Basin - Simpson Timberlands	Temperature	Approved by EPA	Andrew Kolosseus 360-407-7543
Chehalis River Basin - Upper Chehalis River Watershed	Dissolved Oxygen	Approved by EPA	Devan Rostorfer 360-690-4665
Chehalis River Basin - Wildcat Creek	Ammonia-N BOD (5-Day) Chlorine Fecal Coliform	Approved by EPA	Devan Rostorfer 360-690-4665
Grays Harbor	Dioxin Fecal Coliform	Approved by EPA	Devan Rostorfer 360-690-4665
Grays Harbor - Humptulips River	Temperature	Approved by EPA	Devan Rostorfer 360-690-4665
North Ocean Beaches - <ul style="list-style-type: none"> • Pacific Ocean • Moclips River 	Shellfish Closure Response - Fecal Coliform Bacteria Source Investigation Study	Under development	Leanne Whitesell 360-407-6295

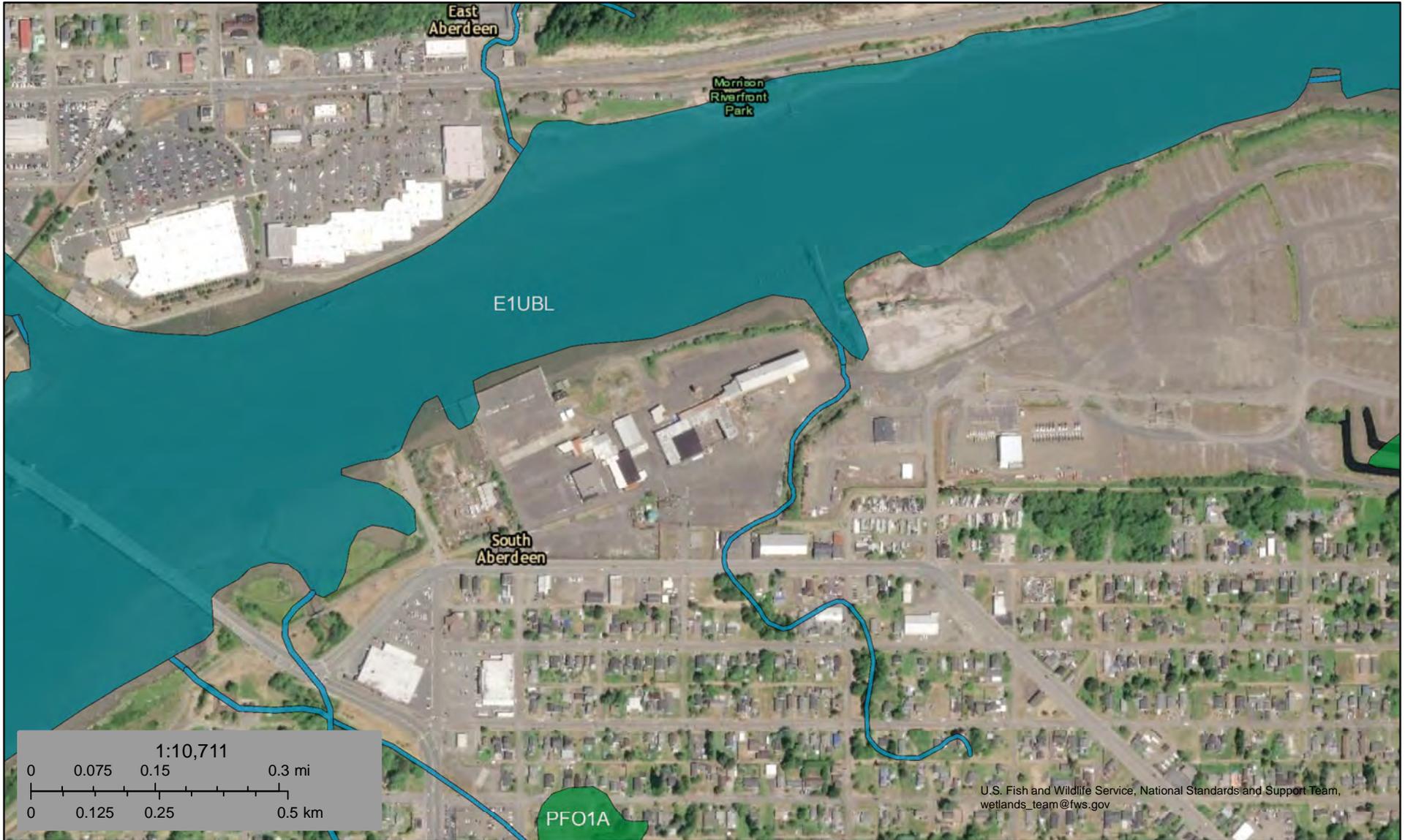
To request ADA accommodation, call Ecology at 360-407-7668, 711 (relay service), or 877-833-6341 (TTY). More about our [accessibility services](#).

MAUL FOSTER ALONGI

GRAYS HARBOR HISTORICAL SEAPORT AUTHORITY CRITICAL AREAS REPORT

APPENDIX E: QUERIED DATABASE FIGURES

DRAFT



U.S. Fish and Wildlife Service, National Standards and Support Team,
wetlands_team@fws.gov

October 16, 2019

Wetlands

- | | | | | | |
|---|--------------------------------|---|-----------------------------------|---|----------|
|  | Estuarine and Marine Deepwater |  | Freshwater Emergent Wetland |  | Lake |
|  | Estuarine and Marine Wetland |  | Freshwater Forested/Shrub Wetland |  | Other |
| | |  | Freshwater Pond |  | Riverine |

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.



WASHINGTON DEPARTMENT OF FISH AND WILDLIFE PRIORITY HABITATS AND SPECIES REPORT

SOURCE DATASET: PHSPublic
REPORT DATE: 10/16/2019 12.03

Query ID: P191016120257

Common Name	Site Name	Priority Area	Accuracy	Federal Status	Sensitive Data	Source Entity
Scientific Name	Source Dataset	Occurrence Type		State Status	Resolution	Geometry Type
Notes	Source Record	More Information (URL)		PHS Listing Status		
	Source Date	Mgmt Recommendations				

DRAFT

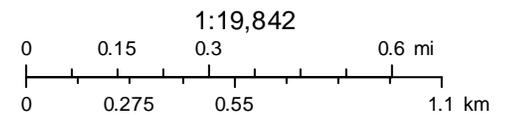
DISCLAIMER. This report includes information that the Washington Department of Fish and Wildlife (WDFW) maintains in a central computer database. It is not an attempt to provide you with an official agency response as to the impacts of your project on fish and wildlife. This information only documents the location of fish and wildlife resources to the best of our knowledge. It is not a complete inventory and it is important to note that fish and wildlife resources may occur in areas not currently known to WDFW biologists, or in areas for which comprehensive surveys have not been conducted. Site specific surveys are frequently necessary to rule out the presence of priority resources. Locations of fish and wildlife resources are subject to variation caused by disturbance, changes in season and weather, and other factors. WDFW does not recommend using reports more than six months old.

WDFW Test Map

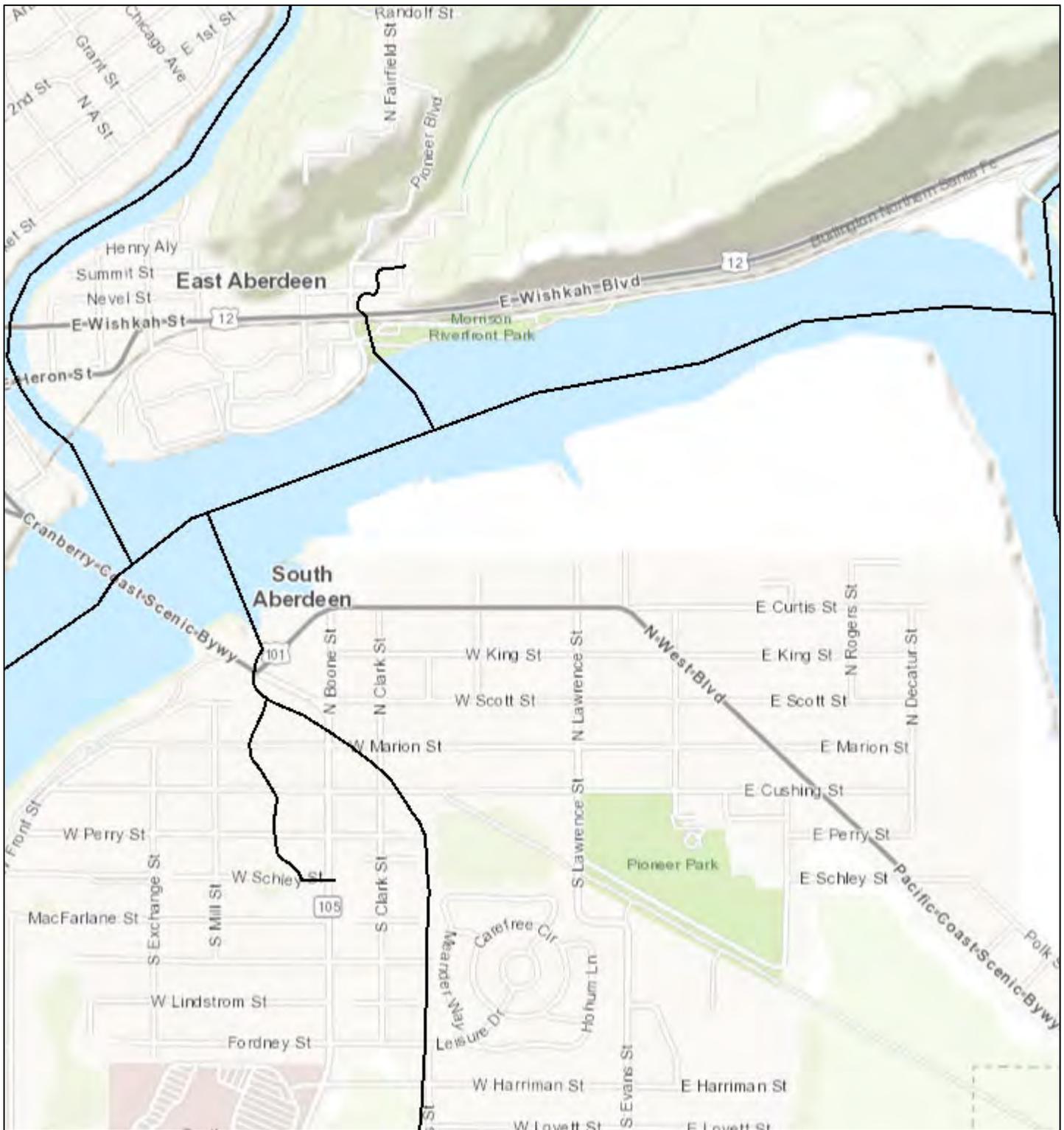


October 16, 2019

- | | | | | | |
|---|----------------------|---|---|---|----------|
|  | PHS Report Clip Area | POLY |  | QTR-TWP | |
|  | PT |  | AS MAPPED |  | TOWNSHIP |
|  | LN |  | SECTION | | |



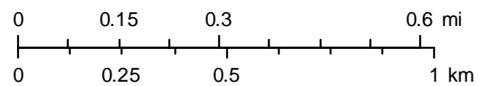
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



October 15, 2019

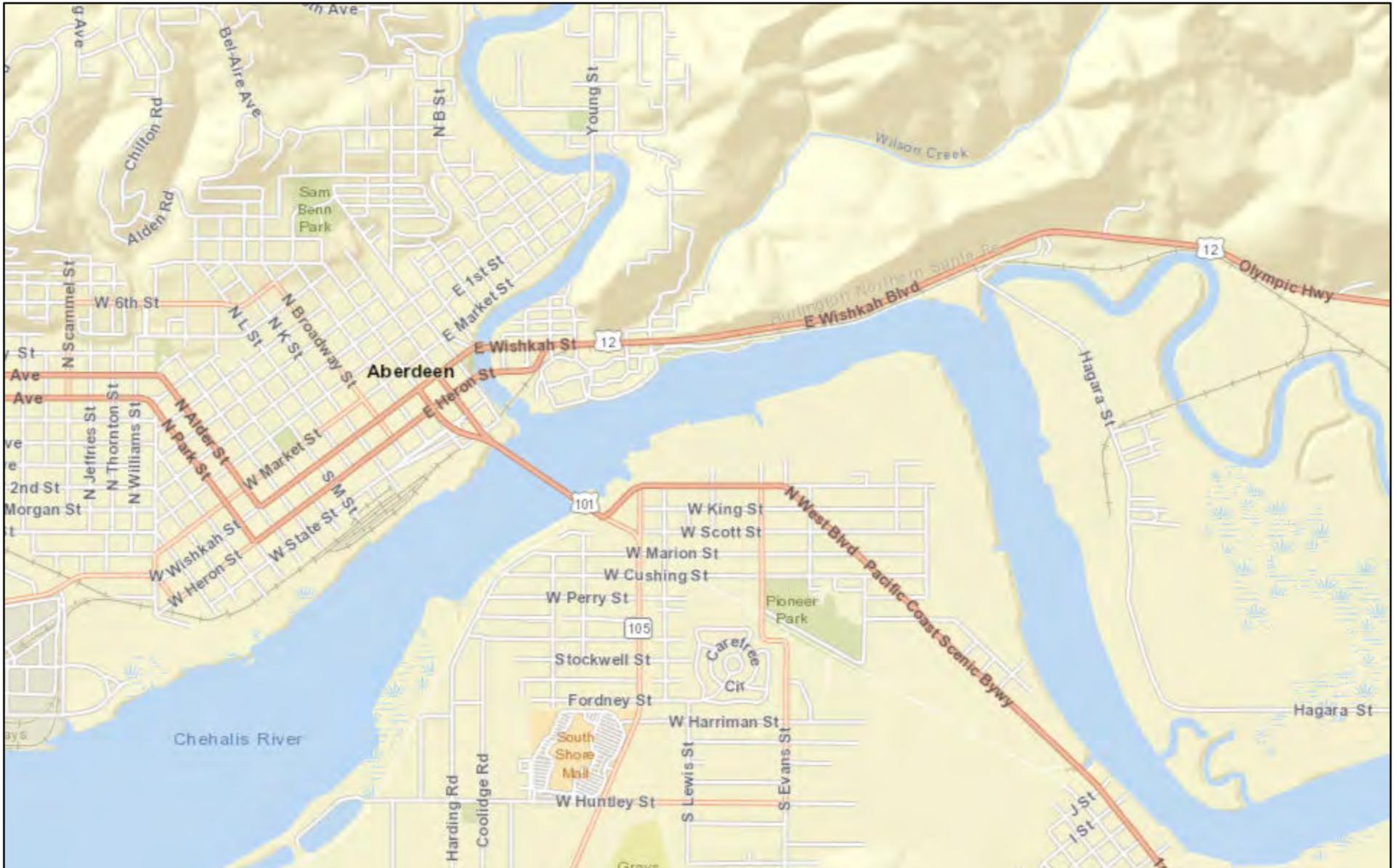
1:18,056

— All SalmonScape Species



Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community
WDFW

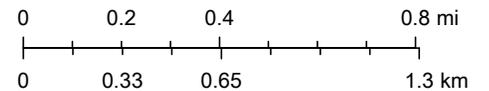
WA Wetlands of High Conservation Value



10/16/2019, 12:17:08 PM

 Counties

1:36,112



Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan,

Forest Practices Activity Map - Application



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Map Symbols	Additional Information	Legal Description
<ul style="list-style-type: none"> --- Harvest Boundary - - - Road Construction ~ Stream RMZ / WMZ Buffers Rock Pit 	<ul style="list-style-type: none"> Landing Waste Area Clumped WRTS/GRTS Existing Structure 	<p>S03 T17.0N R09.0W, S04 T17.0N R09.0W S15 T17.0N R09.0W, S10 T17.0N R09.0W S09 T17.0N R09.0W, S16 T17.0N R09.0W</p>
	<p>Extreme care was used during the compilation of this map to ensure its accuracy. However, due to changes in data and the need to rely on outside information, the Department of Natural Resources cannot accept responsibility for errors or omissions, and therefore, there are no warranties that accompany this material.</p>	<p>0 0.25 Miles Date: 10/15/2019 Time: 1:59:20 PM</p>

APPENDIX D
GEOLOGIC LOGS

DRAFT



Maul Foster & Alongi, Inc.

Geologic Borehole Log/Well Construction

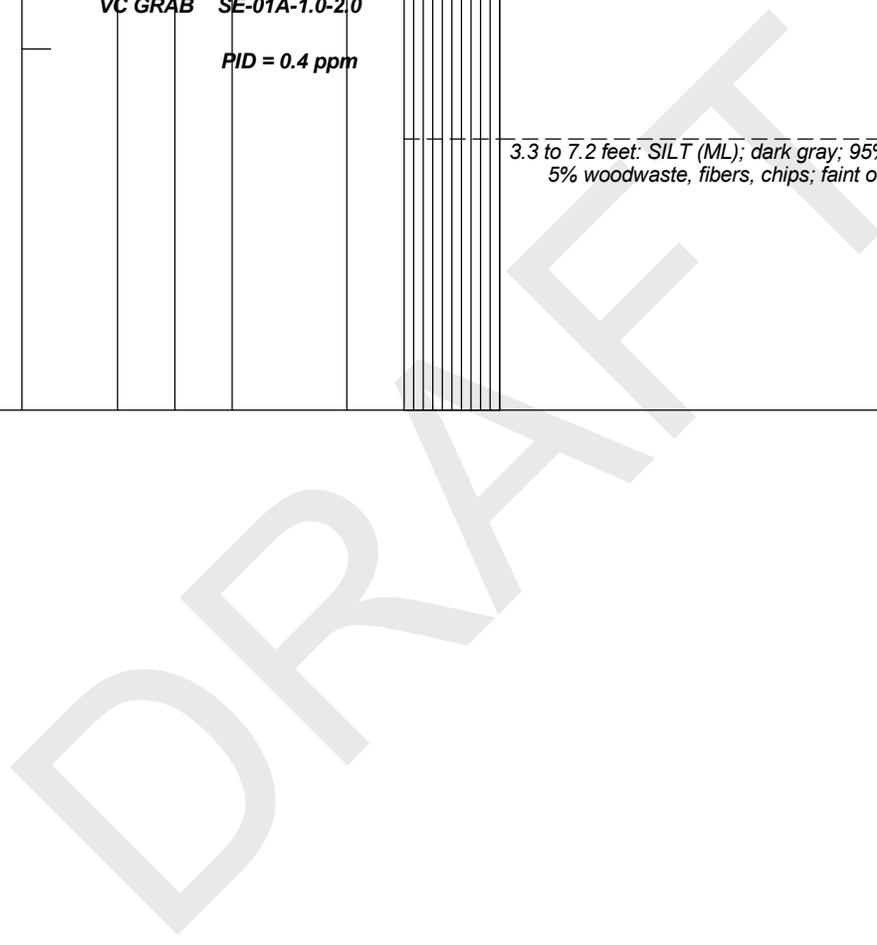
Project Number
1044.02.14

Well Number
SE-01A

Sheet
1 of 1

Project Name	Seaport Landing - Grays Harbor Historical Seaport Authority	TOC Elevation (feet)	Mudline
Project Location	Aberdeen, Washington	Surface Elevation (feet)	
Start/End Date	09/25/19 to 09/25/19	Northing	615665.4
Driller/Equipment	Research Support Services, Inc./Vibracore	Easting	817512.9
Geologist/Engineer	B. Paulik & M. Pollock	Hole Depth	7.2-feet
Sample Method	Vibracore	Outer Hole Diam	3.0-inch

Depth (feet, BGS)	Well Details	Interval	Percent Recovery	Sample Data				Blows/6"	Lithologic Column	Soil Description
				Collection Method	Number	Name (Type)				
1				VC GRAB		SE-01A-1.0-2.0			0.0 to 3.3 feet: SILT (ML); black; 75% fines, low plasticity, firm; 5% sand, fine; 20% woodwaste, fibers, chips, chunks; faint organic-like odor; moist.	
2						PID = 0.4 ppm				
3										
4									3.3 to 7.2 feet: SILT (ML); dark gray; 95% fines, low plasticity, firm; 5% woodwaste, fibers, chips; faint organic-like odor; moist.	
5										
6										
7										



NOTES: 1. bml = below mudline. 2. VC GRAB = grab sediment sample from vibracore. 3. Depths are approximate and relative to feet bml. 4. ppm = parts per million. 5. PID = photoionization detector, sediment head space reading in ppm.

Maul Foster & Alongi, Inc.

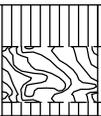
Geologic Borehole Log/Well Construction

Project Number
1044.02.14

Well Number
SE-01B

Sheet
1 of 1

Project Name	Seaport Landing - Grays Harbor Historical Seaport Authority	TOC Elevation (feet)	Mudline
Project Location	Aberdeen, Washington	Surface Elevation (feet)	
Start/End Date	09/25/19 to 09/25/19	Northing	615683.3
Driller/Equipment	Research Support Services, Inc./Vibracore	Easting	817608.8
Geologist/Engineer	B. Paulik & M. Pollock	Hole Depth	1.6-feet
Sample Method	Vibracore	Outer Hole Diam	3.0-inch

Depth (feet, BGS)	Well Details	Interval	Percent Recovery	Sample Data				Blows/6"	Lithologic Column	Soil Description
				Collection Method	Number	Name (Type)				
1				VC GRAB		SE-01B-0.5-1.5 PID = 0.5 ppm			0.0 to 0.6 feet: SILT (ML); dark gray; 90% fines, low plasticity, soft; 10% woodwaste, fibers, small chips (<0.5 inches); wet. 0.6 to 1.4 feet: WOODWASTE; brown to gray; 20% fines; 80% woodwaste, fibers, chips, chunks (<3.0 inches); strong organic-like odor; moist. 1.4 to 1.6 feet: SILT (ML); dark gray; 80% fines, low plasticity, firm; 20% woodwaste, fibers, chips (<0.5 inches); organic-like odor; wet.	

DRAFT

NOTES: 1. bml = below mudline. 2. VC GRAB = grab sediment sample from vibracore. 3. Depths are approximate and relative to feet bml. 4. ppm = parts per million. 5. PID = photoionization detector, sediment head space reading in ppm.

Maul Foster & Alongi, Inc.

Geologic Borehole Log/Well Construction

Project Number
1044.02.14

Well Number
SE-01C

Sheet
1 of 1

Project Name	Seaport Landing - Grays Harbor Historical Seaport Authority	TOC Elevation (feet)	Mudline
Project Location	Aberdeen, Washington	Surface Elevation (feet)	
Start/End Date	09/25/19 to 09/25/19	Northing	615734.0
Driller/Equipment	Research Support Services, Inc./Vibracore	Easting	817722.3
Geologist/Engineer	B. Paulik & M. Pollock	Hole Depth	4.6-feet
Sample Method	Vibracore	Outer Hole Diam	3.0-inch

Depth (feet, BGS)	Well Details	Interval	Percent Recovery	Sample Data				Blows/6"	Lithologic Column	Soil Description	
				Collection Method	Number	Name (Type)					
1										0.0 to 4.6 feet: SILT (ML); dark gray; 90% fines, low plasticity, firm; 10% sand, fine; trace woodwaste; faint organic-like odor; wet.	
2											
3				VC GRAB		SE-01C-2.0-3.0 PID = 0.3 ppm					2.6 to 2.9 feet: Increase in woodwaste fibers up to 15%.
4											

DRAFT

NOTES: 1. bml = below mudline. 2. VC GRAB = grab sediment sample from vibracore. 3. Depths are approximate and relative to feet bml. 4. ppm = parts per million. 5. PID = photoionization detector, sediment head space reading in ppm.

Maul Foster & Alongi, Inc.

Geologic Borehole Log/Well Construction

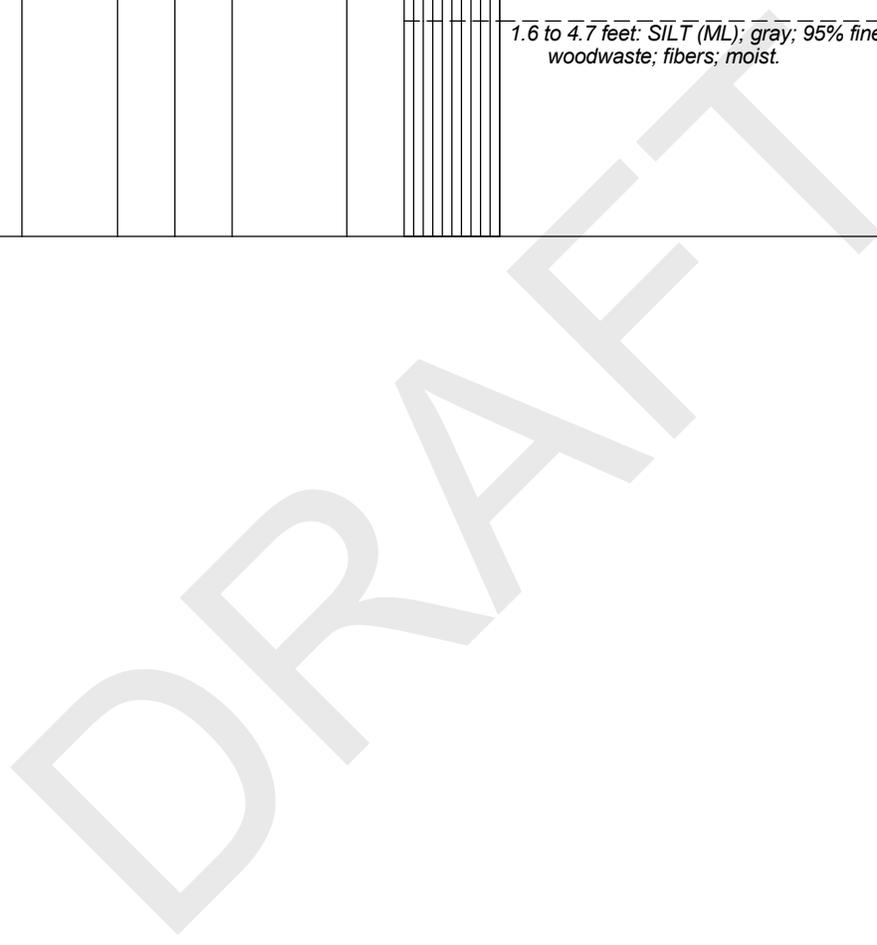
Project Number
1044.02.14

Well Number
SE-01D

Sheet
1 of 1

Project Name	Seaport Landing - Grays Harbor Historical Seaport Authority	TOC Elevation (feet)	Mudline
Project Location	Aberdeen, Washington	Surface Elevation (feet)	
Start/End Date	09/25/19 to 09/25/19	Northing	615735.5
Driller/Equipment	Research Support Services, Inc./Vibracore	Easting	817809.0
Geologist/Engineer	B. Paulik & M. Pollock	Hole Depth	4.7-feet
Sample Method	Vibracore	Outer Hole Diam	3.0-inch

Depth (feet, BGS)	Well Details	Interval	Percent Recovery	Sample Data				Blows/6"	Lithologic Column	Soil Description
				Collection Method	Number	Name (Type)				
1				VC GRAB		SE-01D-0-1.0 PID = 0.5 ppm			0.0 to 1.6 feet: SILT (ML); gray; 80% fines, low plasticity, firm; 5% sand, fine; 15% woodwaste, shreds; faint organic-like odor; moist.	
2									1.6 to 4.7 feet: SILT (ML); gray; 95% fines; low plasticity; firm; 5% woodwaste; fibers; moist.	
3										
4										



NOTES: 1. bml = below mudline. 2. VC GRAB = grab sediment sample from vibracore. 3. Depths are approximate and relative to feet bml. 4. ppm = parts per million. 5. PID = photoionization detector, sediment head space reading in ppm.

Maul Foster & Alongi, Inc.

Geologic Borehole Log/Well Construction

Project Number
1044.02.14

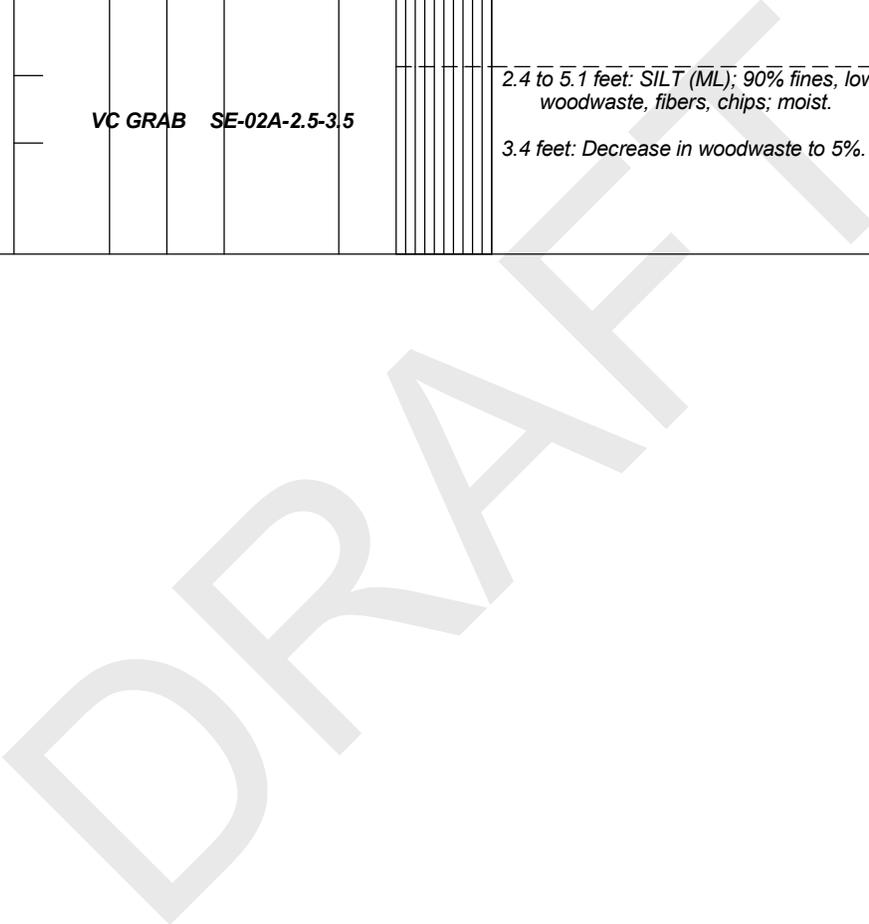
Well Number
SE-02A

Sheet
1 of 1

Project Name	Seaport Landing - Grays Harbor Historical Seaport Authority	TOC Elevation (feet)	Mudline
Project Location	Aberdeen, Washington	Surface Elevation (feet)	
Start/End Date	09/26/19 to 09/26/19	Northing	615705.3
Driller/Equipment	Research Support Services, Inc./Vibracore	Easting	817339.0
Geologist/Engineer	M. Pollock & A. DeVita-McBride	Hole Depth	5.1-feet
Sample Method	Vibracore	Outer Hole Diam	3.0-inch

Depth (feet, BGS)	Well Details	Interval	Percent Recovery	Sample Data				Blows/6"	Lithologic Column	Soil Description
				Collection Method	Number	Name (Type)				
1										0.0 to 2.4 feet: SILT (ML); black; 90% fines, low plasticity, soft; 10% sand, fine; trace woodwaste; wet
2										
3										2.4 to 5.1 feet: SILT (ML); 90% fines, low plasticity, firm; 10% woodwaste, fibers, chips; moist.
4										3.4 feet: Decrease in woodwaste to 5%.
5										

VC GRAB SE-02A-2.5-3.5



NOTES: 1. bml = below mudline. 2. VC GRAB = grab sediment sample from vibracore. 3. Depths are approximate and relative to feet bml.

Maul Foster & Alongi, Inc.

Geologic Borehole Log/Well Construction

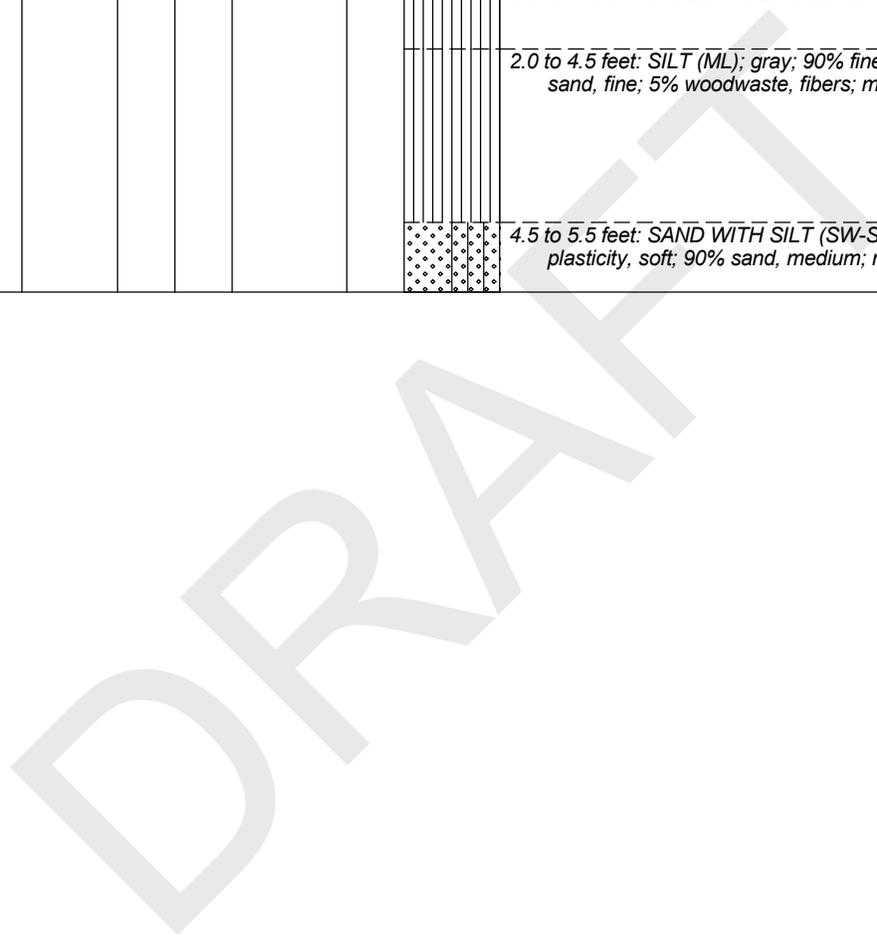
Project Number
1044.02.14

Well Number
SE-03A

Sheet
1 of 1

Project Name	Seaport Landing - Grays Harbor Historical Seaport Authority	TOC Elevation (feet)	Mudline
Project Location	Aberdeen, Washington	Surface Elevation (feet)	
Start/End Date	09/25/19 to 09/25/19	Northing	615673.5
Driller/Equipment	Research Support Services, Inc./Vibracore	Easting	817019.7
Geologist/Engineer	B. Paulik & M. Pollock	Hole Depth	5.5-feet
Sample Method	Vibracore	Outer Hole Diam	3.0-inch

Depth (feet, BGS)	Well Details	Interval	Percent Recovery	Sample Data				Blows/6"	Lithologic Column	Soil Description
				Collection Method	Number	Name (Type)				
1				VC GRAB		SE-03A-0-1.0 PID = 0.3 ppm			0.0 to 2.0 feet: SILT (ML); dark gray; 80% fines, low plasticity, soft; 10% sand, fine; 10% woodwaste, shreds; faint organic-like odor; wet. 0.3 feet to 0.4 feet: Lens of 20% woodwaste.	
2									2.0 to 4.5 feet: SILT (ML); gray; 90% fines, low plasticity, soft; 5% sand, fine; 5% woodwaste, fibers; moist.	
3										
4										
5									4.5 to 5.5 feet: SAND WITH SILT (SW-SM); dark gray; 10% fines, low plasticity, soft; 90% sand, medium; moist.	



NOTES: 1. bml = below mudline. 2. VC GRAB = grab sediment sample from vibracore. 3. Depths are approximate and relative to feet bml. 4. ppm = parts per million. 5. PID = photoionization detector, sediment head space reading in ppm.

Maul Foster & Alongi, Inc.

Geologic Borehole Log/Well Construction

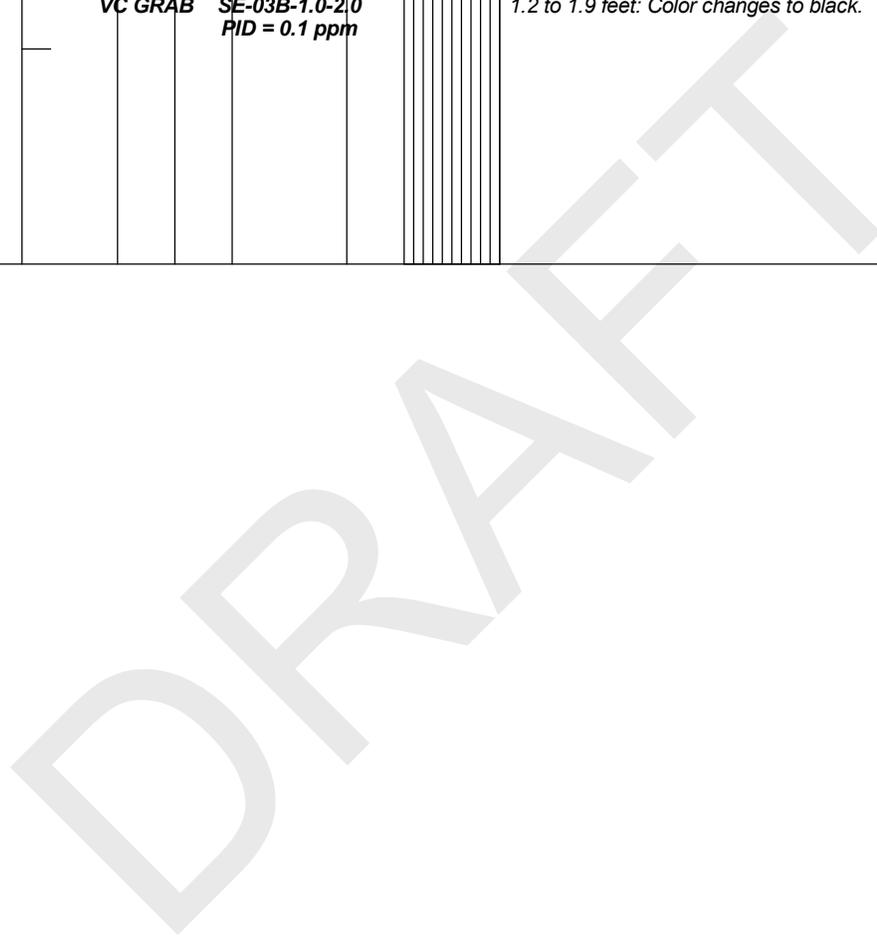
Project Number
1044.02.14

Well Number
SE-03B

Sheet
1 of 1

Project Name	Seaport Landing - Grays Harbor Historical Seaport Authority	TOC Elevation (feet)	Mudline
Project Location	Aberdeen, Washington	Surface Elevation (feet)	
Start/End Date	09/25/19 to 09/25/19	Northing	615692.2
Driller/Equipment	Research Support Services, Inc./Vibracore	Easting	817126.2
Geologist/Engineer	B. Paulik & M. Pollock	Hole Depth	5.1-feet
Sample Method	Vibracore	Outer Hole Diam	3.0-inch

Depth (feet, BGS)	Well Details	Interval	Percent Recovery	Sample Data				Blows/6"	Lithologic Column	Soil Description
				Collection Method	Number	Name (Type)				
1				VC GRAB		SE-03B-1.0-2.0				0.0 to 5.1 feet: SILT (ML); dark gray; 80% fines, low plasticity, soft; 10% sand, fine; 10% woodwaste, shreds; faint organic-like odor; wet.
2						PID = 0.1 ppm				1.2 to 1.9 feet: Color changes to black.
3										
4										
5										



NOTES: 1. bml = below mudline. 2. VC GRAB = grab sediment sample from vibracore. 3. Depths are approximate and relative to feet bml. 4. ppm = parts per million. 5. PID = photoionization detector, sediment head space reading in ppm.

Geologic Borehole Log/Well Construction

Project Number
1044.02.14

Well Number
SE-05A

Sheet
1 of 1

Project Name	Seaport Landing - Grays Harbor Historical Seaport Authority	TOC Elevation (feet)	Mudline
Project Location	Aberdeen, Washington	Surface Elevation (feet)	
Start/End Date	09/23/19 to 09/23/19	Northing	615966.6
Driller/Equipment	Research Support Services, Inc./Vibracore	Easting	818023.1
Geologist/Engineer	B. Paulik & M. Pollock	Hole Depth	9.7-feet
Sample Method	Vibracore	Outer Hole Diam	3.0-inch

Depth (feet, BGS)	Well Details	Interval	Percent Recovery	Sample Data			Blows/6"	Lithologic Column	Soil Description
				Collection Method	Number	Name (Type)			
1									0.0 to 2.3 feet: SILT WITH SAND (ML); gray; 80% fines, low plasticity; 20% sand, fine to medium; trace organic debris and woodwaste; wet. 0.7 feet: Color changes to black.
2									
3				VC GRAB		PID = 51.3 ppm SE-05A-2.0-3.0			2.3 to 4.8 feet: SAND (SP); dark gray to black; 100% sand, medium to coarse; wet.
4									
5									4.8 to 6.0 feet: SILT (ML); gray; 95% fines, low plasticity; 5% sand, fine; moist
6									6.0 to 6.3 feet: SAND (SP); dark gray; 100% sand, medium to coarse; moist
7									6.3 to 9.7 feet: SILT (ML); gray; 95% fines, low plasticity; 5% sand, fine; moist
8									
9									

NOTES: 1. bml = below mudline. 2. VC GRAB = grab sediment sample from vibracore. 3. Depths are approximate and relative to feet bml. 4. ppm = parts per million. 5. PID = photoionization detector, sediment head space reading in ppm.

Maul Foster & Alongi, Inc.

Geologic Borehole Log/Well Construction

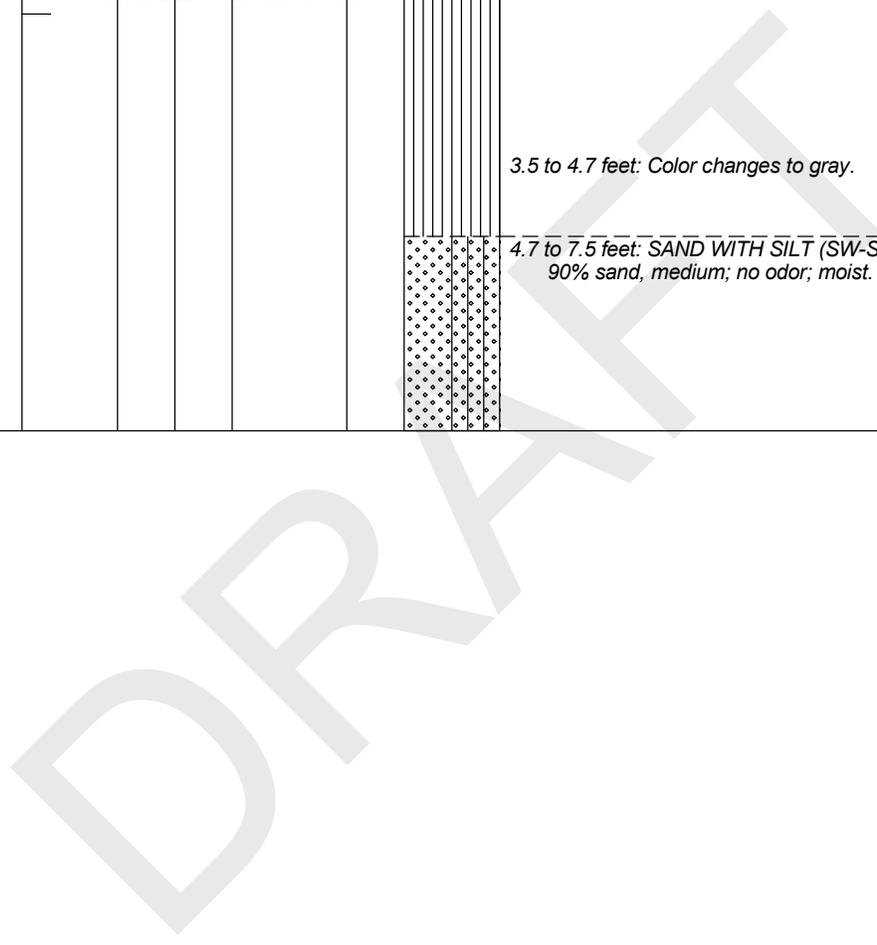
Project Number
1044.02.14

Well Number
SE-06A

Sheet
1 of 1

Project Name	Seaport Landing - Grays Harbor Historical Seaport Authority	TOC Elevation (feet)	Mudline
Project Location	Aberdeen, Washington	Surface Elevation (feet)	
Start/End Date	09/25/19 to 09/25/19	Northing	615849.6
Driller/Equipment	Research Support Services, Inc./Vibracore	Easting	817909.8
Geologist/Engineer	B. Paulik & M. Pollock	Hole Depth	7.5-feet
Sample Method	Vibracore	Outer Hole Diam	3.0-inch

Depth (feet, BGS)	Well Details	Interval	Percent Recovery	Sample Data			Blows/6"	Lithologic Column	Soil Description
				Collection Method	Number	Name (Type)			
1				VC GRAB		SE-06A-0.5-1.5			0.0 to 4.7 feet: SILT (ML); dark gray; 75% fines, low plasticity, firm; 5% sand, fine; 20% woodwaste, chunks (1.0 to 3.0 inches); no odor; moist.
2									
3									
4									3.5 to 4.7 feet: Color changes to gray.
5									4.7 to 7.5 feet: SAND WITH SILT (SW-SM); gray; 10% fines, firm; 90% sand, medium; no odor; moist.
6									
7									



NOTES: 1. bml = below mudline. 2. VC GRAB = grab sediment sample from vibracore. 3. Depths are approximate and relative to feet bml.

Maul Foster & Alongi, Inc.

Geologic Borehole Log/Well Construction

Project Number
1044.02.14

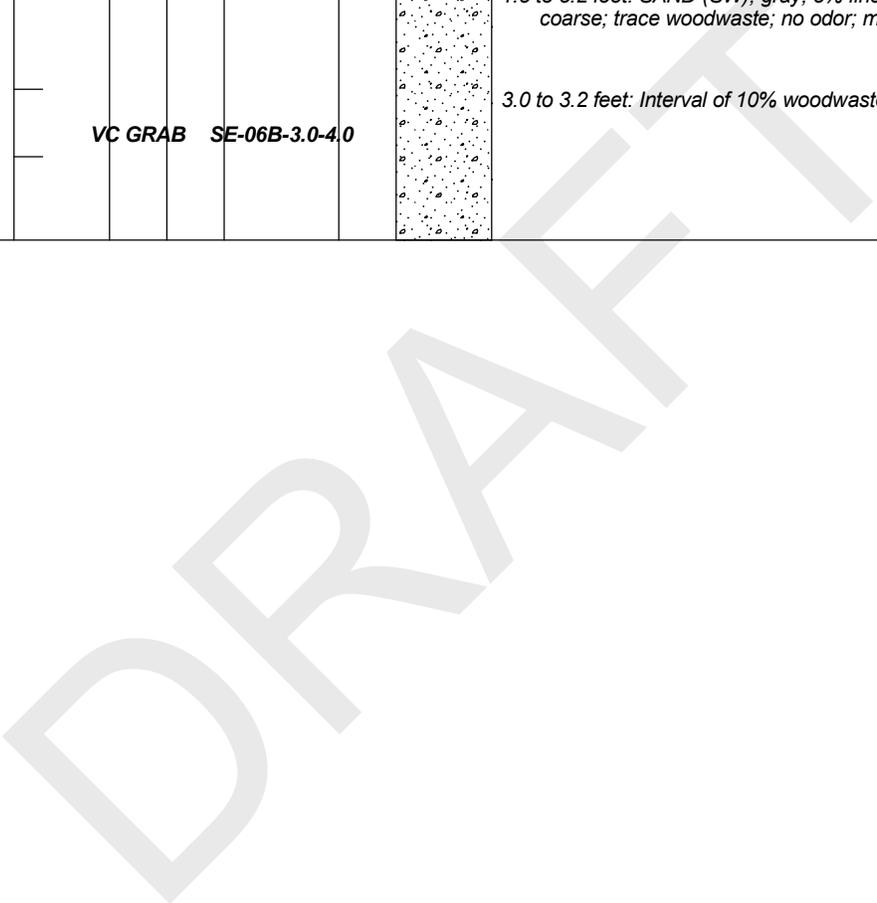
Well Number
SE-06B

Sheet
1 of 1

Project Name	Seaport Landing - Grays Harbor Historical Seaport Authority	TOC Elevation (feet)	Mudline
Project Location	Aberdeen, Washington	Surface Elevation (feet)	
Start/End Date	09/26/19 to 09/26/19	Northing	615890.5
Driller/Equipment	Research Support Services, Inc./Vibracore	Easting	817823.9
Geologist/Engineer	M. Pollock & A. DeVita-McBride	Hole Depth	5.2-feet
Sample Method	Vibracore	Outer Hole Diam	3.0-inch

Depth (feet, BGS)	Well Details	Interval	Percent Recovery	Sample Data			Blows/6"	Lithologic Column	Soil Description
				Collection Method	Number	Name (Type)			
1									0.0 to 1.5 feet: SILT (ML); black; 90% fines, low plasticity, soft; 10% sand, fine; trace woodwaste; no odor; wet.
2									1.5 to 5.2 feet: SAND (SW); gray; 5% fines; 95% sand; moderate to coarse; trace woodwaste; no odor; moist.
3									3.0 to 3.2 feet: Interval of 10% woodwaste chips
4									
5									

VC GRAB SE-06B-3.0-4.0



NOTES: 1. bml = below mudline. 2. VC GRAB = grab sediment sample from vibracore. 3. Depths are approximate and relative to feet bml.

Geologic Borehole Log/Well Construction

Project Number
1044.02.14

Well Number
SE-07A

Sheet
1 of 1

Project Name	Seaport Landing - Grays Harbor Historical Seaport Authority	TOC Elevation (feet)	Mudline
Project Location	Aberdeen, Washington	Surface Elevation (feet)	
Start/End Date	09/26/19 to 09/26/19	Northing	615469.5
Driller/Equipment	Research Support Services, Inc./Vibracore	Easting	816818.5
Geologist/Engineer	M. Pollock & A. DeVita-McBride	Hole Depth	4.0-feet
Sample Method	Vibracore	Outer Hole Diam	3.0-inch

Depth (feet, BGS)	Well Details	Interval	Percent Recovery	Sample Data				Blows/6"	Lithologic Column	Soil Description
				Collection Method	Number	Name (Type)				
1				VC GRAB		SE-07A-0-1.0				0.0 to 4.0 feet: SILT (ML); black; 60% fines, low plasticity, soft; 40% woodwaste, pulp, chips, chunks (=<2.0 inches); wet; free product (petroleum) impacts.
2										
3										
4										

DRAFT

NOTES: 1. bml = below mudline. 2. VC GRAB = grab sediment sample from vibracore. 3. Depths are approximate and relative to feet bml.

Geologic Borehole Log/Well Construction

Project Number
1044.02.14

Well Number
SE-07B

Sheet
1 of 1

Project Name	Seaport Landing - Grays Harbor Historical Seaport Authority	TOC Elevation (feet)	Mudline
Project Location	Aberdeen, Washington	Surface Elevation (feet)	
Start/End Date	09/26/19 to 09/26/19	Northing	615530.6
Driller/Equipment	Research Support Services, Inc./Vibracore	Easting	816792.5
Geologist/Engineer	M. Pollock & A. DeVita-McBride	Hole Depth	6.5-feet
Sample Method	Vibracore	Outer Hole Diam	3.0-inch

Depth (feet, BGS)	Well Details	Interval	Percent Recovery	Sample Data				Blows/6"	Lithologic Column	Soil Description
				Collection Method	Number	Name (Type)				
1				VC GRAB		SE-07B-0-1.0				0.0 to 6.5 feet: SILT (ML); dark gray; 90% fines, low plasticity, firm; 5% sand, fine; 5% woodwaste, chips; no odor; moist. 0.3 feet: Decrease to trace woodwaste, fine chips; increase to 10% sand.
2										
3										
4										
5										
6										

DRAFT

NOTES: 1. bml = below mudline. 2. VC GRAB = grab sediment sample from vibracore. 3. Depths are approximate and relative to feet bml.

Geologic Borehole Log/Well Construction

Project Number
1044.02.14

Well Number
SE-08A

Sheet
1 of 1

Project Name	Seaport Landing - Grays Harbor Historical Seaport Authority	TOC Elevation (feet)	Mudline
Project Location	Aberdeen, Washington	Surface Elevation (feet)	
Start/End Date	09/24/19 to 09/24/19	Northing	615565.0
Driller/Equipment	Research Support Services, Inc./Vibracore	Easting	817053.7
Geologist/Engineer	B. Paulik & M. Pollock	Hole Depth	1.3-feet
Sample Method	Vibracore	Outer Hole Diam	3.0-inch

Depth (feet, BGS)	Well Details	Interval	Percent Recovery	Sample Data				Blows/6"	Lithologic Column	Soil Description
				Collection Method	Number	Name (Type)				
1				VC GRAB		SE-08A-0-1.0 PID = 20.0 ppm			0.0 to 1.3 feet: WOODWASTE; gray; 15% fines; 85% woodwaste, pulp to fine chips; wet.	

DRAFT

NOTES: 1. bml = below mudline. 2. VC GRAB = grab sediment sample from vibracore. 3. Depths are approximate and relative to feet bml. 4. ppm = parts per million. 5. PID = photoionization detector, sediment head space reading in ppm.

Geologic Borehole Log/Well Construction

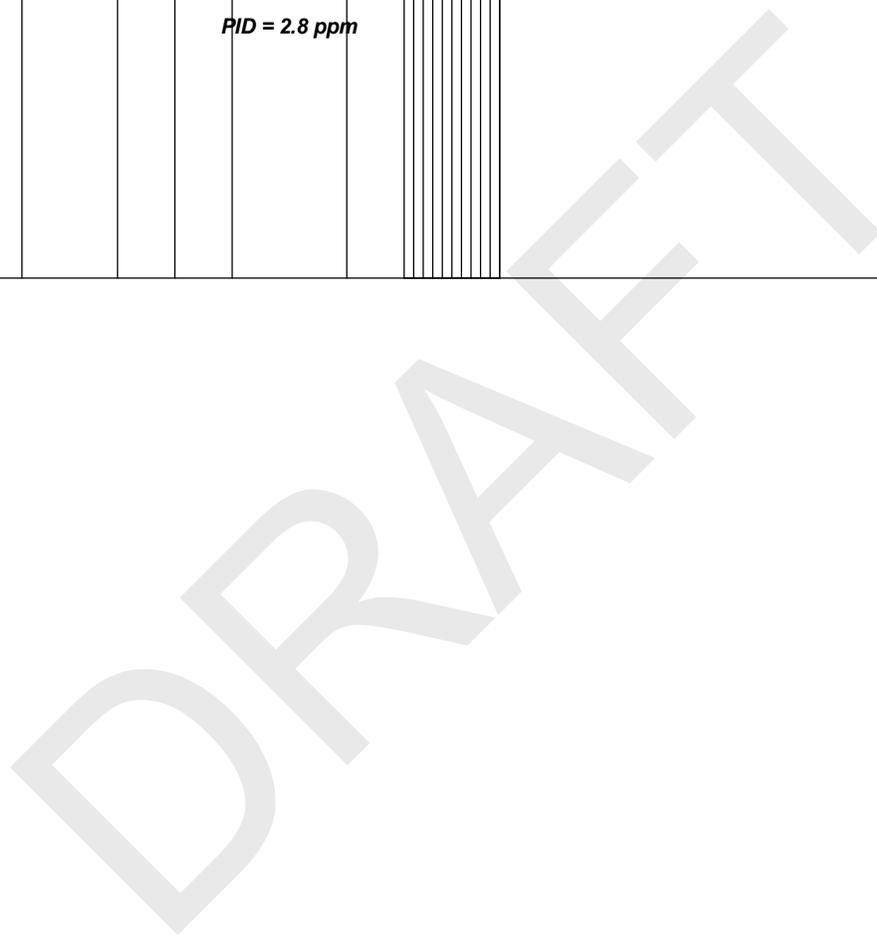
Project Number
1044.02.14

Well Number
SE-08B

Sheet
1 of 1

Project Name	Seaport Landing - Grays Harbor Historical Seaport Authority	TOC Elevation (feet)	Mudline
Project Location	Aberdeen, Washington	Surface Elevation (feet)	
Start/End Date	09/24/19 to 09/24/19	Northing	615582.9
Driller/Equipment	Research Support Services, Inc./Vibracore	Easting	817102.3
Geologist/Engineer	B. Paulik & M. Pollock	Hole Depth	5.3-feet
Sample Method	Vibracore	Outer Hole Diam	3.0-inch

Depth (feet, BGS)	Well Details	Interval	Percent Recovery	Sample Data				Blows/6"	Lithologic Column	Soil Description
				Collection Method	Number	Name (Type)				
1				VC GRAB		SE-08B-0-1.0				0.0 to 5.3 feet: SILT (ML); grayish black; 75% fines, low plasticity, soft; 10% sand, fine; 15% woodwaste, pulp to fine chips; organic-like odor; wet.
2						PID = 2.8 ppm				
3										
4										
5										



NOTES: 1. bml = below mudline. 2. VC GRAB = grab sediment sample from vibracore. 3. Depths are approximate and relative to feet bml. 4. ppm = parts per million. 5. PID = photoionization detector, sediment head space reading in ppm. 6. Core collected for radioisotope analysis.

Maul Foster & Alongi, Inc.

Geologic Borehole Log/Well Construction

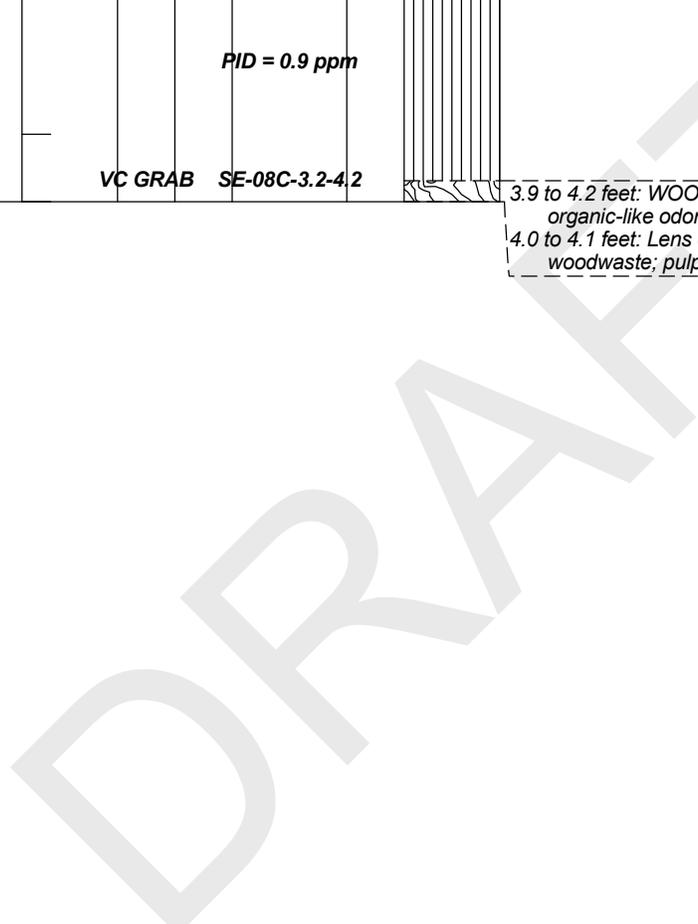
Project Number
1044.02.14

Well Number
SE-08C

Sheet
1 of 1

Project Name	Seaport Landing - Grays Harbor Historical Seaport Authority	TOC Elevation (feet)	Mudline
Project Location	Aberdeen, Washington	Surface Elevation (feet)	
Start/End Date	09/24/19 to 09/24/19	Northing	615597.0
Driller/Equipment	Research Support Services, Inc./Vibracore	Easting	817150.6
Geologist/Engineer	B. Paulik & M. Pollock	Hole Depth	4.2-feet
Sample Method	Vibracore	Outer Hole Diam	3.0-inch

Depth (feet, BGS)	Well Details	Interval	Percent Recovery	Sample Data				Blows/6"	Lithologic Column	Soil Description
				Collection Method	Number	Name (Type)				
1									0.0 to 3.9 feet: SILT (ML); grayish black; 85% fines, low plasticity, firm; 10% sand, fine; 5% woodwaste, chips, chunks (1.0 to 3.0 inches); organic-like odor; wet.	
2						PID = 0.9 ppm				
3										
4				VC GRAB		SE-08C-3.2-4.2			3.9 to 4.2 feet: WOODWASTE; 100% woodwaste; chips, chunks; organic-like odor; moist. 4.0 to 4.1 feet: Lens of silt; gray; 90% fines; low plasticity; 10% woodwaste; pulp, chips; organic-like odor; wet.	



NOTES: 1. bml = below mudline. 2. VC GRAB = grab sediment sample from vibracore. 3. Depths are approximate and relative to feet bml. 4. ppm = parts per million. 5. PID = photoionization detector, sediment head space reading in ppm.

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Geologic Borehole Log/Well Construction

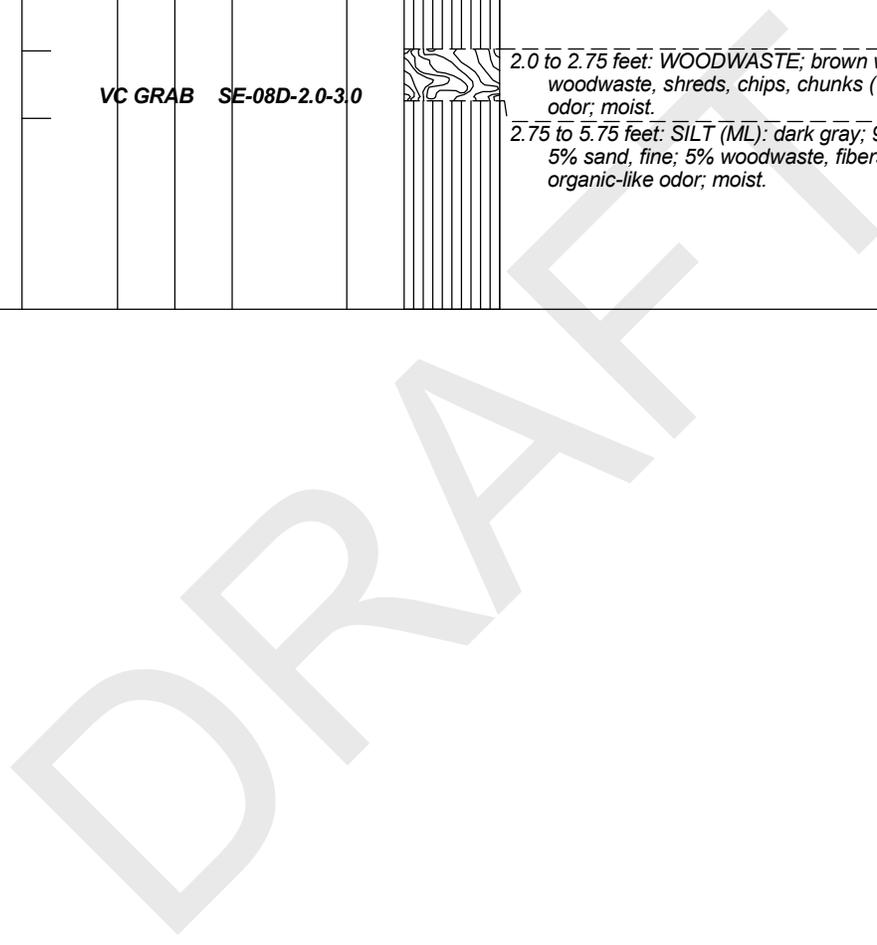
Project Number
1044.02.14

Well Number
SE-08D

Sheet
1 of 1

Project Name	Seaport Landing - Grays Harbor Historical Seaport Authority	TOC Elevation (feet)	Mudline
Project Location	Aberdeen, Washington	Surface Elevation (feet)	
Start/End Date	09/24/19 to 09/24/19	Northing	615614.6
Driller/Equipment	Research Support Services, Inc./Vibracore	Easting	817196.4
Geologist/Engineer	B. Paulik & M. Pollock	Hole Depth	5.8-feet
Sample Method	Vibracore	Outer Hole Diam	3.0-inch

Depth (feet, BGS)	Well Details	Interval	Percent Recovery	Sample Data				Blows/6"	Lithologic Column	Soil Description
				Collection Method	Number	Name (Type)				
1									0.0 to 2.0 feet: SILT WITH SAND (ML): dark gray; 80% fines, low plasticity, firm; 15% sand; 5% woodwaste, chunks (1.0 to 3.0 inches); organic-like odor; wet.	
2									2.0 to 2.75 feet: WOODWASTE; brown with gray; 10% fines; 90% woodwaste, shreds, chips, chunks (<= 4.0 inches); organic-like odor; moist. 2.75 to 5.75 feet: SILT (ML): dark gray; 90% fines, low plasticity, firm; 5% sand, fine; 5% woodwaste, fibers, shreds, chips (<1.0 inch); organic-like odor; moist.	
3				VC GRAB		SE-08D-2.0-3.0				
4										
5										



NOTES: 1. bml = below mudline. 2. VC GRAB = grab sediment sample from vibracore. 3. Depths are approximate and relative to feet bml.

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Geologic Borehole Log/Well Construction

Project Number
1044.02.14

Well Number
SE-10

Sheet
1 of 1

Project Name	Seaport Landing - Grays Harbor Historical Seaport Authority	TOC Elevation (feet)	Mudline
Project Location	Aberdeen, Washington	Surface Elevation (feet)	
Start/End Date	09/26/19 to 09/26/19	Northing	615459.0
Driller/Equipment	Research Support Services, Inc./Vibracore	Easting	816917.7
Geologist/Engineer	M. Pollock & A. DeVita-McBride	Hole Depth	3.7-feet
Sample Method	Vibracore	Outer Hole Diam	3.0-inch

Depth (feet, BGS)	Well Details	Interval	Percent Recovery	Collection Method	Sample Data			Blows/6"	Lithologic Column	Soil Description
					Number	Name (Type)				
1										0.0 to 2.0 feet: WOODWASTE (ML): brown; 20% fines; 80% woodwaste, fibers, chips; strong sulfur-like odor; wet.
2										2.0 to 3.7 feet: SILT (ML): gray; 70% fines, low plasticity, firm; 30% woodwaste; strong sulfur-like odor; moist.
3				VC GRAB	SE-10-2.0-3.7					

DRAFT

NOTES: 1. bml = below mudline. 2. VC GRAB = grab sediment sample from vibracore. 3. Depths are approximate and relative to feet bml.

Geologic Borehole Log/Well Construction

Project Number
1044.02.14

Well Number
SE-12

Sheet
1 of 1

Project Name	Seaport Landing - Grays Harbor Historical Seaport Authority	TOC Elevation (feet)	Mudline
Project Location	Aberdeen, Washington	Surface Elevation (feet)	
Start/End Date	09/25/19 to 09/25/19	Northing	615545.6
Driller/Equipment	Research Support Services, Inc./Vibracore	Easting	816909.9
Geologist/Engineer	B. Paulik & M. Pollock	Hole Depth	1.8-feet
Sample Method	Vibracore	Outer Hole Diam	3.0-inch

Depth (feet, BGS)	Well Details	Interval	Percent Recovery	Sample Data					Blows/6"	Lithologic Column	Soil Description
				Collection Method	Number	Name (Type)					
1										0.0 to 1.8 feet: SILT (ML): gray; 70% fines, low plasticity, soft; 5% sand, fine; 25% woodwaste, shreds, chips; wet.	



NOTES: 1. bml = below mudline. 2. Depths are approximate and relative to feet bml. 3. Core collected for radioisotope analysis.

Geologic Borehole Log/Well Construction

Project Number
1044.02.14

Well Number
SE-29

Sheet
1 of 1

Project Name	Seaport Landing - Grays Harbor Historical Seaport Authority	TOC Elevation (feet)	Mudline
Project Location	Aberdeen, Washington	Surface Elevation (feet)	
Start/End Date	09/24/19 to 09/24/19	Northing	615491.1
Driller/Equipment	Research Support Services, Inc./Vibracore	Easting	816870.0
Geologist/Engineer	B. Paulik & M. Pollock	Hole Depth	2.5-feet
Sample Method	Vibracore	Outer Hole Diam	3.0-inch

Depth (feet, BGS)	Well Details	Interval	Percent Recovery	Sample Data				Blows/6"	Lithologic Column	Soil Description
				Collection Method	Number	Name (Type)				
1										0.0 to 2.3 feet: WOODWASTE; gray; 20% fines, soft; 80% woodwaste, pulp to chips; sulfur-like odor; wet.
2										2.3 to 2.5 feet: SILT (ML); gray; 75% fines, low plasticity, soft; 25% woodwaste, chips; organic-like odor; wet.

DRAFT

NOTES: 1. bml = below mudline. 2. VC GRAB = grab sediment sample from vibracore. 3. Depths are approximate and relative to feet bml. 4. ppm = parts per million. 5. PID = photoionization detector, sediment head space reading in ppm.

Geologic Borehole Log/Well Construction

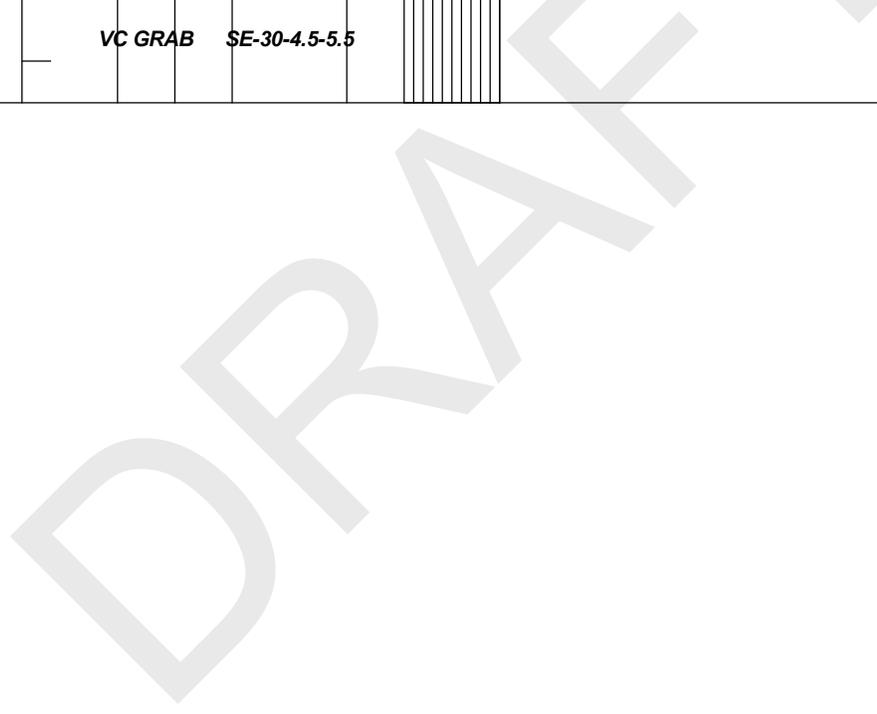
Project Number
1044.02.14

Well Number
SE-30

Sheet
1 of 1

Project Name	Seaport Landing - Grays Harbor Historical Seaport Authority	TOC Elevation (feet)	Mudline
Project Location	Aberdeen, Washington	Surface Elevation (feet)	
Start/End Date	09/26/19 to 09/26/19	Northing	615559.1
Driller/Equipment	Research Support Services, Inc./Vibracore	Easting	816974.6
Geologist/Engineer	M. Pollock & A. DeVita-McBride	Hole Depth	6.1-feet
Sample Method	Vibracore	Outer Hole Diam	3.0-inch

Depth (feet, BGS)	Well Details	Interval	Percent Recovery	Sample Data			Blows/6"	Lithologic Column	Soil Description
				Collection Method	Number	Name (Type)			
1				VC GRAB		SE-30-0-2.0			0.0 to 2.5 feet: WOODWASTE; black; 20% fines; 80% woodwaste, chips, chunks (<2.0 inches); strong sulfur-like odor; wet.
2									1.5 feet: Color changes to gray.
3									2.5 to 3.4 feet: SILT (ML); gray; 75% fines, low plasticity, firm; 5% sand, fine; 20% woodwaste, shreds, chips; faint sulfur-like odor; moist.
4				VC GRAB		SE-30-2.5-4.5			2.9 to 3.0 feet: Lens of 100% solid woodwaste.
5									3.4 to 6.1 feet: SILT (ML); gray; 90% fines; 5% sand, fine; 5% woodwaste, chips; no odor; moist.
6				VC GRAB		SE-30-4.5-5.5			



NOTES: 1. bml = below mudline. 2. VC GRAB = grab sediment sample from vibracore. 3. Depths are approximate and relative to feet bml.

Geologic Borehole Log/Well Construction

Maul Foster & Alongi, Inc.

Project Number
1044.02.13

Well Number
RAU2-GA1

Sheet
1 of 2

Project Name **Upland RI - Grays Harbor Historical Seaport Authority**
 Project Location **Aberdeen, Washington**
 Start/End Date **12/4/2019 to 12/4/2019**
 Driller/Equipment **Holocene Drilling, Inc./Diedrich D-50**
 Geologist/Engineer **R. Lewis**
 Sample Method **Standard Penetration Test**

TOC Elevation (feet)
 Surface Elevation (feet)
 Northing **615307.7**
 Easting **817000.7**
 Hole Depth **26.5-feet**
 Outer Hole Diam **3.0-inch**

Depth (feet, BGS)	Well Details	Sample Data				Blows/6"	Lithologic Column	Soil Description
		Interval	Percent Recovery	Collection Method	Name (Type)			
1							0 to 2.5 feet: Not sampled.	
2								
3		20	SP				2.5 to 3.0 feet: WOODWASTE; brown; 100% woodwaste; wet.	
4							3.0 to 6.0 feet: SILT (ML); gray; 90% fines, medium plasticity; 10% sand, fine to medium; trace woodwaste, organics; wet.	
5		5	SP					
6							@ 6.0 feet: Minor sheen, organic odor.	
7							6.0 to 10.0 feet: SILT with SAND (ML); gray; 80% fines, medium plasticity; 20% sand, medium; trace wood debris, organics; wet.	
8		15	SP					
9								
10		50	SP				10.0 to 20.5 feet: SILTY SAND (SM); gray; 40% fines, medium plasticity; 60% sand, fine to medium; trace woodwaste, organics; wet.	
11								
12								
13								
14								
15		100	SP					
16								
17								
18								
19								
20								

NOTES: 1) bgs = below ground surface. 2) SP = split spoon. 3) Soil lithology determined from soil cuttings during drilling and split spoon sample intervals.

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Geologic Borehole Log/Well Construction

Project Number
1044.02.13

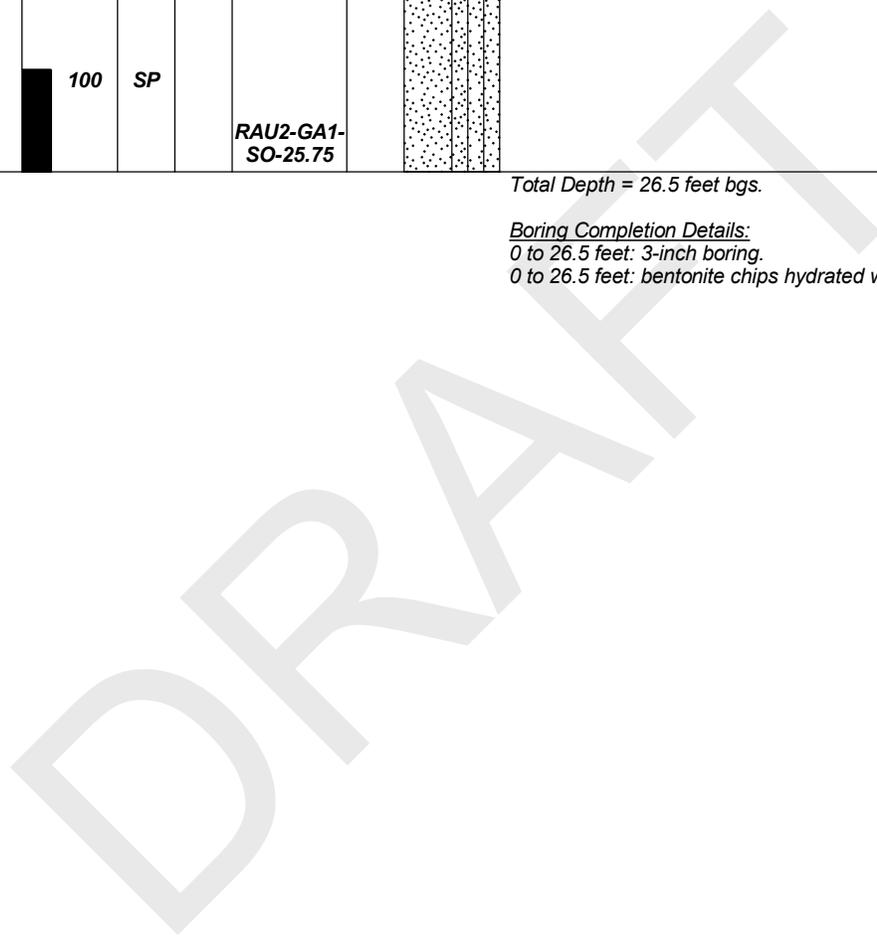
Well Number
RAU2-GA1

Sheet
2 of 2

Depth (feet, BGS)	Well Details	Interval	Percent Recovery	Collection Method	Sample Data			Blows/6"	Lithologic Column	Soil Description
					Number	Name (Type)				
21			100	SP		RAU2-GA1-SO-20.25			20.5 to 26.5 feet: SAND with SILT (SP-SM); gray; 10% fines; 90% sand, medium; wet.	
25			100	SP		RAU2-GA1-SO-25.75				
26										

Total Depth = 26.5 feet bgs.

Boring Completion Details:
 0 to 26.5 feet: 3-inch boring.
 0 to 26.5 feet: bentonite chips hydrated with potable water.



NOTES: 1) bgs = below ground surface. 2) SP = split spoon. 3) Soil lithology determined from soil cuttings during drilling and split spoon sample intervals.

Geologic Borehole Log/Well Construction

Maul Foster & Alongi, Inc.

Project Number
1044.02.13

Well Number
RAU2-GA2

Sheet
1 of 2

Project Name **Upland RI - Grays Harbor Historical Seaport Authority**
 Project Location **Aberdeen, Washington**
 Start/End Date **12/4/2019 to 12/4/2019**
 Driller/Equipment **Holocene Drilling, Inc./Diedrich D-50**
 Geologist/Engineer **R. Lewis**
 Sample Method **Standard Penetration Test**

TOC Elevation (feet)
 Surface Elevation (feet)
 Northing **614931.7**
 Easting **816674.7**
 Hole Depth **26.5-feet**
 Outer Hole Diam **3.0-inch**

Depth (feet, BGS)	Well Details	Sample Data				Blows/6"	Lithologic Column	Soil Description
		Interval	Percent Recovery	Collection Method	Number			
1								0 to 2.5 feet: Not sampled.
2								
3		20	SP					2.5 to 4.0 feet: WOODWASTE; reddish brown; 100% woodwaste; wood chips and sawdust; wet.
4								4.0 to 5.0 feet: No recovery.
5		5	SP					5.0 to 6.0 feet: WOODWASTE; reddish brown; 100% woodwaste, wood chips and sawdust; wet.
6								6.0 to 6.5 feet: No recovery.
7								6.5 to 8.5 feet: WOODWASTE; reddish brown; 100% woodwaste, wood chips and sawdust; wet.
8		15	SP					8.5 to 9.0 feet: No recovery.
9								9.0 to 10.0 feet: WOODWASTE; reddish brown; 100% woodwaste, wood chips and sawdust; wet.
10		50	SP					10.0 to 20.0 feet: SILT (ML); gray; 70% fines, medium plasticity; 30% woodwaste, chips; wet.
11								
12								
13								
14								
15		100	SP					
16								
17								
18								
19								
20								

NOTES: 1) bgs = below ground surface. 2) SP = split spoon. 3) Soil lithology determined from soil cuttings during drilling and split spoon sample intervals.

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Maul Foster & Alongi, Inc.

Geologic Borehole Log/Well Construction

Project Number
1044.02.13

Well Number
RAU2-GA2

Sheet
2 of 2

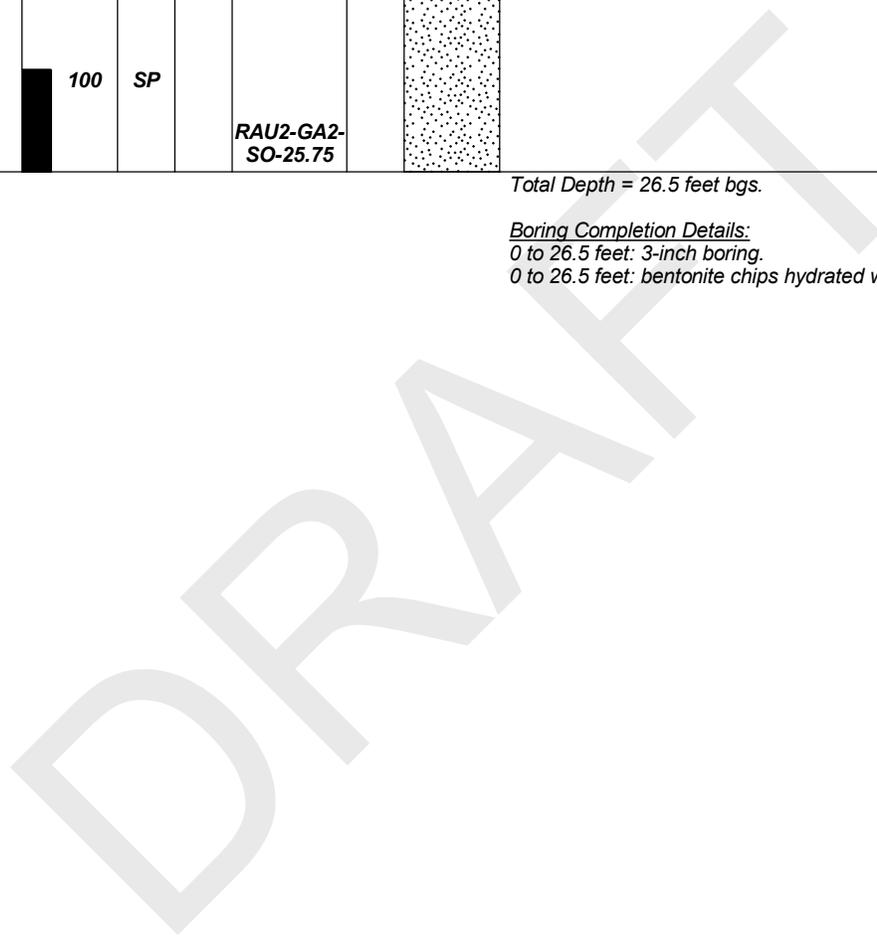
Depth (feet, BGS)	Well Details	Interval	Percent Recovery	Collection Method	Sample Data			Blows/6"	Lithologic Column	Soil Description
					Number	Name (Type)				
21		100	100	SP		RAU2-GA2-SO-20.75			20.0 to 21.0 feet: SAND with SILT (SW-SM); gray; 20% fines, medium plasticity; 80% sand, fine to medium; wet.	
22									21.0 to 26.5 feet: SAND (SP); gray; 100% sand, medium, subrounded to subangular; wet.	
23										
24										
25		100	100	SP		RAU2-GA2-SO-25.75				
26										

Total Depth = 26.5 feet bgs.

Boring Completion Details:

0 to 26.5 feet: 3-inch boring.

0 to 26.5 feet: bentonite chips hydrated with potable water.



NOTES: 1) bgs = below ground surface. 2) SP = split spoon. 3) Soil lithology determined from soil cuttings during drilling and split spoon sample intervals.

APPENDIX E
FIELD SAMPLING DATA SHEETS

DRAFT



Maul Foster & Alongi, Inc.

109 East 13th Street, Vancouver, WA 98660 (360) 694-2691 Fax. (360) 906-

Soil Field Sampling Data Sheet

Client Name	Grays Harbor Historical Seaport Authority	Sample Location	SE-01A				
Project Number	1044.02.06-02	Sampler	LBP; MVP				
Project Name	Seaport In-Water RI	Sampling Date	09/25/2019				
Sampling Event	September 2019	Sample Name	SE-01A-1.0-2.0				
Sub Area		Sample Depth	1.5				
FSDS QA:	TKS; 10/07/2019	Easting	817512.899	Northing	615665.36	TOC	

Sample Information

Sampling Method	Sample Type	Sample Category	PID/FID	Sampling Time	Container Code	#
Vibracore	Sediment	Discrete	0.4	8:10:00 AM	2 oz. soil	
					4 oz. soil	1
					8 oz. soil	1
					Other	1
					Total Containers	3

Sample Description:

Silt with up to 20% woodwaste consisting of chips, fibers, and chunks up to 3 inches.

General Sampling Comment

Samples are a composite of sediment core between depths of 1.0 and 2.0 feet. Mid-point recorded as sample depth. Samples are intended to characterize woodwaste in the 1 foot core segment.

Sampling Method Code:

(1) Backhoe, (2) Hand Auger, (3) Drill Bit Cutting Head, (4) Geoprobe, (5) Split Spoon, (6) Shelby Tube, (7) Grab, (8) Other (Specify)

Maul Foster & Alongi, Inc.

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Soil Field Sampling Data Sheet

Client Name	Grays Harbor Historical Seaport Authority	Sample Location	SE-01B				
Project Number	1044.02.06-02	Sampler	LBP; MVP				
Project Name	Seaport In-Water RI	Sampling Date	09/25/2019				
Sampling Event	September 2019	Sample Name	SE-01B-0.5-1.5				
Sub Area		Sample Depth	1				
FSDS QA:	TKS; 10/07/2019	Easting	817608.828	Northing	615683.27	TOC	

Sample Information

Sampling Method	Sample Type	Sample Category	PID/FID	Sampling Time	Container Code	#
Vibracore	Sediment	Discrete	0.5	9:02:00 AM	2 oz. soil	
					4 oz. soil	
					8 oz. soil	
					Other	1
					Total Containers	1

Sample Description:

Woodwaste (chips, chunks, and fibers) with silt. Strong organic odor.

General Sampling Comment

Samples are a composite of sediment core between depths of 0.5 and 1.5 feet. Mid-point recorded as sample depth. Samples are intended to characterize woodwaste in the 1 foot core segment.

Sampling Method Code:

(1) Backhoe, (2) Hand Auger, (3) Drill Bit Cutting Head, (4) Geoprobe, (5) Split Spoon, (6) Shelby Tube, (7) Grab, (8) Other (Specify)

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Soil Field Sampling Data Sheet

Client Name	Grays Harbor Historical Seaport Authority	Sample Location	SE-01C				
Project Number	1044.02.06-02	Sampler	LBP; MVP				
Project Name	Seaport In-Water RI	Sampling Date	09/25/2019				
Sampling Event	September 2019	Sample Name	SE-01C-2.0-3.0				
Sub Area		Sample Depth	2.5				
FSDS QA:	TKS; 10/07/2019	Easting	817722.292	Northing	615734.03	TOC	

Sample Information

Sampling Method	Sample Type	Sample Category	PID/FID	Sampling Time	Container Code	#
Vibracore	Sediment	Discrete	0.3	9:55:00 AM	2 oz. soil	
					4 oz. soil	
					8 oz. soil	
					Other	1
					Total Containers	1

Sample Description:

Up to 15% woodwaste fibers, chunks (1") in firm silt. Faint organic odor.

General Sampling Comment

Samples are a composite of sediment core between depths of 2.0 and 3.0 feet. Mid-point recorded as sample depth. Samples are intended to characterize woodwaste in the 1 foot core segment.

Sampling Method Code:

(1) Backhoe, (2) Hand Auger, (3) Drill Bit Cutting Head, (4) Geoprobe, (5) Split Spoon, (6) Shelby Tube, (7) Grab, (8) Other (Specify)

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Soil Field Sampling Data Sheet

Client Name	Grays Harbor Historical Seaport Authority	Sample Location	SE-01D				
Project Number	1044.02.06-02	Sampler	LBP; MVP				
Project Name	Seaport In-Water RI	Sampling Date	09/25/2019				
Sampling Event	September 2019	Sample Name	SE-01D-0-1.0				
Sub Area		Sample Depth	0.5				
FSDS QA:	TKS; 10/07/2019	Easting	817808.985	Northing	615735.53	TOC	

Sample Information

Sampling Method	Sample Type	Sample Category	PID/FID	Sampling Time	Container Code	#
Vibracore	Sediment	Discrete	0.5	10:36:00 AM	2 oz. soil	
					4 oz. soil	
					8 oz. soil	
					Other	1
					Total Containers	1

Sample Description:

Silt with 15% woodwaste shreds. Faint organic-like odor.

General Sampling Comment

Samples are a composite of sediment core between depths of 0.0 and 1.0 feet. Mid-point recorded as sample depth. Samples are intended to characterize woodwaste in the 1 foot core segment.

Sampling Method Code:

(1) Backhoe, (2) Hand Auger, (3) Drill Bit Cutting Head, (4) Geoprobe, (5) Split Spoon, (6) Shelby Tube, (7) Grab, (8) Other (Specify)

Maul Foster & Alongi, Inc.

109 East 13th Street, Vancouver, WA 98660 (360) 694-2691 Fax. (360) 906-

Soil Field Sampling Data Sheet

Client Name	Grays Harbor Historical Seaport Authority	Sample Location	SE-02A				
Project Number	1044.02.06-02	Sampler	ADM; MVP				
Project Name	Seaport In-Water RI	Sampling Date	09/26/2019				
Sampling Event	September 2019	Sample Name	SE-02A-2.5-3.5				
Sub Area		Sample Depth	3				
FSDS QA:	TKS; 10/07/2019	Easting	817338.959	Northing	615705.28	TOC	

Sample Information

Sampling Method	Sample Type	Sample Category	PID/FID	Sampling Time	Container Code	#
Vibracore	Sediment	Discrete	--	11:50:00 AM	2 oz. soil	
					4 oz. soil	1
					8 oz. soil	1
					Other	1
					Total Containers	3

Sample Description:

Silt with up to 10% woodwaste shreds and small chips. No odors.

General Sampling Comment

Samples are a composite of sediment core between depths of 2.5 and 3.5 feet. Mid-point recorded as sample depth. Samples are intended to characterize woodwaste in the 1 foot core segment.

Sampling Method Code:

(1) Backhoe, (2) Hand Auger, (3) Drill Bit Cutting Head, (4) Geoprobe, (5) Split Spoon, (6) Shelby Tube, (7) Grab, (8) Other (Specify)

Maul Foster & Alongi, Inc.

109 East 13th Street, Vancouver, WA 98660 (360) 694-2691 Fax. (360) 906-

Soil Field Sampling Data Sheet

Client Name	Grays Harbor Historical Seaport Authority	Sample Location	SE-03A				
Project Number	1044.02.06-02	Sampler	LBP; MVP				
Project Name	Seaport In-Water RI	Sampling Date	09/25/2019				
Sampling Event	September 2019	Sample Name	SE-03A-0-1.0				
Sub Area		Sample Depth	0.5				
FSDS QA:	TKS; 10/07/2019	Easting	817019.684	Northing	615673.50	TOC	

Sample Information

Sampling Method	Sample Type	Sample Category	PID/FID	Sampling Time	Container Code	#
Vibracore	Sediment	Discrete	0.3	11:20:00 AM	2 oz. soil	
					4 oz. soil	1
					8 oz. soil	1
					Other	1
					Total Containers	3

Sample Description:

Up to 10% woodwaste in soft silt with faint organic-like odor.

General Sampling Comment

Samples are a composite of sediment core between depths of 0.0 and 1.0 feet. Mid-point recorded as sample depth. Samples are intended to characterize woodwaste in the 1 foot core segment.

Sampling Method Code:

(1) Backhoe, (2) Hand Auger, (3) Drill Bit Cutting Head, (4) Geoprobe, (5) Split Spoon, (6) Shelby Tube, (7) Grab, (8) Other (Specify)

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Soil Field Sampling Data Sheet

Client Name	Grays Harbor Historical Seaport Authority	Sample Location	SE-03B				
Project Number	1044.02.06-02	Sampler	LBP; MVP				
Project Name	Seaport In-Water RI	Sampling Date	09/25/2019				
Sampling Event	September 2019	Sample Name	SE-03B-1.0-2.0				
Sub Area		Sample Depth	1.5				
FSDS QA:	TKS; 10/07/2019	Easting	817126.239	Northing	615692.22	TOC	

Sample Information

Sampling Method	Sample Type	Sample Category	PID/FID	Sampling Time	Container Code	#
Vibracore	Sediment	Discrete	0.1	11:50:00 AM	2 oz. soil	
					4 oz. soil	
					8 oz. soil	
					Other	1
					Total Containers	1

Sample Description:

10% woodwaste shreds in black silt.

General Sampling Comment

Samples are a composite of sediment core between depths of 1.0 and 2.0 feet. Mid-point recorded as sample depth. Samples are intended to characterize woodwaste in the 1 foot core segment.

Sampling Method Code:

(1) Backhoe, (2) Hand Auger, (3) Drill Bit Cutting Head, (4) Geoprobe, (5) Split Spoon, (6) Shelby Tube, (7) Grab, (8) Other (Specify)

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Soil Field Sampling Data Sheet

Client Name	Grays Harbor Historical Seaport Authority	Sample Location	SE-05A				
Project Number	1044.02.06-02	Sampler	LBP; MVP				
Project Name	Seaport In-Water RI	Sampling Date	09/23/2019				
Sampling Event	September 2019	Sample Name	SE-05A-2.0-3.0				
Sub Area		Sample Depth	2.5				
FSDS QA:	TKS; 10/07/2019	Easting	818023.141	Northing	615966.55	TOC	

Sample Information

Sampling Method	Sample Type	Sample Category	PID/FID	Sampling Time	Container Code	#
Vibracore	Sediment	Discrete	51.3 ppm	2:00:00 PM	2 oz. soil	
					4 oz. soil	1
					8 oz. soil	1
					Other	1
					Total Containers	3

Sample Description:

Black, silt with trace wood debris

General Sampling Comment

Samples are a composite of sediment core between depths of 2.0 and 3.0 feet. Mid-point recorded as sample depth. Samples are intended to characterize woodwaste in the 1 foot core segment.

Sampling Method Code:

(1) Backhoe, (2) Hand Auger, (3) Drill Bit Cutting Head, (4) Geoprobe, (5) Split Spoon, (6) Shelby Tube, (7) Grab, (8) Other (Specify)

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Soil Field Sampling Data Sheet

Client Name	Grays Harbor Historical Seaport Authority	Sample Location	SE-05B				
Project Number	1044.02.06-02	Sampler	ADM; MVP				
Project Name	Seaport In-Water RI	Sampling Date	09/26/2019				
Sampling Event	September 2019	Sample Name	SE-05B-2.5-3.5				
Sub Area		Sample Depth	3				
FSDS QA:	TKS; 10/07/2019	Easting	818104.57	Northing	615917.33	TOC	

Sample Information

Sampling Method	Sample Type	Sample Category	PID/FID	Sampling Time	Container Code	#
Vibracore	Sediment	Discrete	--	4:20:00 PM	2 oz. soil	
					4 oz. soil	
					8 oz. soil	
					Other	1
					Total Containers	1

Sample Description:

Trace to 5% woodwaste in dark gray silt. No odor.

General Sampling Comment

Samples are a composite of sediment core between depths of 2.5 and 3.5 feet. Mid-point recorded as sample depth. Samples are intended to characterize woodwaste in the 1 foot core segment.

Sampling Method Code:

(1) Backhoe, (2) Hand Auger, (3) Drill Bit Cutting Head, (4) Geoprobe, (5) Split Spoon, (6) Shelby Tube, (7) Grab, (8) Other (Specify)

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Soil Field Sampling Data Sheet

Client Name	Grays Harbor Historical Seaport Authority	Sample Location	SE-06A				
Project Number	1044.02.06-02	Sampler	ADM; MVP				
Project Name	Seaport In-Water RI	Sampling Date	09/25/2019				
Sampling Event	September 2019	Sample Name	SE-06A-0.5-1.5				
Sub Area		Sample Depth	1				
FSDS QA:	TKS; 10/07/2019	Easting	817909.818	Northing	615849.62	TOC	

Sample Information

Sampling Method	Sample Type	Sample Category	PID/FID	Sampling Time	Container Code	#
Vibracore	Sediment	Discrete	--	2:15:00 PM	2 oz. soil	
					4 oz. soil	1
					8 oz. soil	1
					Other	1
					Total Containers	3

Sample Description:

Up to 20% woodwaste in silt. Woodwaste consists of 1-3" chunks. No odor.

General Sampling Comment

Samples are a composite of sediment core between depths of 0.5 and 1.5 feet. Mid-point recorded as sample depth. Samples are intended to characterize woodwaste in the 1 foot core segment.

Sampling Method Code:

(1) Backhoe, (2) Hand Auger, (3) Drill Bit Cutting Head, (4) Geoprobe, (5) Split Spoon, (6) Shelby Tube, (7) Grab, (8) Other (Specify)

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Soil Field Sampling Data Sheet

Client Name	Grays Harbor Historical Seaport Authority	Sample Location	SE-06B				
Project Number	1044.02.06-02	Sampler	ADM; MVP				
Project Name	Seaport In-Water RI	Sampling Date	09/26/2019				
Sampling Event	September 2019	Sample Name	SE-06B-3.0-4.0				
Sub Area		Sample Depth	3.5				
FSDS QA:	TKS; 10/07/2019	Easting	817823.914	Northing	615890.48	TOC	

Sample Information

Sampling Method	Sample Type	Sample Category	PID/FID	Sampling Time	Container Code	#
Vibracore	Sediment	Discrete	--	11:55:00 AM	2 oz. soil	
					4 oz. soil	
					8 oz. soil	
					Other	1
					Total Containers	1

Sample Description:

Sand with up to 10% woodwaste from 3.8' to 4.0'

General Sampling Comment

Samples are a composite of sediment core between depths of 3.0 and 4.0 feet. Mid-point recorded as sample depth. Samples are intended to characterize woodwaste in the 1 foot core segment.

Sampling Method Code:

(1) Backhoe, (2) Hand Auger, (3) Drill Bit Cutting Head, (4) Geoprobe, (5) Split Spoon, (6) Shelby Tube, (7) Grab, (8) Other (Specify)

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Soil Field Sampling Data Sheet

Client Name	Grays Harbor Historical Seaport Authority	Sample Location	SE-07A				
Project Number	1044.02.06-02	Sampler	ADM; MVP				
Project Name	Seaport In-Water RI	Sampling Date	09/26/2019				
Sampling Event	September 2019	Sample Name	SE-07A-0-1.0				
Sub Area		Sample Depth	0.5				
FSDS QA:	TKS; 10/07/2019	Easting	816818.518	Northing	615469.51	TOC	

Sample Information

Sampling Method	Sample Type	Sample Category	PID/FID	Sampling Time	Container Code	#
Vibracore	Sediment	Discrete	--	8:15:00 AM	2 oz. soil	
					4 oz. soil	1
					8 oz. soil	1
					Other	1
					Total Containers	3

Sample Description:

Significant woodwaste (chips, pulp, chunks) in black silt that is impacted by free product.

General Sampling Comment

Samples are a composite of sediment core between depths of 0.0 and 1.0 feet. Mid-point recorded as sample depth. Samples are intended to characterize woodwaste in the 1 foot core segment.

Sampling Method Code:

(1) Backhoe, (2) Hand Auger, (3) Drill Bit Cutting Head, (4) Geoprobe, (5) Split Spoon, (6) Shelby Tube, (7) Grab, (8) Other (Specify)

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Soil Field Sampling Data Sheet

Client Name	Grays Harbor Historical Seaport Authority	Sample Location	SE-07B				
Project Number	1044.02.06-02	Sampler	ADM; MVP				
Project Name	Seaport In-Water RI	Sampling Date	09/26/2019				
Sampling Event	September 2019	Sample Name	SE-07B-0-1.0				
Sub Area		Sample Depth	0.5				
FSDS QA:	TKS; 10/07/2019	Easting	816792.453	Northing	615530.59	TOC	

Sample Information

Sampling Method	Sample Type	Sample Category	PID/FID	Sampling Time	Container Code	#
Vibracore	Sediment	Discrete	--	10:00:00 AM	2 oz. soil	
					4 oz. soil	
					8 oz. soil	
					Other	1
					Total Containers	1

Sample Description:

Silt with 5% woodwaste. No odor.

General Sampling Comment

Samples are a composite of sediment core between depths of 0.0 and 1.0 feet. Mid-point recorded as sample depth. Samples are intended to characterize woodwaste in the 1 foot core segment.

Sampling Method Code:

(1) Backhoe, (2) Hand Auger, (3) Drill Bit Cutting Head, (4) Geoprobe, (5) Split Spoon, (6) Shelby Tube, (7) Grab, (8) Other (Specify)

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Soil Field Sampling Data Sheet

Client Name	Grays Harbor Historical Seaport Authority	Sample Location	SE-08A				
Project Number	1044.02.06-02	Sampler	LBP; MVP				
Project Name	Seaport In-Water RI	Sampling Date	09/24/2019				
Sampling Event	September 2019	Sample Name	SE-08A-0-1.0				
Sub Area		Sample Depth	0.5				
FSDS QA:	TKS; 10/07/2019	Easting	817053.736	Northing	615565	TOC	

Sample Information

Sampling Method	Sample Type	Sample Category	PID/FID	Sampling Time	Container Code	#
Vibracore	Sediment	Discrete	20.0	10:00:00 AM	2 oz. soil	
					4 oz. soil	1
					8 oz. soil	1
					Other	1
					Total Containers	3

Sample Description:

Significant woodwaste, pulp to fine chips. Strong organic/sulfurous odor.

General Sampling Comment

Samples are a composite of sediment core between depths of 0.0 and 1.0 feet. Mid-point recorded as sample depth. Samples are intended to characterize woodwaste in the 1 foot core segment.

Sampling Method Code:

(1) Backhoe, (2) Hand Auger, (3) Drill Bit Cutting Head, (4) Geoprobe, (5) Split Spoon, (6) Shelby Tube, (7) Grab, (8) Other (Specify)

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Soil Field Sampling Data Sheet

Client Name	Grays Harbor Historical Seaport Authority	Sample Location	SE-08B				
Project Number	1044.02.06-02	Sampler	LBP; MVP				
Project Name	Seaport In-Water RI	Sampling Date	09/24/2019				
Sampling Event	September 2019	Sample Name	SE-08B-0-2.461				
Sub Area		Sample Depth					
FSDS QA:	TKS; 10/07/2019	Easting	817111.749	Northing	615589.16	TOC	

Sample Information

Sampling Method	Sample Type	Sample Category	PID/FID	Sampling Time	Container Code	#
Vibracore	Sediment	Discrete	--	12:10:00 PM	2 oz. soil	
					4 oz. soil	
					8 oz. soil	30
					Other	7
					Total Containers	37

Sample Description:

Silt with ~15% woodwaste consists of fine to trace coarse chips.

General Sampling Comment

Core collected for radioisotope analysis.
0-20 cm: samples collected in 1 cm increments
20-40 cm: samples collected in 2 cm increments
>40 cm: samples collected in 5 cm increments

Sampling Method Code:

(1) Backhoe, (2) Hand Auger, (3) Drill Bit Cutting Head, (4) Geoprobe, (5) Split Spoon, (6) Shelby Tube, (7) Grab, (8) Other (Specify)

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Soil Field Sampling Data Sheet

Client Name	Grays Harbor Historical Seaport Authority	Sample Location	SE-08B				
Project Number	1044.02.06-02	Sampler	LBP; MVP				
Project Name	Seaport In-Water RI	Sampling Date	09/24/2019				
Sampling Event	September 2019	Sample Name	SE-08B-0-1.0				
Sub Area		Sample Depth	0.5				
FSDS QA:	TKS; 10/07/2019	Easting	817102.348	Northing	615582.90	TOC	

Sample Information

Sampling Method	Sample Type	Sample Category	PID/FID	Sampling Time	Container Code	#
Vibracore	Sediment	Discrete	2.8	10:35:00 AM	2 oz. soil	
					4 oz. soil	
					8 oz. soil	
					Other	1
					Total Containers	1

Sample Description:

Silt with woodwaste consists of pulp to fine chips, trace larger chips of wood. Faint organic-like odor.

General Sampling Comment

Samples are a composite of sediment core between depths of 0.0 and 1.0 feet. Mid-point recorded as sample depth. Samples are intended to characterize woodwaste in the 1 foot core segment.

Sampling Method Code:

(1) Backhoe, (2) Hand Auger, (3) Drill Bit Cutting Head, (4) Geoprobe, (5) Split Spoon, (6) Shelby Tube, (7) Grab, (8) Other (Specify)

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Soil Field Sampling Data Sheet

Client Name	Grays Harbor Historical Seaport Authority	Sample Location	SE-08C				
Project Number	1044.02.06-02	Sampler	LBP; MVP				
Project Name	Seaport In-Water RI	Sampling Date	09/24/2019				
Sampling Event	September 2019	Sample Name	SE-08C-3.2-4.2				
Sub Area		Sample Depth	3.7				
FSDS QA:	TKS; 10/07/2019	Easting	817150.646	Northing	615597.03	TOC	

Sample Information

Sampling Method	Sample Type	Sample Category	PID/FID	Sampling Time	Container Code	#
Vibracore	Sediment	Discrete	0.9	2:45:00 PM	2 oz. soil	
					4 oz. soil	1
					8 oz. soil	1
					Other	1
					Total Containers	3

Sample Description:

Grab sample from interval with dense woodwaste consists of wood pulp, chips, and shreds.

General Sampling Comment

Samples are a composite of sediment core between depths of 3.2 and 4.2 feet. Mid-point recorded as sample depth. Samples are intended to characterize woodwaste in the 1 foot core segment.

Sampling Method Code:

(1) Backhoe, (2) Hand Auger, (3) Drill Bit Cutting Head, (4) Geoprobe, (5) Split Spoon, (6) Shelby Tube, (7) Grab, (8) Other (Specify)

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Soil Field Sampling Data Sheet

Client Name	Grays Harbor Historical Seaport Authority	Sample Location	SE-08D				
Project Number	1044.02.06-02	Sampler	LBP; MVP				
Project Name	Seaport In-Water RI	Sampling Date	09/24/2019				
Sampling Event	September 2019	Sample Name	SE-08D-2.0-3.0				
Sub Area		Sample Depth	2.5				
FSDS QA:	TKS; 10/07/2019	Easting	817196.439	Northing	615614.58	TOC	

Sample Information

Sampling Method	Sample Type	Sample Category	PID/FID	Sampling Time	Container Code	#
Vibracore	Sediment	Discrete	0.2	1:43:00 PM	2 oz. soil	
					4 oz. soil	
					8 oz. soil	
					Other	1
					Total Containers	1

Sample Description:

Significant woodwaste (pulp, fibers, chips) and silt. Strong organic odor.

General Sampling Comment

Samples are a composite of sediment core between depths of 2.0 and 3.0 feet. Mid-point recorded as sample depth. Samples are intended to characterize woodwaste in the 1 foot core segment.

Sampling Method Code:

(1) Backhoe, (2) Hand Auger, (3) Drill Bit Cutting Head, (4) Geoprobe, (5) Split Spoon, (6) Shelby Tube, (7) Grab, (8) Other (Specify)

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Soil Field Sampling Data Sheet

Client Name	Grays Harbor Historical Seaport Authority	Sample Location	SE-10				
Project Number	1044.02.06-02	Sampler	ADM; MVP				
Project Name	Seaport In-Water RI	Sampling Date	09/26/2019				
Sampling Event	September 2019	Sample Name	SE-10-2.0-3.7				
Sub Area		Sample Depth	2.85				
FSDS QA:	TKS; 10/07/2019	Easting	816917.72	Northing	615459	TOC	

Sample Information

Sampling Method	Sample Type	Sample Category	PID/FID	Sampling Time	Container Code	#
Vibracore	Sediment	Discrete	--	1:50:00 PM	2 oz. soil	
					4 oz. soil	1
					8 oz. soil	1
					Other	9
					Total Containers	11

Sample Description:

30% woodwaste in silt. Strong sulfur-like odor.

General Sampling Comment

Collected MS + MSD, TCLP, Hg+Pb
Samples are a composite of sediment core between depths of 2.0 and 3.7 feet. Mid-point recorded as sample depth. Samples are intended to characterize woodwaste in the 1.7 foot core segment.

Sampling Method Code:

(1) Backhoe, (2) Hand Auger, (3) Drill Bit Cutting Head, (4) Geoprobe, (5) Split Spoon, (6) Shelby Tube, (7) Grab, (8) Other (Specify)

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Soil Field Sampling Data Sheet

Client Name	Grays Harbor Historical Seaport Authority	Sample Location	SE-12				
Project Number	1044.02.06-02	Sampler	ADM; MVP				
Project Name	Seaport In-Water RI	Sampling Date	09/25/2019				
Sampling Event	September 2019	Sample Name	SE-12-0-1.804				
Sub Area		Sample Depth					
FSDS QA:	TKS; 10/07/2019	Easting	816909.897	Northing	615545.57	TOC	

Sample Information

Sampling Method	Sample Type	Sample Category	PID/FID	Sampling Time	Container Code	#
Vibracore	Sediment	Discrete	--	3:24:00 PM	2 oz. soil	
					4 oz. soil	
					8 oz. soil	33
					Other	
					Total Containers	33

Sample Description:

--

General Sampling Comment

Core collected for radioisotope analysis. 0-20 cm: samples collected in 1 cm increments 20-40 cm: samples collected in 2 cm increments >40 cm: samples collected in 5 cm increments
--

Sampling Method Code:

(1) Backhoe, (2) Hand Auger, (3) Drill Bit Cutting Head, (4) Geoprobe, (5) Split Spoon, (6) Shelby Tube, (7) Grab, (8) Other (Specify)

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Soil Field Sampling Data Sheet

Client Name	Grays Harbor Historical Seaport Authority	Sample Location	SE-14				
Project Number	1044.02.06-02	Sampler	ADM; MVP				
Project Name	Seaport In-Water RI	Sampling Date	09/27/2019				
Sampling Event	September 2019	Sample Name	SE-14-0-0.33				
Sub Area		Sample Depth	0.165				
FSDS QA:	TKS; 10/07/2019	Easting	816904.889	Northing	615447.03	TOC	

Sample Information

Sampling Method	Sample Type	Sample Category	PID/FID	Sampling Time	Container Code	#
(7) Grab	Sediment	Discrete	--	2:02:00 PM	2 oz. soil	
					4 oz. soil	3
					8 oz. soil	
					Other	7
					Total Containers	10

Sample Description:

0-2 cm: black silt (80%) with sand (10%) and gravel (10%).
2-10 cm: woodwaste (chips,shreds) with up to 15% silt.

General Sampling Comment

Samples are a composite of surface sediment sampled to a depth of 10 cm. Mid-point recorded as sample depth.

Sampling Method Code:

(1) Backhoe, (2) Hand Auger, (3) Drill Bit Cutting Head, (4) Geoprobe, (5) Split Spoon, (6) Shelby Tube, (7) Grab, (8) Other (Specify)

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Soil Field Sampling Data Sheet

Client Name	Grays Harbor Historical Seaport Authority	Sample Location	SE-15				
Project Number	1044.02.06-02	Sampler	ADM;MVP				
Project Name	Seaport In-Water RI	Sampling Date	09/27/2019				
Sampling Event	September 2019	Sample Name	SE-15-0-0.33				
Sub Area		Sample Depth	0.165				
FSDS QA:	TKS; 10/07/2019	Easting	817048.03	Northing	615579.53	TOC	

Sample Information

Sampling Method	Sample Type	Sample Category	PID/FID	Sampling Time	Container Code	#
(7) Grab	Sediment	Discrete	--	11:24:00 AM	2 oz. soil	
					4 oz. soil	2
					8 oz. soil	
					Other	7
					Total Containers	9

Sample Description:

Dark gray silt (60%) with sand (10%) and significant woodwaste chips (30%). Strong sulfur odor. Bits of masonry debris.

General Sampling Comment

Samples are a composite of surface sediment sampled to a depth of 10 cm. Mid-point recorded as sample depth.

Sampled collected for bioassay.

Sampling Method Code:

(1) Backhoe, (2) Hand Auger, (3) Drill Bit Cutting Head, (4) Geoprobe, (5) Split Spoon, (6) Shelby Tube, (7) Grab, (8) Other (Specify)

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Soil Field Sampling Data Sheet

Client Name	Grays Harbor Historical Seaport Authority	Sample Location	SE-16				
Project Number	1044.02.06-02	Sampler	ADM; MVP				
Project Name	Seaport In-Water RI	Sampling Date	09/27/2019				
Sampling Event	September 2019	Sample Name	SE-16-0-0.33				
Sub Area		Sample Depth	0.165				
FSDS QA:	TKS; 10/07/2019	Easting	817209.59	Northing	615655.29	TOC	

Sample Information

Sampling Method	Sample Type	Sample Category	PID/FID	Sampling Time	Container Code	#
(7) Grab	Sediment	Discrete	--	9:00:00 AM	2 oz. soil	
					4 oz. soil	2
					8 oz. soil	
					Other	8
					Total Containers	10

Sample Description:

Dark gray silt (90%) with sand (10%) and trace woodwaste. Soft. No odor.

General Sampling Comment

Samples are a composite of surface sediment sampled to a depth of 10 cm. Midpoint recorded as sample depth.

Sample collected for bioassay.

Sampling Method Code:

(1) Backhoe, (2) Hand Auger, (3) Drill Bit Cutting Head, (4) Geoprobe, (5) Split Spoon, (6) Shelby Tube, (7) Grab, (8) Other (Specify)

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Soil Field Sampling Data Sheet

Client Name	Grays Harbor Historical Seaport Authority	Sample Location	SE-17				
Project Number	1044.02.06-02	Sampler	ADM; MVP				
Project Name	Seaport In-Water RI	Sampling Date	09/27/2019				
Sampling Event	September 2019	Sample Name	SE-17-0-0.33				
Sub Area		Sample Depth	0.165				
FSDS QA:	TKS; 10/07/2019	Easting	817514.165	Northing	615657.14	TOC	

Sample Information

Sampling Method	Sample Type	Sample Category	PID/FID	Sampling Time	Container Code	#
(7) Grab	Sediment	Discrete	--	9:47:00 AM	2 oz. soil	
					4 oz. soil	2
					8 oz. soil	
					Other	7
					Total Containers	9

Sample Description:

Silt (85%) with sand (15%). Dark gray with orange mostly. No odor. Trace organic debris.

General Sampling Comment

Targeted the same location as SE-01A. Samples are a composite of surface sediment sampled to a depth of 10 cm. Midpoint recorded as sample depth.

Sample collected for bioassay.

Sampling Method Code:

(1) Backhoe, (2) Hand Auger, (3) Drill Bit Cutting Head, (4) Geoprobe, (5) Split Spoon, (6) Shelby Tube, (7) Grab, (8) Other (Specify)

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Soil Field Sampling Data Sheet

Client Name	Grays Harbor Historical Seaport Authority	Sample Location	SE-18				
Project Number	1044.02.06-02	Sampler	ADM; MVP				
Project Name	Seaport In-Water RI	Sampling Date	09/27/2019				
Sampling Event	September 2019	Sample Name	SE-18-0-0.33				
Sub Area		Sample Depth	0.165				
FSDS QA:	TKS; 10/07/2019	Easting	817442.424	Northing	615790.44	TOC	

Sample Information

Sampling Method	Sample Type	Sample Category	PID/FID	Sampling Time	Container Code	#
(7) Grab	Sediment	Discrete	--	11:54:00 AM	2 oz. soil	
					4 oz. soil	2
					8 oz. soil	
					Other	8
					Total Containers	10

Sample Description:

Black silt (85%) with fine sand (10%) and woodwaste (5%). No odor.

General Sampling Comment

Samples are a composite of surface sediment sampled to a depth of 10 cm. Midpoint recorded as sample depth.

Sample collected for bioassay.

Sampling Method Code:

(1) Backhoe, (2) Hand Auger, (3) Drill Bit Cutting Head, (4) Geoprobe, (5) Split Spoon, (6) Shelby Tube, (7) Grab, (8) Other (Specify)

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Soil Field Sampling Data Sheet

Client Name	Grays Harbor Historical Seaport Authority	Sample Location	SE-19				
Project Number	1044.02.06-02	Sampler	ADM; MVP				
Project Name	Seaport In-Water RI	Sampling Date	09/27/2019				
Sampling Event	September 2019	Sample Name	SE-19-0-0.33				
Sub Area		Sample Depth	0.165				
FSDS QA:	TKS; 10/07/2019	Easting	817965.455	Northing	615939.86	TOC	

Sample Information

Sampling Method	Sample Type	Sample Category	PID/FID	Sampling Time	Container Code	#
(7) Grab	Sediment	Discrete	--	8:30:00 AM	2 oz. soil	
					4 oz. soil	2
					8 oz. soil	
					Other	7
					Total Containers	9

Sample Description:

<0.1 ft layer of brown, soft silt overlying dark gray silt (90%) with sand (10%). No woodwaste. No odor.

General Sampling Comment

Water depth 25.2 ft. Samples are a composite of surface sediment sampled to a depth of 10 cm. Midpoint recorded as sample depth.

Sample collected for bioassay.

Sampling Method Code:

(1) Backhoe, (2) Hand Auger, (3) Drill Bit Cutting Head, (4) Geoprobe, (5) Split Spoon, (6) Shelby Tube, (7) Grab, (8) Other (Specify)

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Soil Field Sampling Data Sheet

Client Name	Grays Harbor Historical Seaport Authority	Sample Location	SE-20				
Project Number	1044.02.06-02	Sampler	ADM; MVP				
Project Name	Seaport In-Water RI	Sampling Date	09/25/2019				
Sampling Event	September 2019	Sample Name	SE-20-0-0.33				
Sub Area		Sample Depth	0.165				
FSDS QA:	TKS; 10/07/2019	Easting	818048.048	Northing	615568.77	TOC	

Sample Information

Sampling Method	Sample Type	Sample Category	PID/FID	Sampling Time	Container Code	#
(7) Grab	Sediment	Discrete	--	6:15:00 PM	2 oz. soil	
					4 oz. soil	1
					8 oz. soil	1
					Other	8
					Total Containers	10

Sample Description:

Soft silt with trace benthic organisms. Faint, organic-like odor.

General Sampling Comment

Samples are a composite of surface sediment sampled to a depth of 10 cm. Midpoint recorded as sample depth.

Sample collected for bioassay.

Sampling Method Code:

(1) Backhoe, (2) Hand Auger, (3) Drill Bit Cutting Head, (4) Geoprobe, (5) Split Spoon, (6) Shelby Tube, (7) Grab, (8) Other (Specify)

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Soil Field Sampling Data Sheet

Client Name	Grays Harbor Historical Seaport Authority	Sample Location	SE-21A				
Project Number	1044.02.06-02	Sampler	ADM; MVP				
Project Name	Seaport In-Water RI	Sampling Date	09/27/2019				
Sampling Event	September 2019	Sample Name	SE-21A-0-0.33				
Sub Area		Sample Depth	0.165				
FSDS QA:	TKS; 10/07/2019	Easting	818511.923	Northing	616086.16	TOC	

Sample Information

Sampling Method	Sample Type	Sample Category	PID/FID	Sampling Time	Container Code	#
(7) Grab	Sediment	Discrete	--	3:07:00 PM	2 oz. soil	
					4 oz. soil	
					8 oz. soil	
					Other	1
					Total Containers	1

Sample Description:

Brown silt (70%) with fine sand (15%) and large chunks (1-4") of wood waste (15%). No odor.

General Sampling Comment

Samples are a composite of surface sediment sampled to a depth of 10 cm. Midpoint recorded as sample depth.

Samples of SE-21A were collected for archive. The remainder was used for composite sample SE-21-0-0.33

Sampling Method Code:

(1) Backhoe, (2) Hand Auger, (3) Drill Bit Cutting Head, (4) Geoprobe, (5) Split Spoon, (6) Shelby Tube, (7) Grab, (8) Other (Specify)

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Soil Field Sampling Data Sheet

Client Name	Grays Harbor Historical Seaport Authority	Sample Location	SE-21B				
Project Number	1044.02.06-02	Sampler	ADM; MVP				
Project Name	Seaport In-Water RI	Sampling Date	09/27/2019				
Sampling Event	September 2019	Sample Name	SE-21B-0-0.33				
Sub Area		Sample Depth	0.165				
FSDS QA:	TKS; 10/07/2019	Easting	818485.956	Northing	616142.99	TOC	

Sample Information

Sampling Method	Sample Type	Sample Category	PID/FID	Sampling Time	Container Code	#
(7) Grab	Sediment	Discrete	--	3:15:00 PM	2 oz. soil	
					4 oz. soil	
					8 oz. soil	
					Other	1
					Total Containers	1

Sample Description:

Dark gray silt (85%) with fine sand (10%) and fine chips of woodwaste (5%). No odor.

General Sampling Comment

Samples are a composite of surface sediment sampled to a depth of 10 cm. Midpoint recorded as sample depth.

Samples of SE-21B were collected for archive. The remainder was used for composite sample SE-21-0-0.33

Sampling Method Code:

(1) Backhoe, (2) Hand Auger, (3) Drill Bit Cutting Head, (4) Geoprobe, (5) Split Spoon, (6) Shelby Tube, (7) Grab, (8) Other (Specify)

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Soil Field Sampling Data Sheet

Client Name	Grays Harbor Historical Seaport Authority	Sample Location	SE-21C				
Project Number	1044.02.06-02	Sampler	ADM; MVP				
Project Name	Seaport In-Water RI	Sampling Date	09/27/2019				
Sampling Event	September 2019	Sample Name	SE-21C-0-0.33				
Sub Area		Sample Depth	0.165				
FSDS QA:	TKS; 10/07/2019	Easting	818503.648	Northing	616112.56	TOC	

Sample Information

Sampling Method	Sample Type	Sample Category	PID/FID	Sampling Time	Container Code	#
(7) Grab	Sediment	Discrete	--	3:24:00 PM	2 oz. soil	
					4 oz. soil	
					8 oz. soil	
					Other	1
					Total Containers	1

Sample Description:

1 cm layer of light brown silt. Soft overlay. Dark gray coarse sand with up to 10% woodwaste chunks (up to 3 inches).

General Sampling Comment

Samples are a composite of surface sediment sampled to a depth of 10 cm. Midpoint recorded as sample depth.

Samples of SE-21C were collected for archive. The remainder was used for composite sample SE-21-0-0.33

Sampling Method Code:

(1) Backhoe, (2) Hand Auger, (3) Drill Bit Cutting Head, (4) Geoprobe, (5) Split Spoon, (6) Shelby Tube, (7) Grab, (8) Other (Specify)

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Soil Field Sampling Data Sheet

Client Name	Grays Harbor Historical Seaport Authority	Sample Location	SE-21D				
Project Number	1044.02.06-02	Sampler	ADM; MVP				
Project Name	Seaport In-Water RI	Sampling Date	09/27/2019				
Sampling Event	September 2019	Sample Name	SE-21D-0-0.33				
Sub Area		Sample Depth	0.165				
FSDS QA:	TKS; 10/07/2019	Easting	818522.458	Northing	616056.47	TOC	

Sample Information

Sampling Method	Sample Type	Sample Category	PID/FID	Sampling Time	Container Code	#
(7) Grab	Sediment	Discrete	--	3:34:00 PM	2 oz. soil	
					4 oz. soil	
					8 oz. soil	
					Other	1
					Total Containers	1

Sample Description:

<1 cm layer of brown, soft silt overlies dark gray coarse sand with large chunks of woodwaste (>5%). No odor.

General Sampling Comment

Samples are a composite of surface sediment sampled to a depth of 10 cm. Midpoint recorded as sample depth.

Samples of SE-21D were collected for archive. The remainder was used for composite sample SE-21-0-0.33

Sampling Method Code:

(1) Backhoe, (2) Hand Auger, (3) Drill Bit Cutting Head, (4) Geoprobe, (5) Split Spoon, (6) Shelby Tube, (7) Grab, (8) Other (Specify)

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Soil Field Sampling Data Sheet

Client Name	Grays Harbor Historical Seaport Authority	Sample Location	SE-22				
Project Number	1044.02.06-02	Sampler	ADM; MVP				
Project Name	Seaport In-Water RI	Sampling Date	09/27/2019				
Sampling Event	September 2019	Sample Name	SE-22-0-0.33				
Sub Area		Sample Depth	0.165				
FSDS QA:	TKS; 10/07/2019	Easting	818063.598	Northing	615318.61	TOC	

Sample Information

Sampling Method	Sample Type	Sample Category	PID/FID	Sampling Time	Container Code	#
(7) Grab	Sediment	Discrete	--	7:30:00 PM	2 oz. soil	
					4 oz. soil	2
					8 oz. soil	
					Other	7
					Total Containers	9

Sample Description:

Sample collected contains silt (soft, up to 80%), woodwaste chips (up to 10%), and large pieces of riprap (10%).

General Sampling Comment

Samples are a composite of surface sediment sampled to a depth of 10 cm. Midpoint recorded as sample depth.

Sampling Method Code:

(1) Backhoe, (2) Hand Auger, (3) Drill Bit Cutting Head, (4) Geoprobe, (5) Split Spoon, (6) Shelby Tube, (7) Grab, (8) Other (Specify)

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Soil Field Sampling Data Sheet

Client Name	Grays Harbor Historical Seaport Authority	Sample Location	SE-23				
Project Number	1044.02.06-02	Sampler	ADM; MVP				
Project Name	Seaport In-Water RI	Sampling Date	09/27/2019				
Sampling Event	September 2019	Sample Name	SE-23-0-0.33				
Sub Area		Sample Depth	0.165				
FSDS QA:	TKS; 10/07/2019	Easting	816856.922	Northing	615507.10	TOC	

Sample Information

Sampling Method	Sample Type	Sample Category	PID/FID	Sampling Time	Container Code	#
(7) Grab	Sediment	Discrete	--	10:23:00 AM	2 oz. soil	
					4 oz. soil	2
					8 oz. soil	
					Other	6
					Total Containers	8

Sample Description:

Dark gray silt (80%) with fine sand (5%) and woodwaste chips (15%). No odor. Some structural/masonry pieces of brick are evident in sample.

General Sampling Comment

Samples are a composite of surface sediment sampled to a depth of 10 cm. Midpoint recorded as sample depth.

Sampling Method Code:

(1) Backhoe, (2) Hand Auger, (3) Drill Bit Cutting Head, (4) Geoprobe, (5) Split Spoon, (6) Shelby Tube, (7) Grab, (8) Other (Specify)

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Soil Field Sampling Data Sheet

Client Name	Grays Harbor Historical Seaport Authority	Sample Location	SE-24				
Project Number	1044.02.06-02	Sampler	ADM; MVP				
Project Name	Seaport In-Water RI	Sampling Date	09/27/2019				
Sampling Event	September 2019	Sample Name	SE-24-0-0.33				
Sub Area		Sample Depth	0.165				
FSDS QA:	TKS; 10/07/2019	Easting	816893.880	Northing	615474.44	TOC	

Sample Information

Sampling Method	Sample Type	Sample Category	PID/FID	Sampling Time	Container Code	#
(7) Grab	Sediment	Discrete	--	1:13:00 PM	2 oz. soil	
					4 oz. soil	2
					8 oz. soil	
					Other	8
					Total Containers	10

Sample Description:

Gray silt (70%) with fine sand (5%) and woodwaste chips & chunks (25%). No odor. Sheen observed on water in grabber upon retrieval.

General Sampling Comment

Samples are a composite of surface sediment sampled to a depth of 10 cm. Midpoint recorded as sample depth.

Sample collected for bioassay.

Sampling Method Code:

(1) Backhoe, (2) Hand Auger, (3) Drill Bit Cutting Head, (4) Geoprobe, (5) Split Spoon, (6) Shelby Tube, (7) Grab, (8) Other (Specify)

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Soil Field Sampling Data Sheet

Client Name	Grays Harbor Historical Seaport Authority	Sample Location	SE-25				
Project Number	1044.02.06-02	Sampler	ADM; MVP				
Project Name	Seaport In-Water RI	Sampling Date	09/27/2019				
Sampling Event	September 2019	Sample Name	SE-25-0-0.33				
Sub Area		Sample Depth	0.165				
FSDS QA:	TKS; 10/07/2019	Easting	816914.594	Northing	615422.64	TOC	

Sample Information

Sampling Method	Sample Type	Sample Category	PID/FID	Sampling Time	Container Code	#
(7) Grab	Sediment	Discrete	--	6:15:00 PM	2 oz. soil	
					4 oz. soil	2
					8 oz. soil	
					Other	6
					Total Containers	8

Sample Description:

Predominately woodwaste (80%, chips, pulp, chunks <4") with black to gray silt. Fain hydrocarbon-like odor.

General Sampling Comment

Samples are a composite of surface sediment sampled to a depth of 10 cm. Midpoint recorded as sample depth.

Sampling Method Code:

(1) Backhoe, (2) Hand Auger, (3) Drill Bit Cutting Head, (4) Geoprobe, (5) Split Spoon, (6) Shelby Tube, (7) Grab, (8) Other (Specify)

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Soil Field Sampling Data Sheet

Client Name	Grays Harbor Historical Seaport Authority	Sample Location	SE-26				
Project Number	1044.02.06-02	Sampler	ADM; MVP				
Project Name	Seaport In-Water RI	Sampling Date	09/27/2019				
Sampling Event	September 2019	Sample Name	SE-26-0-0.33				
Sub Area		Sample Depth	0.165				
FSDS QA:	TKS; 10/07/2019	Easting	816933.865	Northing	615411.99	TOC	

Sample Information

Sampling Method	Sample Type	Sample Category	PID/FID	Sampling Time	Container Code	#
(7) Grab	Sediment	Discrete	--	5:25:00 PM	2 oz. soil	
					4 oz. soil	2
					8 oz. soil	
					Other	8
					Total Containers	10

Sample Description:

Significant woodwaste shreds, pulp, chunks (1-3"), rootlets. Up to 20% gray silt. No odor.

General Sampling Comment

Samples are a composite of surface sediment sampled to a depth of 10 cm. Midpoint recorded as sample depth.

Sample collected for bioassay.

Sampling Method Code:

(1) Backhoe, (2) Hand Auger, (3) Drill Bit Cutting Head, (4) Geoprobe, (5) Split Spoon, (6) Shelby Tube, (7) Grab, (8) Other (Specify)

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Soil Field Sampling Data Sheet

Client Name	Grays Harbor Historical Seaport Authority	Sample Location	SE-27				
Project Number	1044.02.06-02	Sampler	ADM; MVP				
Project Name	Seaport In-Water RI	Sampling Date	09/27/2019				
Sampling Event	September 2019	Sample Name	SE-27-0-0.33				
Sub Area		Sample Depth	0.165				
FSDS QA:	TKS; 10/07/2019	Easting	816971.969	Northing	615539.97	TOC	

Sample Information

Sampling Method	Sample Type	Sample Category	PID/FID	Sampling Time	Container Code	#
(7) Grab	Sediment	Discrete	--	2:35:00 PM	2 oz. soil	
					4 oz. soil	2
					8 oz. soil	
					Other	6
					Total Containers	8

Sample Description:

0-2 cm: brown silt (80%) with fine sand (10%) and woodwaste (10%).
2-10 cm: significant woodwaste chips and shreds.
No odor.

General Sampling Comment

Samples are a composite of surface sediment sampled to a depth of 10 cm. Midpoint recorded as sample depth.

Duplicate sample SE-27-0-0.33-DUP also collected.

Sampling Method Code:

(1) Backhoe, (2) Hand Auger, (3) Drill Bit Cutting Head, (4) Geoprobe, (5) Split Spoon, (6) Shelby Tube, (7) Grab, (8) Other (Specify)

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Soil Field Sampling Data Sheet

Client Name	Grays Harbor Historical Seaport Authority	Sample Location	SE-28				
Project Number	1044.02.06-02	Sampler	ADM; MVP				
Project Name	Seaport In-Water RI	Sampling Date	09/27/2019				
Sampling Event	September 2019	Sample Name	SE-28-0-0.33				
Sub Area		Sample Depth	0.165				
FSDS QA:	TKS; 10/07/2019	Easting	817819.311	Northing	615670.53	TOC	

Sample Information

Sampling Method	Sample Type	Sample Category	PID/FID	Sampling Time	Container Code	#
(7) Grab	Sediment	Discrete	--	6:40:00 PM	2 oz. soil	
					4 oz. soil	2
					8 oz. soil	
					Other	7
					Total Containers	9

Sample Description:

Predominately (75%) woodwaste consisting of wood pulp, chips, and chunks <2".
25% silt. Organic-like odor.

General Sampling Comment

Samples are a composite of surface sediment sampled to a depth of 10 cm. Midpoint recorded as sample depth.

Sampling Method Code:

(1) Backhoe, (2) Hand Auger, (3) Drill Bit Cutting Head, (4) Geoprobe, (5) Split Spoon, (6) Shelby Tube, (7) Grab, (8) Other (Specify)

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Soil Field Sampling Data Sheet

Client Name	Grays Harbor Historical Seaport Authority	Sample Location	SE-29				
Project Number	1044.02.06-02	Sampler	LBP; MVP				
Project Name	Seaport In-Water RI	Sampling Date	09/24/2019				
Sampling Event	September 2019	Sample Name	SE-29-0-2.0				
Sub Area		Sample Depth	1				
FSDS QA:	TKS; 10/07/2019	Easting	816870.004	Northing	615491.1	TOC	

Sample Information

Sampling Method	Sample Type	Sample Category	PID/FID	Sampling Time	Container Code	#
Vibracore	Sediment	Discrete	37.1	8:50:00 AM	2 oz. soil	
					4 oz. soil	2
					8 oz. soil	
					Other	6
					Total Containers	8

Sample Description:

Significant woodwaste in form of pulp, chips, and chunks. Strong organic/sulfur-like odor.

General Sampling Comment

Samples are a composite of sediment core between depths of 0.0 and 2.0 feet. Midpoint recorded as sample depth. Samples are intended to characterize woodwaste in the 2 foot core segment.

Sampling Method Code:

(1) Backhoe, (2) Hand Auger, (3) Drill Bit Cutting Head, (4) Geoprobe, (5) Split Spoon, (6) Shelby Tube, (7) Grab, (8) Other (Specify)

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Soil Field Sampling Data Sheet

Client Name	Grays Harbor Historical Seaport Authority	Sample Location	SE-30				
Project Number	1044.02.06-02	Sampler	ADM; MVP				
Project Name	Seaport In-Water RI	Sampling Date	09/26/2019				
Sampling Event	September 2019	Sample Name	SE-30-2.5-4.5				
Sub Area		Sample Depth	3.5				
FSDS QA:	TKS; 10/07/2019	Easting	816974.559	Northing	615559.08	TOC	

Sample Information

Sampling Method	Sample Type	Sample Category	PID/FID	Sampling Time	Container Code	#
Vibracore	Sediment	Discrete	--	3:40:00 PM	2 oz. soil	
					4 oz. soil	1
					8 oz. soil	1
					Other	7
					Total Containers	9

Sample Description:

20% woodwaste in silty sediment. Sulfur odor.

General Sampling Comment

Samples are a composite of sediment core between depths of 2.5 and 4.5 feet. Midpoint recorded as sample depth. Samples are intended to characterize woodwaste in the 2 foot core segment. Collected archive samples from core between 0-2.0 ft and 4.5-5.5 ft

Sampling Method Code:

(1) Backhoe, (2) Hand Auger, (3) Drill Bit Cutting Head, (4) Geoprobe, (5) Split Spoon, (6) Shelby Tube, (7) Grab, (8) Other (Specify)

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Soil Field Sampling Data Sheet

Client Name	Grays Harbor Historical Seaport Authority	Sample Location	SE-31				
Project Number	1044.02.06-02	Sampler	ADM; MVP				
Project Name	Seaport In-Water RI	Sampling Date	09/27/2019				
Sampling Event	September 2019	Sample Name	SE-31-0-0.33				
Sub Area		Sample Depth	0.165				
FSDS QA:	TKS; 10/07/2019	Easting	817731.813	Northing	615866.85	TOC	

Sample Information

Sampling Method	Sample Type	Sample Category	PID/FID	Sampling Time	Container Code	#
(7) Grab	Sediment	Discrete	--	12:10:00 PM	2 oz. soil	
					4 oz. soil	2
					8 oz. soil	
					Other	7
					Total Containers	9

Sample Description:

Silt (50%), sand (15%), and woodwaste chips and fibers (35%). Sulfur odor.

General Sampling Comment

Samples are a composite of surface sediment sampled to a depth of 10 cm. Midpoint recorded as sample depth. Collected two grabs from location to obtain adequate sediment for all samples (mixed together). Sample collected for bioassay.

Sampling Method Code:

(1) Backhoe, (2) Hand Auger, (3) Drill Bit Cutting Head, (4) Geoprobe, (5) Split Spoon, (6) Shelby Tube, (7) Grab, (8) Other (Specify)

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Sediment Field Sampling Data Sheet

Client Name	Grays Harbor Historical Seaport Authority	Sample Location	SE-32				
Project Number	1044.02.14-02	Sampler	ENH; MVP				
Project Name	Seaport In-Water RI	Sampling Date	07/22/2020				
Sampling Event	July 2020	Sample Name	SE-32				
Sub Area		Sample Depth	0.164				
FSDS QA:	BAJ;01/27/22	Easting		Northing		TOC	

Sample Information

Sampling Method	Sample Type	Sample Category	PID/FID	Sampling Time	Container Code	#
(7) Grab	Sediment	Discrete		9:22:00 AM	2 oz. sediment	
					4 oz. sediment	1
					8 oz. sediment	2
					Other	2
					Total Containers	5

Sample Description:

0-0.2 cm: light brown sediment film
0.2-10 cm: medium brownish gray; 90% fines, low plasticity, 10% sand, fine; trace woody material; no odor.

General Sampling Comments

DGT probe deployed in sediment without black staining. No sulfur-like odor. Sheen visible on water.
DGT Deployment: 7/21/20, 08:30, DGT Retrieval: 7/22/20, 09:24
Porewater Parameters @ retrieval:
pH=7.01, temperature=17.4 degrees C, salinity=7.52ms

Sampling Method Code:

(1) Backhoe, (2) Hand Auger, (3) Drill Bit Cutting Head, (4) Geoprobe, (5) Split Spoon, (6) Shelby Tube, (7) Grab, (8) Other (Specify)

Signature _____

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Sediment Field Sampling Data Sheet

Client Name	Grays Harbor Historical Seaport Authority	Sample Location	SE-33				
Project Number	1044.02.14-02	Sampler	ENH; MVP				
Project Name	Seaport In-Water RI	Sampling Date	07/22/2020				
Sampling Event	July 2020	Sample Name	SE-33				
Sub Area		Sample Depth	0.164				
FSDS QA:	BAJ;01/28/22	Easting		Northing		TOC	

Sample Information

Sampling Method	Sample Type	Sample Category	PID/FID	Sampling Time	Container Code	#
(7) Grab	Sediment	Discrete		9:06:00 AM	2 oz. sediment	
					4 oz. sediment	1
					8 oz. sediment	2
					Other	2
					Total Containers	5

Sample Description:

0-0.2cm: light brown sediment film.
0.2-10cm: dark brownish-gray.
70% fines, low plasticity; 30% sand, fine; rootlets (10%); no odor.

General Sampling Comments

No sulfur odor. No visible seep in vicinity.
DGT Deployment: 7/21/20, 08:15, DGT Retrieval: 7/22/20, 09:37
Porewater Parameters @ retrieval:
pH=6.54, temperature=17.3 degrees C, salinity=5.92ms

Sampling Method Code:

(1) Backhoe, (2) Hand Auger, (3) Drill Bit Cutting Head, (4) Geoprobe, (5) Split Spoon, (6) Shelby Tube, (7) Grab, (8) Other (Specify)

Signature _____

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Sediment Field Sampling Data Sheet

Client Name	Grays Harbor Historical Seaport Authority	Sample Location	SE-34				
Project Number	1044.02.14-02	Sampler	ENH; MVP				
Project Name	Seaport In-Water RI	Sampling Date	07/22/2020				
Sampling Event	July 2020	Sample Name	SE-34				
Sub Area		Sample Depth	0.164				
FSDS QA:	BAJ;01/28/22	Easting		Northing		TOC	

Sample Information

Sampling Method	Sample Type	Sample Category	PID/FID	Sampling Time	Container Code	#
(7) Grab	Sediment	Discrete		8:56:00 AM	2 oz. sediment	
					4 oz. sediment	1
					8 oz. sediment	2
					Other	2
					Total Containers	5

Sample Description:

0-0.2cm: light brown sediment film.
0.2-10cm: dark brownish-gray.
90% fines, low plasticity; 10% sand, fine: wood debris (chunks, twigs) 5%

General Sampling Comments

DGT probe deployed in sediment not near identified seeps. No sulfur-like odor.
DGT Deployment: 7/21/20, 08:06, DGT Retrieval: 7/22/20, 09:42
Porewater Parameters @ retrieval:
pH=6.64, temperature=17.1 degrees C, salinity=8.00ms

Sampling Method Code:

(1) Backhoe, (2) Hand Auger, (3) Drill Bit Cutting Head, (4) Geoprobe, (5) Split Spoon, (6) Shelby Tube, (7) Grab, (8) Other (Specify)

Signature _____

Maul Foster & Alongi, Inc.

109 East 13th Street, Vancouver, WA 98660 (360) 694-2691

Sediment Field Sampling Data Sheet

Client Name	Grays Harbor Historical Seaport Authority	Sample Location	SE-35				
Project Number	1044.02.14-02	Sampler	ENH; MVP				
Project Name	Seaport In-Water RI	Sampling Date	07/22/2020				
Sampling Event	July 2020	Sample Name	SE-35				
Sub Area		Sample Depth	0.164				
FSDS QA:	BAJ;01/28/22	Easting		Northing		TOC	

Sample Information

Sampling Method	Sample Type	Sample Category	PID/FID	Sampling Time	Container Code	#
(7) Grab	Sediment	Discrete		8:36:00 AM	2 oz. sediment	
					4 oz. sediment	1
					8 oz. sediment	2
					Other	2
					Total Containers	5

Sample Description:

0-0.2cm: light brown sediment film. 0.2-10cm: grayish brown with dark gray/black and orange redox features throughout. 95% fines, low plasticity; 5% sand, fine; trace rootlets, woody debris (rootlets, chunks).

General Sampling Comments

DGT deployed near black-stained sediment. Sulfur-like odor.
DGT Deployment: 7/21/20, 08:01, DGT Retrieval: 7/22/20, 09:46
Porewater Parameters @ retrieval:
pH=6.73, temperature=16.9 degrees C, salinity=6.36ms

Sampling Method Code:

(1) Backhoe, (2) Hand Auger, (3) Drill Bit Cutting Head, (4) Geoprobe, (5) Split Spoon, (6) Shelby Tube, (7) Grab, (8) Other (Specify)

Signature _____

Maul Foster & Alongi, Inc.

109 East 13th Street, Vancouver, WA 98660 (360) 694-2691

Sediment Field Sampling Data Sheet

Client Name	Grays Harbor Historical Seaport Authority	Sample Location	SE-36				
Project Number	1044.02.14-02	Sampler	ENH; MVP				
Project Name	Seaport In-Water RI	Sampling Date	07/22/2020				
Sampling Event	July 2020	Sample Name	SE-36				
Sub Area		Sample Depth	0.164				
FSDS QA:	BAJ;01/28/22	Easting		Northing		TOC	

Sample Information

Sampling Method	Sample Type	Sample Category	PID/FID	Sampling Time	Container Code	#
(7) Grab	Sediment	Discrete		7:56:00 AM	2 oz. sediment	
					4 oz. sediment	1
					8 oz. sediment	2
					Other	4
					Total Containers	7

Sample Description:

0-0.2cm: light brown sediment film.
0.2-10cm: brownish gray with black and reddish-orange redox.
80% fines, low plasticity; 20% sand, fine; twigs (5-10%) and wood chunks.

General Sampling Comments

Strong sulfur-like odor. DGT probe deployed in black-stained sediment.
DGT Deployment: 7/21/20, 07:55, DGT Retrieval: 7/22/20, 07:58
Porewater Parameters @ retrieval:
pH=6.79, temperature=17.6 degrees C, salinity=7.90ms

Sampling Method Code:

(1) Backhoe, (2) Hand Auger, (3) Drill Bit Cutting Head, (4) Geoprobe, (5) Split Spoon, (6) Shelby Tube, (7) Grab, (8) Other (Specify)

Signature _____

Maul Foster & Alongi, Inc.

109 East 13th Street, Vancouver, WA 98660 (360) 694-2691

Sediment Field Sampling Data Sheet

Client Name	Grays Harbor Historical Seaport Authority	Sample Location	SE-37				
Project Number	1044.02.14-02	Sampler	ENH; MVP				
Project Name	Seaport In-Water RI	Sampling Date	07/22/2020				
Sampling Event	July 2020	Sample Name	SE-37				
Sub Area		Sample Depth	0.164				
FSDS QA:	BAJ;01/28/22	Easting		Northing		TOC	

Sample Information

Sampling Method	Sample Type	Sample Category	PID/FID	Sampling Time	Container Code	#
(7) Grab	Sediment	Discrete		10:02:00 AM	2 oz. sediment	
					4 oz. sediment	1
					8 oz. sediment	2
					Other	2
					Total Containers	5

Sample Description:

0-0.2cm: light brown sediment film.
0.2-10cm: dark brownish gray to black.
95% fines, low plasticity; 5% sand, fine; wood waste chunks (25%)

General Sampling Comments

DGT probe deployed in black-stained sediment. No sulfur odor.
DGT Deployment: 7/21/20, 07:48, DGT Retrieval: 7/22/20, 09:54
Porewater Parameters @ retrieval:
pH=6.81, temperature=16.7 degrees C, salinity=7.20ms

Sampling Method Code:

(1) Backhoe, (2) Hand Auger, (3) Drill Bit Cutting Head, (4) Geoprobe, (5) Split Spoon, (6) Shelby Tube, (7) Grab, (8) Other (Specify)

Signature _____

Maul Foster & Alongi, Inc.

109 East 13th Street, Vancouver, WA 98660 (360) 694-2691

Sediment Field Sampling Data Sheet

Client Name	Grays Harbor Historical Seaport Authority	Sample Location	SE-38				
Project Number	1044.02.14-02	Sampler	ENH; MVP				
Project Name	Seaport In-Water RI	Sampling Date	07/22/2020				
Sampling Event	July 2020	Sample Name	SE-38				
Sub Area		Sample Depth	0.164				
FSDS QA:	BAJ;01/28/22	Easting		Northing		TOC	

Sample Information

Sampling Method	Sample Type	Sample Category	PID/FID	Sampling Time	Container Code	#
(7) Grab	Sediment	Discrete		10:16:00 AM	2 oz. sediment	
					4 oz. sediment	1
					8 oz. sediment	2
					Other	2
					Total Containers	5

Sample Description:

0-0.2cm: light brown sediment film. 0.2-10cm: dark brownish gray.
85% fines, low plasticity; 15% sand, fine to medium; woodwaste (chips, chunks, sawdust) 50%. Strong sulfur odor.

General Sampling Comments

Sulfur odor.
DGT Deployment: 7/21/20, 07:41, DGT Retrieval: 7/22/20, 10:14
Porewater Parameters @ retrieval:
pH=7.38, temperature=16.8 degrees C, salinity=7.97ms

Sampling Method Code:

(1) Backhoe, (2) Hand Auger, (3) Drill Bit Cutting Head, (4) Geoprobe, (5) Split Spoon, (6) Shelby Tube, (7) Grab, (8) Other (Specify)

Signature _____

Maul Foster & Alongi, Inc.

109 East 13th Street, Vancouver, WA 98660 (360) 694-2691

Sediment Field Sampling Data Sheet

Client Name	Grays Harbor Historical Seaport Authority	Sample Location	SE-39				
Project Number	1044.02.14-02	Sampler	ENH; MVP				
Project Name	Seaport In-Water RI	Sampling Date	07/22/2020				
Sampling Event	July 2020	Sample Name	SE-39				
Sub Area		Sample Depth	0.164				
FSDS QA:	BAJ;01/28/22	Easting		Northing		TOC	

Sample Information

Sampling Method	Sample Type	Sample Category	PID/FID	Sampling Time	Container Code	#
(7) Grab	Sediment	Discrete		9:56:00 AM	2 oz. sediment	
					4 oz. sediment	1
					8 oz. sediment	2
					Other	2
					Total Containers	5

Sample Description:

0-3cm: orangey-red.
3-10: dark brownish-gray.
90% wood waste (chunks, chips, twigs, rootlets); 5% fines; 5% sand, fine.

General Sampling Comments

Area was not inundated at high tide.
DGT Deployment: 7/21/20, 09:24, DGT Retrieval: 7/22/20, 10:26
Porewater Parameters @ retrieval:
pH=6.45, temperature=19.6 degrees C, salinity=6.27ms

Sampling Method Code:

(1) Backhoe, (2) Hand Auger, (3) Drill Bit Cutting Head, (4) Geoprobe, (5) Split Spoon, (6) Shelby Tube, (7) Grab, (8) Other (Specify)

Signature _____

Maul Foster & Alongi, Inc.

109 East 13th Street, Vancouver, WA 98660 (360) 694-2691

Sediment Field Sampling Data Sheet

Client Name	Grays Harbor Historical Seaport Authority	Sample Location	SE-40				
Project Number	1044.02.14-02	Sampler	ENH; MVP				
Project Name	Seaport In-Water RI	Sampling Date	07/22/2020				
Sampling Event	July 2020	Sample Name	SE-40				
Sub Area		Sample Depth	0.164				
FSDS QA:	BAJ;01/28/22	Easting		Northing		TOC	

Sample Information

Sampling Method	Sample Type	Sample Category	PID/FID	Sampling Time	Container Code	#
(7) Grab	Sediment	Discrete		7:16:00 AM	2 oz. sediment	
					4 oz. sediment	1
					8 oz. sediment	2
					Other	2
					Total Containers	5

Sample Description:

Black; 15% fines, 15% sand, 70% gravel, fine to medium, subangular to subrounded; black and white bacteria coating grains; sulfur odor.

General Sampling Comments

Seep groundwater. Plentiful white bacteria and black material. Gravelly substrate. DGT Deployment: 7/21/20, 09:06, DGT Retrieval: 7/22/20, 07:12
Porewater Parameters @ retrieval:
pH=6.74, temperature=16.5 degrees C, salinity=17.91ms

Sampling Method Code:

(1) Backhoe, (2) Hand Auger, (3) Drill Bit Cutting Head, (4) Geoprobe, (5) Split Spoon, (6) Shelby Tube, (7) Grab, (8) Other (Specify)

Signature _____

Maul Foster & Alongi, Inc.

109 East 13th Street, Vancouver, WA 98660 (360) 694-2691

Sediment Field Sampling Data Sheet

Client Name	Grays Harbor Historical Seaport Authority	Sample Location	SE-41				
Project Number	1044.02.14-02	Sampler	ENH; MVP				
Project Name	Seaport In-Water RI	Sampling Date	07/22/2020				
Sampling Event	July 2020	Sample Name	SE-41				
Sub Area		Sample Depth	0.164				
FSDS QA:	BAJ;01/28/22	Easting		Northing		TOC	

Sample Information

Sampling Method	Sample Type	Sample Category	PID/FID	Sampling Time	Container Code	#
(7) Grab	Sediment	Discrete		7:26:00 AM	2 oz. sediment	
					4 oz. sediment	1
					8 oz. sediment	2
					Other	2
					Total Containers	5

Sample Description:

0-0.2cm: light brown sediment film. 0.2-10cm: grayish-brown with red redox features throughout. 90% fines, low plasticity; 10% sand, fine; trace gravel, twigs, wood chunks (20%). Sulfur odor.

General Sampling Comments

DGT probe deployed in sediment. Faint sulfur-like odor.
DGT Deployment: 7/21/20, 09:16, DGT Retrieval: 7/22/20, 07:00
Porewater Parameters @ retrieval:
pH=6.86, temperature=17.6 degrees C, salinity=10.29ms

Sampling Method Code:

(1) Backhoe, (2) Hand Auger, (3) Drill Bit Cutting Head, (4) Geoprobe, (5) Split Spoon, (6) Shelby Tube, (7) Grab, (8) Other (Specify)

Signature _____

APPENDIX F
PHOTOGRAPH LOG

DRAFT



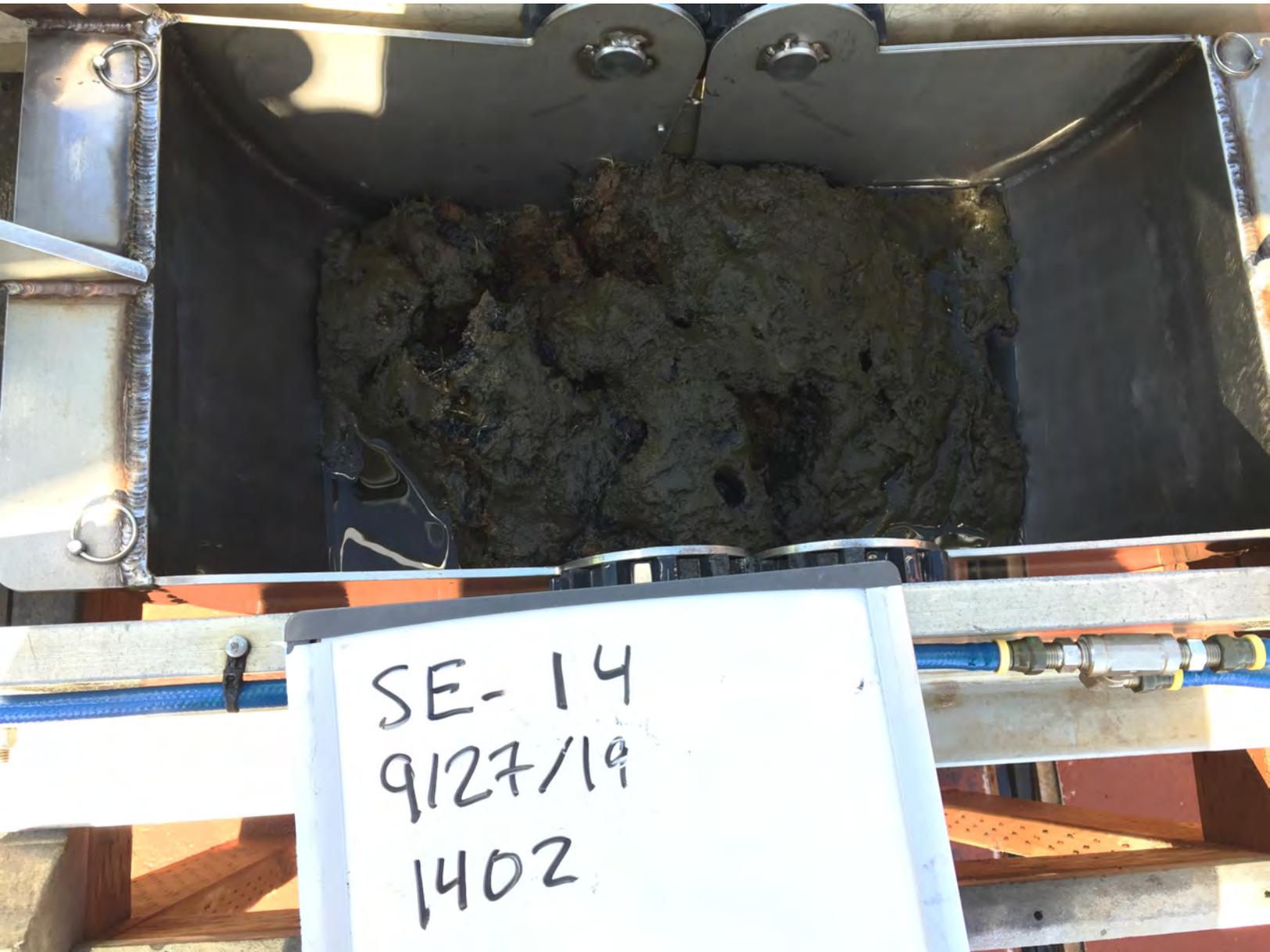


PHOTOGRAPHS:

Project Name: Grays Harbor Historical Seaport Authority
Project Number: M1044.02.014
Location: Chehalis River, Aberdeen, Washington
Date: 9/27/19

Surface Sediment Grabs

Location: SE-14



0 – 10 cm bml

Notes:

bml = below mudline.
cm = centimeter(s).



PHOTOGRAPHS:

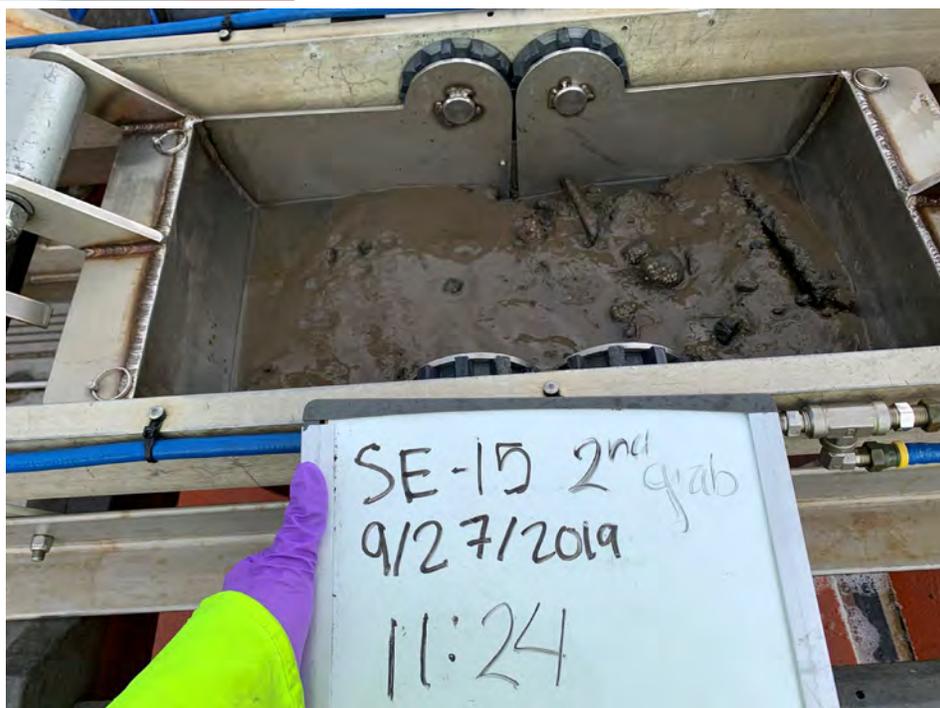
Project Name: Grays Harbor Historical Seaport Authority
Project Number: M1044.02.014
Location: Chehalis River, Aberdeen, Washington
Date: 9/27/19

Surface Sediment Grabs

Location: SE-15



0 – 10 cm bml



0 – 10 cm bml

Notes:
bml = below mudline.
cm = centimeter(s).

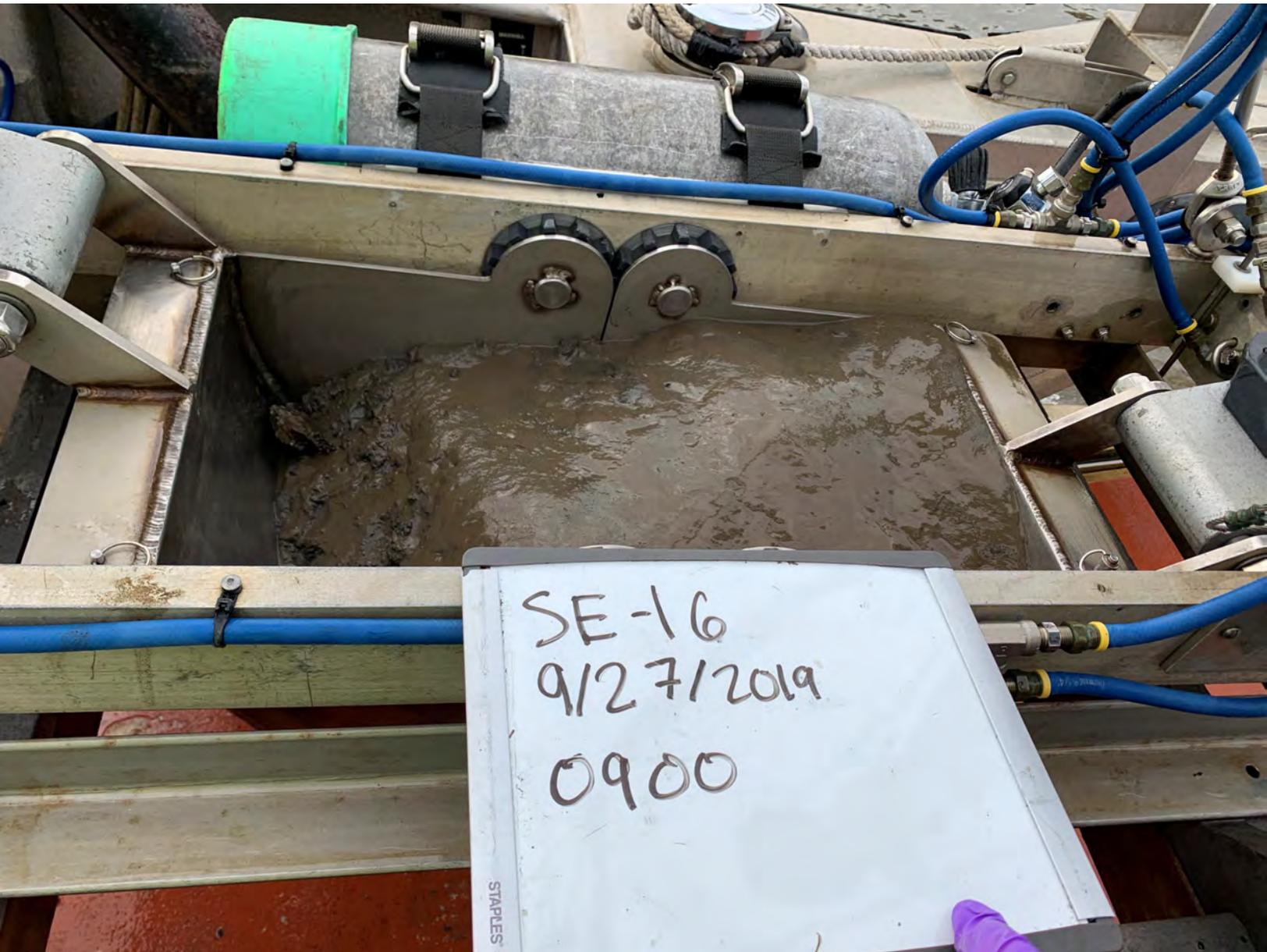


PHOTOGRAPHS:

Project Name: Grays Harbor Historical Seaport Authority
Project Number: M1044.02.014
Location: Chehalis River, Aberdeen, Washington
Date: 9/27/19

Surface Sediment Grabs

Location: SE-16



0 – 10 cm bml

Notes:

bml = below mudline.
cm = centimeter(s).

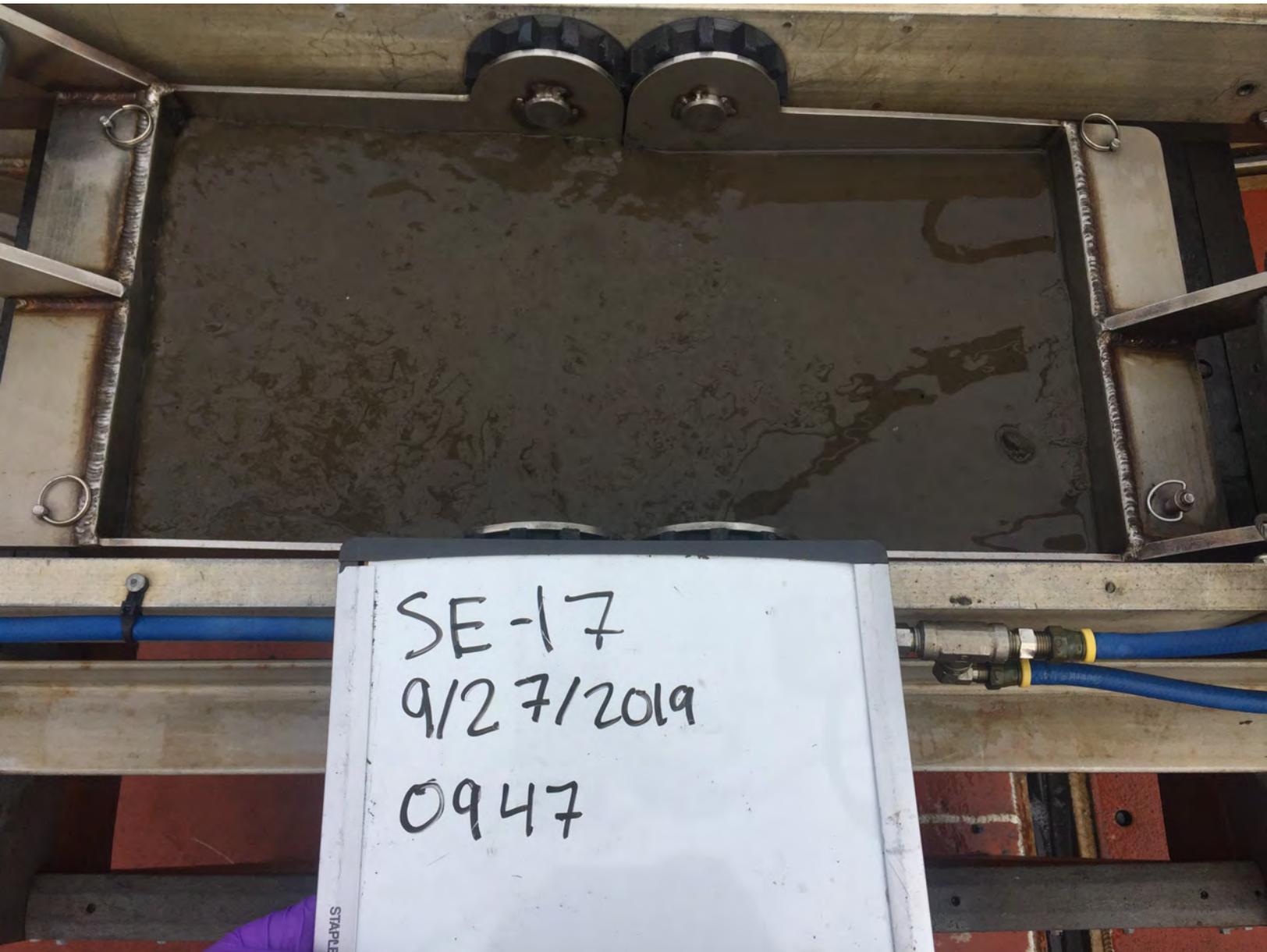


PHOTOGRAPHS:

Project Name: Grays Harbor Historical Seaport Authority
Project Number: M1044.02.014
Location: Chehalis River, Aberdeen, Washington
Date: 9/27/19

Surface Sediment Grabs

Location: SE-17



0 – 10 cm bml

Notes:

bml = below mudline.
cm = centimeter(s).



PHOTOGRAPHS:

Project Name: Grays Harbor Historical Seaport Authority
Project Number: M1044.02.014
Location: Chehalis River, Aberdeen, Washington
Date: 9/27/19

Surface Sediment Grabs

Location: SE-18



0 – 10 cm bml

Notes:

bml = below mudline.
cm = centimeter(s).

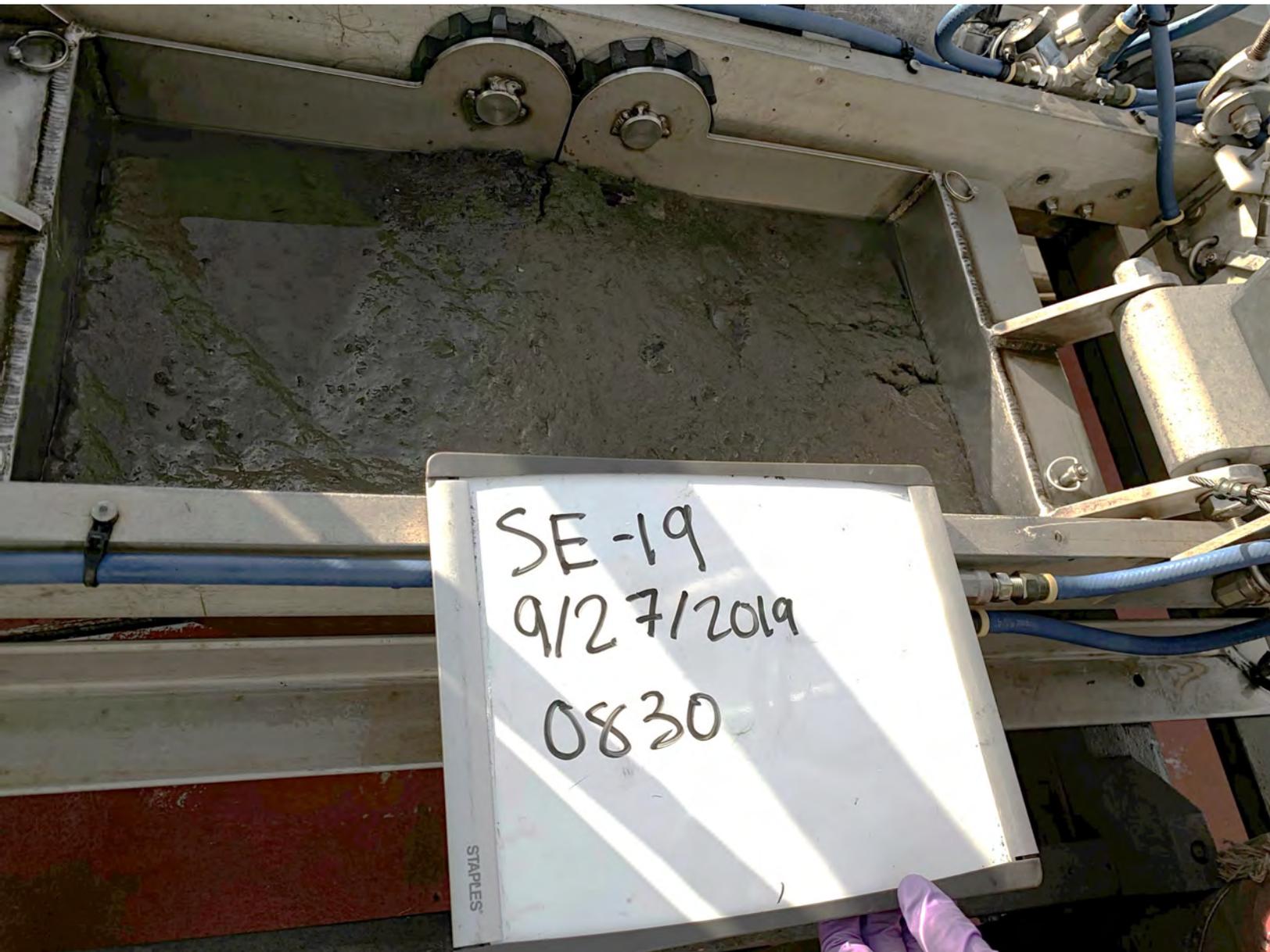


PHOTOGRAPHS:

Project Name: Grays Harbor Historical Seaport Authority
Project Number: M1044.02.014
Location: Chehalis River, Aberdeen, Washington
Date: 9/27/19

Surface Sediment Grabs

Location: SE-19



0 – 10 cm bml

Notes:

bml = below mudline.
cm = centimeter(s).



PHOTOGRAPHS:

Project Name: Grays Harbor Historical Seaport Authority
Project Number: M1044.02.014
Location: Chehalis River, Aberdeen, Washington
Date: 9/27/19

Surface Sediment Grabs

Location: SE-21A



0 – 10 cm bml

Notes:

bml = below mudline.
cm = centimeter(s).



PHOTOGRAPHS:

Project Name: Grays Harbor Historical Seaport Authority
Project Number: M1044.02.014
Location: Chehalis River, Aberdeen, Washington
Date: 9/27/19

Surface Sediment Grabs

Location: SE-21B



0 – 10 cm bml

Notes:

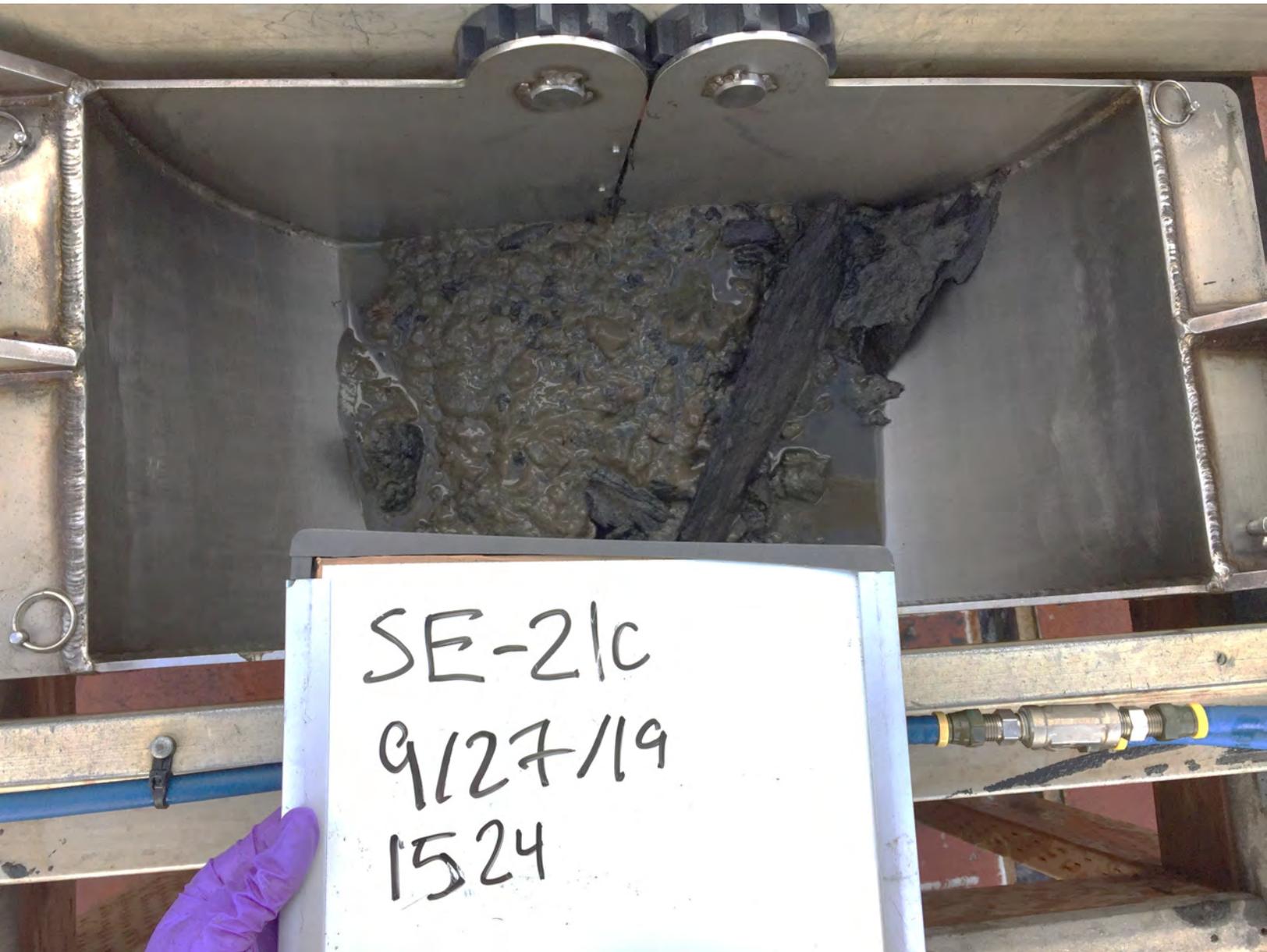
bml = below mudline.
cm = centimeter(s).



PHOTOGRAPHS:

Project Name: Grays Harbor Historical Seaport Authority
Project Number: M1044.02.014
Location: Chehalis River, Aberdeen, Washington
Date: 9/27/19

Surface Sediment Grabs
Location: SE-21C



0 – 10 cm bml

Notes:
bml = below mudline.
cm = centimeter(s).

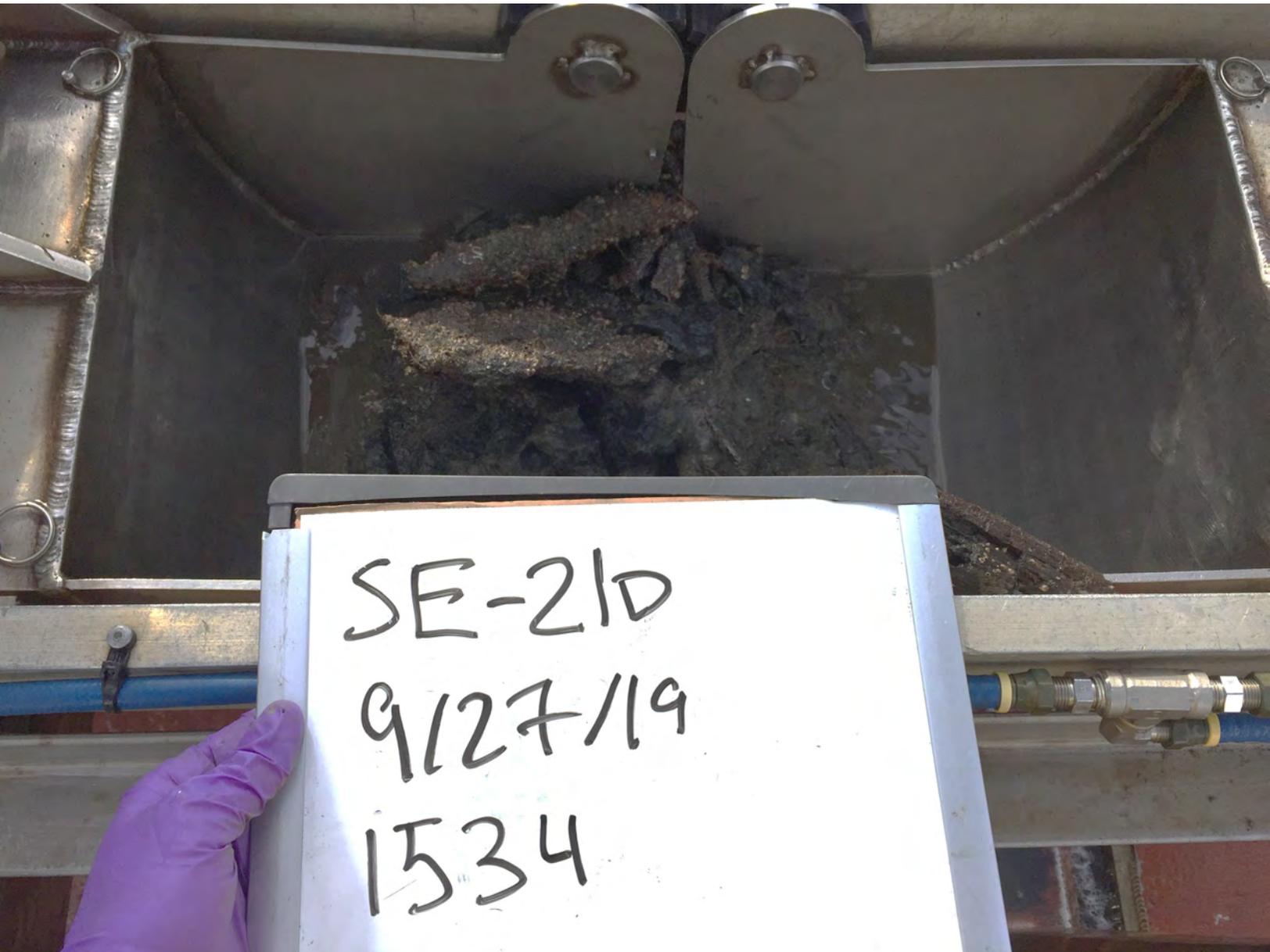


PHOTOGRAPHS:

Project Name: Grays Harbor Historical Seaport Authority
Project Number: M1044.02.014
Location: Chehalis River, Aberdeen, Washington
Date: 9/27/19

Surface Sediment Grabs

Location: SE-21D



0 – 10 cm bml

Notes:

bml = below mudline.
cm = centimeter(s).

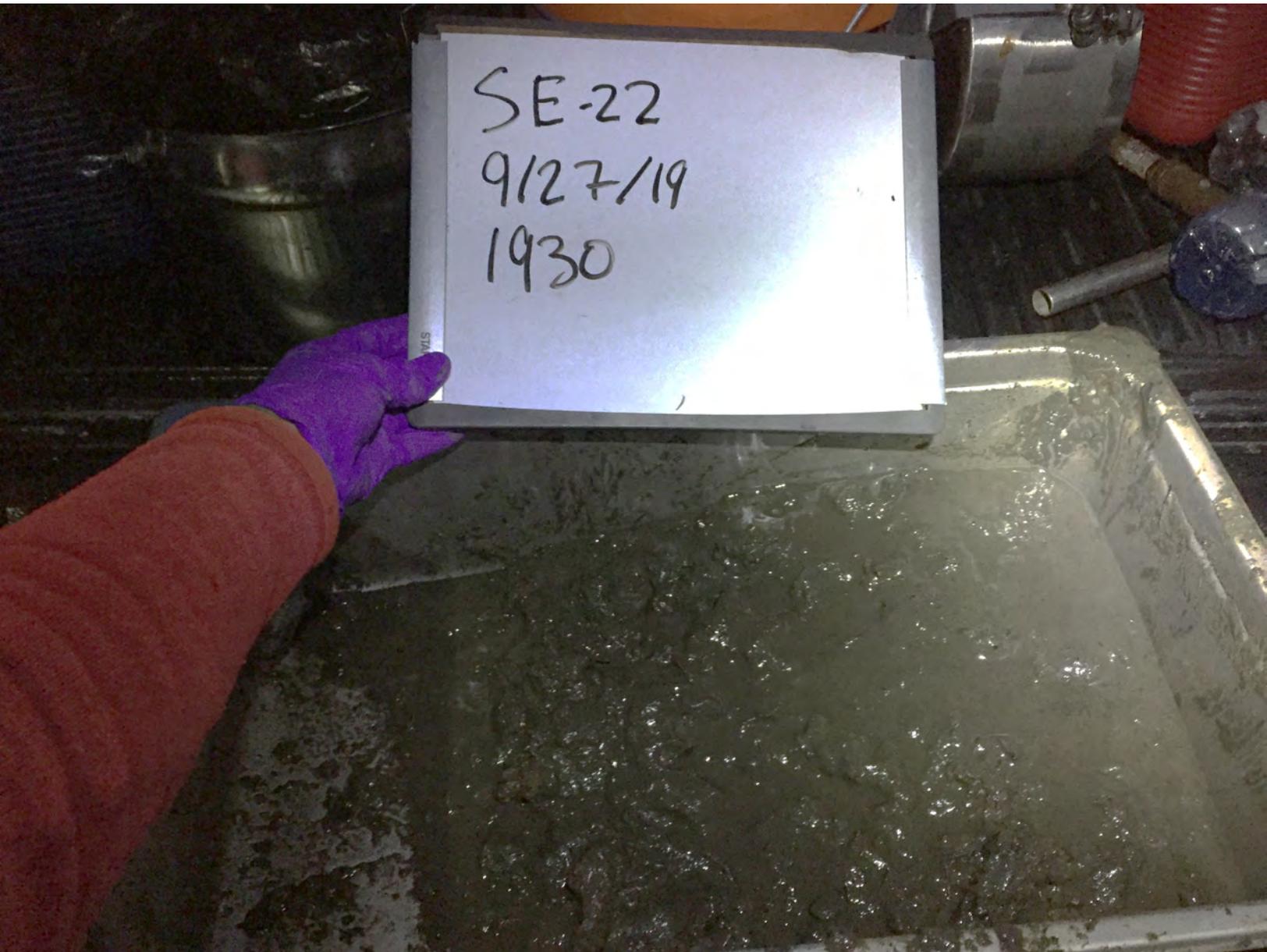


PHOTOGRAPHS:

Project Name: Grays Harbor Historical Seaport Authority
Project Number: M1044.02.014
Location: Chehalis River, Aberdeen, Washington
Date: 9/27/19

Surface Sediment Grabs

Location: SE-22



0 – 10 cm bml

Notes:

bml = below mudline.
cm = centimeter(s).

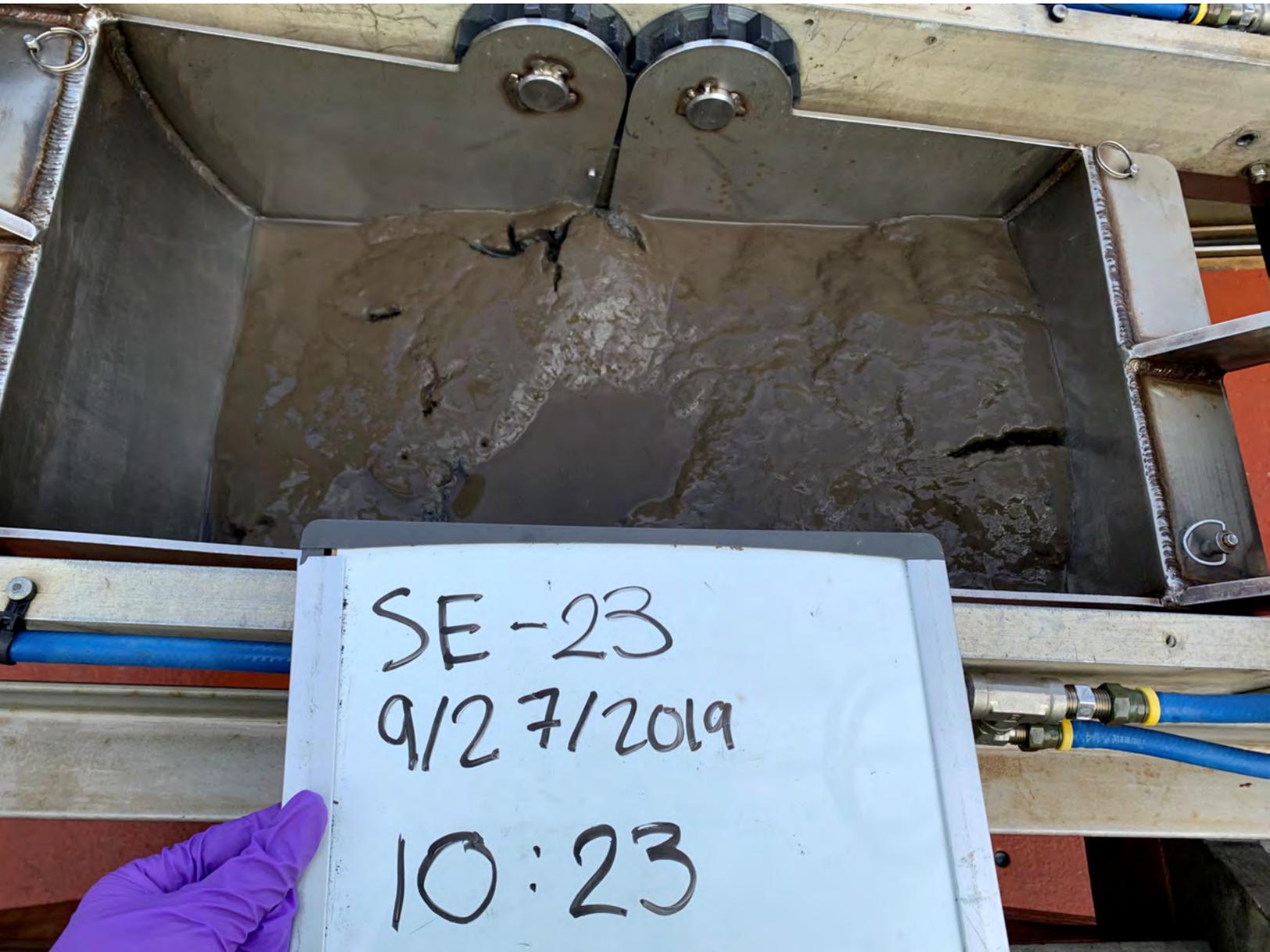


PHOTOGRAPHS:

Project Name: Grays Harbor Historical Seaport Authority
Project Number: M1044.02.014
Location: Chehalis River, Aberdeen, Washington
Date: 9/27/19

Surface Sediment Grabs

Location: SE-23



0 – 10 cm bml

Notes:

bml = below mudline.
cm = centimeter(s).

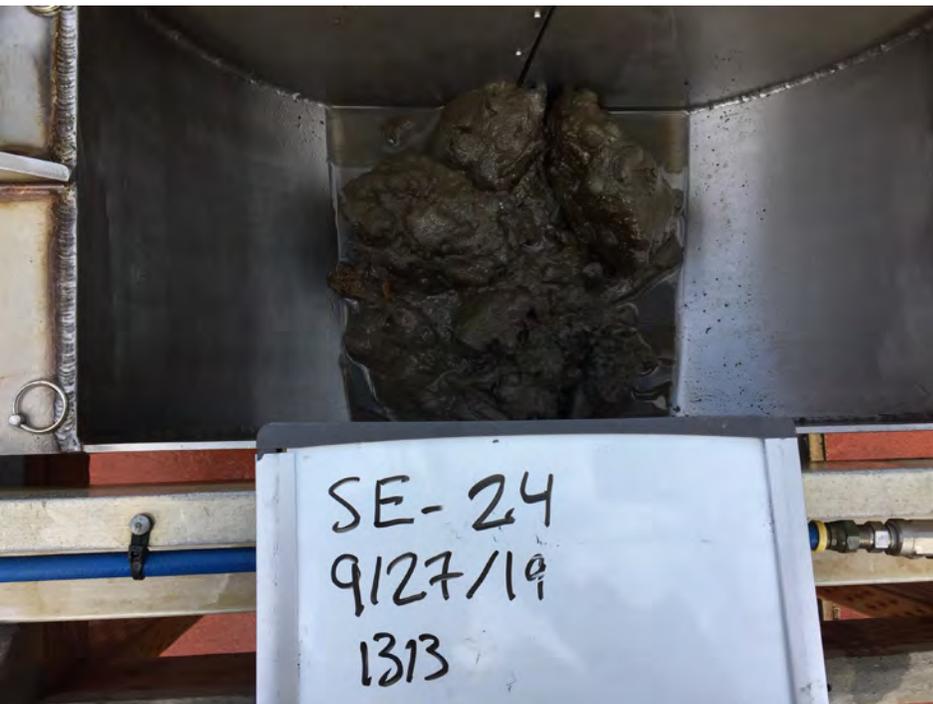


PHOTOGRAPHS:

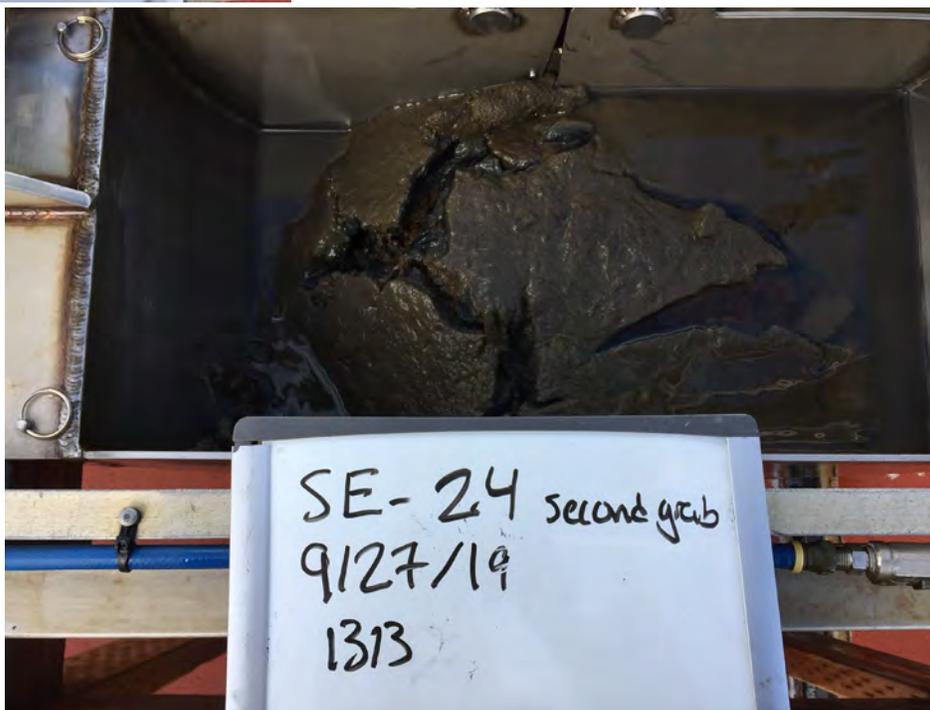
Project Name: Grays Harbor Historical Seaport Authority
Project Number: M1044.02.014
Location: Chehalis River, Aberdeen, Washington
Date: 9/27/19

Surface Sediment Grabs

Location: SE-24



0 – 10 cm bml



0 – 10 cm bml

Notes:

bml = below mudline.
cm = centimeter(s).



PHOTOGRAPHS:

Project Name: Grays Harbor Historical Seaport
Authority
Project Number: M1044.02.014
Location: Chehalis River, Aberdeen, Washington
Date: 9/27/19

Surface Sediment Grabs

Location: SE-25



0 – 10 cm bml

Notes:

bml = below mudline.
cm = centimeter(s).



PHOTOGRAPHS:

Project Name: Grays Harbor Historical Seaport Authority
Project Number: M1044.02.014
Location: Chehalis River, Aberdeen, Washington
Date: 9/27/19

Surface Sediment Grabs

Location: SE-26



0 – 10 cm bml

Notes:

bml = below mudline.
cm = centimeter(s).



PHOTOGRAPHS:

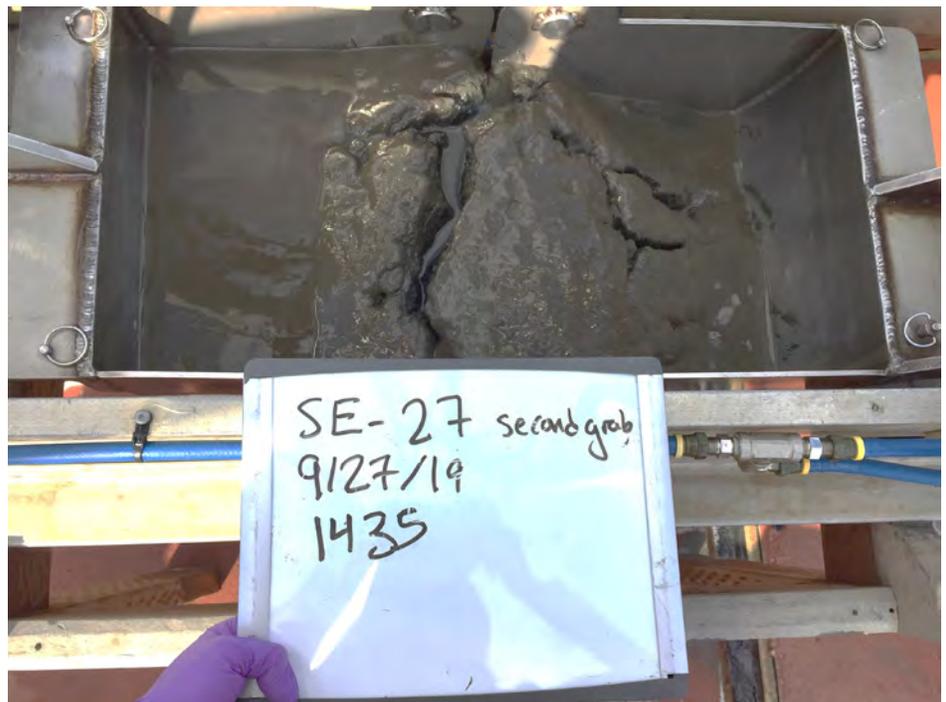
Project Name: Grays Harbor Historical Seaport Authority
Project Number: M1044.02.014
Location: Chehalis River, Aberdeen, Washington
Date: 9/27/19

Surface Sediment Grabs

Location: SE-27



0 – 10 cm bml



0 – 10 cm bml

Notes:
bml = below mudline.
cm = centimeter(s).

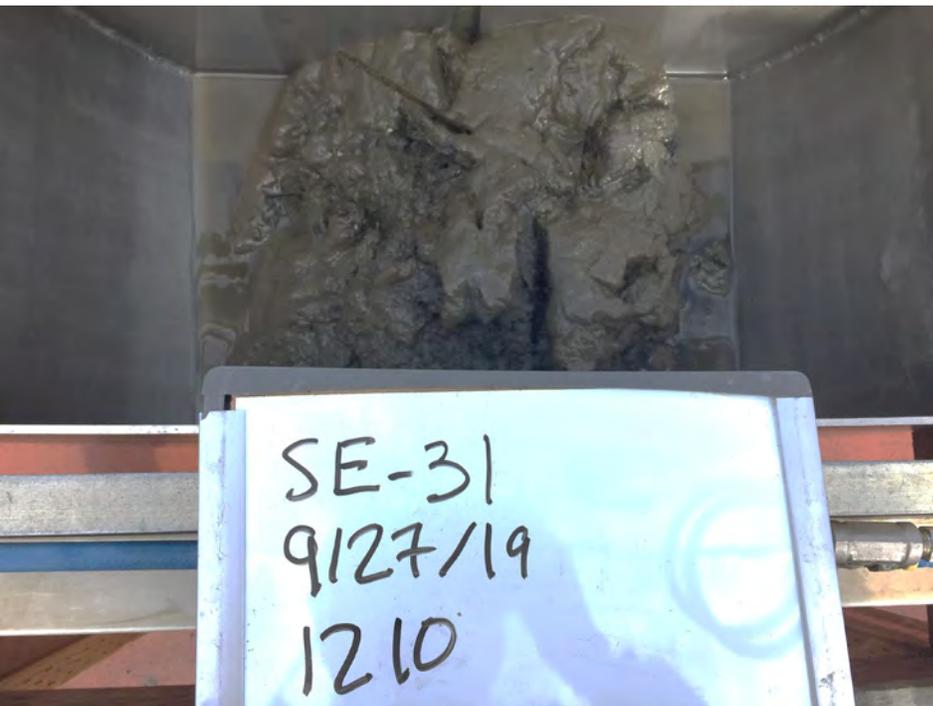


PHOTOGRAPHS:

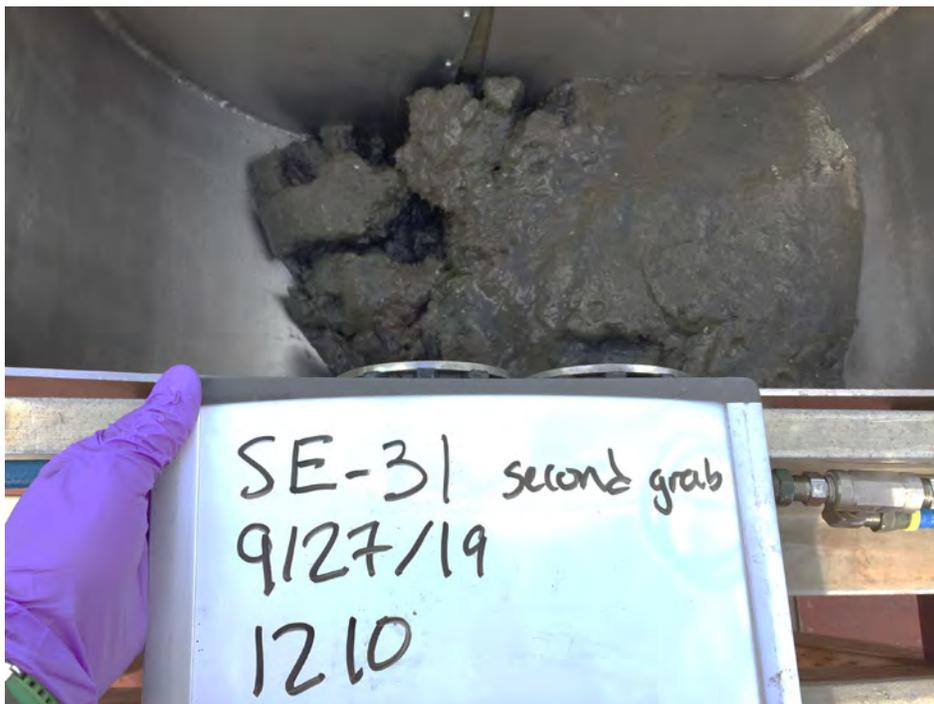
Project Name: Grays Harbor Historical Seaport Authority
Project Number: M1044.02.014
Location: Chehalis River, Aberdeen, Washington
Date: 9/27/19

Surface Sediment Grabs

Location: SE-31



0 – 10 cm bml



0 – 10 cm bml

Notes:
bml = below mudline.
cm = centimeter(s).

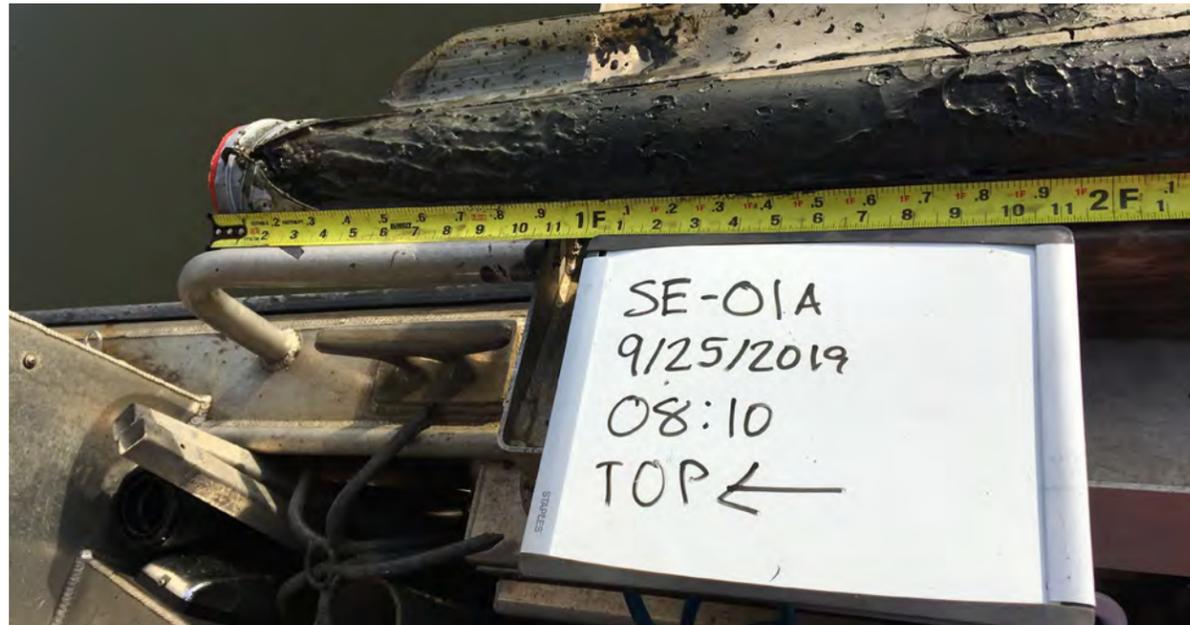


PHOTOGRAPHS:

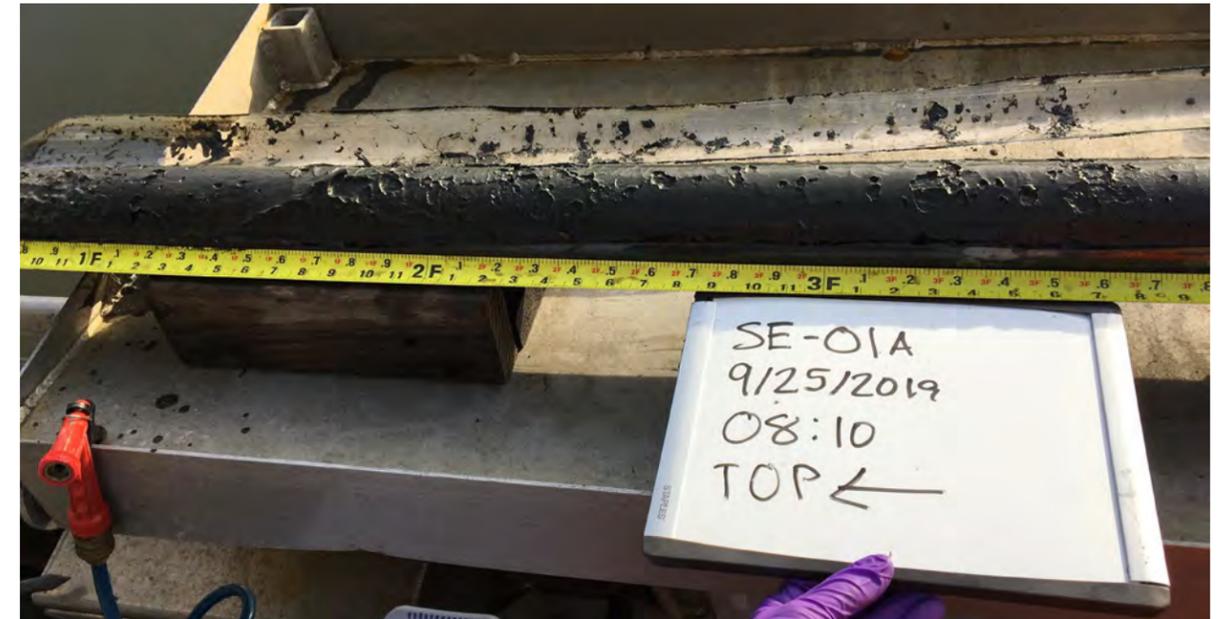
Project Name: Grays Harbor Historical Seaport Authority
Project Number: M1044.02.014
Location: Chehalis River, Aberdeen, Washington
Date: 9/23/19 – 9/26/19

Subsurface Sediment Cores
Location: SE-01A

Sample Depth: 1 – 2 feet bml



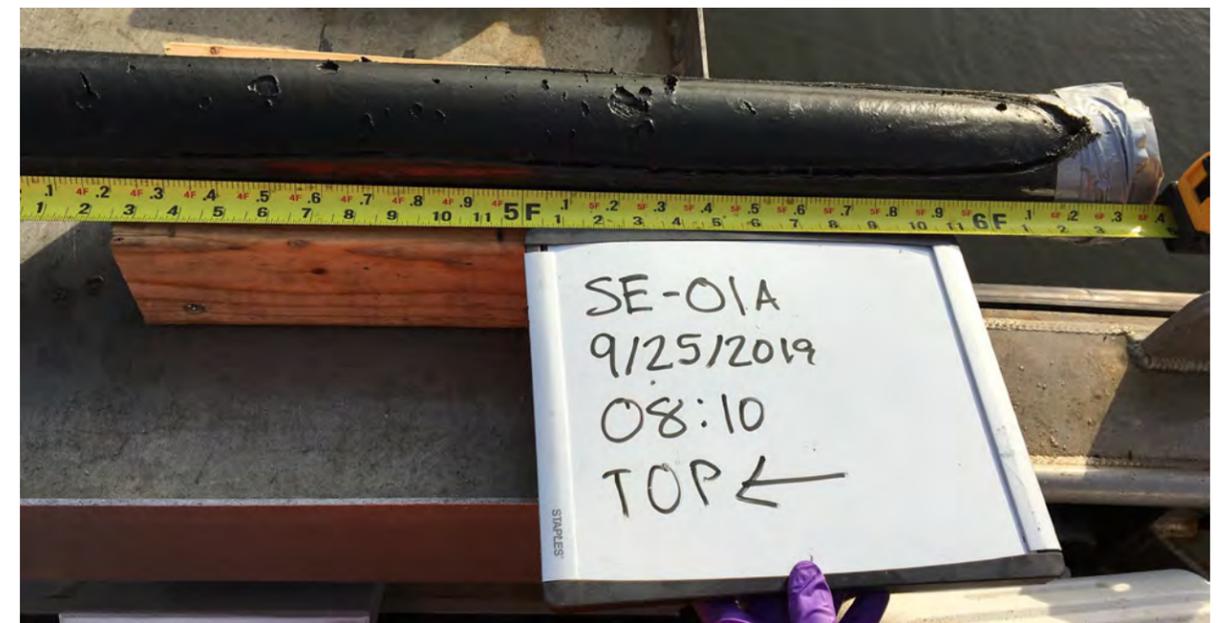
0 – 2.1 feet bml



0.8 – 3.8 feet bml



2.9 – 5.3 feet bml



4.1 – 6.2 feet bml

Notes:

Core length, including cutting in shoe, was 7.2 feet.

Scale shown in feet.

bml = below mudline.



PHOTOGRAPHS:

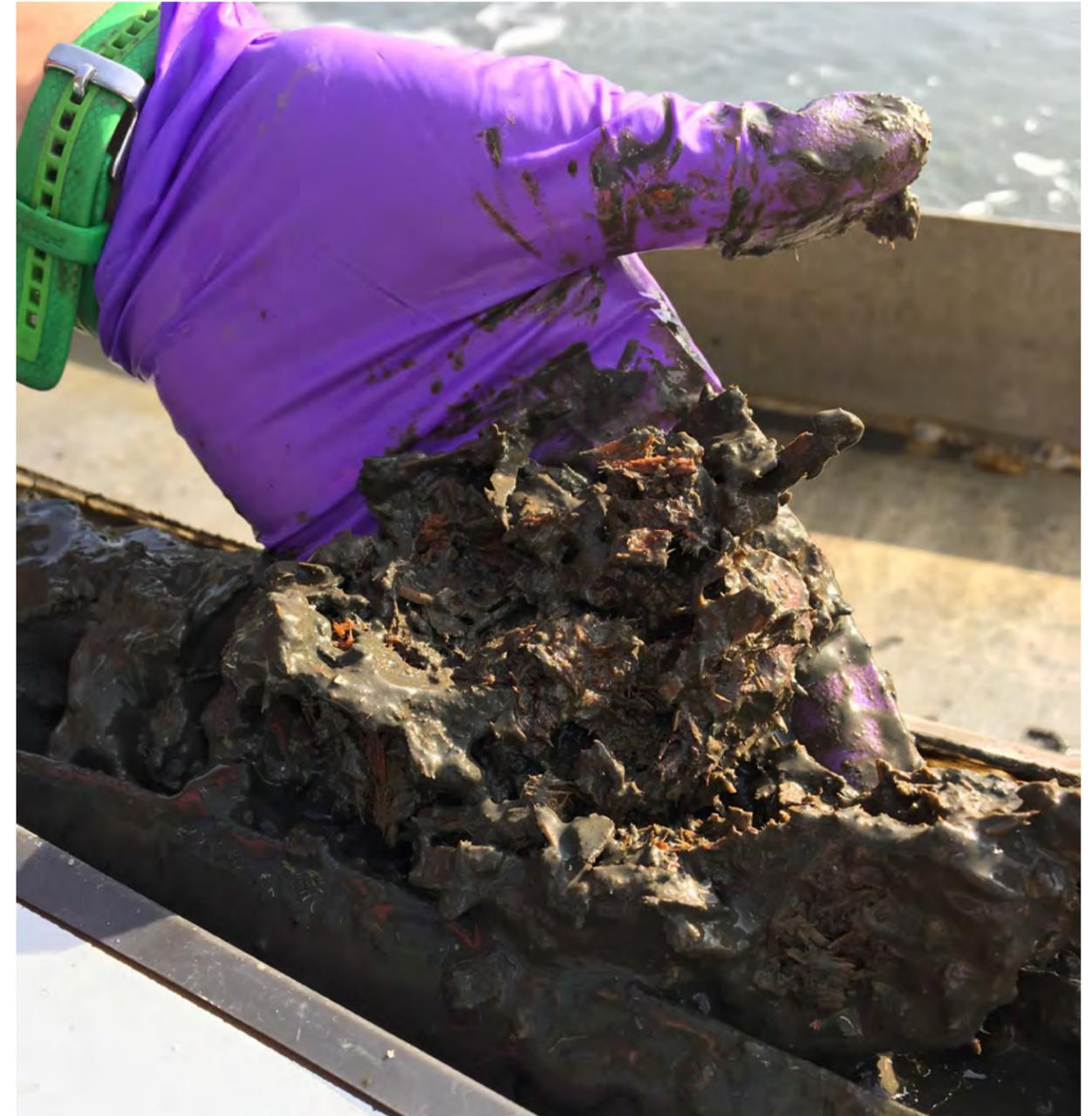
Project Name: Grays Harbor Historical Seaport Authority
Project Number: M1044.02.014
Location: Chehalis River, Aberdeen, Washington
Date: 9/23/19 – 9/26/19

Subsurface Sediment Cores
Location: SE-01B

Sample Depth: 0.5 – 1.5 feet bml (archive)



0 – 1.6 feet bml



Woodwaste at 0.8 feet bml

Notes:

Core length, including cutting in shoe, was 1.6 feet.

Scale shown in feet.

bml = below mudline.



PHOTOGRAPHS:

Project Name: Grays Harbor Historical Seaport Authority
Project Number: M1044.02.014
Location: Chehalis River, Aberdeen, Washington
Date: 9/23/19 – 9/26/19

Subsurface Sediment Cores
Location: SE-01C

Sample Depth: 2 – 3 feet bml (archive)



0 – 1.6 feet bml



1.4 – 2.8 feet bml



2.9 – 4 feet bml

Notes:

Core length, including cutting in shoe, was 4.6 feet.

Scale shown in feet.

bml = below mudline.



PHOTOGRAPHS:

Project Name: Grays Harbor Historical Seaport Authority
Project Number: M1044.02.014
Location: Chehalis River, Aberdeen, Washington
Date: 9/23/19 – 9/26/19

Subsurface Sediment Cores
Location: SE-01D

Sample Depth: 0 – 1 foot bml (archive)



0 – 1.9 feet bml



1.4 – 3.2 feet bml



2.8 – 4.7 feet bml

Notes:

Core length, including cutting in shoe, was 4.7 feet.

Scale shown in feet.

bml = below mudline.

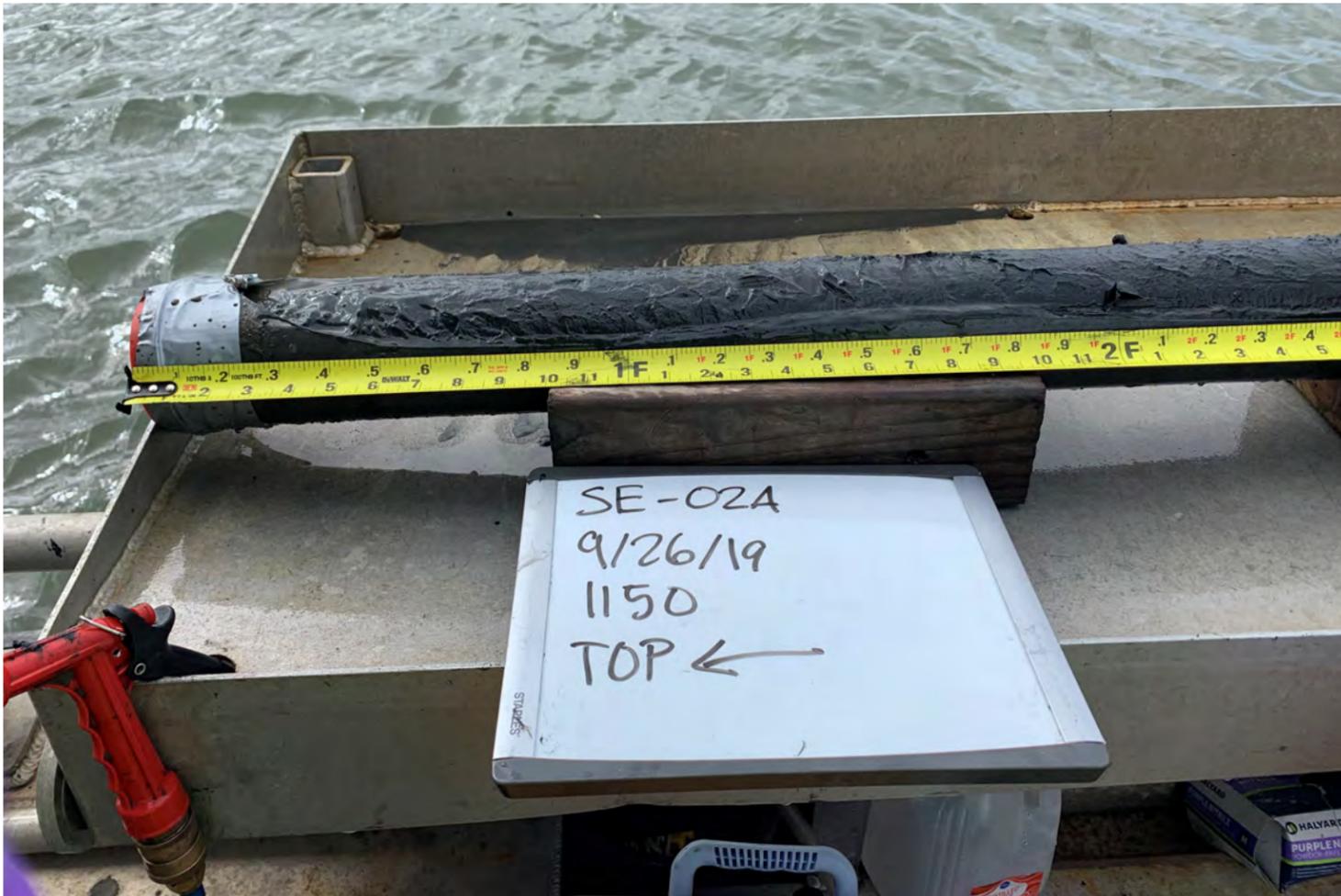


PHOTOGRAPHS:

Project Name: Grays Harbor Historical Seaport Authority
Project Number: M1044.02.014
Location: Chehalis River, Aberdeen, Washington
Date: 9/23/19 – 9/26/19

Subsurface Sediment Cores
Location: SE-02A

Sample Depth: 2.5 – 3.5 feet bml



0 – 2.4 feet bml



1.6 – 4.7 feet bml

Notes:

Core length, including cutting in shoe, was 5.1 feet.

Scale shown in feet.

bml = below mudline.



PHOTOGRAPHS:

Project Name: Grays Harbor Historical Seaport Authority
Project Number: M1044.02.014
Location: Chehalis River, Aberdeen, Washington
Date: 9/23/19 – 9/26/19

Subsurface Sediment Cores
Location: SE-03A

Sample Depth: 0 – 1 foot bml (archive)



0 – 1.8 feet bml



0.8 – 3.1 feet bml



3.3 – 5.5 feet bml

Notes:

Core length, including cutting in shoe, was 5.5 feet.

Scale shown in feet.

bml = below mudline.



PHOTOGRAPHS:

Project Name: Grays Harbor Historical Seaport Authority
Project Number: M1044.02.014
Location: Chehalis River, Aberdeen, Washington
Date: 9/23/19 – 9/26/19

Subsurface Sediment Cores
Location: SE-03B

Sample Depth: 1 – 2 feet bml (archive)



0 – 1.8 feet bml



1.8 – 3.6 feet bml



3.1 – 5.1 feet bml

Notes:

Core length, including cutting in shoe, was 5.1 feet.

Scale shown in feet.

bml = below mudline.



PHOTOGRAPHS:

Project Name: Grays Harbor Historical Seaport Authority
Project Number: M1044.02.014
Location: Chehalis River, Aberdeen, Washington
Date: 9/23/19 – 9/26/19

Subsurface Sediment Cores
Location: SE-05A

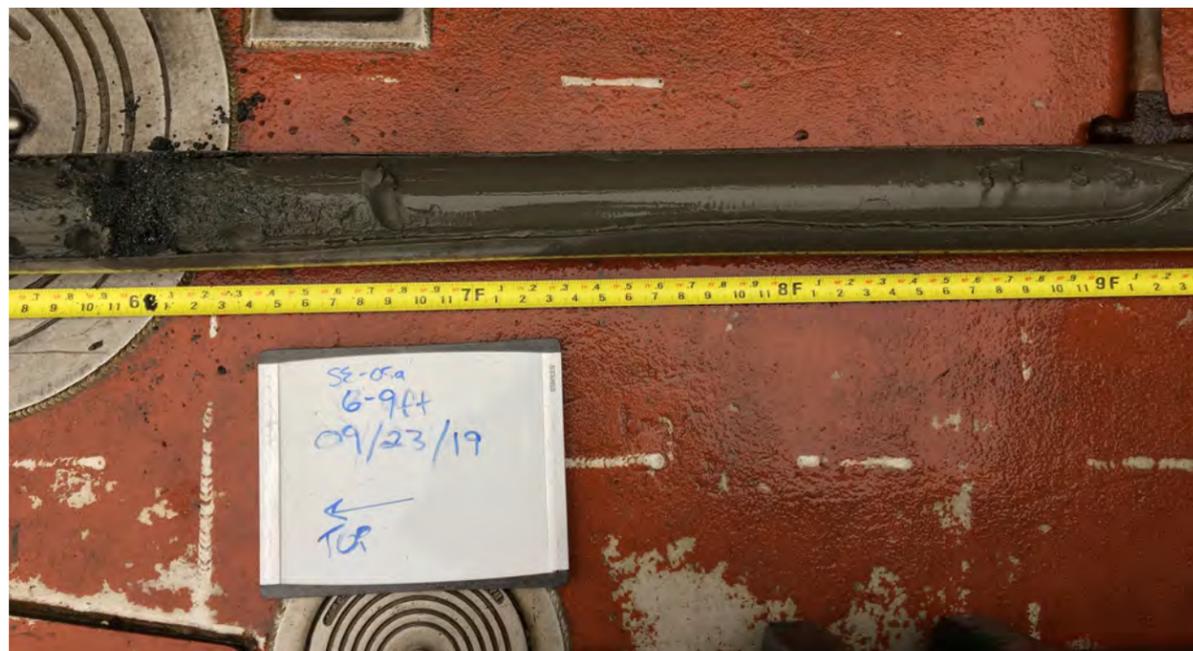
Sample Depth: 2 – 3 feet bml



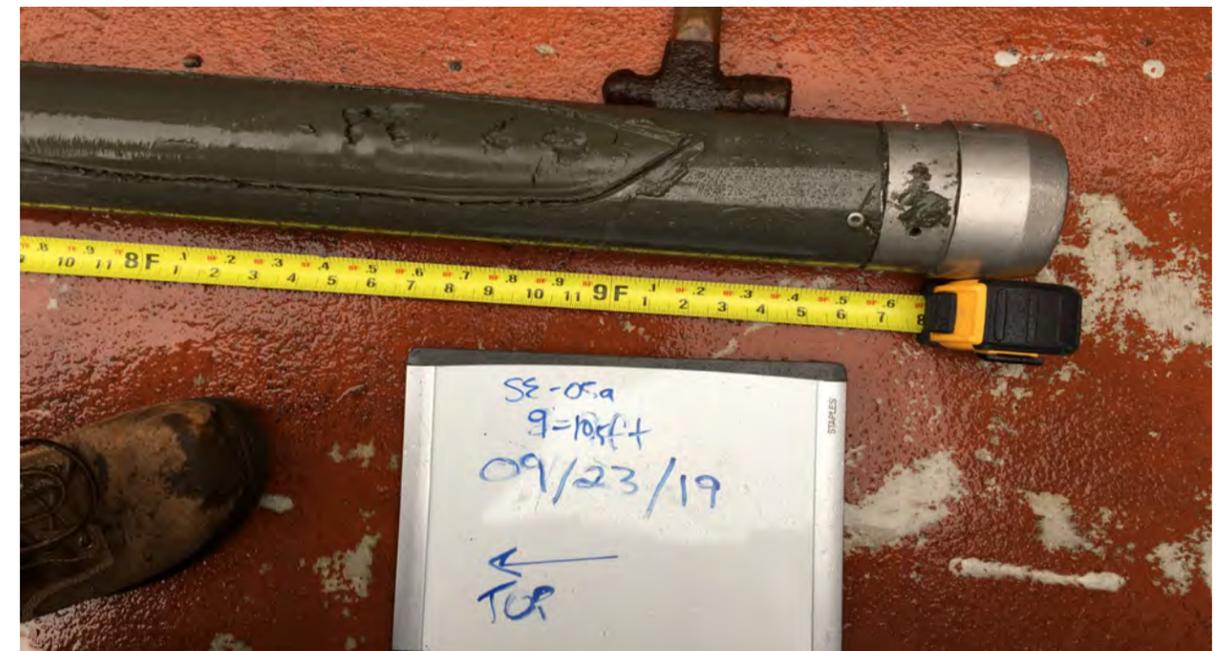
0 – 2.8 feet bml



2.9 – 6.3 feet bml



5.8 – 9.3 feet bml



7.8 – 9.7 feet bml

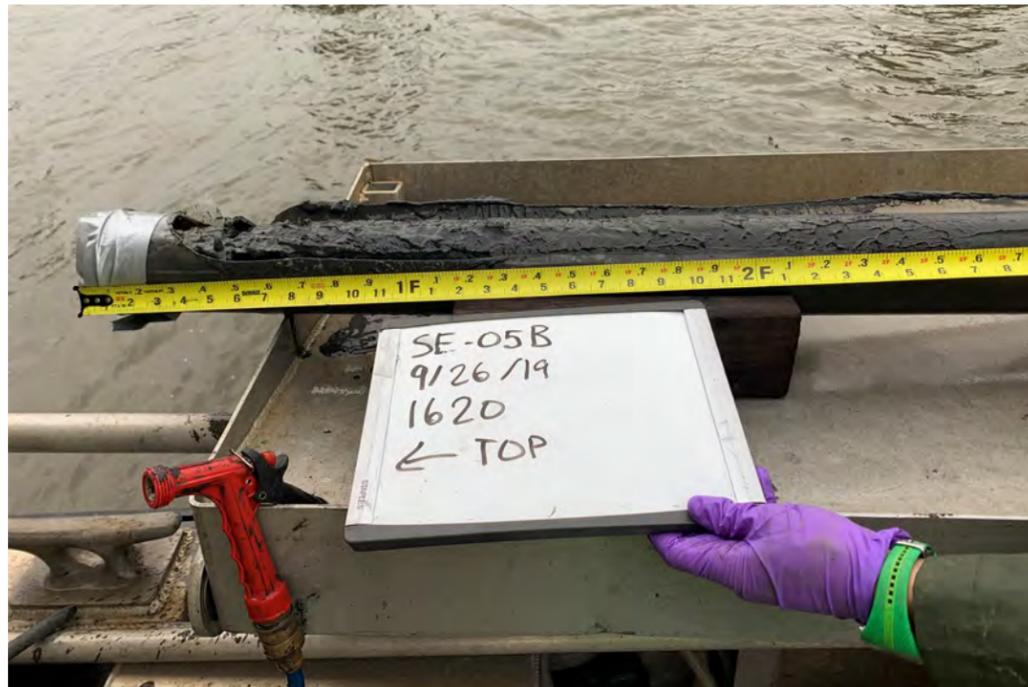
Notes:
Core length, including cutting in shoe, was 9.7 feet.
Scale shown in feet.
bml = below mudline.



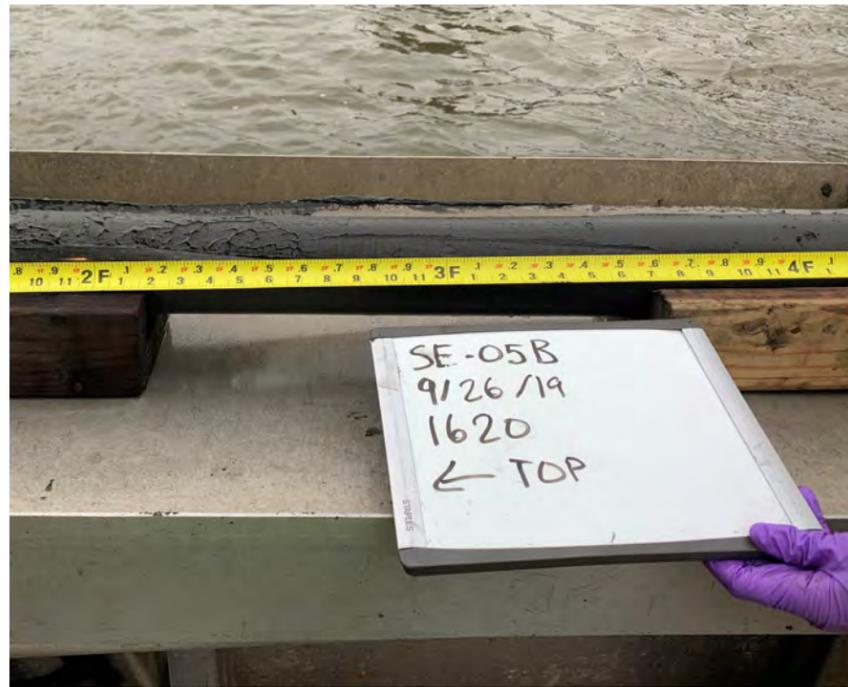
PHOTOGRAPHS:

Project Name: Grays Harbor Historical Seaport Authority
Project Number: M1044.02.014
Location: Chehalis River, Aberdeen, Washington
Date: 9/23/19 – 9/26/19

Subsurface Sediment Cores
Location: SE-05B
Sample Depth: 2.5 – 3.5 feet bml (archive)



0 – 2.8 feet bml



1.8 – 4.2 feet bml



3.1 – 6.2 feet bml

Notes:
Core length, including cutting in shoe, was 7.2 feet.
Scale shown in feet.
bml = below mudline.

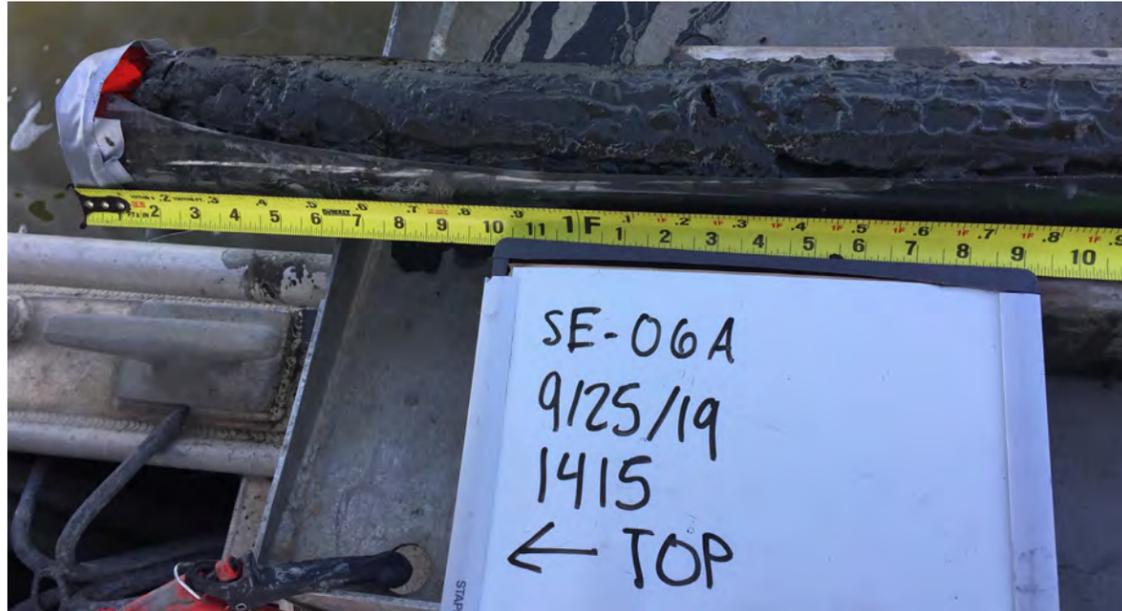


PHOTOGRAPHS:

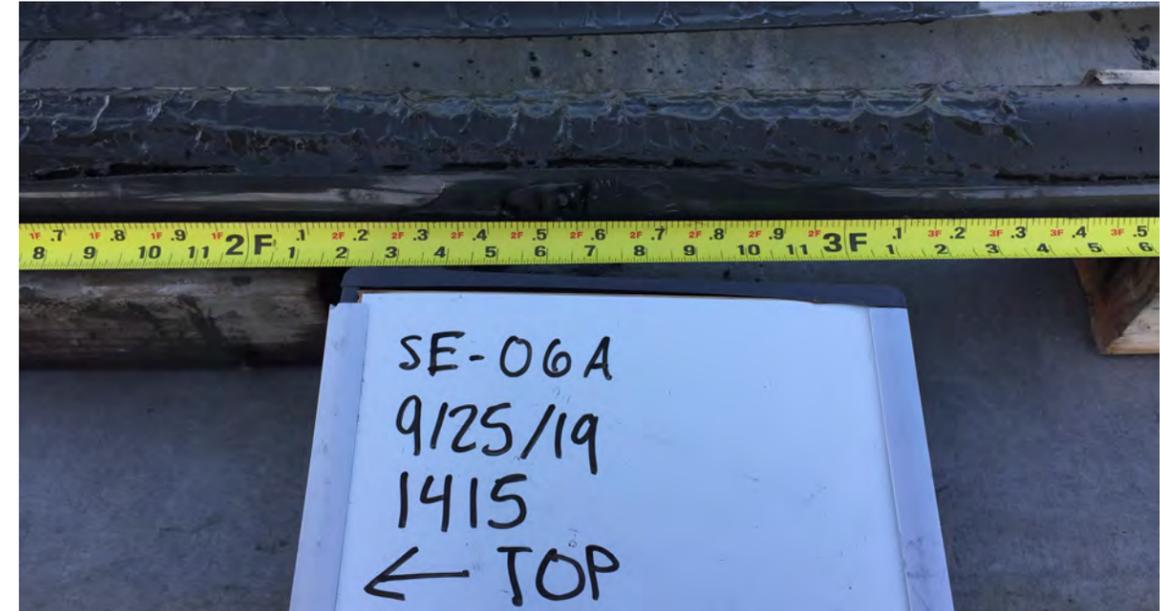
Project Name: Grays Harbor Historical Seaport Authority
Project Number: M1044.02.014
Location: Chehalis River, Aberdeen, Washington
Date: 9/23/19 – 9/26/19

Subsurface Sediment Cores
Location: SE-06A

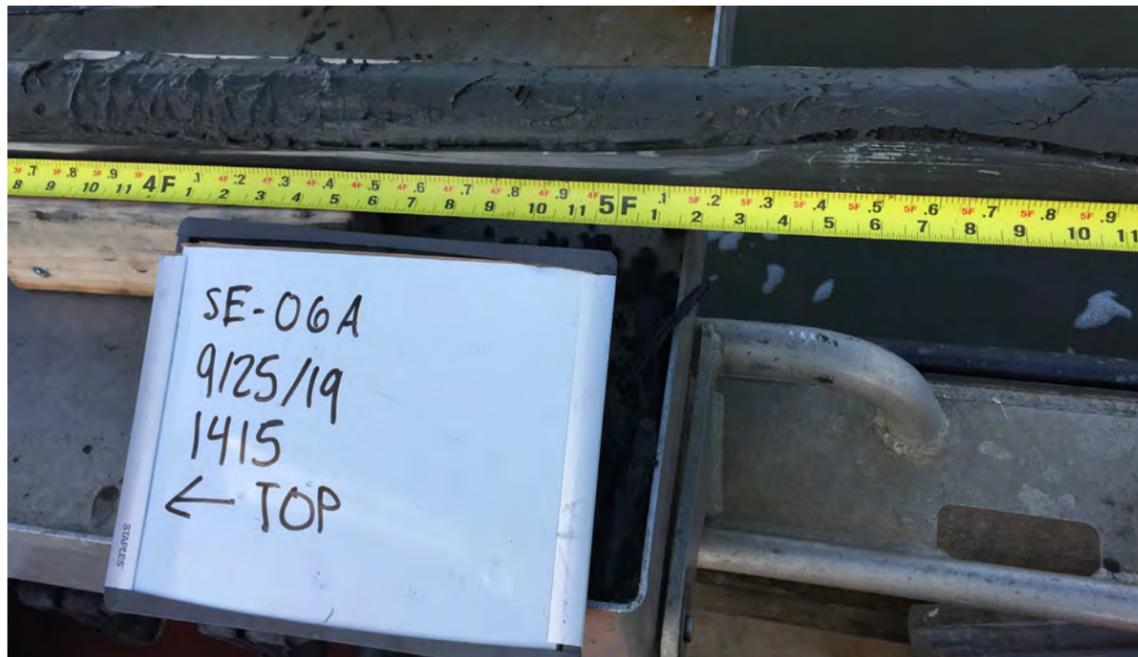
Sample Depth: 0.5 – 1.5 feet bml (archive)



0 – 1.9 feet bml



1.7 – 3.5 feet bml



3.7 – 5.9 feet bml



5 – 6.7 feet bml

Notes:
Core length, including cutting in shoe, was 7.5 feet.
Scale shown in feet.
bml = below mudline.



PHOTOGRAPHS:

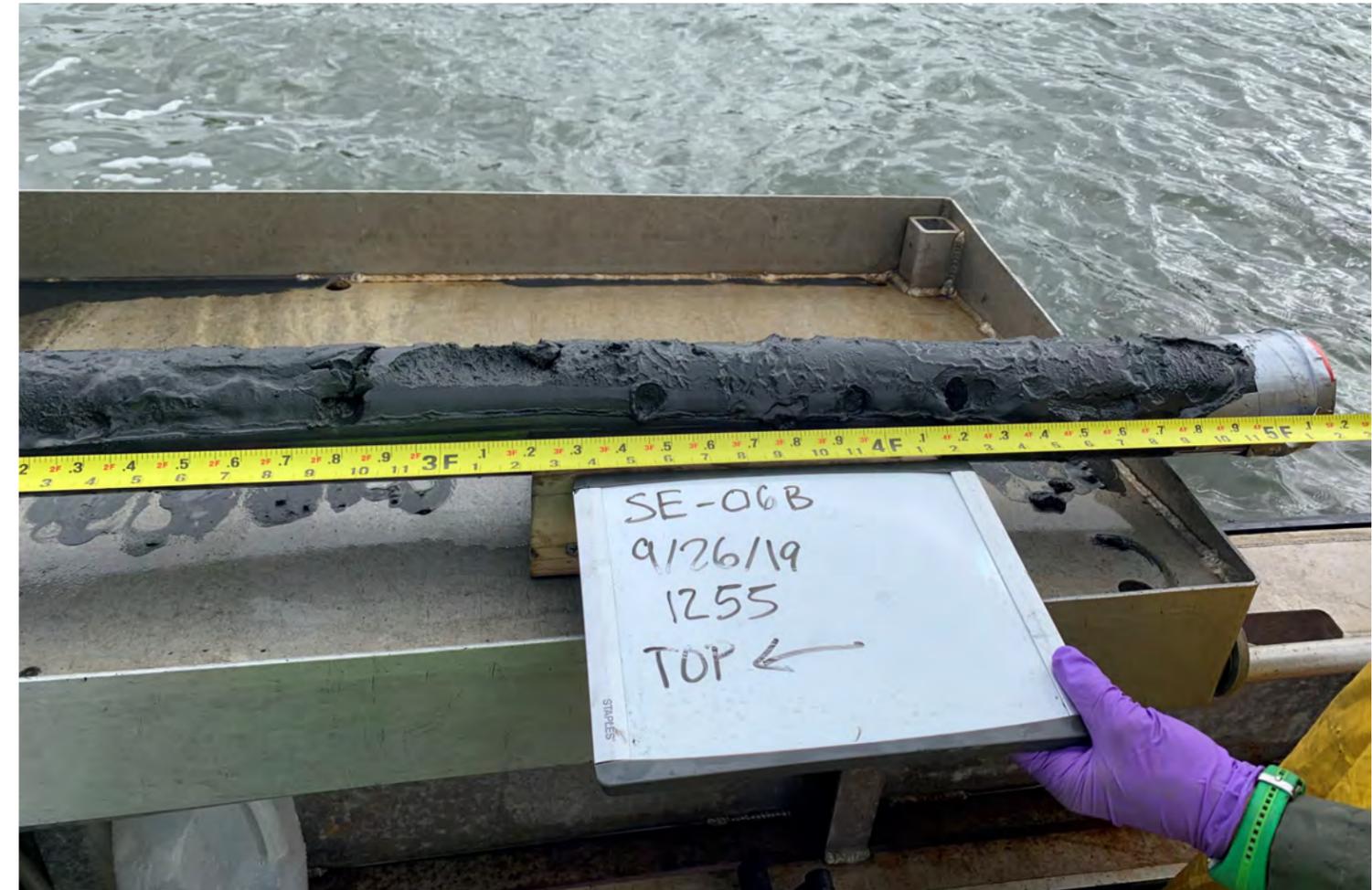
Project Name: Grays Harbor Historical Seaport Authority
Project Number: M1044.02.014
Location: Chehalis River, Aberdeen, Washington
Date: 9/23/19 – 9/26/19

Subsurface Sediment Cores
Location: SE-06B

Sample Depth: 3 – 4 feet bml (archive)



0 – 2.8 feet bml



2.2 – 5.2 feet bml

Notes:

Core length, including cutting in shoe, was 5.2 feet.

Scale shown in feet.

bml = below mudline.



PHOTOGRAPHS:

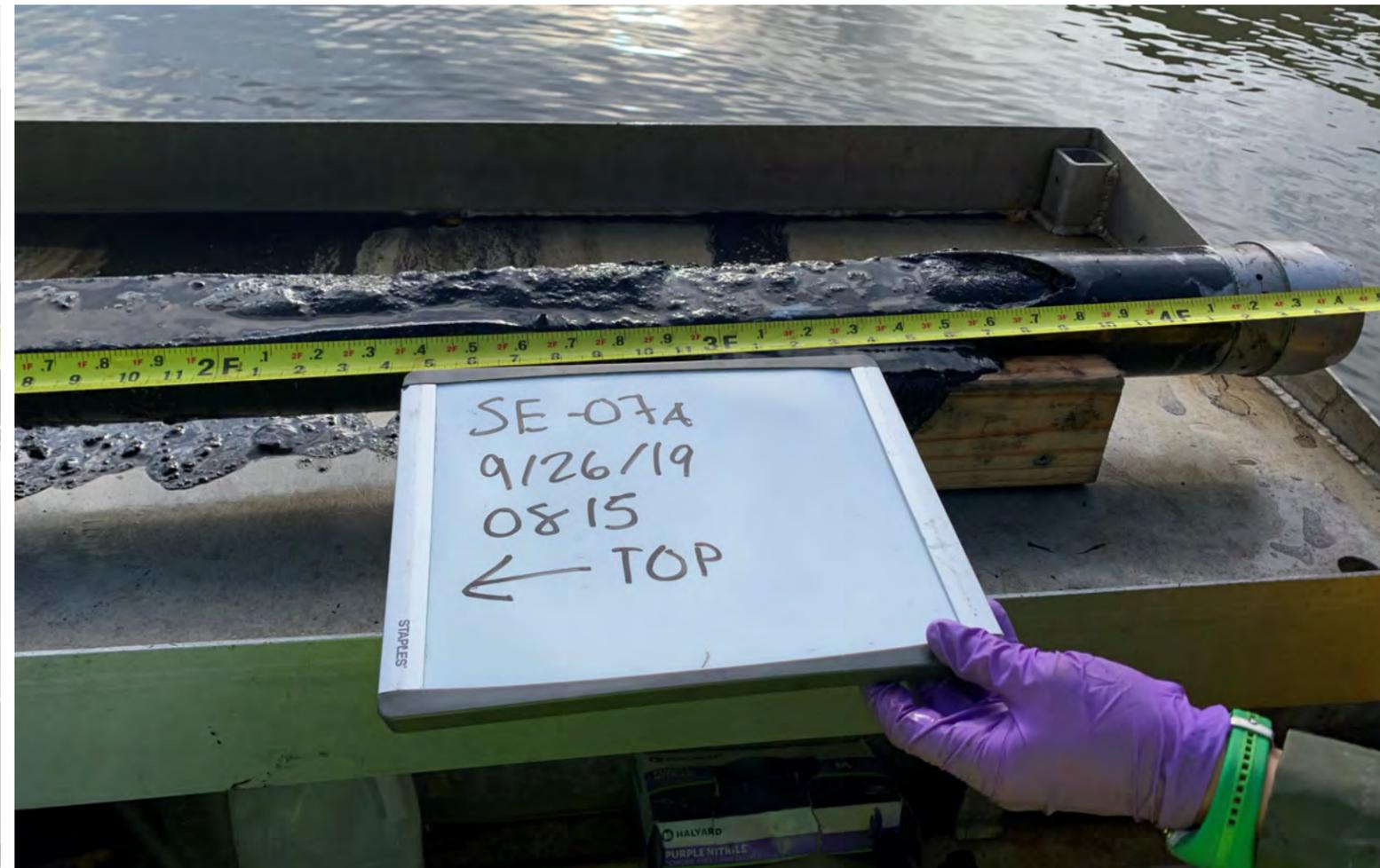
Project Name: Grays Harbor Historical Seaport Authority
Project Number: M1044.02.014
Location: Chehalis River, Aberdeen, Washington
Date: 9/23/19 – 9/26/19

Subsurface Sediment Cores
Location: SE-07A

Sample Depth: 0 – 1 foot bml



0 – 2.4 feet bml



1.7 – 4 feet bml

Notes:

Core length, including cutting in shoe, was 4 feet.

4.3-foot core length in photograph because of 0.3-foot section of water column included in top of liner.

Scale shown in feet.

bml = below mudline.



PHOTOGRAPHS:

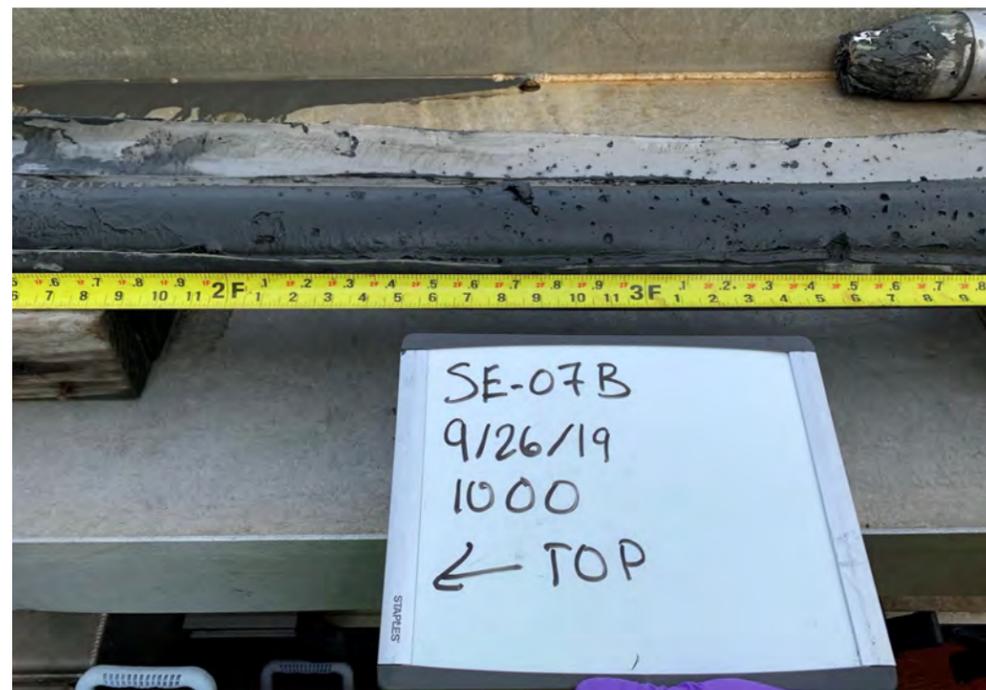
Project Name: Grays Harbor Historical Seaport Authority
Project Number: M1044.02.014
Location: Chehalis River, Aberdeen, Washington
Date: 9/23/19 – 9/26/19

Subsurface Sediment Cores
Location: SE-07B

Sample Depth: 0 – 1 foot bml (archive)



0 – 2.2 feet bml



1.5 – 3.8 feet bml



3.4 – 5.7 feet bml

Notes:

Core length, including cutting in shoe, was 6.5 feet.

Scale shown in feet.

bml = below mudline.



PHOTOGRAPHS:

Project Name: Grays Harbor Historical Seaport Authority
Project Number: M1044.02.014
Location: Chehalis River, Aberdeen, Washington
Date: 9/23/19 – 9/26/19

Subsurface Sediment Cores
Location: SE-08A

Sample Depth: 0 – 1 foot bml



Notes:

Core length, including cutting in shoe, was 1.3 feet.

Scale shown in feet.

bml = below mudline.

0 – 1.3 feet bml

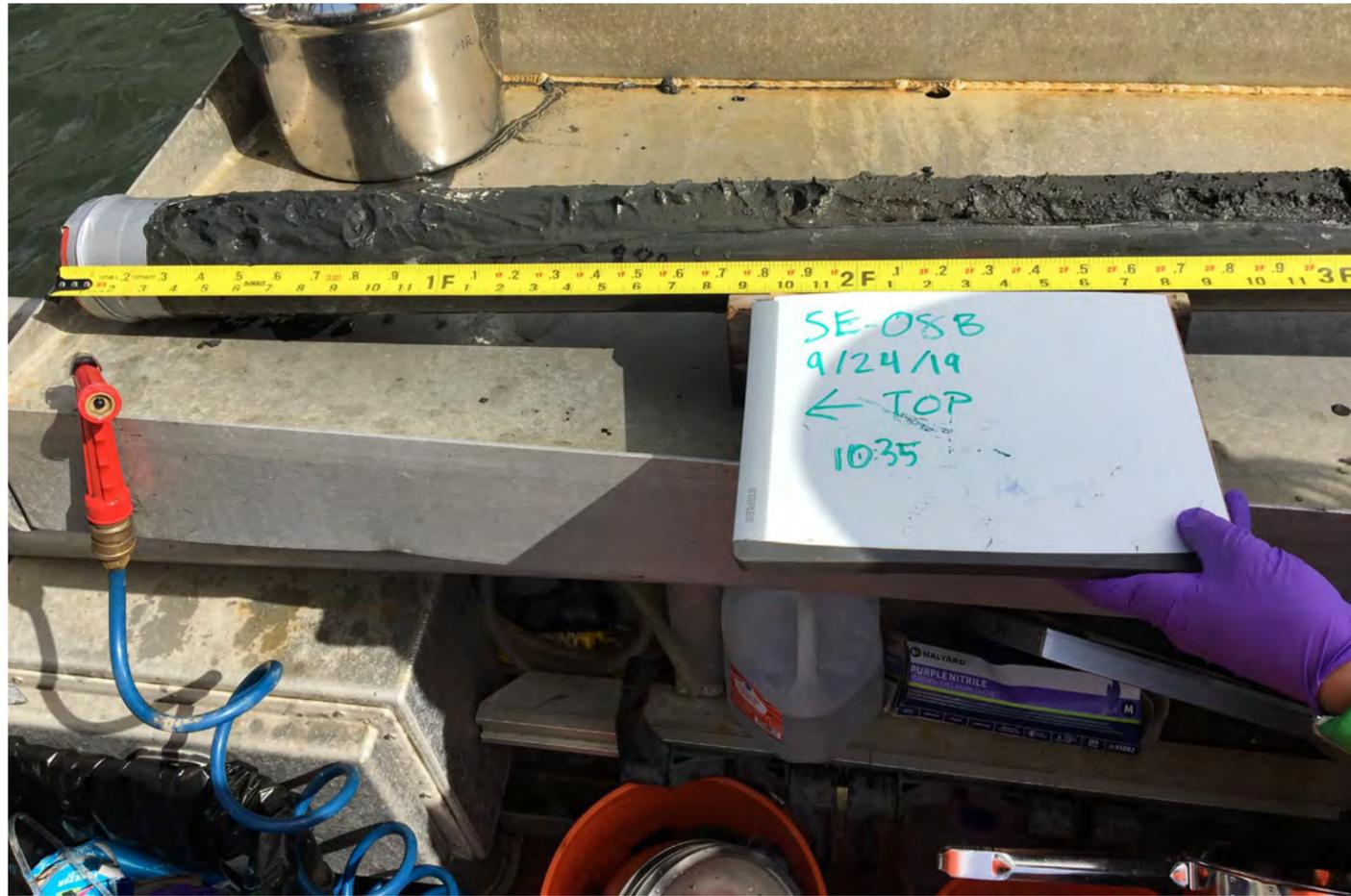


PHOTOGRAPHS:

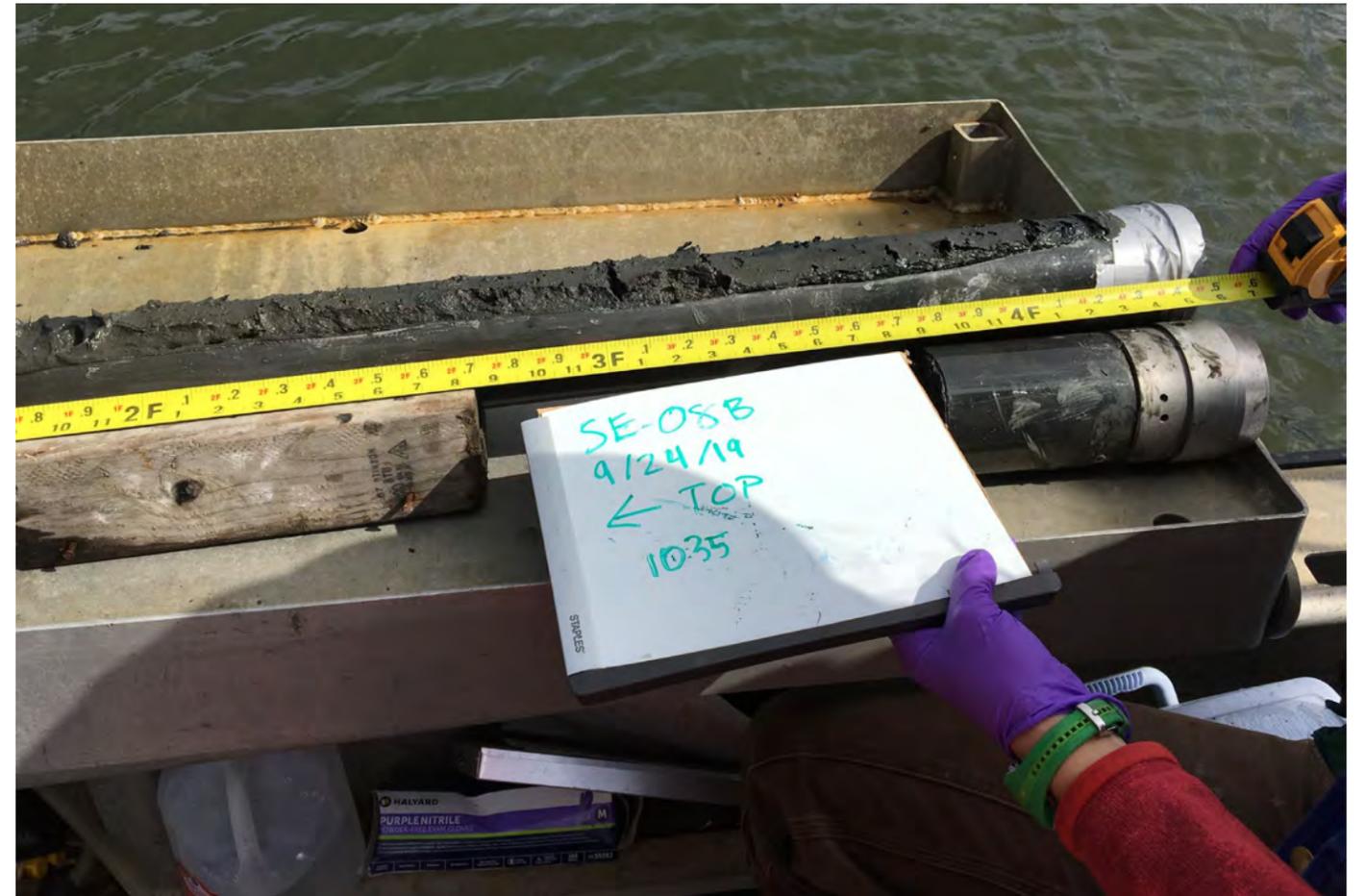
Project Name: Grays Harbor Historical Seaport Authority
Project Number: M1044.02.014
Location: Chehalis River, Aberdeen, Washington
Date: 9/23/19 – 9/26/19

Subsurface Sediment Cores
Location: SE-08B

Sample Depth: 0 – 1 foot bml (archive);
Radioisotope samples also collected at this location



0 – 3 feet bml



1.8 – 5.3 feet bml

Notes:

Core length, including cutting in shoe, was 5.3 feet.

Scale shown in feet.

bml = below mudline.



PHOTOGRAPHS:

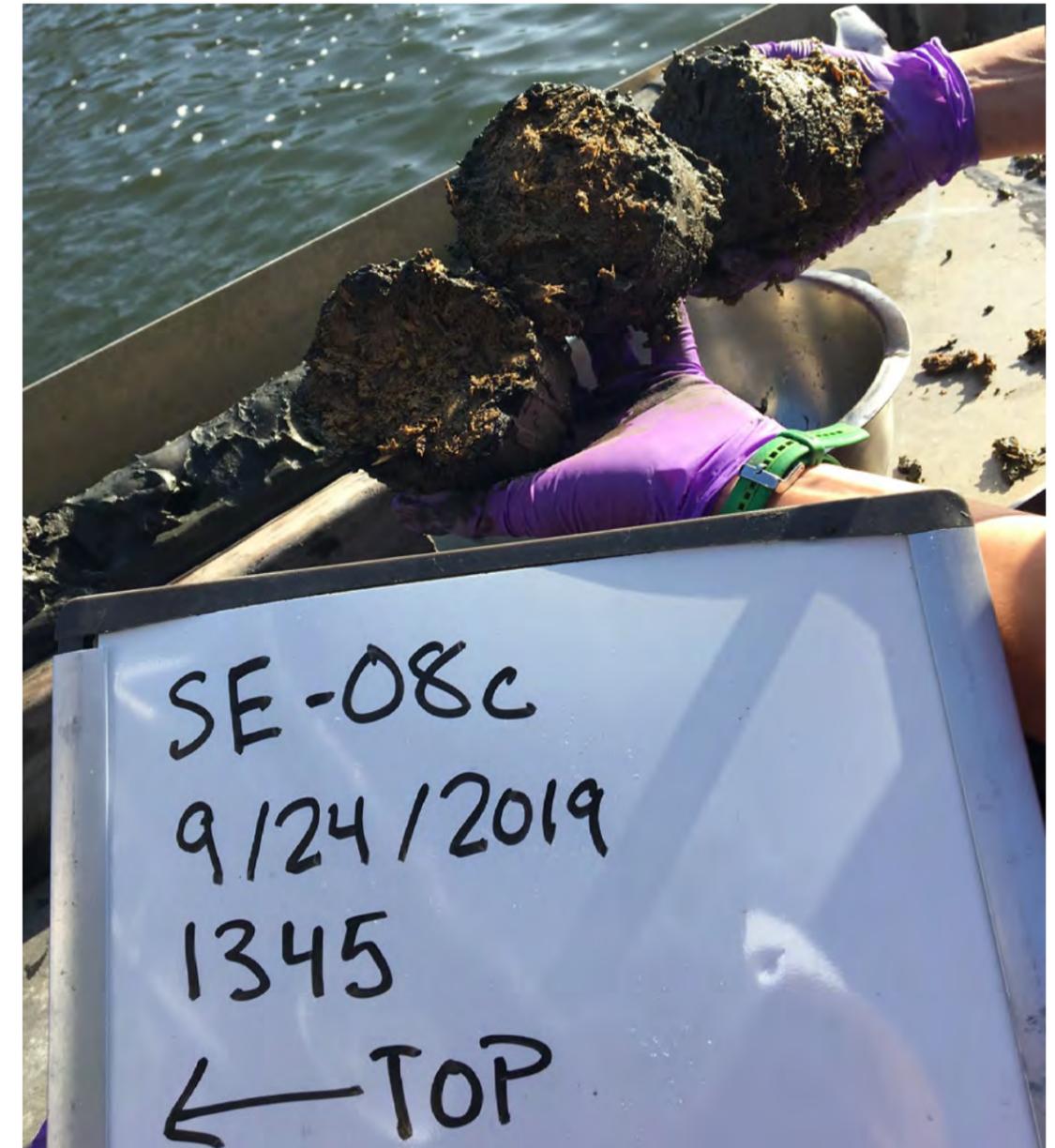
Project Name: Grays Harbor Historical Seaport Authority
Project Number: M1044.02.014
Location: Chehalis River, Aberdeen, Washington
Date: 9/23/19 – 9/26/19

Subsurface Sediment Cores
Location: SE-08C

Sample Depth: 3.2 – 4.2 feet bml



0 – 3.6 feet bml



Woodwaste at 3.9 feet bml

Notes:

Core length, including cutting in shoe, was 4.2 feet.

Scale shown in feet.

bml = below mudline.

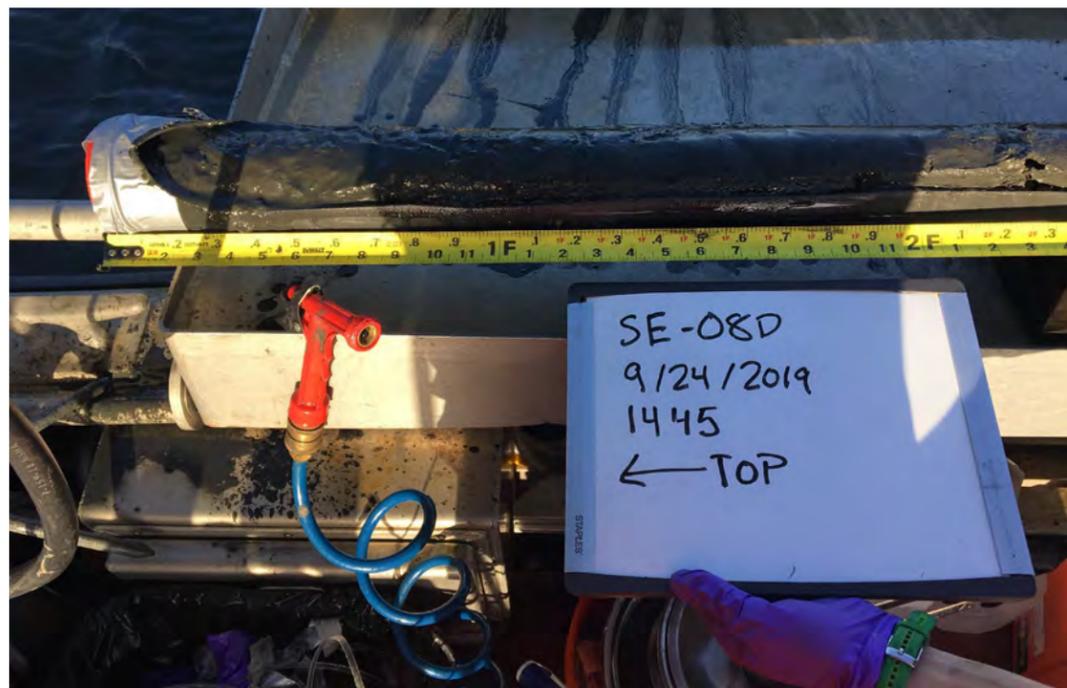


PHOTOGRAPHS:

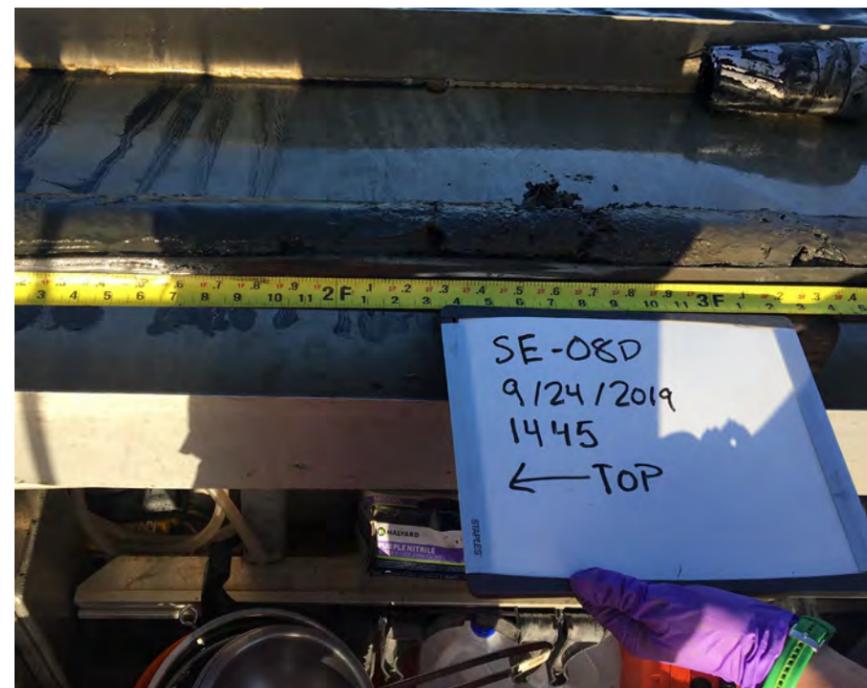
Project Name: Grays Harbor Historical Seaport Authority
Project Number: M1044.02.014
Location: Chehalis River, Aberdeen, Washington
Date: 9/23/19 – 9/26/19

Subsurface Sediment Cores
Location: SE-08D

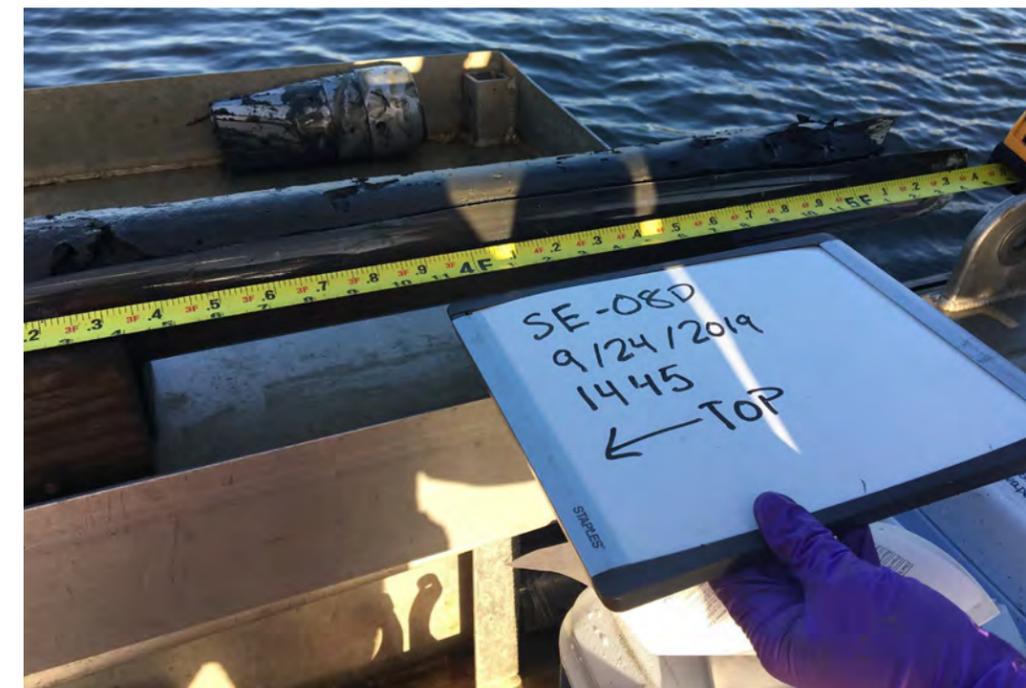
Sample Depth: 2 – 3 feet bml (archive)



0 – 2.3 feet bml



1.3 – 3.4 feet bml



3.2 – 5.4 feet bml

Notes:

Core length, including cutting in shoe, was 5.75 feet.

Scale shown in feet.

bml = below mudline.



PHOTOGRAPHS:

Project Name: Grays Harbor Historical Seaport Authority
Project Number: M1044.02.014
Location: Chehalis River, Aberdeen, Washington
Date: 9/23/19 – 9/26/19

Subsurface Sediment Cores
Location: SE-10

Sample Depth: 2 – 3.7 feet bml



0 – 2.3 feet bml



2.4 – 3.3 feet bml



Core in shoe at base of core

Notes:

Core length, including cutting in shoe, was 3.7 feet.

Scale shown in feet.

bml = below mudline.

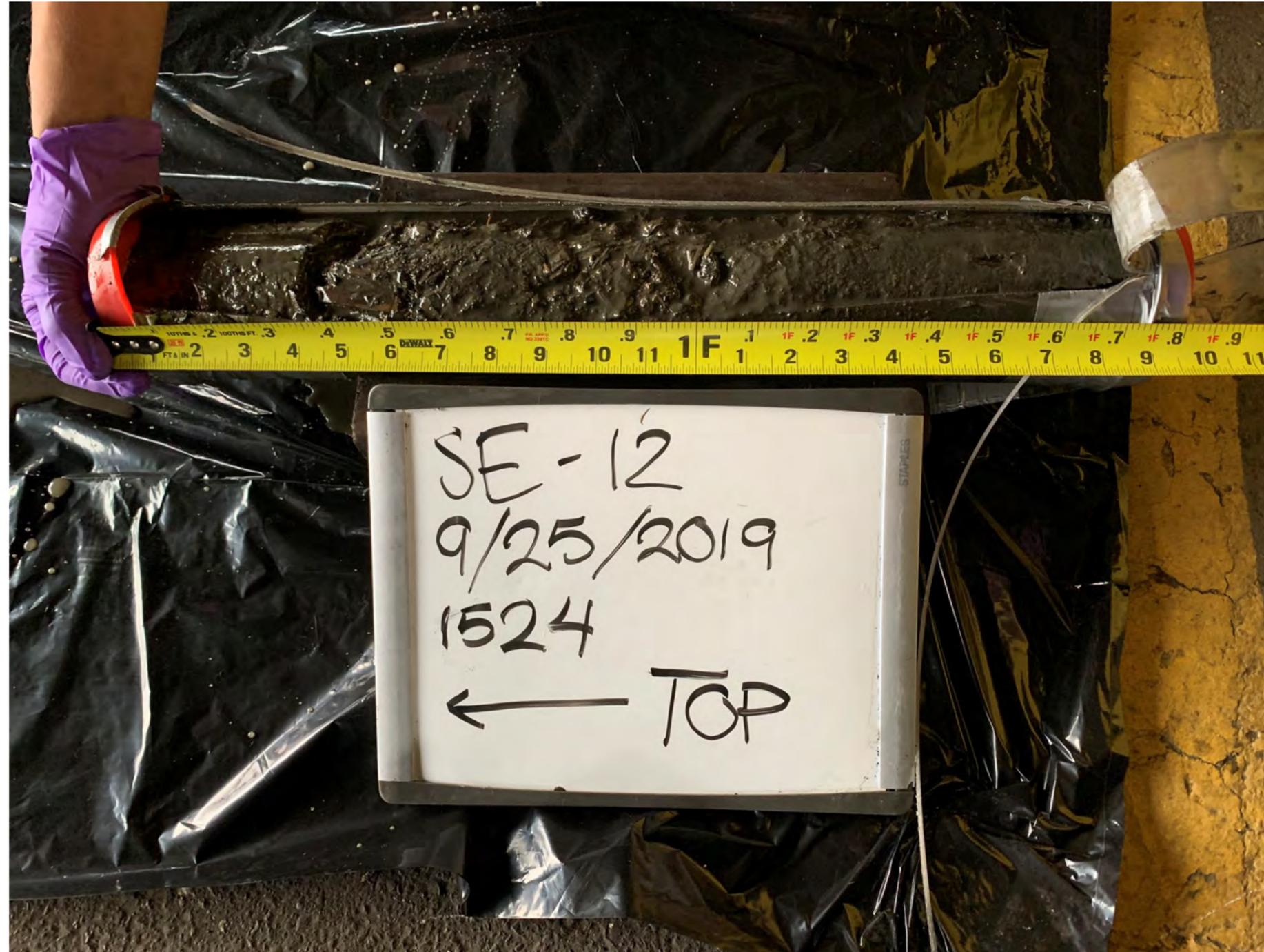


PHOTOGRAPHS:

Project Name: Grays Harbor Historical Seaport Authority
Project Number: M1044.02.014
Location: Chehalis River, Aberdeen, Washington
Date: 9/23/19 – 9/26/19

Subsurface Sediment Cores
Location: SE-12

Radioisotope samples collected
at this location



0 – 1.8 feet bml

Notes:
Core length, including cutting in shoe, was 1.8 feet.
Scale shown in feet.
bml = below mudline.



PHOTOGRAPHS:

Project Name: Grays Harbor Historical Seaport Authority
Project Number: M1044.02.014
Location: Chehalis River, Aberdeen, Washington
Date: 9/23/19 – 9/26/19

Subsurface Sediment Cores

Location: SE-29

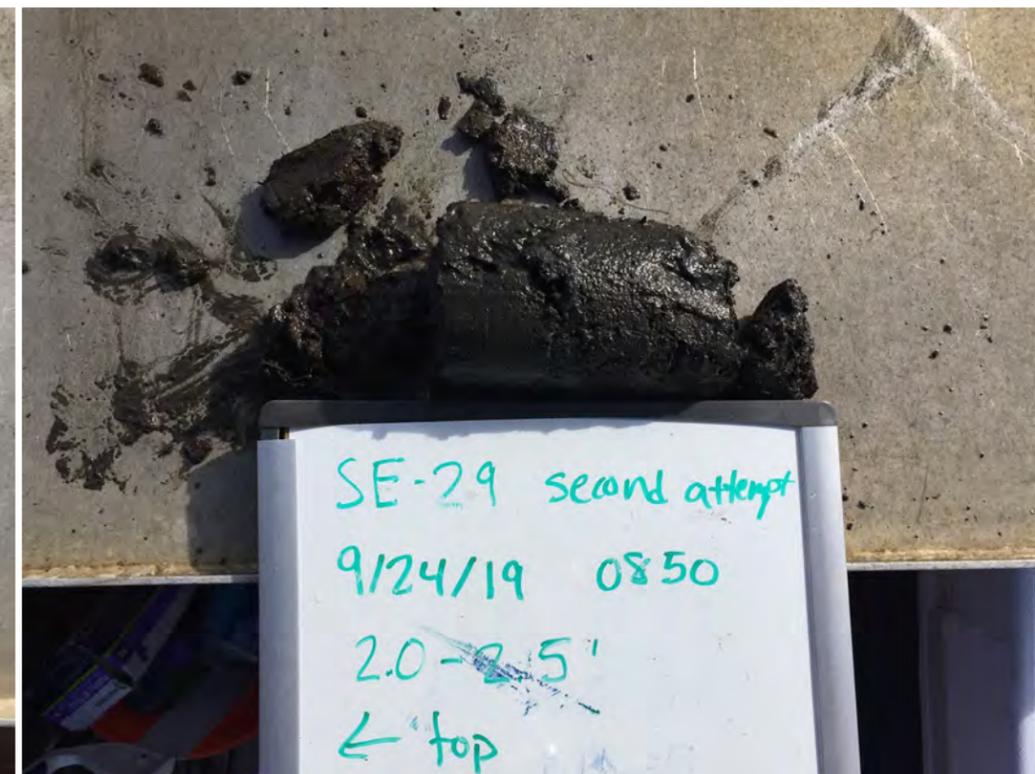
Sample Depth: 0 – 2 feet bml



Woodwaste in shoe



2 feet bml



2 – 2.5 feet bml

Notes:

Core length, including cutting in shoe, was 2.5 feet.

Scale shown in feet.

bml = below mudline.

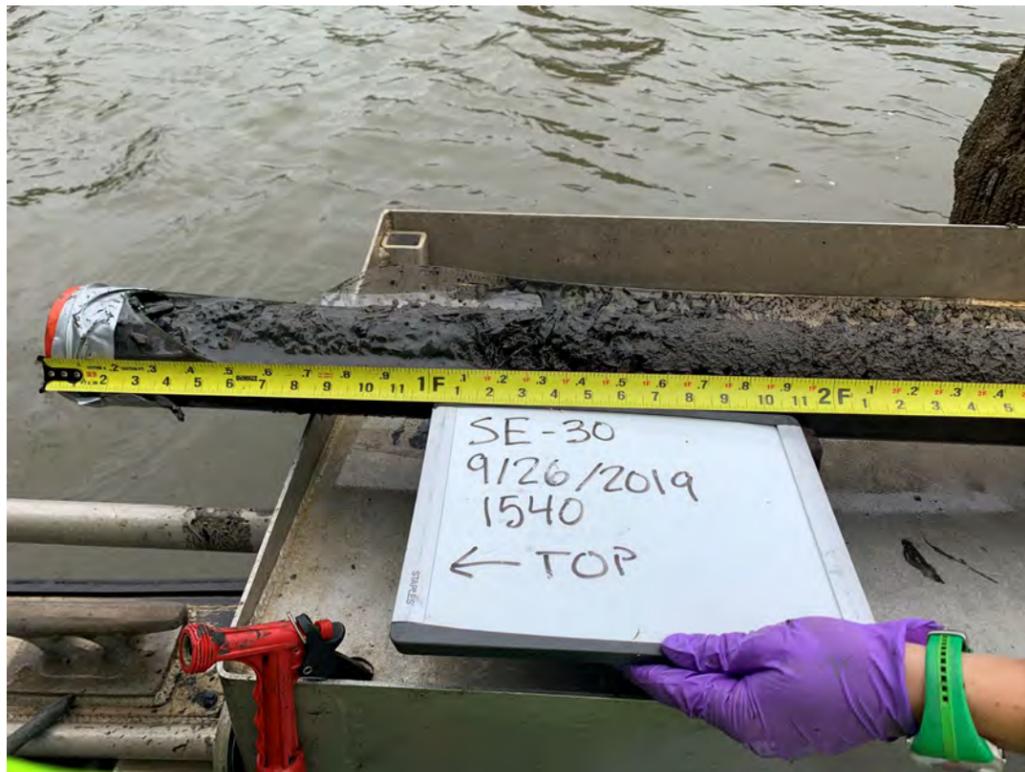


PHOTOGRAPHS:

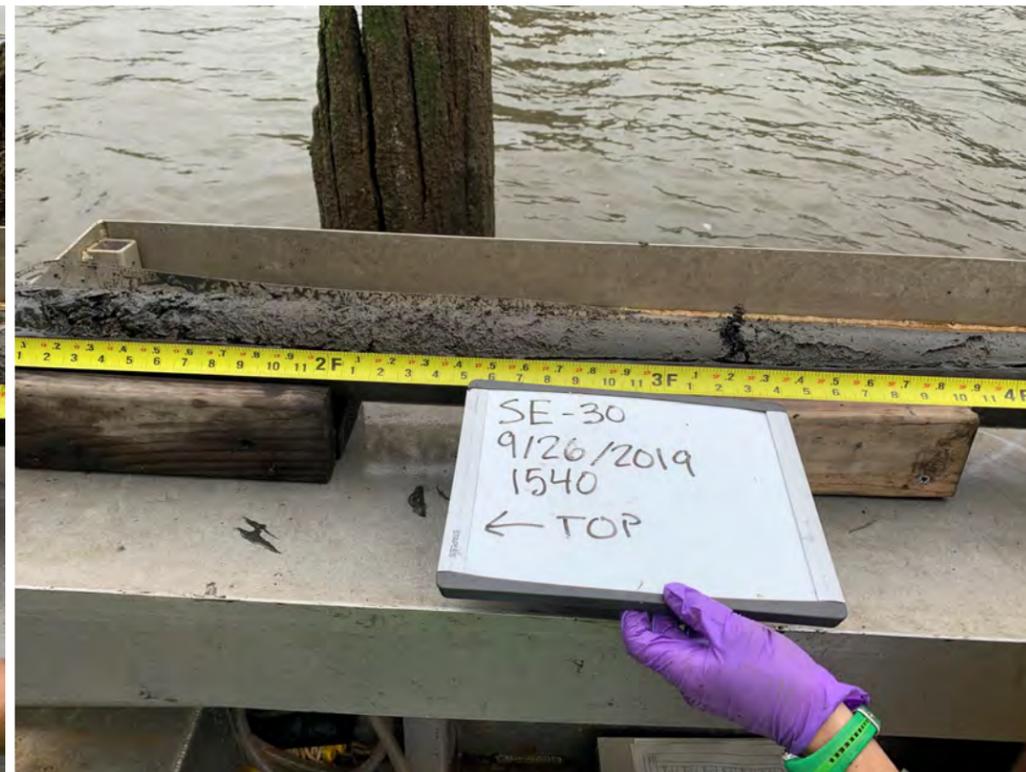
Project Name: Grays Harbor Historical Seaport Authority
Project Number: M1044.02.014
Location: Chehalis River, Aberdeen, Washington
Date: 9/23/19 – 9/26/19

Subsurface Sediment Cores
Location: SE-30

Sample Depths (feet bml): 0 – 2 (archive);
2.5 – 4.5; 4.5 – 5.5 (archive)



0 – 2.4 feet bml



1.1 – 4 feet bml



3 – 5.5 feet bml

Notes:

Core length, including cutting in shoe, was 6.1 feet.
Scale shown in feet.
bml = below mudline.



PHOTOGRAPHS

Project Name: Weyerhaeuser Sawmill Aberdeen/Seaport Landing
Site: In-Water Remedial Investigation
Project Number: M1044.02.014
Location: 500 N Custer Street, Aberdeen, Washington
Date: July 21, 2020

Photo No. 1.

Description

Possible sulfide seep observed near the wharf, facing northwest toward the Chehalis River.



Photo No. 2.

Description

Close up of possible sulfide seep near the wharf as shown on photo no. 1.





PHOTOGRAPHS

Project Name: Weyerhaeuser Sawmill Aberdeen/Seaport Landing
Site: In-Water Remedial Investigation
Project Number: M1044.02.014
Location: 500 N Custer Street, Aberdeen, Washington
Date: July 21, 2020

Photo No. 3.

Description

Representative photograph of decaying organic material (black material) along shoreline, facing southwest.



Photo No. 4.

Description

Possible sulfide seeps observed downstream of the mouth of Shannon Slough, facing northeast.





PHOTOGRAPHS

Project Name: Weyerhaeuser Sawmill Aberdeen/Seaport Landing
Site: In-Water Remedial Investigation
Project Number: M1044.02.014
Location: 500 N Custer Street, Aberdeen, Washington
Date: July 21, 2020

Photo No. 5.

Description

Possible sulfide seeps observed downstream of the mouth of Shannon Slough, facing northeast.



Photo No. 6.

Description

Woodwaste observed near the mouth of Shannon Slough, facing east. Note possible sulfide seep (light colored substance excreting from the woodwaste), circled.





PHOTOGRAPHS

Project Name: Weyerhaeuser Sawmill Aberdeen/Seaport Landing
Site: In-Water Remedial Investigation
Project Number: M1044.02.014
Location: 500 N Custer Street, Aberdeen, Washington
Date: July 21, 2020

Photo No. 7.

Description

Woodwaste and possible sulfide seeps observed near mouth of Shannon Slough, facing east.



Photo No. 8.

Description

Woodwaste and possible sulfide seeps observed near mouth of Shannon Slough, facing east.



APPENDIX G
DGT TECHNICAL MEMORANDUM

DRAFT





MEMORANDUM

To: Joyce Mercuri and Tom Middleton, LHG Date: February 9, 2023
From: Phil Wiescher, PhD and Amanda Bixby, GIT Project No.: M1044.02.014
RE: Sulfide Measurement Methods

INTRODUCTION

Historically, sawmills operating at the Weyerhaeuser Sawmill Aberdeen/Seaport Landing site (the Site) used wood waste as fill material in the Chehalis River. The wood waste, including sawdust, woodchips, and planked fill material, was deposited in the river sediments over time. Anoxic decomposition of wood waste produces hydrogen sulfide, a hazardous substance that is toxic to benthic organisms, fish, and eelgrass when present in excess amounts (Podger, 2013). Maul Foster & Alongi, Inc. (MFA) evaluated the presence of sulfide concentrations in wood waste-impacted sediment and compared results to toxicity values to develop appropriate in-water screening criteria.

Hydrogen sulfide readily converts into sulfate or other non-toxic forms when exposed to oxygen. Because hydrogen sulfide is easily oxidized, collecting representative samples can be challenging. MFA used three methods of evaluating sulfide levels in sediment at colocated sample locations on the Site: diffusive gradients in thin films (DGT) passive samplers to assess in-situ porewater sulfide, surface sediment sampling for bulk sediment sulfides, and porewater sulfide. Sulfide sampling methods, data calculations, and analyses are described in this memorandum.

DGT SAMPLING

DGT passive samplers quantify the bioavailable fraction of sulfide present in sediment porewater. The bioavailable fraction is measure of contamination that may cause adverse biological effects to benthic or aquatic organisms and is considered a more useful measure of toxicity in sediment than bulk sediment sampling (Paulik and Anderson, 2018).

DGT Sampler Description

DGT samplers are typically deployed in sediment underwater or at low tide to minimize sulfide oxidation. While the samplers are submerged in the sediment, sulfide accumulates on a binding layer of light-yellow silver iodide gel, which turns black as sulfide accumulates. After DGT samplers are retrieved from the field, sulfide concentrations are quantified by scanning the gray-scale color on the silver iodide layer using a flatbed scanner and an image processing software (Schneider, Rasband, and

109 East 13th Street, Vancouver, WA 98660
www.maulfoster.com

Eliceiri, 2012). Calibration and data interpretation are then conducted in accordance with the DGT Research guidance document (see Attachment A).

Field Methods

On July 21, 2020, MFA deployed ten DGT units (SE-32 through SE-41) 10 centimeters (cm) below mudline during low tide to ensure they remained submerged for the duration of deployment to avoid oxygenation (see sample locations on Figure G-1 and field photographs in Attachment B). Each sampling device was equipped with high-visibility tape. Samples were retrieved after two tide cycles (i.e., slightly over 24 hours) from deployment. At the time of retrieval, field staff obtained the in-situ porewater temperature and potential hydrogen (pH) using a Hanna Instruments 99121 direct soil pH meter and obtained the conductivity using a FieldScout direct soil EC meter. These parameters were later used to calculate hydrogen sulfide from total free sulfide results.

DGT devices that had been exposed to sulfide calibration standards were used to calibrate the DGT samplers, per the DGT Research guidance document, included as Attachment A. The gray-scale calibration strips represent the mass of sulfide per unit area. Calibration strips were simultaneously scanned with the deployed DGT samplers as a full color image (see scans in Attachment C). Note that the binding gel on some of the samplers appeared brown, which was due to iron oxide precipitate. The full color scan of the samplers and calibration strips was converted into a gray-scale image, which was then uploaded to ImageJ (Schneider, Rasband, and Eliceiri, 2012) to determine the gray-scale values of each calibration strip. Color variations were present on each strip; therefore, the mathematical mode of the gray scale value was selected as the representative gray-scale value for each DGT sample. Calculations are further described in the data analysis section below.

Data Analysis

MFA prepared a calibration curve (see Figure G-2) using the gray-scale intensity from the calibration strips (mean vs. assigned concentration). MFA then consulted Dr. Hao Zhang of Lancaster University, who helped develop the DGT samplers. Per Dr. Zhang's recommendation, the lowest sulfide concentration was excluded from the calibration curve because it skewed the curve trendline. The calibration curve equation is shown below:

$$M = 0.01 * I^{2.2928}$$

Where:

M = mass of sulfide (nanomole [nmol]/cm²)

I = mathematical mode of gray-scale intensity of binding gel image (unitless)

Data Calculations

The mass of sulfide value from the gray-scale calibration curve and the deployment time were used in the equation (Teasedale et al., 1999) below to obtain the sulfide concentration:

$$c_{DGT} = \frac{M\Delta g}{D^{mdl}A_p t}$$

Where:

c_{DGT} = sulfide concentration (nmol/milliliter)

M = mass of accumulated sulfide (nmol)

Δg = thickness of diffusion layer (0.094 cm)

D^{mdl} = temperature-corrected diffusion coefficient of sulfide (12.41 cm²/seconds) (DGT Research, n.d.)

A_p = cross sectional area of exposed DGT window (10⁻⁶ cm²)

t = deployment time (seconds)

Sulfide was then converted to milligrams per liter (mg/L) using following conversion factors:

$$total S^{2-} = c_{DGT} * \frac{32,070 \text{ mg}}{1 \text{ mol}} * \frac{1 \text{ mol}}{1e9 \text{ nmol}} * \frac{1,000 \text{ mL}}{1 \text{ L}}$$

The porewater temperature was used in the Millero equation below to calculate the infinite dilution value for each sample (Limnology and Oceanography, 1988).

$$pK_1 = -98.080 + \frac{5765.4}{T} + 15.04055 \ln T$$

Where:

pK_1 = infinite dilution value (unitless)

T = porewater temperature (degrees Celsius)

Porewater conductivity and temperature were converted to salinity using an online calculator (Oceanlife, 2018). The online salinity calculator used the complex polynomial equation adopted by Unesco/ICES/SCOR/IAPSO (Unesco, 1981).

The salinity and infinite dilution values were then used to calculate the dissociation constant for hydrogen sulfide (Limnology and Oceanography, 1988). Note that this equation is considered appropriate when salinity is between 5 and 40 and temperature is between 5 and 25 degrees Celsius; all sample parameters were within the given ranges.

$$pK_1^* = pK_1 + AS^{1/2} + BS$$

Where:

pK_1^* = dissociation constant (unitless)

A = -0.1570 (unitless)
S = salinity (parts per trillion)
B = 0.0135 (unitless)

The dissociation constant was then plugged into the below equation to calculate hydrogen sulfide (Phillips, Anderson, and Hunt, 1997).

$$H_2S = [total S^{2-}] * \left(1 - \frac{1}{1 + 10^{(pK_1^* - pH)}}\right)$$

Where:

H₂S = hydrogen sulfide (mg/L)
total S²⁻ = total free sulfide (mg/L)
pK₁^{*} = dissociation constant (unitless)
pH = potential hydrogen (unitless)

Results

Parameters used in data calculation and DGT sulfide results are presented in Table G-1. Free sulfide DGT values ranged from 0.0002 to 7.85 mg/L. The highest free sulfide value was at sample location SE-40.

Hydrogen sulfide DGT values ranged from 0.0001 to 4.17 mg/L. The highest hydrogen sulfide value was at sample location SE-33.

BULK SEDIMENT SAMPLING

Field and Analytical Methods

Co-located surface sediment samples were collected after DGT passive sampler retrieval to avoid sediment disturbance during DGT sample collection (see sample locations on Figure G-1). A decontaminated stainless-steel trowel was used to collect sediment from 0 to 10 centimeters below mudline, the area with the highest potential for benthic organism exposure. Visual and olfactory characteristics, including color, odor, sheen, texture, percentage of debris, and/or wood waste by volume, were recorded on field sampling data sheets, and soil types were classified using the Unified Soil Classification System (see Attachment D). Sample material was then placed into laboratory-supplied jars and submitted to the analytical laboratory under standard chain-of-custody procedures for analysis of bulk sulfide by Standard Method (SM) 4500-S2-D-00, total volatile solids by SM 2540G, total organic carbon by U.S. Environmental Protection Agency Method 9060A, and ammonia as nitrogen by Plumb (1981)/SM 4500-NH3.

Results

Analytical results for the surface sediment sample colocated with the DGT samples are shown on Figure G-1 and summarized below.

Bulk sediment sulfide was detected in all samples (see Table G-2). The highest bulk sediment sulfide concentration was 2,110 milligrams per kilogram (mg/kg) at sample location SE-39. Remaining bulk sediment sulfide results ranged from 204 to 921 mg/kg.

Total volatile solids were detected in all samples at concentrations ranging from 2.51 to 50.1 percent, with the highest percentage at sample location SE-39.

Total organic carbon was detected in all samples at concentrations ranging from 1 to 3.9 percent, with the highest percentage at sample location SE-39.

Ammonia as nitrogen was detected in all samples at concentrations ranging from 0.783 to 26.4 mg/kg, with the highest concentration at sample location SE-37.

POREWATER SULFIDE SAMPLING

As discussed in Section 4.2.2 of the RI, MFA conducted sediment bioassay sampling to assess the effects of sediment contamination on benthic organisms, per the Washington State Department of Ecology sediment cleanup user's manual II (Ecology, 2021). Bioassays are considered a holistic representation of sediment toxicity, as they account for bioavailability of contaminants to benthic organisms, other-than-additive effects of chemical mixtures in sediments, and toxicity of non-chemical stressors such as wood waste (Ecology, 2021).

Porewater was extracted from the bioassay sediment samples via centrifugation and analyzed for porewater sulfides by Standard Method 4500-SD-D-00. One sample from location SE-39 was too dry to extract porewater and, therefore, was not analyzed.

Results

Porewater sulfide was detected in eight of the nine analyzed samples (see Table G-2). Detected concentrations of porewater sulfide ranged from 0.06 to 0.202 mg/L. The highest concentration was detected at sample location SE-40.

DISCUSSION

DGT hydrogen sulfide, conventional parameters, and porewater sulfides data were compared to evaluate their reliability in predicting potential toxic effects to the benthic community (see Figures G-3 through G-8). Note that the sample from SE-39 was too dry to extract porewater and was not able to be analyzed; therefore, SE-39 is not shown on the figures.

Bulk sediment sulfide results do not correlate with DGT hydrogen sulfides (see Figure G-3), nor do they correlate with porewater sulfides (see Figure G-4). Bulk sediment sulfides are likely not representative of field conditions, as they represent sulfide concentrations in sediment at one point in time, when, sulfide concentrations vary significantly over time in the tidally influenced, estuarine study area. Bulk sediment sulfides also likely overestimate the bioavailable fraction because analytical results provide the concentration of total sulfides, rather than bioavailable hydrogen sulfide, which represents the toxic portion. Therefore, bulk sediment sulfides are a poor predictor of potential toxic effects to the benthic community and should not be used for cleanup level development at the Site.

Conventional parameters do not correlate well with DGT hydrogen sulfides (see Figures G-5 through G-7). Conventional parameters, specifically total volatile solids and total organic carbon, are considered reliable indicators for benthic toxicity and are further discussed in the RI.

DGT hydrogen sulfide results and porewater sulfide results are not well correlated (see Figure G-8). There is uncertainty associated with both sampling methods. To analyze porewater sulfides, the laboratory places sediment in a centrifuge to extract all available porewater. Biological receptors would likely only contact a fraction of the extracted porewater in sediment (i.e., centrifuged porewater may overestimate the bioavailable portion).

Unlike bulk sediment sulfides and porewater sulfides, DGT samplers were deployed over two tide cycles to capture sulfide variations over time. DGT sampling results are ideally represented by relatively uniform gray-scale values, or gray-scale value gradients along a depth interval. However, the silver-iodide strips from DGT samplers deployed at the Site were non-uniform, containing a wide range of gray-scale values. When analyzing the DGT strips, the mathematical mode of gray-scale values on each strip to use in sulfide calculations. Other methods to identify representative gray-scale values (e.g., median, mean) exist and influence the resulting sulfide and hydrogen sulfide calculations. Additionally, iron oxide precipitate accumulated on the strips (see brown areas on the full-color scan in Attachment C). Removal of the brown coating required soaking the DGT samplers in a 0.01 molar solution of hydroxylamine hydrochloride for three hours. MFA did not undertake this step. The brown coating may have contributed to higher gray-scale values that are not representative of sulfate concentrations. While DGT samplers accumulated sulfide over time, geochemical parameters (pH and conductivity) and temperature factored into the DGT sulfide and hydrogen sulfide calculations as well. These parameters were recorded at the time of DGT retrieval; however, these can vary over time at the Site. Due to the various factors contributing to uncertainty of DGT sulfide measurements, this sampling method may not provide a reliable predictor of bioavailable hydrogen sulfide and benthic toxicity at the Site.

There is significant uncertainty associated with the three sulfide sampling methods and results from these methods are inconsistent with each other; therefore, we do not recommend using these methods as a proxy for sediment cleanup levels. We further evaluate the correlation between wood waste presence and other wood waste parameters (other than sulfide) to inform potential cleanup objectives in the cleanup level development memorandum, included as Appendix J to the RI report.

Attachments:

Limitations

Tables

Figures

Attachment A—DGT Research Guidance

Attachment B—Field Photographs

Attachment C—DGT Scans

Attachment D—Sediment Field Sampling Data Sheets

DRAFT

REFERENCES

- DGT Research. n.d. Diffusion coefficients. <https://www.dgtresearch.com/diffusion-coefficients/#:~:text=Diffusion%20Coefficients%20in%20the%20standard,in%20cm2%20s%2D1.&text=The%20data%20are%20based%20on,water%20at%2025%C2%B0C> (accessed January 15, 2021).
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LIMITATIONS

The services undertaken in completing this memorandum were performed consistent with generally accepted professional consulting principles and practices. No other warranty, express or implied, is made. These services were performed consistent with our agreement with our client. This memorandum is solely for the use and information of our client unless otherwise noted. Any reliance on this memorandum by a third party is at such party's sole risk.

Opinions and recommendations contained in this memorandum apply to conditions existing when services were performed and are intended only for the client, purposes, locations, time frames, and project parameters indicated. We are not responsible for the impacts of any changes in environmental standards, practices, or regulations subsequent to performance of services. We do not warrant the accuracy of information supplied by others, or the use of segregated portions of this memorandum.

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TABLES



Table G-1
DGT Sulfide Parameters and Calculation Results
Weyerhaeuser Sawmill Aberdeen/Seaport Landing Site

Location:	SE-32	SE-33	SE-34	SE-35	SE-36	SE-37	SE-38	SE-39	SE-40	SE-41	
Deployment Time:	7/21/20 8:30	7/21/20 8:15	7/21/20 8:06	7/21/20 8:01	7/21/20 7:55	7/21/20 7:48	7/21/20 7:41	7/21/20 9:24	7/21/20 9:06	7/21/20 9:16	
Retrieval Time:	7/22/20 9:24	7/22/20 9:37	7/22/20 9:42	7/22/20 9:46	7/22/20 7:58	7/22/20 9:54	7/22/20 10:14	7/22/20 10:26	7/22/20 7:12	7/22/20 7:00	
Deployment Time (seconds):	89640	91320	92160	92700	86580	93960	95580	90120	79560	78240	
Porewater Parameters during Retrieval:	pH	7.01	6.54	6.64	6.73	6.79	6.81	7.38	6.45	6.74	6.86
	Temperature (°C)	17.40	17.30	17.10	16.90	17.60	16.70	16.80	19.60	16.50	17.60
	Conductivity (mS/cm)	7.52	5.92	8.00	6.36	7.90	7.20	7.97	6.27	17.91	10.29
	Salinity (ppt)	4.9	3.8	5.3	4.2	5.2	4.8	5.3	3.9	12.9	6.9
Corrected Gray-Scale Values	Mean	16.37	180.05	14.48	24.23	98.04	207.02	81.68	21.81	197.70	35.85
	Mode	2.37	219.87	-3.13	29.37	219.87	224.87	39.37	-3.13	228.87	42.87
Sulfide from Calibration Curve (nmol/cm ²)	0.07	2344.79	4.58	23.20	2344.79	2468.85	45.43	11.72	2570.71	55.22	
Sulfide (nmol/mL)	0.01	194.49	0.38	1.90	199.04	199.03	3.60	0.90	244.74	5.19	
Sulfide (mg/L)	0.0002	6.24	0.01	0.06	6.38	6.38	0.12	0.03	7.85	0.17	
pK ₁ Calculation	7.10	7.10	7.10	7.11	7.09	7.11	7.11	7.06	7.11	7.09	
Dissociation (pK ₁ *) Using Salinity Calculator	6.82	6.84	6.81	6.84	6.81	6.83	6.82	6.80	6.72	6.78	
H ₂ S with sample-specific pK ₁ (mg/L)	0.0001	4.17	0.01	0.03	3.25	3.27	0.02	0.02	3.85	0.08	
H ₂ S with sample-specific pK ₁ (ug/L)	0.08	4169.74	7.23	34.26	3252.79	3265.64	24.83	20.07	3847.67	75.09	
Woodwaste Observation (%)	Trace	10	5	Trace	10	25.00	50	90	0	20	
Notes											
Sulfide and H ₂ S calculation results are shaded for ease of viewing.											
% = percent.											
°C = degrees Celsius.											
cm = centimeter.											
H ₂ S - hydrogen sulfide.											
pK ₁ = infinite dilution value.											
pK ₁ * = dissociation constant.											
ppt = parts per trillion.											
mg/L = milligram per liter.											
mL = milliliters.											
mS = milliSiemens.											
nmol = nanomoles.											
trace = less than 5%.											
ug/L = microgram per liter.											

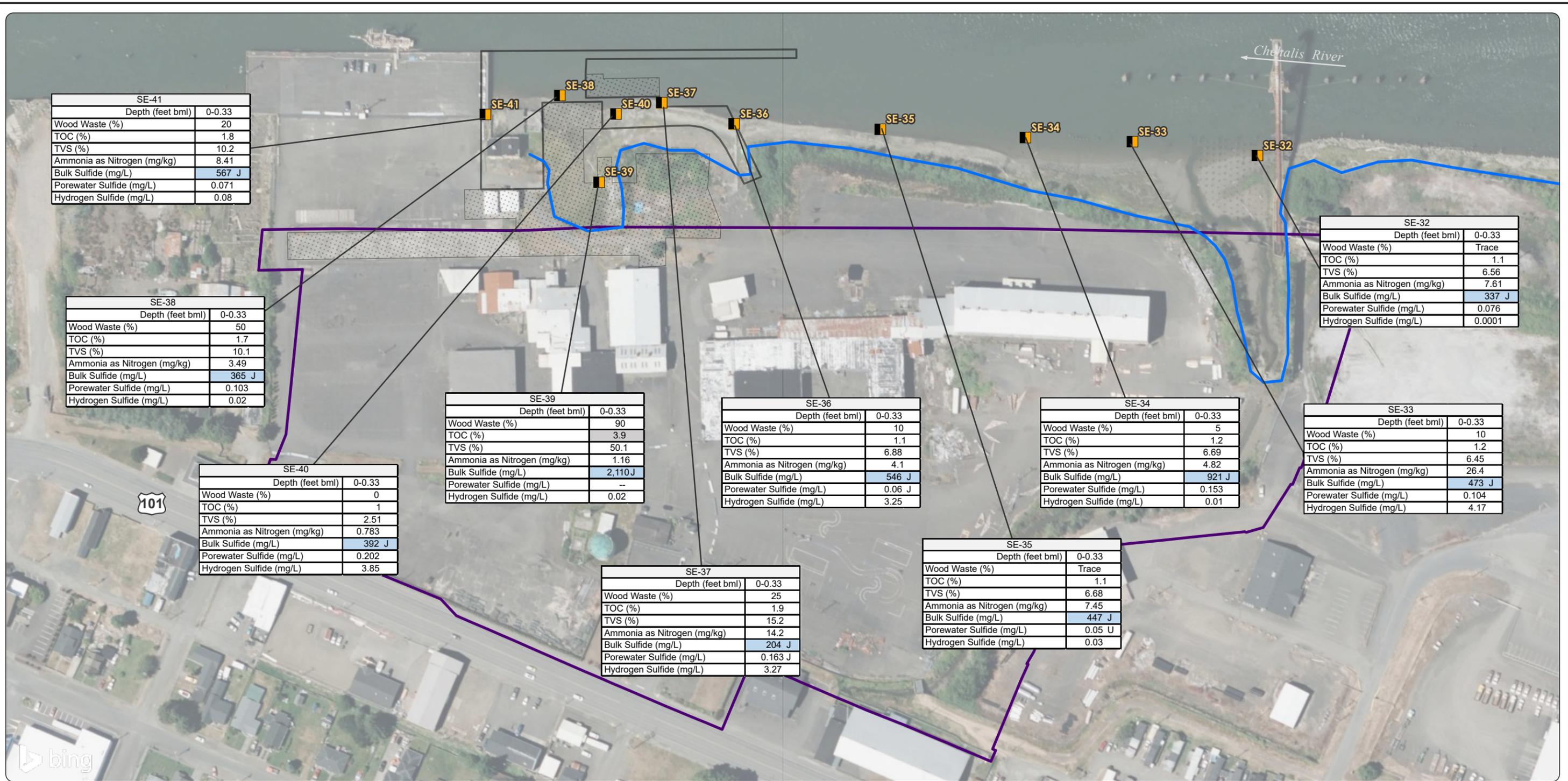
Table G-2
Bulk and Porewater Sulfide Results
Weyerhaeuser Sawmill Aberdeen/Seaport Landing Site

Location	SE-32	SE-33	SE-34	SE-35	SE-36	SE-37	SE-38	SE-39	SE-40	SE-41
Collection Date	07/22/2020	07/22/2020	07/22/2020	07/22/2020	07/22/2020	07/22/2020	07/22/2020	07/22/2020	07/22/2020	07/22/2020
Collection Depth (ft bml)	0-0.33	0-0.33	0-0.33	0-0.33	0-0.33	0-0.33	0-0.33	0-0.33	0-0.33	0-0.33
Type	Surface	Surface	Surface	Surface	Surface	Surface	Surface	Surface	Surface	Surface
Bulk Sediment (mg/kg)										
Sulfide	337 J	473 J	921 J	447 J	546 J	204 J	365 J	2,110 J	392 J	567 J
Porewater Sulfide (mg/L)										
Sulfide	0.076	0.104	0.153	0.05 U	0.06 J	0.163	0.103	--	0.202	0.071
Woodwaste Observation (%)										
Woodwaste	Trace	10	5	Trace	10	25	50	90	0	20
<p>Notes</p> <p>-- = not analyzed.</p> <p>% = percent.</p> <p>Bold indicates a porewater sulfide value greater than the lowest available dissolved sulfides toxicity value (0.1 mg/L) provided in Podger (2013): Sulfide Effects on Aquatic Organisms Literature Review.</p> <p>ft bml = feet below mudline.</p> <p>J = result is an estimated value.</p> <p>mg/kg = milligrams per kilogram.</p> <p>mg/L = milligrams per liter.</p> <p>trace = less than 5%.</p> <p>U = result is non-detect at reporting limit.</p>										

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FIGURES





SE-41	
Depth (feet bml)	0-0.33
Wood Waste (%)	20
TOC (%)	1.8
TVS (%)	10.2
Ammonia as Nitrogen (mg/kg)	8.41
Bulk Sulfide (mg/L)	567 J
Porewater Sulfide (mg/L)	0.071
Hydrogen Sulfide (mg/L)	0.08

SE-38	
Depth (feet bml)	0-0.33
Wood Waste (%)	50
TOC (%)	1.7
TVS (%)	10.1
Ammonia as Nitrogen (mg/kg)	3.49
Bulk Sulfide (mg/L)	365 J
Porewater Sulfide (mg/L)	0.103
Hydrogen Sulfide (mg/L)	0.02

SE-40	
Depth (feet bml)	0-0.33
Wood Waste (%)	0
TOC (%)	1
TVS (%)	2.51
Ammonia as Nitrogen (mg/kg)	0.783
Bulk Sulfide (mg/L)	392 J
Porewater Sulfide (mg/L)	0.202
Hydrogen Sulfide (mg/L)	3.85

SE-39	
Depth (feet bml)	0-0.33
Wood Waste (%)	90
TOC (%)	3.9
TVS (%)	50.1
Ammonia as Nitrogen (mg/kg)	1.16
Bulk Sulfide (mg/L)	2,110 J
Porewater Sulfide (mg/L)	--
Hydrogen Sulfide (mg/L)	0.02

SE-36	
Depth (feet bml)	0-0.33
Wood Waste (%)	10
TOC (%)	1.1
TVS (%)	6.88
Ammonia as Nitrogen (mg/kg)	4.1
Bulk Sulfide (mg/L)	546 J
Porewater Sulfide (mg/L)	0.06 J
Hydrogen Sulfide (mg/L)	3.25

SE-34	
Depth (feet bml)	0-0.33
Wood Waste (%)	5
TOC (%)	1.2
TVS (%)	6.69
Ammonia as Nitrogen (mg/kg)	4.82
Bulk Sulfide (mg/L)	921 J
Porewater Sulfide (mg/L)	0.153
Hydrogen Sulfide (mg/L)	0.01

SE-32	
Depth (feet bml)	0-0.33
Wood Waste (%)	Trace
TOC (%)	1.1
TVS (%)	6.56
Ammonia as Nitrogen (mg/kg)	7.61
Bulk Sulfide (mg/L)	337 J
Porewater Sulfide (mg/L)	0.076
Hydrogen Sulfide (mg/L)	0.0001

SE-33	
Depth (feet bml)	0-0.33
Wood Waste (%)	10
TOC (%)	1.2
TVS (%)	6.45
Ammonia as Nitrogen (mg/kg)	26.4
Bulk Sulfide (mg/L)	473 J
Porewater Sulfide (mg/L)	0.104
Hydrogen Sulfide (mg/L)	4.17

SE-35	
Depth (feet bml)	0-0.33
Wood Waste (%)	Trace
TOC (%)	1.1
TVS (%)	6.68
Ammonia as Nitrogen (mg/kg)	7.45
Bulk Sulfide (mg/L)	447 J
Porewater Sulfide (mg/L)	0.05 U
Hydrogen Sulfide (mg/L)	0.03

SE-37	
Depth (feet bml)	0-0.33
Wood Waste (%)	25
TOC (%)	1.9
TVS (%)	15.2
Ammonia as Nitrogen (mg/kg)	14.2
Bulk Sulfide (mg/L)	204 J
Porewater Sulfide (mg/L)	0.163 J
Hydrogen Sulfide (mg/L)	3.27

Data Sources
Aerial photograph obtained from Esri ArcGIS Online;
parcels obtained from Grays Harbor County.

Notes
Hydrogen sulfide was calculated using
diffusive gradients in thin-films.
% = percent.
-- = not measured.
bml = below mud line.
DGT = diffusive gradients in thin-films.
J = result is estimated.
mg/kg = milligrams per kilogram.
mg/L = milligrams per liter.
TOC = total organic carbon.
TVS = total volatile solids.
U = result is non-detect at reporting limit.

- Sample Location
- Seaport Authority Property

- Legend**
- Former Mill
 - Former Wharf Extension
 - Approximate Ordinary High Water Mark

	Detected result exceeds preliminary cleanup standard, regardless of whether TOC is within standard 0.5 to 3.5 percent range.
	Total organic carbon outside of standard 0.5 to 3.5 percent range.

Figure G-1
Surface Sediment Locations with DGT Samplers and Wood Waste Parameters
Aberdeen, Washington

Figure G-2
DGT Calibration Curve
Grays Harbor Historical Seaport Authority

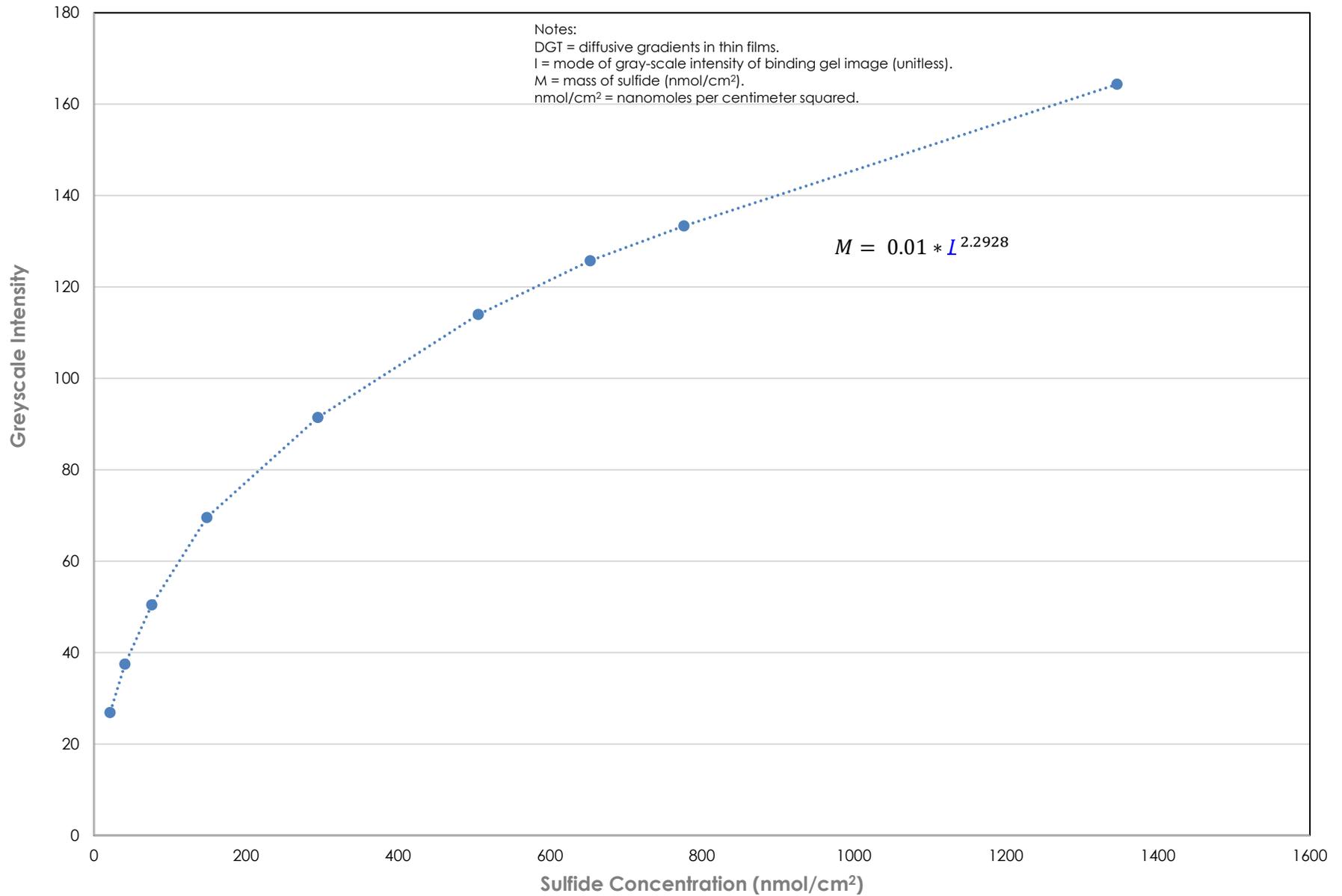


Figure G-3
DGT H₂S vs. Bulk Sediment Sulfide Results
Gravs Harbor Historical Seaport Authority

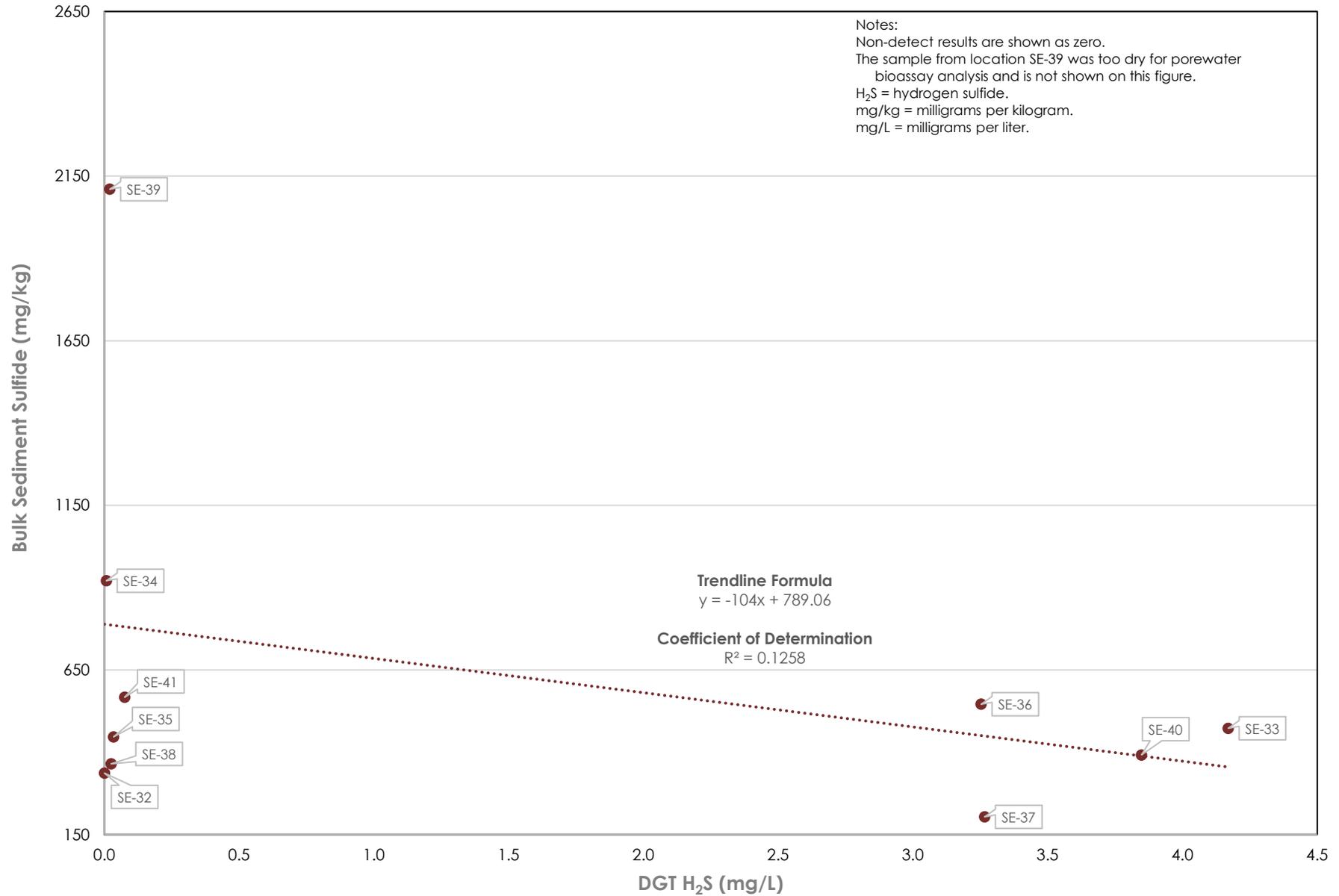
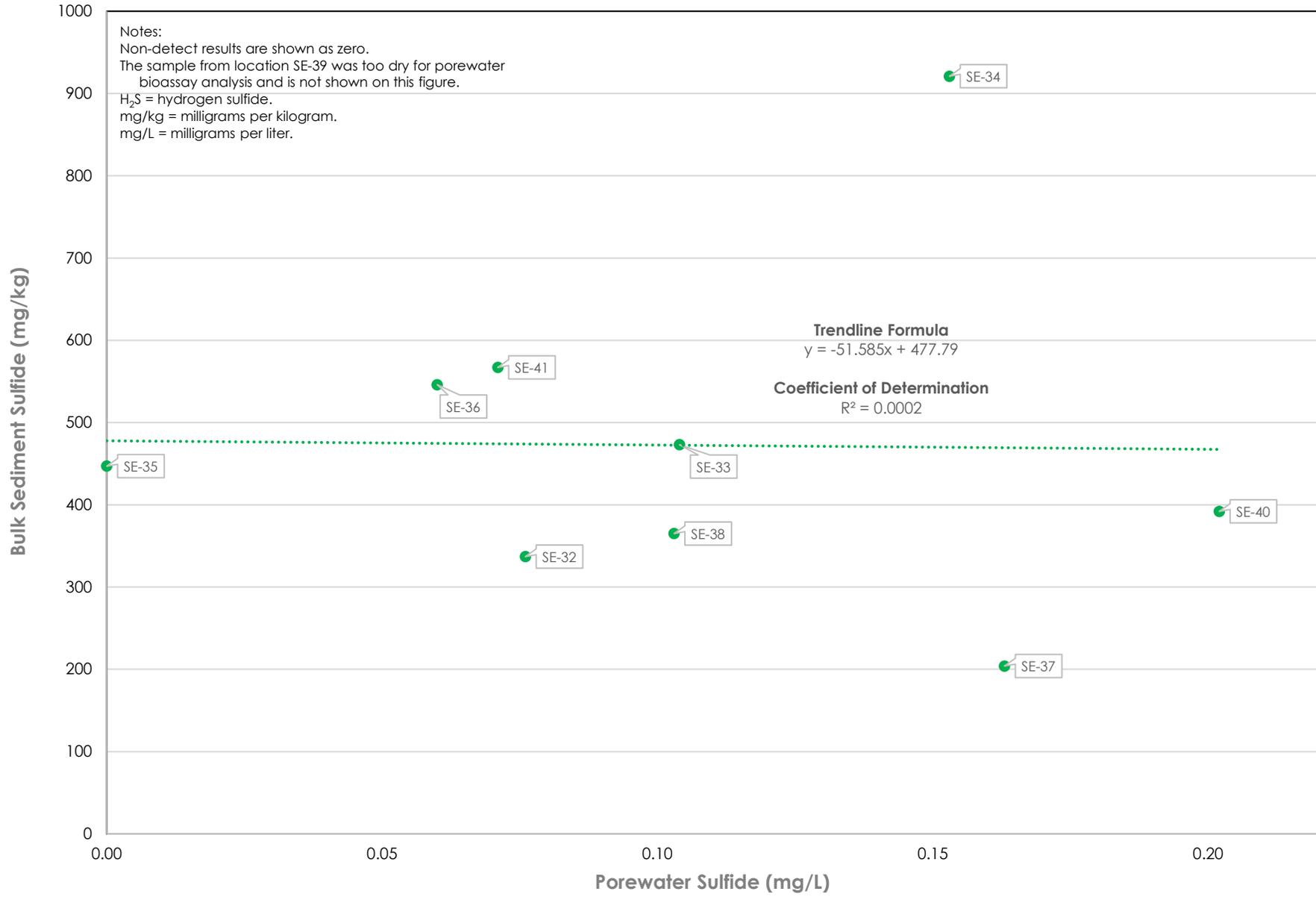


Figure G-4
Porewater Sulfide vs. Bulk Sediment Sulfide Results
Grays Harbor Historical Seaport Authority



**Figure G-5
DGT H₂S vs. TVS Results
Gravs Harbor Historical Seaport Authority**

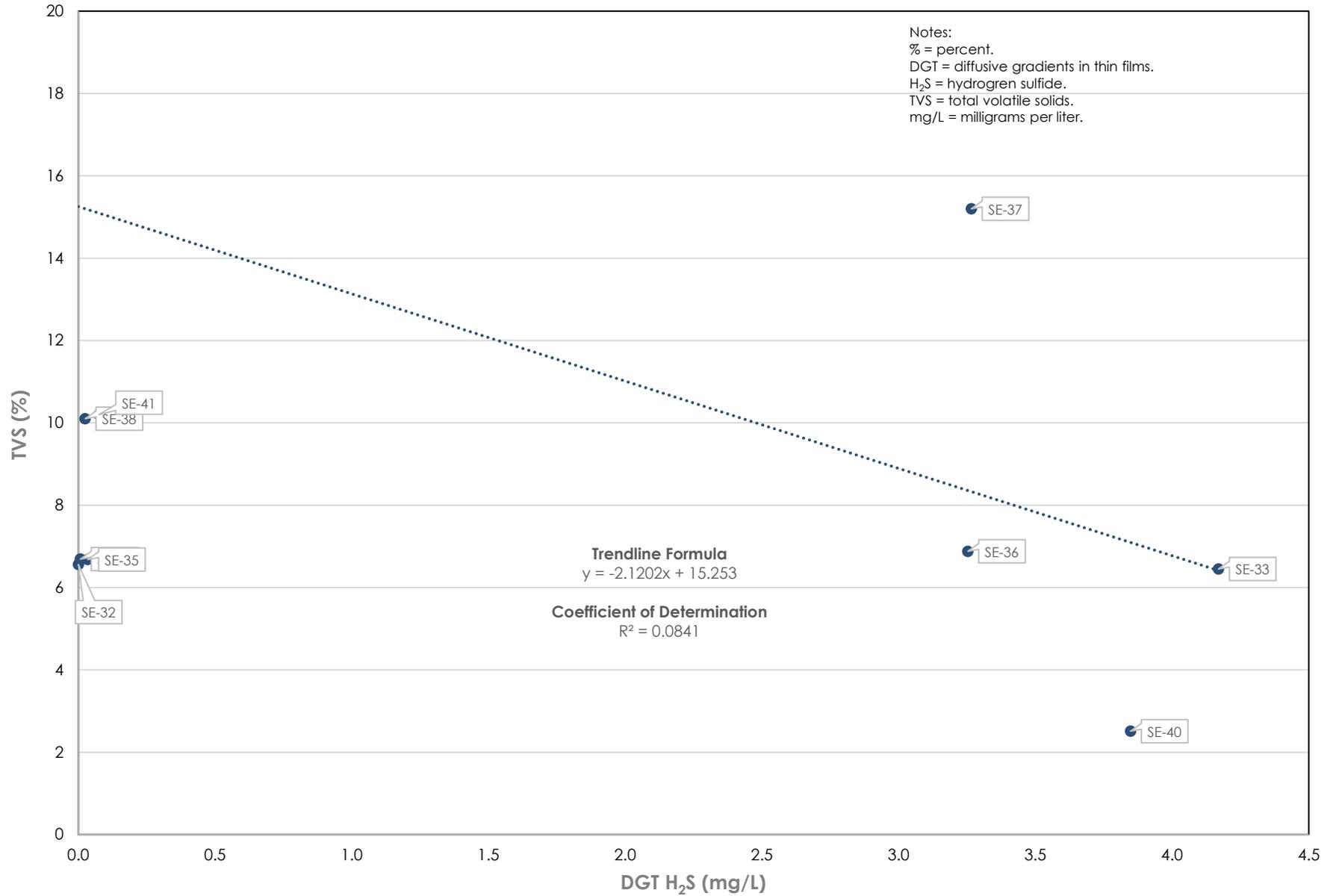


Figure G-6
DGT H₂S vs. TOC Results
Gravs Harbor Historical Seaport Authority

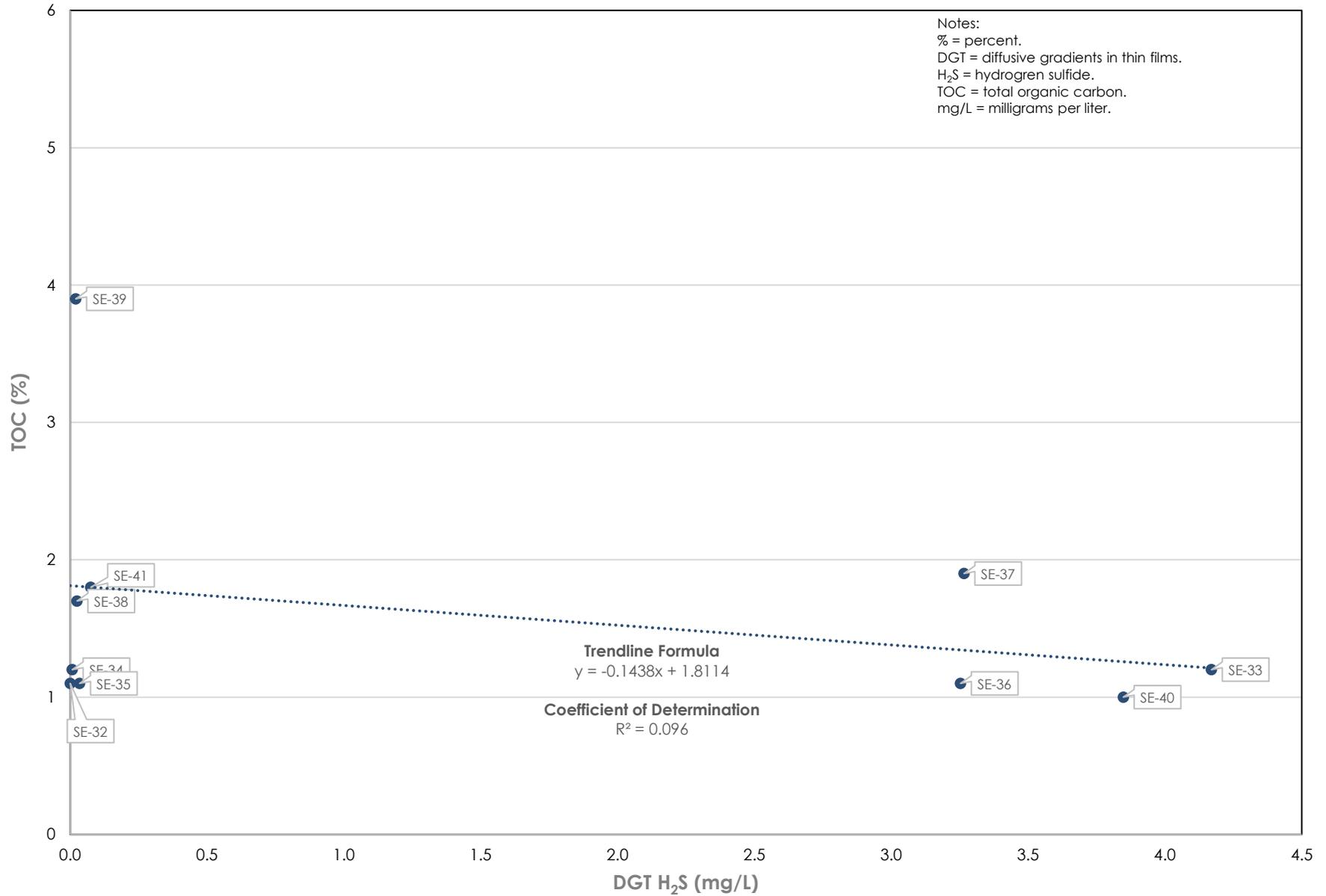


Figure G-7
DGT H₂S vs. Ammonia as Nitrogen Results
Gravs Harbor Historical Seaport Authority

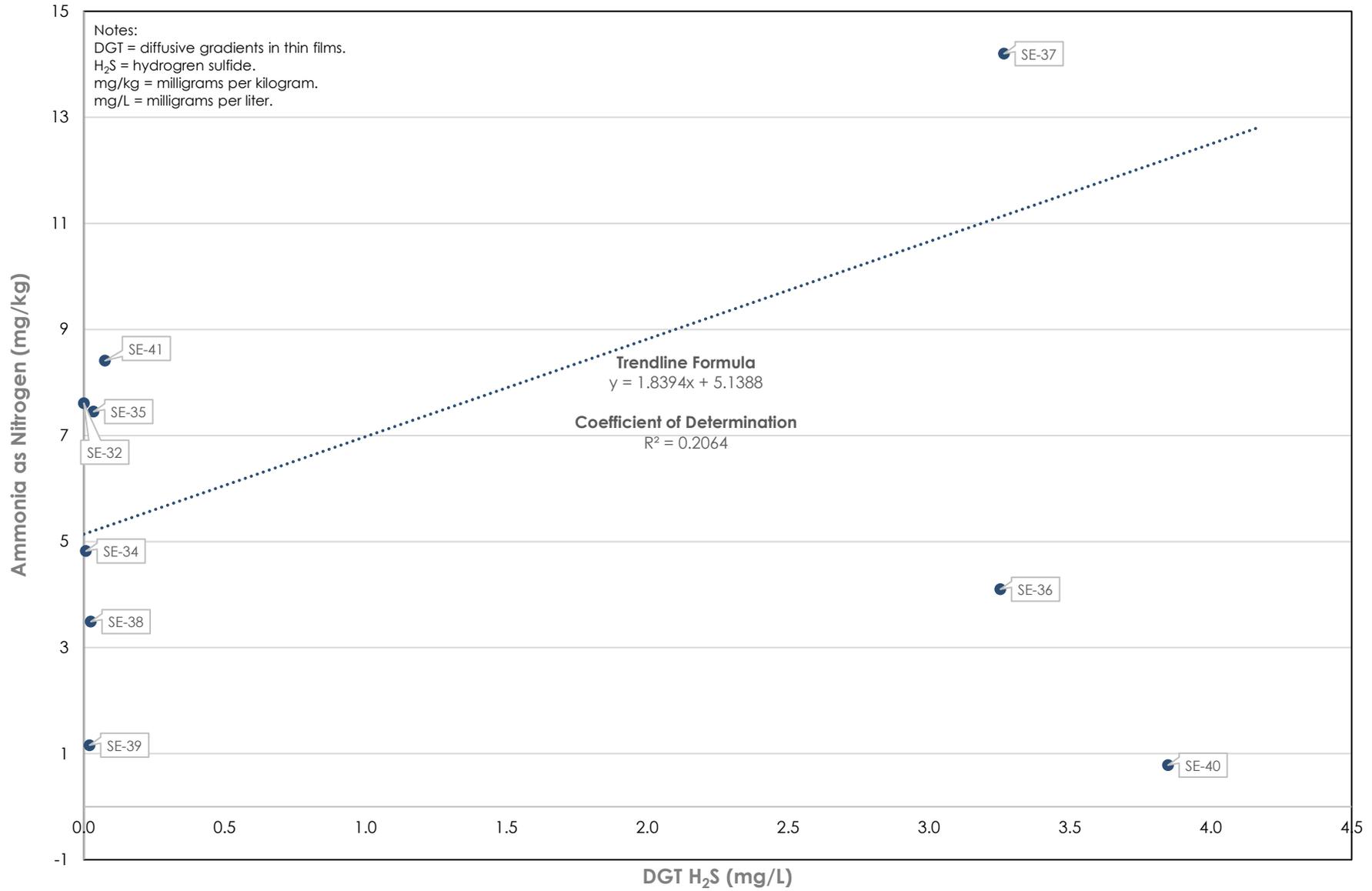
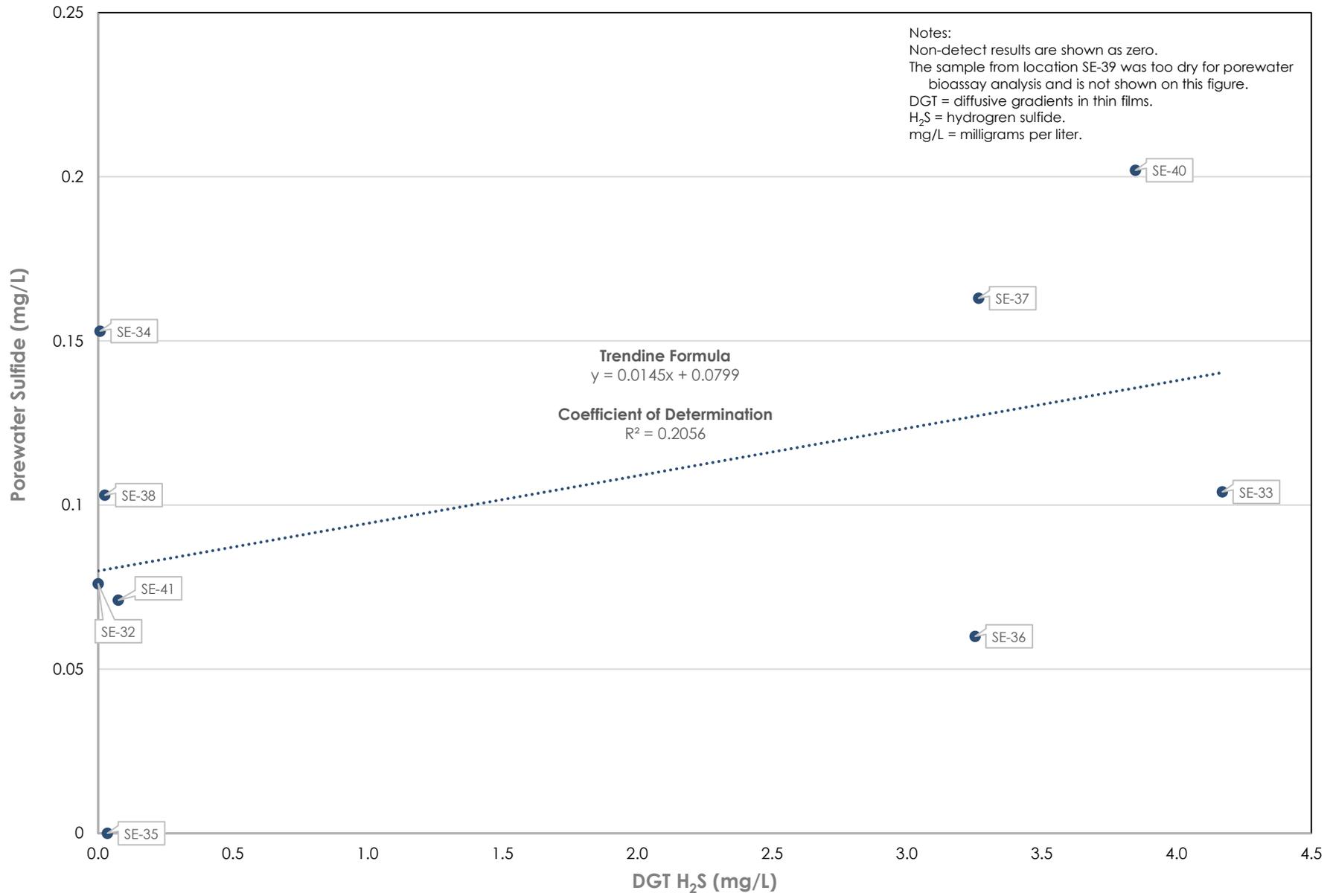


Figure G-8
DGT H₂S vs. Porewater Sulfide Results
Gravs Harbor Historical Seaport Authority



ATTACHMENT A

DGT RESEARCH GUIDANCE

DRAFT



Simple protocol for using AgI DGT probes to measure sulfide in sediments

This is a simple set of instructions. Further [details on sediments deployments](#) and the basis of [sulfide determination from a greyscale image](#) are available.

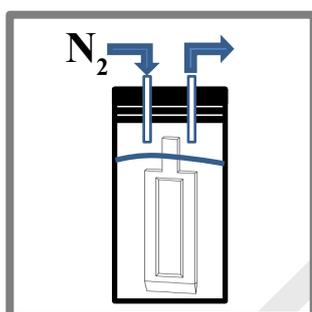
General deployment considerations

Sediments need to be sufficiently fine grained and soft to allow insertion of the probe without tearing the membrane in the exposure window. Biofouling is not a problem for deployments in sediments.

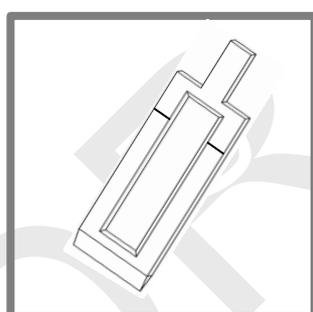
Deploying DGT probes

Deoxygenation?

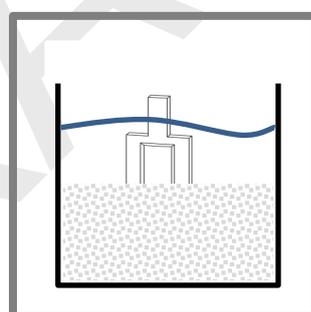
Deoxygenation (Step 1) is optional. Good results can be obtained without it. For the pros and cons of deoxygenation see either FAQs or the more detailed guide for sulfide. If you prefer to deoxygenate follow these brief instructions. Immerse the DGT probe for 24 h in a clean container filled with 0.03 M NaCl solution through which N₂ is steadily bubbled. Seal this container to maintain it oxygen-free for transportation to the deployment site (ideally no more than a few hours).



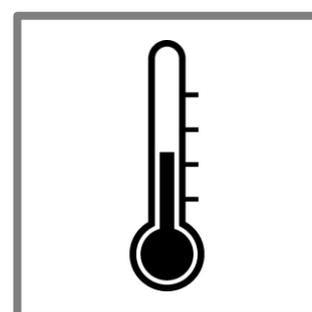
1. If probes are to be deoxygenated include this step, otherwise proceed directly to step 2. Deoxygenated probes must be deployed immediately to minimize air contact. Speed is not critical if deployment is from the plastic bag,



2. Remove the probe from either the oxygen-free container or its supplied plastic bag. Quickly mark the plastic body of the probe (permanent marker) at the intended depth for the sediment-water interface.



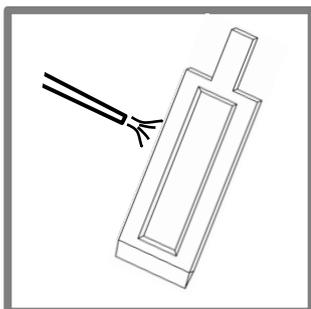
3. As soon as possible (within seconds) of removing the probe from its oxygen-free container or original bag, smoothly push it into the sediment until the mark is in line with the sediment-water interface. Keep the probe as vertical as possible during the insertion.



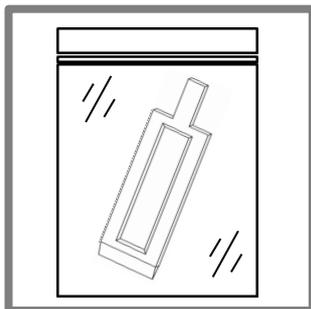
4. Record the temperature of the sediment during the deployment period. A start and end temperature will suffice. Record the deployment time to the nearest minute.

Procedure for analyzing DGT samples

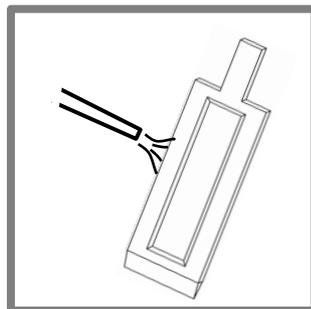
DGT Recovery and Sample Treatment



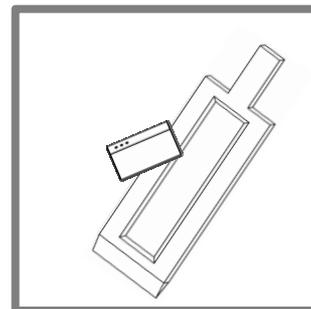
1. After retrieving the DGT probe from the sediment thoroughly rinse it with clean water.



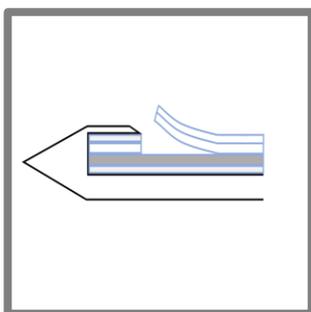
2. Place in a clean plastic bag for storage and transportation back to the lab for sample treatment.



3. Remove from the plastic bag and thoroughly rinse the probe again with clean water.



4. Either disassemble the probe or simply cut the gels and the filter membranes together along the window edges by pushing a razor blade into them in a series of guillotine-like steps.



5. Carefully lift out the four layers together. Please note that there is a backing filter membrane layer at the bottom of the AgI binding gel.



6. Place them on a supporting sheet of fairly thick polythene. Carefully peel of the top membrane filter and clear diffusive gel to reveal the underlying AgI binding gel. Its appearance from light grey-yellow to dark grey reflects the concentration of sulfide in the sediment.

Note If the binding gel appears brown, it is due to freshly precipitated iron oxide. The iron oxide can be removed without affecting any grey coloration by placing the binding gel with underlying support in a solution of 0.01M hydroxylamine hydrochloride for 3 hours. Rinse with water then proceed as given below.

Converting the grey and black appearance of the binding gel to concentration

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Scan

Cover the binding gel with a transparent plastic film (cling film) to prevent dehydration, ensuring that there are no air bubbles between the gel and the plastic film. Place the wet binding gel, complete with polythene supporting sheet, backing filter membrane and plastic film, on a flat bed scanner. Before scanning you need to add some other items to be scanned together. These are: firstly, a supplied moist binding gel that has not been exposed to sulfide; secondly, the ten calibration grey-scale strips. Scan and save the scanned image.

Obtain grey-scale intensity

The grey-scale intensity of the scanned images can be determined using any appropriate software. ImageJ, a versatile, public domain, image processing and analysis software package developed at National Institutes of Health, U.S., has proved to be very effective (downloadable from <http://rsb.info.nih.gov/ij/>). The software allows selection of sub-areas of an image, and measurements of the grey-scale intensity of features in the image. Some notes on using ImageJ are provided in the Appendix to this document.

Sample gels should be blank corrected by subtracting the grey-scale intensity measured on gels that have not been exposed to sulfide. The relation between blank-corrected grey-scale intensity and mass of accumulated sulfide in the AgI gels will be unique to the flatbed scanner that you have used and therefore a calibration must be performed.

Calibrate to quantify sulfide

The supplied set of grey-scale strips enable calibration of the gels exposed to sulfide. They have been calibrated in terms of mass of sulfide per unit area of gel by comparing their grey-scale intensity with those of standard DGT devices exposed to a set of calibrated sulfide standard solutions. The grey-scale intensities of the standards were blank corrected with reference to DGT devices from the same batch that were not exposed to sulfide. The grey-scale intensity of the supplied strips need to be measured with your scanner. Plot the grey-scale intensity values against the sulfide quantity provided (in units of nmol/cm^2) to obtain your unique calibration curve. This calibration is for your particular scanner and it needs to be done only once. It will be a curved line. If the calibration is plotted in Excel, the standard procedure for fitting a trend-line using a power function can be used to fit the curve (see Appendix).

Sensitivity range

The calibration relates the grey-scale intensity to the mass of sulfide accumulated on the binding layer. As, in practice, this mass depends on the deployment time, if sulfide is very high in the sediment, short deployment times can be used to ensure that the grey-scale range is not exceeded. Conversely, long deployment times can be used to increase sensitivity when sulfide concentrations are low. The measurement range is likely to be within 7 to 1200 nmol cm^{-2} . For a 24 hour deployment time, these correspond to pore water sulfide concentrations of 0.5 to 85 $\mu\text{mol L}^{-1}$ (0.1 to 2.7 mg L^{-1}).

Calculate the DGT measured concentration in the sediment

The calibration curve provides the mass per unit area accumulated, M_A , in the deployment time, t (seconds). This can be used to calculate the mean concentration during the deployment time of sulfide in the pore water at the surface of the device, which we call C_{DGT} .

$$C_{\text{DGT}} = M_A \Delta_g / Dt$$

Δ_g (usually 0.094 cm) is the total thickness of the materials in the diffusion layer (diffusive gel and filter membrane).

D ($\text{cm}^2 \text{s}^{-1}$) is the diffusion coefficient of analyte in the material diffusion layer for the deployment temperature (see

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diffusion coefficients). Recommended units to facilitate easy calculation are shown.

Appendix

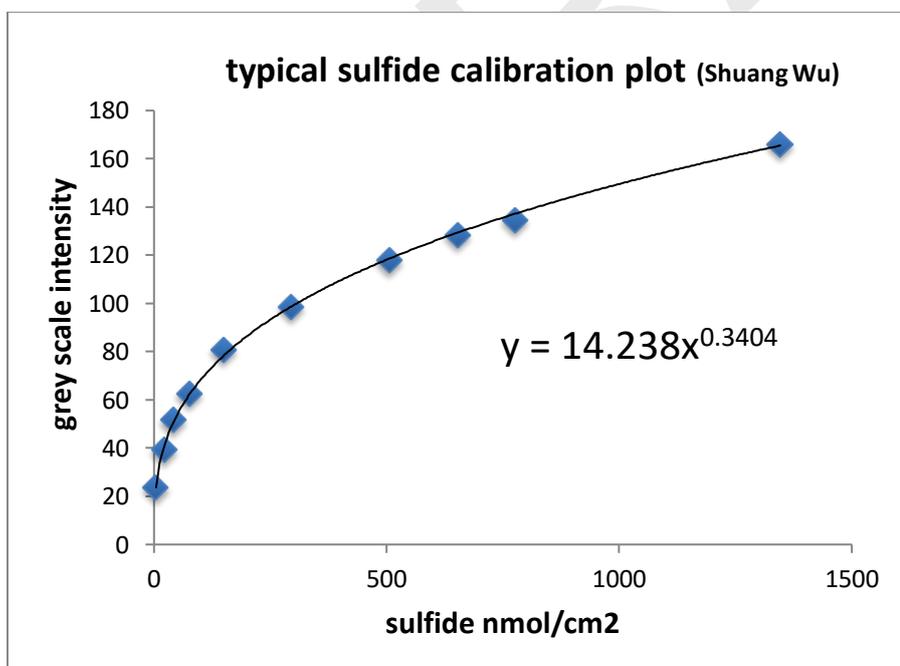
Suggestions for using ImageJ

Before following these instructions we suggest you familiarise yourself with the basic features of the software. Various short tutorials for its use are available on YouTube, among them 'Tutorial ImageJ' and 'Optical Density Using ImageJ'.

- 1) Open your grey-scale image in Image J; select the part you are interested in, adjust the width and length of your image (Image > properties) and invert it (Edit > Invert).
- 2) Transform the image to results, saving the results in Excel (the outcome is a series of grey-scale values, as each pixel of your image has a grey-scale value) (Image > Transform > Image to results).
- 3) Blank correct in Excel by subtracting values obtained for your unexposed devices. Calculate the concentration values from the blank-corrected, grey-scale values in Excel, using the equation from your calibration plot (as in the figure above).
- 4) Import your calculated concentration values into Image J.
- 5) Transform your results to an image (Image > Transform > Results to Image). Now you have a 2D concentration plot. Image J allows you to manipulate this in many ways, for example conversion to a color plot (Image > lookup tables > spectrum) or insertion of a calibration bar (Analyze > Tools > calibration/scale bar).

Example calibration plot

(it is essential that you obtain your own for your chosen scanner)



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ATTACHMENT B

FIELD PHOTOGRAPHS

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PHOTOGRAPHS

Project Name: Weyerhaeuser Sawmill Aberdeen/Seaport Landing
Site: In-Water Remedial Investigation
Project Number: M1044.02.014
Location: 500 N Custer Street, Aberdeen, Washington

Photo No. 1.

Description

Field staff on the bank of the Chehalis River during low tide to deploy diffusive gradients in thin films (DGT) passive sampler, looking northeast.



Photo No. 2.

Description

Field staff near deployed DGT passive sampler equipped with high-visibility tag, looking south.





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PHOTOGRAPHS

Project Name: Weyerhaeuser Sawmill Aberdeen/Seaport Landing
Site: In-Water Remedial Investigation
Project Number: M1044.02.014
Location: 500 N Custer Street, Aberdeen, Washington

Photo No. 3.

Description

Planked woodwaste material in river sediments, looking southeast.



Photo No. 4.

Description

Woodwaste in riverbank sediments upstream of the chip loader, looking northeast.





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PHOTOGRAPHS

Project Name: Weyerhaeuser Sawmill Aberdeen/Seaport Landing
Site: In-Water Remedial Investigation
Project Number: M1044.02.014
Location: 500 N Custer Street, Aberdeen, Washington

Photo No. 5.

Description

Field staff deploying
DGT passive sampler,
looking north.



Photo No. 6.

Description

High-visibility tag with
sample name on DGT
passive sampler.





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PHOTOGRAPHS

Project Name: Weyerhaeuser Sawmill Aberdeen/Seaport Landing
Site: In-Water Remedial Investigation
Project Number: M1044.02.014
Location: 500 N Custer Street, Aberdeen, Washington

Photo No. 7.

Description

DGT sampler post-retrieval, after two tide cycles, prior to filter membrane removal. Note calibration strips.



Photo No. 8.

Description

Representative photograph of discrete sediment sample collected at DGT deployment location. Sample shown was collected at location SE-35.





MAUL
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ALONGI

PHOTOGRAPHS

Project Name: Weyerhaeuser Sawmill Aberdeen/Seaport Landing
Site: In-Water Remedial Investigation
Project Number: M1044.02.014
Location: 500 N Custer Street, Aberdeen, Washington

Photo No. 9.

Description

Field staff collecting in-situ porewater conductivity, temperature, and potential hydrogen measurements.

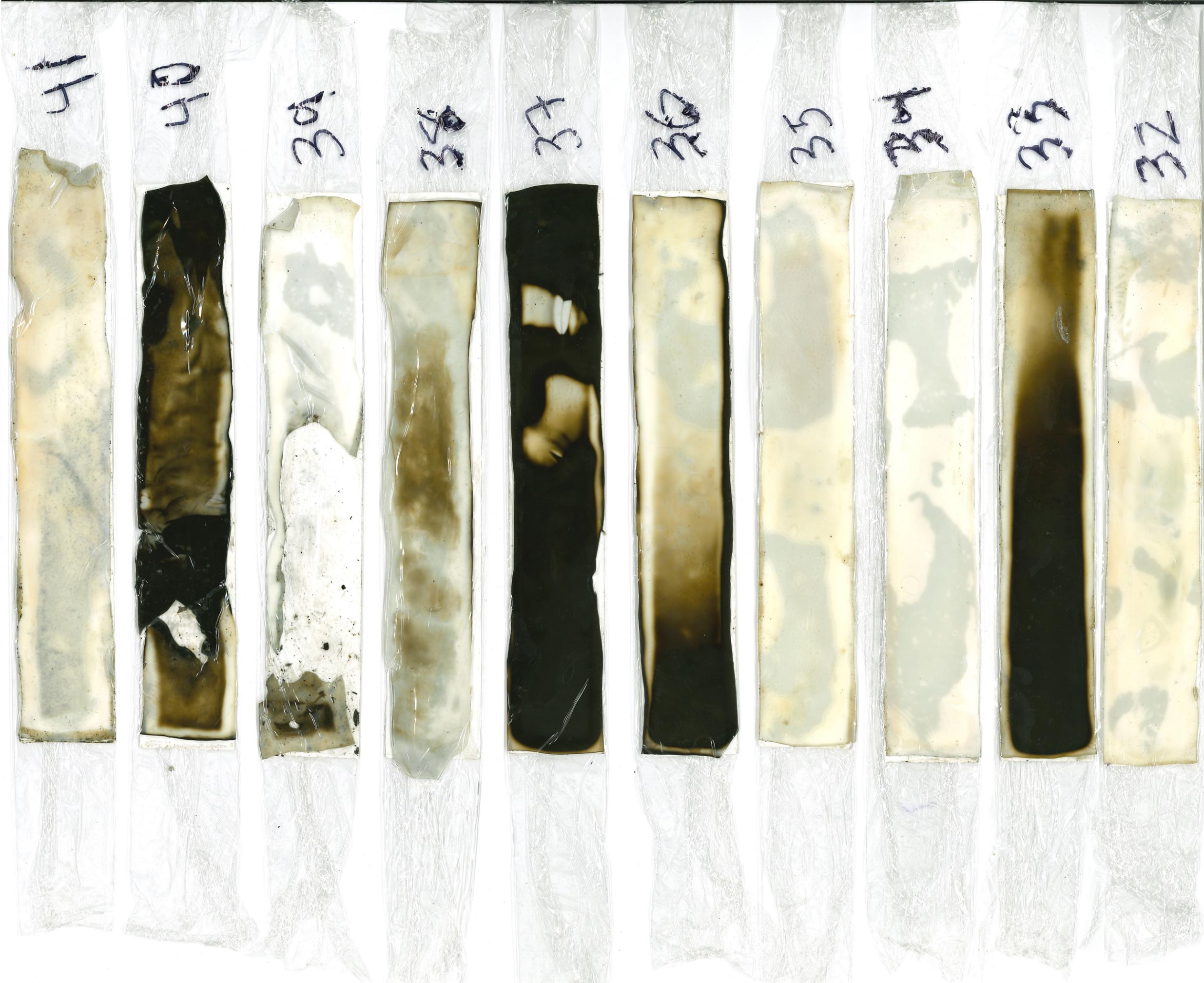


ATTACHMENT C

DGT SCANS

DRAFT

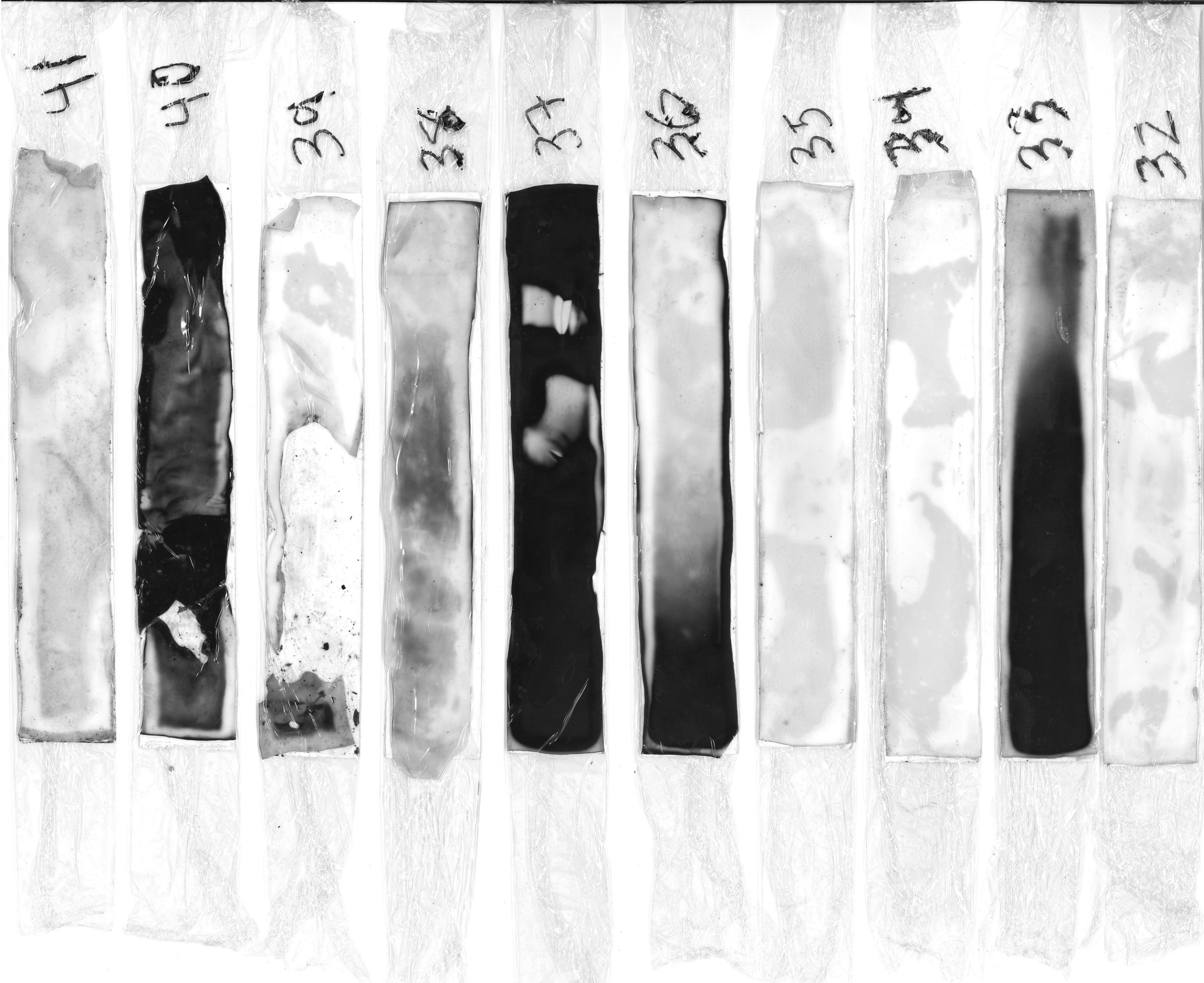




Concentration data for grey-scales

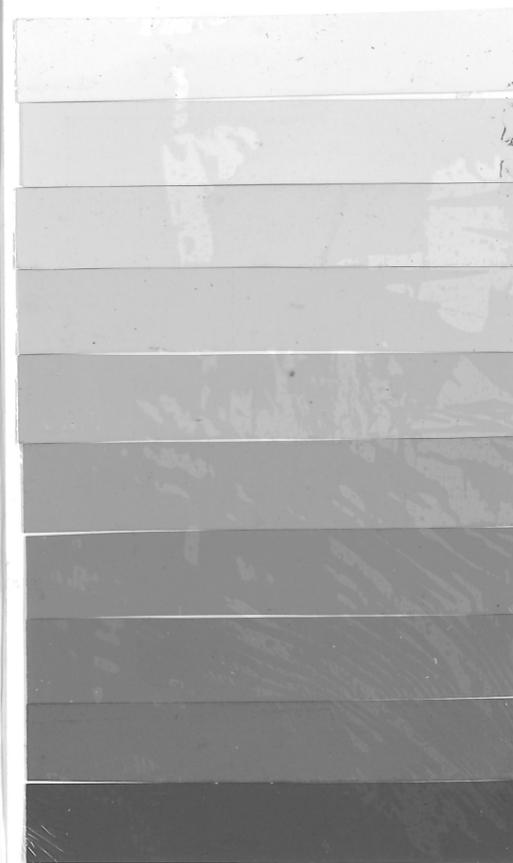
Shade code	Concentration nmol cm ⁻²
2001	4.4
274	21.2
228	40.8
242	76.1
88	148.6
265	294.7
272	505.8
276	653.0
299	776.3
26	1346.3





Concentration data for grey-scales

Shade code	Concentration nmol cm ⁻²
2001	4.4
274	21.2
228	40.8
242	76.1
88	148.6
265	294.7
272	505.8
276	653.0
299	776.3
26	1346.3



ATTACHMENT D
SEDIMENT FIELD SAMPLING DATA SHEETS

DRAFT



Maul Foster & Alongi, Inc.

109 East 13th Street, Vancouver, WA 98660 (360) 694-2691

Sediment Field Sampling Data Sheet

Client Name	Grays Harbor Historical Seaport Authority	Sample Location	SE-32				
Project Number	1044.02.14-02	Sampler	ENH; MVP				
Project Name	Seaport In-Water RI	Sampling Date	07/22/2020				
Sampling Event	July 2020	Sample Name	SE-32				
Sub Area		Sample Depth	0.164				
FSDS QA:	BAJ;01/27/22	Easting		Northing		TOC	

Sample Information

Sampling Method	Sample Type	Sample Category	PID/FID	Sampling Time	Container Code	#
(7) Grab	Sediment	Discrete		9:22:00 AM	2 oz. sediment	
					4 oz. sediment	1
					8 oz. sediment	2
					Other	2
					Total Containers	5

Sample Description:

0-0.2 cm: light brown sediment film
0.2-10 cm: medium brownish gray; 90% fines, low plasticity, 10% sand, fine; trace woody material; no odor.

General Sampling Comments

DGT probe deployed in sediment without black staining. No sulfur-like odor. Sheen visible on water.
DGT Deployment: 7/21/20, 08:30, DGT Retrieval: 7/22/20, 09:24
Porewater Parameters @ retrieval:
pH=7.01, temperature=17.4 degrees C, salinity=7.52ms

Sampling Method Code:

(1) Backhoe, (2) Hand Auger, (3) Drill Bit Cutting Head, (4) Geoprobe, (5) Split Spoon, (6) Shelby Tube, (7) Grab, (8) Other (Specify)

Signature _____

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Sediment Field Sampling Data Sheet

Client Name	Grays Harbor Historical Seaport Authority	Sample Location	SE-33				
Project Number	1044.02.14-02	Sampler	ENH; MVP				
Project Name	Seaport In-Water RI	Sampling Date	07/22/2020				
Sampling Event	July 2020	Sample Name	SE-33				
Sub Area		Sample Depth	0.164				
FSDS QA:	BAJ;01/28/22	Easting		Northing		TOC	

Sample Information

Sampling Method	Sample Type	Sample Category	PID/FID	Sampling Time	Container Code	#
(7) Grab	Sediment	Discrete		9:06:00 AM	2 oz. sediment	
					4 oz. sediment	1
					8 oz. sediment	2
					Other	2
					Total Containers	5

Sample Description:

0-0.2cm: light brown sediment film.
0.2-10cm: dark brownish-gray.
70% fines, low plasticity; 30% sand, fine; rootlets (10%); no odor.

General Sampling Comments

No sulfur odor. No visible seep in vicinity.
DGT Deployment: 7/21/20, 08:15, DGT Retrieval: 7/22/20, 09:37
Porewater Parameters @ retrieval:
pH=6.54, temperature=17.3 degrees C, salinity=5.92ms

Sampling Method Code:

(1) Backhoe, (2) Hand Auger, (3) Drill Bit Cutting Head, (4) Geoprobe, (5) Split Spoon, (6) Shelby Tube, (7) Grab, (8) Other (Specify)

Signature _____

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Sediment Field Sampling Data Sheet

Client Name	Grays Harbor Historical Seaport Authority	Sample Location	SE-34				
Project Number	1044.02.14-02	Sampler	ENH; MVP				
Project Name	Seaport In-Water RI	Sampling Date	07/22/2020				
Sampling Event	July 2020	Sample Name	SE-34				
Sub Area		Sample Depth	0.164				
FSDS QA:	BAJ;01/28/22	Easting		Northing		TOC	

Sample Information

Sampling Method	Sample Type	Sample Category	PID/FID	Sampling Time	Container Code	#
(7) Grab	Sediment	Discrete		8:56:00 AM	2 oz. sediment	
					4 oz. sediment	1
					8 oz. sediment	2
					Other	2
					Total Containers	5

Sample Description:

0-0.2cm: light brown sediment film.
0.2-10cm: dark brownish-gray.
90% fines, low plasticity; 10% sand, fine: wood debris (chunks, twigs) 5%

General Sampling Comments

DGT probe deployed in sediment not near identified seeps. No sulfur-like odor.
DGT Deployment: 7/21/20, 08:06, DGT Retrieval: 7/22/20, 09:42
Porewater Parameters @ retrieval:
pH=6.64, temperature=17.1 degrees C, salinity=8.00ms

Sampling Method Code:

(1) Backhoe, (2) Hand Auger, (3) Drill Bit Cutting Head, (4) Geoprobe, (5) Split Spoon, (6) Shelby Tube, (7) Grab, (8) Other (Specify)

Signature _____

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Sediment Field Sampling Data Sheet

Client Name	Grays Harbor Historical Seaport Authority	Sample Location	SE-35				
Project Number	1044.02.14-02	Sampler	ENH; MVP				
Project Name	Seaport In-Water RI	Sampling Date	07/22/2020				
Sampling Event	July 2020	Sample Name	SE-35				
Sub Area		Sample Depth	0.164				
FSDS QA:	BAJ;01/28/22	Easting		Northing		TOC	

Sample Information

Sampling Method	Sample Type	Sample Category	PID/FID	Sampling Time	Container Code	#
(7) Grab	Sediment	Discrete		8:36:00 AM	2 oz. sediment	
					4 oz. sediment	1
					8 oz. sediment	2
					Other	2
					Total Containers	5

Sample Description:

0-0.2cm: light brown sediment film. 0.2-10cm: grayish brown with dark gray/black and orange redox features throughout. 95% fines, low plasticity; 5% sand, fine; trace rootlets, woody debris (rootlets, chunks).

General Sampling Comments

DGT deployed near black-stained sediment. Sulfur-like odor.
DGT Deployment: 7/21/20, 08:01, DGT Retrieval: 7/22/20, 09:46
Porewater Parameters @ retrieval:
pH=6.73, temperature=16.9 degrees C, salinity=6.36ms

Sampling Method Code:

(1) Backhoe, (2) Hand Auger, (3) Drill Bit Cutting Head, (4) Geoprobe, (5) Split Spoon, (6) Shelby Tube, (7) Grab, (8) Other (Specify)

Signature _____

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109 East 13th Street, Vancouver, WA 98660 (360) 694-2691

Sediment Field Sampling Data Sheet

Client Name	Grays Harbor Historical Seaport Authority	Sample Location	SE-36				
Project Number	1044.02.14-02	Sampler	ENH; MVP				
Project Name	Seaport In-Water RI	Sampling Date	07/22/2020				
Sampling Event	July 2020	Sample Name	SE-36				
Sub Area		Sample Depth	0.164				
FSDS QA:	BAJ;01/28/22	Easting		Northing		TOC	

Sample Information

Sampling Method	Sample Type	Sample Category	PID/FID	Sampling Time	Container Code	#
(7) Grab	Sediment	Discrete		7:56:00 AM	2 oz. sediment	
					4 oz. sediment	1
					8 oz. sediment	2
					Other	4
					Total Containers	7

Sample Description:

0-0.2cm: light brown sediment film.
0.2-10cm: brownish gray with black and reddish-orange redox.
80% fines, low plasticity; 20% sand, fine; twigs (5-10%) and wood chunks.

General Sampling Comments

Strong sulfur-like odor. DGT probe deployed in black-stained sediment.
DGT Deployment: 7/21/20, 07:55, DGT Retrieval: 7/22/20, 07:58
Porewater Parameters @ retrieval:
pH=6.79, temperature=17.6 degrees C, salinity=7.90ms

Sampling Method Code:

(1) Backhoe, (2) Hand Auger, (3) Drill Bit Cutting Head, (4) Geoprobe, (5) Split Spoon, (6) Shelby Tube, (7) Grab, (8) Other (Specify)

Signature _____

Maul Foster & Alongi, Inc.

109 East 13th Street, Vancouver, WA 98660 (360) 694-2691

Sediment Field Sampling Data Sheet

Client Name	Grays Harbor Historical Seaport Authority	Sample Location	SE-37				
Project Number	1044.02.14-02	Sampler	ENH; MVP				
Project Name	Seaport In-Water RI	Sampling Date	07/22/2020				
Sampling Event	July 2020	Sample Name	SE-37				
Sub Area		Sample Depth	0.164				
FSDS QA:	BAJ;01/28/22	Easting		Northing		TOC	

Sample Information

Sampling Method	Sample Type	Sample Category	PID/FID	Sampling Time	Container Code	#
(7) Grab	Sediment	Discrete		10:02:00 AM	2 oz. sediment	
					4 oz. sediment	1
					8 oz. sediment	2
					Other	2
					Total Containers	5

Sample Description:

0-0.2cm: light brown sediment film.
0.2-10cm: dark brownish gray to black.
95% fines, low plasticity; 5% sand, fine; wood waste chunks (25%)

General Sampling Comments

DGT probe deployed in black-stained sediment. No sulfur odor.
DGT Deployment: 7/21/20, 07:48, DGT Retrieval: 7/22/20, 09:54
Porewater Parameters @ retrieval:
pH=6.81, temperature=16.7 degrees C, salinity=7.20ms

Sampling Method Code:

(1) Backhoe, (2) Hand Auger, (3) Drill Bit Cutting Head, (4) Geoprobe, (5) Split Spoon, (6) Shelby Tube, (7) Grab, (8) Other (Specify)

Signature _____

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Sediment Field Sampling Data Sheet

Client Name	Grays Harbor Historical Seaport Authority	Sample Location	SE-38				
Project Number	1044.02.14-02	Sampler	ENH; MVP				
Project Name	Seaport In-Water RI	Sampling Date	07/22/2020				
Sampling Event	July 2020	Sample Name	SE-38				
Sub Area		Sample Depth	0.164				
FSDS QA:	BAJ;01/28/22	Easting		Northing		TOC	

Sample Information

Sampling Method	Sample Type	Sample Category	PID/FID	Sampling Time	Container Code	#
(7) Grab	Sediment	Discrete		10:16:00 AM	2 oz. sediment	
					4 oz. sediment	1
					8 oz. sediment	2
					Other	2
					Total Containers	5

Sample Description:

0-0.2cm: light brown sediment film. 0.2-10cm: dark brownish gray.
85% fines, low plasticity; 15% sand, fine to medium; woodwaste (chips, chunks, sawdust) 50%. Strong sulfur odor.

General Sampling Comments

Sulfur odor.
DGT Deployment: 7/21/20, 07:41, DGT Retrieval: 7/22/20, 10:14
Porewater Parameters @ retrieval:
pH=7.38, temperature=16.8 degrees C, salinity=7.97ms

Sampling Method Code:

(1) Backhoe, (2) Hand Auger, (3) Drill Bit Cutting Head, (4) Geoprobe, (5) Split Spoon, (6) Shelby Tube, (7) Grab, (8) Other (Specify)

Signature _____

Maul Foster & Alongi, Inc.

109 East 13th Street, Vancouver, WA 98660 (360) 694-2691

Sediment Field Sampling Data Sheet

Client Name	Grays Harbor Historical Seaport Authority	Sample Location	SE-39				
Project Number	1044.02.14-02	Sampler	ENH; MVP				
Project Name	Seaport In-Water RI	Sampling Date	07/22/2020				
Sampling Event	July 2020	Sample Name	SE-39				
Sub Area		Sample Depth	0.164				
FSDS QA:	BAJ;01/28/22	Easting		Northing		TOC	

Sample Information

Sampling Method	Sample Type	Sample Category	PID/FID	Sampling Time	Container Code	#
(7) Grab	Sediment	Discrete		9:56:00 AM	2 oz. sediment	
					4 oz. sediment	1
					8 oz. sediment	2
					Other	2
					Total Containers	5

Sample Description:

0-3cm: orangey-red.
3-10: dark brownish-gray.
90% wood waste (chunks, chips, twigs, rootlets); 5% fines; 5% sand, fine.

General Sampling Comments

Area was not inundated at high tide.
DGT Deployment: 7/21/20, 09:24, DGT Retrieval: 7/22/20, 10:26
Porewater Parameters @ retrieval:
pH=6.45, temperature=19.6 degrees C, salinity=6.27ms

Sampling Method Code:

(1) Backhoe, (2) Hand Auger, (3) Drill Bit Cutting Head, (4) Geoprobe, (5) Split Spoon, (6) Shelby Tube, (7) Grab, (8) Other (Specify)

Signature _____

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109 East 13th Street, Vancouver, WA 98660 (360) 694-2691

Sediment Field Sampling Data Sheet

Client Name	Grays Harbor Historical Seaport Authority	Sample Location	SE-40				
Project Number	1044.02.14-02	Sampler	ENH; MVP				
Project Name	Seaport In-Water RI	Sampling Date	07/22/2020				
Sampling Event	July 2020	Sample Name	SE-40				
Sub Area		Sample Depth	0.164				
FSDS QA:	BAJ;01/28/22	Easting		Northing		TOC	

Sample Information

Sampling Method	Sample Type	Sample Category	PID/FID	Sampling Time	Container Code	#
(7) Grab	Sediment	Discrete		7:16:00 AM	2 oz. sediment	
					4 oz. sediment	1
					8 oz. sediment	2
					Other	2
					Total Containers	5

Sample Description:

Black; 15% fines, 15% sand, 70% gravel, fine to medium, subangular to subrounded; black and white bacteria coating grains; sulfur odor.

General Sampling Comments

Seep groundwater. Plentiful white bacteria and black material. Gravelly substrate. DGT Deployment: 7/21/20, 09:06, DGT Retrieval: 7/22/20, 07:12
Porewater Parameters @ retrieval:
pH=6.74, temperature=16.5 degrees C, salinity=17.91ms

Sampling Method Code:

(1) Backhoe, (2) Hand Auger, (3) Drill Bit Cutting Head, (4) Geoprobe, (5) Split Spoon, (6) Shelby Tube, (7) Grab, (8) Other (Specify)

Signature _____

Maul Foster & Alongi, Inc.

109 East 13th Street, Vancouver, WA 98660 (360) 694-2691

Sediment Field Sampling Data Sheet

Client Name	Grays Harbor Historical Seaport Authority	Sample Location	SE-41				
Project Number	1044.02.14-02	Sampler	ENH; MVP				
Project Name	Seaport In-Water RI	Sampling Date	07/22/2020				
Sampling Event	July 2020	Sample Name	SE-41				
Sub Area		Sample Depth	0.164				
FSDS QA:	BAJ;01/28/22	Easting		Northing		TOC	

Sample Information

Sampling Method	Sample Type	Sample Category	PID/FID	Sampling Time	Container Code	#
(7) Grab	Sediment	Discrete		7:26:00 AM	2 oz. sediment	
					4 oz. sediment	1
					8 oz. sediment	2
					Other	2
					Total Containers	5

Sample Description:

0-0.2cm: light brown sediment film. 0.2-10cm: grayish-brown with red redox features throughout. 90% fines, low plasticity; 10% sand, fine; trace gravel, twigs, wood chunks (20%). Sulfur odor.

General Sampling Comments

DGT probe deployed in sediment. Faint sulfur-like odor.
DGT Deployment: 7/21/20, 09:16, DGT Retrieval: 7/22/20, 07:00
Porewater Parameters @ retrieval:
pH=6.86, temperature=17.6 degrees C, salinity=10.29ms

Sampling Method Code:

(1) Backhoe, (2) Hand Auger, (3) Drill Bit Cutting Head, (4) Geoprobe, (5) Split Spoon, (6) Shelby Tube, (7) Grab, (8) Other (Specify)

Signature _____

APPENDIX H
WOOD WASTE CLEANUP LEVEL DEVELOPMENT
TECHNICAL MEMORANDUM



Puget Sound, Washington for control testing. The reference sediment samples were tested concurrently with each bioassay to estimate non-treatment effects due to grain size. The organisms were cultured to appropriate conditions and introduced to sediment in glass chambers. Some chambers contained sediment from the Site, while others contained control sediments. At the end of the bioassay period, the sediments were sieved from the chambers, allowing each type of organism to be enumerated and studied. Mean mortality (percent), mean number normal, mean dry weight (milligrams per individual per day [mg/ind/day]), and/or mean ash-free dry weight (mg/ind/day) of the organisms were recorded, depending on the bioassay specifications. All reference sediments were analyzed for TVS, TOC, ammonia, and total porewater sulfides. Six of the eight bioassay samples passed the Sediment Cleanup Objective (SCO) larval bioassay test, as shown on Table H-1.

Co-located samples were analyzed for contaminants of concern associated with the Site to evaluate if non-wood waste-related factors were contributing to benthic mortality (see Table H-2). Of the eight bioassay samples, the two samples with failing results (i.e., SE-24 and SE-26) had the highest concentrations of total polychlorinated biphenyls and higher concentrations of carcinogenic polycyclic aromatic hydrocarbons. With these exceptions, sediment from the bioassay sample locations generally contained chemical concentrations below the Sediment Management Standards criteria; therefore, bioassay results do not appear to be impacted by chemical contaminants.

WOOD WASTE PARAMETERS

Total Organic Carbon

TOC was analyzed by U.S. Environmental Protection Agency (EPA) Method 9060A-modified. TOC analysis quantifies all carbon, including that in wood waste, in the sample. TOC was detected in all eight samples from 1.5 to 13 percent volume. As shown on Table H-1 and Figure H-2, bioassay samples that failed the SCO larval test contained between 7.8 and 13 percent TOC. Bioassay samples that passed contained between 1.5 and 6.6 percent TOC. Bioassay failures at a distinctly higher range of TOC (see Figure H-2) indicate elevated TOC and bioassay results are strongly correlated. Therefore, TOC is included as a component of the proposed site-specific wood waste cleanup level.

Total Volatile Solids

TVS was analyzed by Standard Methods for the Examination of Water and Wastewater (SM) 2540 G. TVS are the fraction of total solids that are lost on ignition at a higher temperature than that used to determine total solids. TVS can be used as a crude estimate of the amount of organic matter in total solids (Tetra Tech, 1986). TVS was detected in all eight samples from 5.35 to 18.9 percent volume. As shown on Table H-1 and Figure H-3, bioassay samples that failed the SCO larval test contained between 18.4 and 18.9 percent TVS. Bioassay samples that passed contained between 1.35 and 14.4 percent TVS. Bioassay failures at a distinctly higher range of TVS (see Figure H-3) indicate elevated TVS and bioassay results are strongly correlated. Therefore, TVS is included as a component of the proposed site-specific wood waste cleanup level.

Total Porewater Sulfides

Anoxic decomposition of wood waste produces hydrogen sulfide, a hazardous substance that is toxic to benthic organisms, fish, and eelgrass when present in excess amounts (Podger, 2013). Total porewater sulfides were extracted from bioassay sediment samples by centrifuge and analyzed by Method SM 4500-S2 D-00. Porewater sulfides were detected in three of the five analyzed samples, with detections ranging from 0.06 to 0.12 milligrams per liter (mg/L). As shown on Table H-1 and Figure H-4, bioassay samples that failed the SCO larval test contained porewater sulfide concentrations between 0.10 and 0.12 mg/L. Bioassay samples that passed were either non-detect with a reporting limit of 0.05 mg/L or detected at 0.06 mg/L.

Porewater sulfides appear to be well correlated with bioassay results (see Figure H-4); however, there is uncertainty associated with sulfide sampling methods. To analyze porewater sulfides, the laboratory places sediment in a centrifuge to extract porewater. Biological receptors would likely only contact a fraction of the extracted porewater in sediment (i.e., centrifuged porewater may overestimate the bioavailable portion). Additionally, porewater sulfides are likely not representative of field conditions, as they represent sulfide concentrations in sediment at one point in time, when sulfide concentrations vary significantly over time in the tidally influenced estuarine study area. Therefore, porewater sulfides are not included in our proposed site-specific wood waste cleanup level. Other sulfide sampling methods, including bulk sediment sulfides and diffusive gradients in thin films (DGT) passive sulfide samplers, also have associated uncertainty. Unlike bulk sediment sulfides and porewater sulfides that were collected during a single sampling event representing a single tide cycle, DGT samplers were deployed over two tide cycles to capture sulfide variations over time. Due to various factors contributing to uncertainty of DGT sulfide measurements (i.e., color uniformity, iron oxide precipitate on gels, and in-situ pH and conductivity), DGT sampling is not considered a reliable predictor of bioavailable hydrogen sulfide and benthic toxicity at the Site (also see Appendix G to the RI). DGT results were therefore not incorporated in the evaluation of a proposed site-specific wood waste cleanup level.

Porewater sulfides are well correlated with TOC and TVS (see Figure H-5 and H-6, respectively). By incorporating these parameters into the evaluation of a proposed site-specific wood waste cleanup level, the associated effects to benthic toxicity from porewater sulfides are accounted for.

Ammonia

Microbial metabolism of wood waste results in ammonia production, which can be toxic to benthic organisms (Ecology, 2013). Ammonia was detected in all eight samples from 3.48 to 12.9 milligrams per kilogram (mg/kg). As shown on Table H-1 and Figure H-7, bioassay samples that failed the SCO larval test contained between 3.48 and 9.49 mg/kg of ammonia. Bioassay samples that passed contained between 3.9 and 12.9 mg/kg of ammonia. Ammonia does not appear to correlate to bioassay results. Excess ammonia is harmful to benthic organisms, yet samples containing higher ammonia concentrations passed the bioassay testing (see Figure H-7). Therefore, ammonia is not included as a component of the proposed site-specific wood waste cleanup level.

Percent Wood waste

MFA field staff estimated wood waste percentages in the field. As shown on Table H-1 and Figure H-8, bioassay samples that failed the SCO larval test contained between 25 and 80 percent wood waste. Bioassay samples that passed contained between 0 and 35 percent wood waste. Wood waste percentages also correlate with TOC (Figure H-9), TVS (Figure H-10), and porewater sulfides (Figure H-11). Bulk sulfide (Figure H-12) and ammonia (Figure H-13) do not correlate well with wood waste percentage and bioassay failures (see discussion above). Because wood waste percentages correlate with the bioassay results, wood waste percent is included as a component of the recommended site-specific wood waste cleanup level.

TVS/TOC Ratio

Ecology wood waste guidance identifies the ratio of TVS to TOC as a potential proxy for toxicity, with increasing TVS/TOC ratio correlating to higher toxicity, and a ratio approaching 2 indicating high toxicity (Ecology, 2013). Ecology does note that this is a general trend observation and may not be applicable in all site-specific scenarios. MFA compared TVS/TOC data to bioassay results (see Figure H-14) and plotted TOC against TVS to evaluate the site-specific trends (see Figure H-15). Five of the six samples that passed the SCO larval test contained TVS/TOC ratios above 2. Of the two failing bioassay samples, one had a TVS/TOC ratio of 1.42, and the other had a ratio of 2.42. Therefore, it does not appear that the TVS/TOC ratio is an appropriate measure of toxicity at the Site.

DISCUSSION

Based on the relationship between the wood waste parameters and bioassay test results from site samples, MFA recommends incorporating TOC, TVS, and wood waste percent into the site-specific wood waste cleanup level. Wood waste scoring is intended to be used as a guide for wood waste compliance and individual site-specific wood waste cleanup level exceedances will be discussed with Ecology. Points will be assigned based on parameter ranges and summed to assess compliance with the site-specific wood waste cleanup level. Parameter ranges and associated scoring are presented in the table below.

Parameter	0 Point Range	1 Point Range	2 Point Range
TOC (%)	< 6	6 - 7	> 7
TVS (%)	< 14	14 - 16	> 16
Wood Waste (% Volume)	< 25	25 - <50	≥ 50

NOTES:

Based on parameter ranges, locations are awarded either zero (0), one (1), or two (2) points. If the total points for a sample location equal or exceed two (2), the sample is not in compliance with the wood waste cleanup level. The point of compliance is the top 10 centimeters below mudline.
% = percent.
> = greater than.
< = less than.

MFA compiled Ecology-approved site-specific wood waste cleanup levels developed for other sites (Ecology, 2013) and confirmed that the proposed the parameter ranges and scoring align (see Table H-3). At these sites wood waste percentages that required cleanup ranged from 25 percent (Scott Paper Mill Site) to 50 percent (Hylebos Waterway and Barbee Mill Sites). These percentages are consistent with the equal to or greater than 50 percent value proposed for the Site. This site-specific wood waste cleanup level, which incorporates three parameters using the above scoring matrix, will be used in conjunction with the cleanup standards proposed in the in-water remedial investigation report, of which this memorandum is an appendix, to delineate the extent of impacts to sediments at the Site.

REFERENCES

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GeoEngineers. 2018. Draft final remedial investigation report, Anacortes Port Log Yard, Anacortes, Washington, Ecology Agreed Order no. DE 10630. Prepared for the Washington State Department of Ecology on behalf of Port of Anacortes. GeoEngineers, Inc. Seattle, Washington. June.

Podger, D. 2013. Sulfide effects on aquatic organisms. literature review.

Tetra Tech. 1986. Recommended protocols for measuring conventional sediment variables in Puget Sound. Final report. Prepared for the U.S. Environmental Protection Agency and the U.S. Army Corps of Engineers, Seattle, Washington. Prepared by Tetra Tech, Inc. March.

LIMITATIONS

The services undertaken in completing this memorandum were performed consistent with generally accepted professional consulting principles and practices. No other warranty, express or implied, is made. These services were performed consistent with our agreement with our client. This memorandum is solely for the use and information of our client unless otherwise noted. Any reliance on this memorandum by a third party is at such party's sole risk.

Opinions and recommendations contained in this memorandum apply to conditions existing when services were performed and are intended only for the client, purposes, locations, time frames, and project parameters indicated. We are not responsible for the impacts of any changes in environmental standards, practices, or regulations subsequent to performance of services. We do not warrant the accuracy of information supplied by others, or the use of segregated portions of this memorandum.

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TABLES



**Table H-1
Bioassay Analytical Results
Weyerhaeuser Sawmill Aberdeen/Seaport Landing Site**



Location	SE-15	SE-16	SE-17	SE-18	SE-20	SE-24	SE-26	SE-31
Sample Name	SE-15-0-0.33	SE-16-0-0.33	SE-17-0-0.33	SE-18-0-0.33	SE-20-0-0.33	SE-24-0-0.33	SE-26-0-0.33	SE-31-0-0.33
Collection Date	09/27/2019	09/27/2019	09/27/2019	09/27/2019	09/25/2019	09/27/2019	09/27/2019	09/27/2019
Collection Depth (ft bml)	0-0.33	0-0.33	0-0.33	0-0.33	0-0.33	0-0.33	0-0.33	0-0.33
Percent Woodwaste	30	Trace	0	5	0	25	80	35
Conventional Parameters								
Total Organic Carbon (%)	4.7	1.5	2.3	1.7	6.6	7.8	13	2.1
Total Solids (%)	43.4	52.9	43.3	46.3	36.8	35.5 J	42.4	48.8
Total Volatile Solids (%)	14.4	5.35	6.8	6.06	12.7	18.9 J	18.4	8.8
Ammonia as Nitrogen (mg/kg)	5.75	8.43	10.7	12.9	3.9	9.49	3.48	7.98
Pore Water Sulfide (mg/L)								
Sulfide	--	0.05 U	--	0.05 U	0.06 J	0.10	0.12	--
Summary of Bioassay Results^(a)								
SCO	Amphipod	Pass						
	Polychaete	Pass						
	Larval	Pass	Pass	Pass	Pass	Pass	Fail	Fail
CSL	Amphipod	Pass						
	Polychaete	Pass						
	Larval	Pass	Pass	Pass	Pass	Pass	Fail	Pass
Notes								
-- = not analyzed.								
Bold indicates values equal to or greater than the lowest available dissolved sulfides toxicity value (0.1 mg/L) provided in Podger (2013): <i>Sulfide Effects on Aquatic Organisms</i>								
Gray shading indicates total organic carbon results outside the 0.5-3.5% range.								
Orange shading indicates failure of bioassay test.								
% = percent.								
CSL = cleanup screening level.								
ft bml = feet below mudline.								
J = result is an estimated value.								
mg/kg = milligrams per kilogram.								
mg/L = milligrams per liter.								
RI = remedial investigation.								
SCO = sediment cleanup objective.								
U = result is non-detect at reporting limit.								
^(a) Bioassay results adapted from table 5-1 of <i>Bioassay Testing Results; Sediment Quality Analysis: Seaport Landing Site, Aberdeen Washington January 8, 2020</i> report prepared by EcoAnalysts, Inc. Pass/fail performance criteria are provided in the report.								

Table H-2
Chemical Analytical Results
Weyerhaeuser Sawmill Aberdeen/Seaport Landing Site

Location:	SCO for Protection of Benthic Organisms ⁽¹⁾		SSL for Protection of Human Health and Higher Trophic Level Ecological Receptors ^(c)	SE-15	SE-16	SE-17	SE-18	SE-20	SE-24	SE-26	SE-31
Sample Name:				SE-15-0-0.33	SE-16-0-0.33	SE-17-0-0.33	SE-18-0-0.33	SE-20-0-0.33	SE-24-0-0.33	SE-26-0-0.33	SE-31-0-0.33
Collection Date:				09/27/2019	09/27/2019	09/27/2019	09/27/2019	09/25/2019	09/27/2019	09/27/2019	09/27/2019
Collection Depth (ft bml):				0-0.33	0-0.33	0-0.33	0-0.33	0-0.33	0-0.33	0-0.33	0-0.33
Type:				Surface							
Percent Woodwaste:				30	Trace	0	5	0	25	80	35
TOC:			Outside	Inside	Inside	Inside	Outside	Outside	Outside	Inside	
Conventional Parameters											
Total Organic Carbon (%)	NV	NV	NV	4.7	1.5	2.3	1.7	6.6	7.8	13	2.1
Total Solids (%)	NV	NV	NV	43.4	52.9	43.3	46.3	36.8	35.5 J	42.4	48.8
Total Volatile Solids (%)	NV	NV	NV	14.4	5.35	6.8	6.06	12.7	18.9 J	18.4	8.8
Ammonia as Nitrogen (mg/kg)	230	230	NV	5.75	8.43	10.7	12.9	3.9	9.49	3.48	7.98
Grain Size (%)											
Clay	NV	NV	NV	11.2	15.4	24.1	17.4	26.6	8.3	7.1	15.9
Silt	NV	NV	NV	42.4	42.4	56.9	43.8	58.5	39.2	20.7	36.6
Sand	NV	NV	NV	21	41.8	18.5	38.8	9.74	14.3	37.2	44.4
Gravel	NV	NV	NV	25.4	0.39	0.55	0.02	5.18	38.2	35	2.99
Metals (mg/kg-dry)											
Arsenic	14	14	11	6.2	4.91	7.09	5.93	7.96	8.26	5.11	6.07
Cadmium	2.1	2.1	0.8	0.175 J	0.143 J	0.151 J	0.169 J	0.239 J	0.216 J	0.119 U	0.165 J
Chromium	72	72	NV	32	32.2	36.1	34.5	32.9	40	25.7	34.7
Copper	390	390	NV	49.8	52	57.3	62.1	64.6	73.7	81.9	61.4
Lead	360	360	NV	7.52	6.35	8.21	7.28	11.7	32.9	30.4	7.94
Mercury	0.41	0.41	0.2	0.0402 J	0.0244 J	0.045 J	0.0386 J	0.069	0.111	0.104	0.0443 J
Nickel	26	26	NV	21.8	26.1	27.2	30.1	25.4	40.2	26	30.2
Selenium	11	11	NV	0.714 J	0.725 J	0.867 J	0.86 J	0.941 J	0.797 J	0.593 U	0.845 J
Silver	0.57	0.57	NV	0.115 J	0.0918 U	0.119 J	0.111 U	0.144 J	0.146 J	0.119 U	0.111 J
Zinc	410	410	NV	67.3	75.1	82.1	80.3	142	93	76	74.7
Organic Chemicals (ug/kg-dry)											
2,4-Dimethylphenol	29	29	NV	60.4 U	48.8 U	59 U	57 U	71.8 U	74 U	153 U	53.8 U
2-Methylphenol	63	63	NV	30.2 U	24.4 U	29.5 U	28.4 U	35.8 U	37 U	76.6 U	26.9 U
3- & 4-Methylphenol (m,p-Cresol)	260	260	NV	157	28.4 J	29.5 U	28.4 U	43.2 J	137	93.4 J	267
Benzoic acid	650	650	NV	1,510 U	1,220 U	1,480 U	1,430 U	1,800 U	1,850 UJ	3,840 U	1,350 U
Benzyl alcohol	57	57	NV	60.4 U	48.8 U	59 U	57 U	71.8 U	74 U	153 U	53.8 U
Dibenzofuran	200	200	NV	14.5 J	9.74 U	18.7 J	11.4 U	14.3 U	21.1 J	33.9 J	10.7 U
Phenol	120	120	NV	58.3 J	19.5 U	23.6 U	22.8 U	28.7 U	88.9	94.1 J	73.9
N-Nitrosodiphenylamine	NV	28	NV	30.2 U	24.4 U	29.5 U	28.4 U	35.8 U	37 U	76.6 U	26.9 U
Organic Chemicals (ug/kg-OC)											
N-Nitrosodiphenylamine	11,000	NV	NV	643 U	1,630 U	1,280 U	1,670 U	542 U	474 U	589 U	1,280 U
Phthalates (ug/kg-dry)											
Bis(2-ethylhexyl)phthalate	500	500	NV	181 U	146 U	177 U	171 U	215 U	222 U	460 U	161 U
Butylbenzylphthalate	NV	63	NV	60.4 U	48.8 U	59 U	57 U	71.8 U	74 U	153 U	53.8 U
Diethyl phthalate	NV	200	NV	60.4 U	48.8 U	59 U	57 U	71.8 U	74 U	153 U	53.8 U
Dimethyl phthalate	NV	71	NV	60.4 U	48.8 U	59 U	57 U	71.8 U	74 U	153 U	53.8 U
Di-n-butyl phthalate	380	380	NV	60.4 U	48.8 U	59 U	57 U	71.8 U	74 U	153 U	53.8 U
Di-n-octyl phthalate	39	39	NV	96.9 U	78.3 U	94.6 U	91.4 U	115 U	119 U	246 U	86.3 U

Table H-2
Chemical Analytical Results
Weyerhaeuser Sawmill Aberdeen/Seaport Landing Site

Location:	SCO for Protection of Benthic Organisms ⁽¹⁾		SSL for Protection of Human Health and Higher Trophic Level Ecological Receptors ^(c)	SE-15	SE-16	SE-17	SE-18	SE-20	SE-24	SE-26	SE-31
Sample Name:				SE-15-0-0.33	SE-16-0-0.33	SE-17-0-0.33	SE-18-0-0.33	SE-20-0-0.33	SE-24-0-0.33	SE-26-0-0.33	SE-31-0-0.33
Collection Date:				09/27/2019	09/27/2019	09/27/2019	09/27/2019	09/25/2019	09/27/2019	09/27/2019	09/27/2019
Collection Depth (ft bml):				0-0.33	0-0.33	0-0.33	0-0.33	0-0.33	0-0.33	0-0.33	0-0.33
Type:				Surface	Surface	Surface	Surface	Surface	Surface	Surface	Surface
Percent Woodwaste:				30	Trace	0	5	0	25	80	35
TOC:			Outside	Inside	Inside	Inside	Outside	Outside	Outside	Inside	
Phthalates (ug/kg-OC)											
Butylbenzylphthalate	4,900	NV	NV	1,290 U	3,250 U	2,570 U	3,350 U	1,090 U	949 U	1,180 U	2,560 U
Diethyl phthalate	61,000	NV	NV	1,290 U	3,250 U	2,570 U	3,350 U	1,090 U	949 U	1,180 U	2,560 U
Dimethyl phthalate	53,000	NV	NV	1,290 U	3,250 U	2,570 U	3,350 U	1,090 U	949 U	1,180 U	2,560 U
Chlorinated Organics (ug/kg-dry)											
1,2,4-Trichlorobenzene	NV	31	NV	30.2 U	24.4 U	29.5 U	28.4 U	35.8 U	37 U	76.6 U	26.9 U
1,2-Dichlorobenzene	NV	35	NV	30.2 U	24.4 U	29.5 U	28.4 U	35.8 U	37 U	76.6 U	26.9 U
1,4-Dichlorobenzene	NV	110	NV	30.2 U	24.4 U	29.5 U	28.4 U	35.8 U	37 U	76.6 U	26.9 U
Hexachlorobenzene	NV	22	NV	12 U	9.74 U	11.8 U	11.4 U	14.3 U	14.8 U	30.6 U	10.7 U
Hexachlorobutadiene	NV	11	NV	30.2 U	24.4 U	29.5 U	28.4 U	35.8 U	37 U	76.6 U	26.9 U
Pentachlorophenol	360	360	NV	120 U	97.4 U	118 U	114 U	143 U	148 U	306 U	107 U
Chlorinated Organics (ug/kg-OC)											
1,2,4-Trichlorobenzene	810	NV	NV	643 U	1,630 U	1,280 U	1,670 U	542 U	474 U	589 U	1,280 U
1,2-Dichlorobenzene	2,300	NV	NV	643 U	1,630 U	1,280 U	1,670 U	542 U	474 U	589 U	1,280 U
1,4-Dichlorobenzene	3,100	NV	NV	643 U	1,630 U	1,280 U	1,670 U	542 U	474 U	589 U	1,280 U
Hexachlorobenzene	380	NV	NV	255 U	649 U	513 U	671 U	217 U	190 U	235 U	510 U
Hexachlorobutadiene	3,900	NV	NV	643 U	1,630 U	1,280 U	1,670 U	542 U	474 U	589 U	1,280 U
PAHs (ug/kg-dry)											
Total PAH ^(d)	17,000	17,000	NV	899 J	40.4 J	2,060 J	22.8 U	34.3 J	594 J	742 J	247 J
1-Methylnaphthalene	NV	NV	NV	24.2 U	19.5 U	70.6	22.8 U	28.7 U	29.6 U	61.4 U	21.5 U
2-Methylnaphthalene	NV	670	NV	24.2 U	19.5 U	33.7 J	22.8 U	28.7 U	29.6 U	61.4 U	21.5 U
Total LPAH ^(e)	NV	5,200	NV	93.8 J	13.6 J	1,010 J	22.8 U	28.7 U	223 J	267 J	160 J
Acenaphthene	NV	500	NV	48.7	9.74 U	126	11.4 U	14.3 U	29.3 J	40.8 J	37.2
Acenaphthylene	NV	1,300	NV	12 U	9.74 U	22.9 J	11.4 U	14.3 U	14.8 U	30.6 U	19.6 J
Anthracene	NV	960	NV	20.8 J	9.74 U	121	11.4 U	14.3 U	22.6 J	30.6 U	10.7 U
Fluorene	NV	540	NV	12 U	9.74 U	87.5	11.4 U	14.3 U	24.2 J	38.6 J	10.7 U
Naphthalene	NV	2,100	NV	24.2 U	19.5 U	77	22.8 U	28.7 U	69.8	75.2 J	74.2
Phenanthrene	NV	1,500	NV	24.3	13.6 J	575	11.4 U	14.3 U	76.8	112	28.9
Total HPAH ^(f)	NV	12,000	NV	805 J	26.8 J	945 J	17.1 U	34.3 J	371 J	475 J	87.4 J
Benzo(a)anthracene	NV	1,300	NV	61.2	9.74 U	66.5	11.4 U	14.3 U	41.2	45.8 J	12.5 J
Benzo(a)pyrene	NV	1,600	NV	45.8	14.6 U	38.7	17.1 U	21.5 U	31.8 J	66.5 J	17.3 J
Benzo(ghi)perylene	NV	670	NV	18.3 J	9.74 U	11.8 U	11.4 U	14.3 U	14.8 U	30.6 U	10.7 U
Chrysene	NV	1,400	NV	71.9	9.74 U	70.3	11.4 U	14.3 U	33.4	42.4 J	10.7 U
Dibenzo(a,h)anthracene	NV	230	NV	12 U	9.74 U	11.8 U	11.4 U	14.3 U	14.8 U	30.6 U	10.7 U
Fluoranthene	NV	1,700	NV	250	13.8 J	335	11.4 U	16.9 J	123	109	28
Indeno(1,2,3-cd)pyrene	NV	600	NV	20.7 J	9.74 U	11.8 U	11.4 U	14.3 U	14.8 U	34 J	10.7 U
Pyrene	NV	2,600	NV	210	13 J	401	11.4 U	17.4 J	113	102	29.6
Benzo(b)fluoranthene	NV	NV	NV	90.7	14.6 U	33.9 J	17.1 U	21.5 U	28.6 J	75.4 J	16.1 U
Benzo(k)fluoranthene	NV	NV	NV	36.5 J	14.6 U	17.7 U	17.1 U	21.5 U	22.2 U	46 U	16.1 U
Total benzofluoranthenes ^(g)	NV	3,200	NV	127 J	14.6 U	33.9 J	17.1 U	21.5 U	28.6 J	75.4 J	16.1 U
cPAH TEQ ^(h)	NV	NV	21	68 J	14.6 U	51.5 J	17.1 U	21.5 U	41.7 J	86.3 J	21.3 J

Table H-2
Chemical Analytical Results
Weyerhaeuser Sawmill Aberdeen/Seaport Landing Site

Location:	SCO for Protection of Benthic Organisms ⁽¹⁾		SSL for Protection of Human Health and Higher Trophic Level Ecological Receptors ^(c)	SE-15	SE-16	SE-17	SE-18	SE-20	SE-24	SE-26	SE-31
Sample Name:				SE-15-0-0.33	SE-16-0-0.33	SE-17-0-0.33	SE-18-0-0.33	SE-20-0-0.33	SE-24-0-0.33	SE-26-0-0.33	SE-31-0-0.33
Collection Date:				09/27/2019	09/27/2019	09/27/2019	09/27/2019	09/25/2019	09/27/2019	09/27/2019	09/27/2019
Collection Depth (ft bml):				0-0.33	0-0.33	0-0.33	0-0.33	0-0.33	0-0.33	0-0.33	0-0.33
Type:				Surface	Surface	Surface	Surface	Surface	Surface	Surface	Surface
Percent Woodwaste:				30	Trace	0	5	0	25	80	35
TOC:	Organic Carbon (0.5% to 3.5%) ^(a)	Organic Carbon (<0.5% or >3.5%) ^(b)	Outside	Inside	Inside	Inside	Outside	Outside	Outside	Inside	
PAHs (ug/kg-OC)											
2-Methylnaphthalene	38,000	NV	NV	515 U	1,300 U	1,470 J	1,340 U	435 U	379 U	472 U	1,020 U
Total LPAH ^(e)	370,000	NV	NV	2,000 J	907	43,900	1,340	435 U	2,860 J	2,050 J	7,620
Acenaphthene	16,000	NV	NV	1,040	649 U	5,480	671 U	217 U	376 J	314 J	1,770
Acenaphthylene	66,000	NV	NV	255 U	649 U	996 J	671 U	217 U	190 U	235 U	933 J
Anthracene	220,000	NV	NV	443 J	649 U	5,260	671 U	217 U	290 J	235 U	510 U
Fluorene	23,000	NV	NV	255 U	649 U	3,800	671 U	217 U	310 J	297 J	510 U
Naphthalene	99,000	NV	NV	515 U	1,300 U	3,350	1,340 U	435 U	895	578 J	3,530
Phenanthrene	100,000	NV	NV	517	907 J	25,000	671 U	217 U	985	862	1,380
Total HPAH ^(f)	960,000	NV	NV	17,100 J	1,790 J	41,100 J	1,010 U	520 J	4,760 J	3,650 J	4,160 J
Benzo(a)anthracene	110,000	NV	NV	1,300	649 U	2,890	671 U	217 U	528	352 J	595 J
Benzo(a)pyrene	99,000	NV	NV	974	973 U	1,680	1,010 U	326 U	408 J	512 J	824 J
Benzo(ghi)perylene	31,000	NV	NV	389 J	649 U	513 U	671 U	217 U	190 U	235 U	510 U
Chrysene	110,000	NV	NV	1,530	649 U	3,060	671 U	217 U	428	326 J	510 U
Dibenzo(a,h)anthracene	12,000	NV	NV	255 U	649 U	513 U	671 U	217 U	190 U	235 U	510 U
Fluoranthene	160,000	NV	NV	5,320	920 J	14,600	671 U	256 J	1,580	838	1,330
Indeno(1,2,3-cd)pyrene	34,000	NV	NV	440 J	649 U	513 U	671 U	217 U	190 U	262 J	510 U
Pyrene	1,000,000	NV	NV	4,470	867 J	17,400	671 U	264 J	1,450	785	1,410
Benzo(b)fluoranthene	NV	NV	NV	1,930	973 U	1,470 J	1,010 U	326 U	367 J	580 J	767 U
Benzo(k)fluoranthene	NV	NV	NV	777 J	973 U	770 U	1,010 U	326 U	285 U	354 U	767 U
Total benzofluoranthenes ^(g)	230,000	NV	NV	2,710 J	973	1,470 J	1,010	326 U	367 J	580 J	767
Pesticides and PCBs (ug/kg-dry)											
Aroclor 1016	NV	NV	NV	4.57 U	2.02 U	2.07 U	2.03 U	2.12 U	5.6 U	4.42 U	3.96 U
Aroclor 1221	NV	NV	NV	4.57 U	2.02 U	2.07 U	2.03 U	2.12 U	5.6 U	4.42 U	3.96 U
Aroclor 1232	NV	NV	NV	4.57 U	2.02 U	2.07 U	2.03 U	2.12 U	5.6 U	4.42 U	3.96 U
Aroclor 1242	NV	NV	NV	4.57 U	2.02 U	2.07 U	2.03 U	2.12 U	5.6 U	4.42 U	3.96 U
Aroclor 1248	NV	NV	NV	4.57 U	2.02 U	2.07 U	2.03 U	2.12 U	5.6 U	4.42 U	3.96 U
Aroclor 1254	NV	NV	NV	4.57 U	2.02 U	4.14 U	2.03 U	2.38 J	5.6 U	4.42 U	3.96 U
Aroclor 1260	NV	NV	NV	4.57 U	2.02 U	4.14 U	2.03 U	2.31 J	42.4	15.5	3.96 U
Total PCBs ^(h)	110	110	3.5	4.57 U	2.02 U	4.14 U	2.03 U	4.69 J	42.4	15.5	3.96 U
Additional SVOCs (ug/kg-dry)											
Hexachlorocyclopentadiene	NV	NV	NV	60.4 U	48.8 U	59 U	57 U	71.8 U	74 U	153 U	53.8 U
TPH (mg/kg-dry)											
Gasoline-Range Hydrocarbons	NV	NV	NV	10 U	8.42 U	13.3 U	9.11 U	13.4 U	27.9 U	9.64 U	7.73 U
Diesel-Range Hydrocarbons	340	340	NV	22.5 U	18.5 J	22.4 U	21.5 U	26.7 U	28.1 U	23.4 U	20.4 U
Motor-Oil-Range Hydrocarbons	3,600	3,600	NV	374	36.8 U	44.9 U	43 U	610	559	842	58.5 J

Notes
Bold font is applied to detected results, with the exception of conventional parameters and grain size.
Shading (color key below) indicates values that exceed screening criteria. All results are screened against SSLs for protection of human health and higher trophic level ecological receptors. Results are screened against SCOs for protection of benthic organisms based on individual sample TOC results.
TOC results outside 0.5-3.5%.
Detected result exceeding SCO for Protection of Benthic Organisms, Inside or Outside Organic Carbon 0.5-3.5%.
Detected result exceeding SSL for Protection of Human Health and Higher Trophic Level Ecological Receptors.
% = percent.
-- = not analyzed.
AET = apparent effects threshold.
cPAH = carcinogenic PAH.
CSL = cleanup screening level.
ft bml = feet below mudline.
HPAH = high-molecular-weight PAH.
J = result is an estimated value.
K = result is an estimated maximum potential concentration.
LPAH = low-molecular-weight PAH.
mg/kg = milligrams per kilogram.
mg/kg-dry = milligrams per kilogram, dry weight.
mg/L = milligrams per liter.
NV = no value.
PAH = polycyclic aromatic hydrocarbon.
PCB = polychlorinated biphenyl.
pg/g-dry = picograms per gram, dry weight.
RI = remedial investigation.
SCO = sediment cleanup objective.
SSL = sediment screening level.
SVOCs = semivolatile organic compounds.
TEQ = toxicity equivalence.
TOC = total organic carbon.
TPH = total petroleum hydrocarbons.
U = result is non-detect at detection limit or estimated detection limit.
ug/kg-dry = micrograms per kilogram, dry weight.
ug/kg-OC = micrograms per kilogram, organic carbon normalized.
^(a) Screening level is equivalent to organic carbon normalized marine criteria. Where organic carbon normalized criteria are not available, screening level is the lowest marine or freshwater SCO or CSL.
^(b) Screening level is the lowest of the following criteria: marine AET, marine sediment, or freshwater sediment SCO or CSL.
^(c) Human health and higher trophic level ecological receptor screening levels are chosen from lowest of bioaccumulative and direct contact pathways. If the risk-based value is lower than natural background or PQL, the cleanup level defaults to the higher of natural background or PQL.
^(d) Total PAH is the sum of detected 1-methylnaphthalene, 2-methylnaphthalene, acenaphthene, acenaphthylene, anthracene, benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, fluorene, fluoranthene, indeno(1,2,3-cd)pyrene, naphthalene, phenanthrene, and pyrene. Non-detect results are not included in the sum. When all analytical results are non-detect, the highest detection limit is used.
^(e) LPAH is the sum of detected acenaphthene, acenaphthylene, anthracene, fluorene, naphthalene, and phenanthrene. Non-detect results are not included in the sum. When all analytical results are non-detect, the highest detection limit is used.
^(f) HPAH is the sum of detected benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, fluoranthene, indeno(1,2,3-cd)pyrene, and pyrene. Non-detect results are not included in the sum. When all analytical results are non-detect, the highest detection limit is used.
^(g) Total benzofluoranthenes is the sum of detected benzo(b)fluoranthene and benzo(k)fluoranthene. Non-detect results are not included in the sum. When both analytical results are non-detect, the highest detection limit is used.
^(h) cPAH TEQ is calculated with 2005 California EPA toxicity equivalence factors. Non-detect results are included at one-half the detection limit. When all cPAHs are non-detect, the highest reported detection limit is shown.
⁽ⁱ⁾ Total PCBs is the sum of all detected recolors. Non-detect results are not included in the sum. When all analytical results are non-detect, the highest detection limit is used.
⁽¹⁾ Ecology. 2021. SCUM II Table 8-1 Marine and freshwater sediment chemical criteria for protection of the benthic community.

Table H-3
Case Study Wood Waste Cleanup Levels
Weyerhaeuser Sawmill Aberdeen/Seaport Landing Site

Parameter Range Triggering Cleanup (% Volume):	TOC	TVS	Woodwaste
Anacortes Log Yard ⁽¹⁾	<i>No unified approach; weight of evidence method.</i>		
Hylebos Waterway ⁽²⁾	--	≥15	≥50
Port Gamble Bay ⁽²⁾	<i>No unified approach; weight of evidence method.</i>		
Scott Paper Mill ⁽²⁾	--	>12.2	≥25
Barbee Mill ⁽²⁾	≥14	--	≥50
Grays Harbor Historical Seaport Authority	>7	>16	≥50
<p>Notes</p> <p>% = percent.</p> <p>-- = parameter not incorporated into site-specific wood waste cleanup level.</p> <p>≥ = equal to or greater than.</p> <p>TOC = total organic carbon.</p> <p>TVS = total volatile solids.</p> <p>⁽¹⁾Ecology. 2013. Wood waste cleanup, identifying, assessing, and remediating wood waste in marine and freshwater environments, guidance for implementing the cleanup provisions of the sediment management standards, Chapter 173-204 WAC. Publication no. 09-09-044. Washington State Department of Ecology. September.</p> <p>⁽²⁾GeoEngineers. 2018. Draft final remedial investigation report, Anacortes Port Log Yard, Anacortes, Washington, Ecology Agreed Order no. DE 10630. Prepared for the Washington State Department of Ecology on behalf of Port of Anacortes. GeoEngineers, Inc. Seattle, Washington. June.</p>			

DRAFT

FIGURES





NOTES:
 AM = amphipod mortality.
 CSL = cleanup screening level.
 LD = larval development.
 PG = polychaete growth.
 SCO = sediment cleanup objective.
 Aquatic lease areas were digitized from print maps of Aberdeen tidelands dated Mar. 22, 2001 and Jan. 15, 1907 on file with the Office of the Commissioner of Public Lands in Olympia, Washington, and should be considered approximate.
 Surface is sediment collected in the top 10 centimeters (0 to 0.33 feet below the mudline).

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This product is for informational purposes and may not have been prepared for, or be suitable for legal, engineering, or surveying purposes. Users of this information should review or consult the primary data and information sources to ascertain the usability of the information.

Source:
 Aerial imagery obtained from Bing via ArcGIS Online.

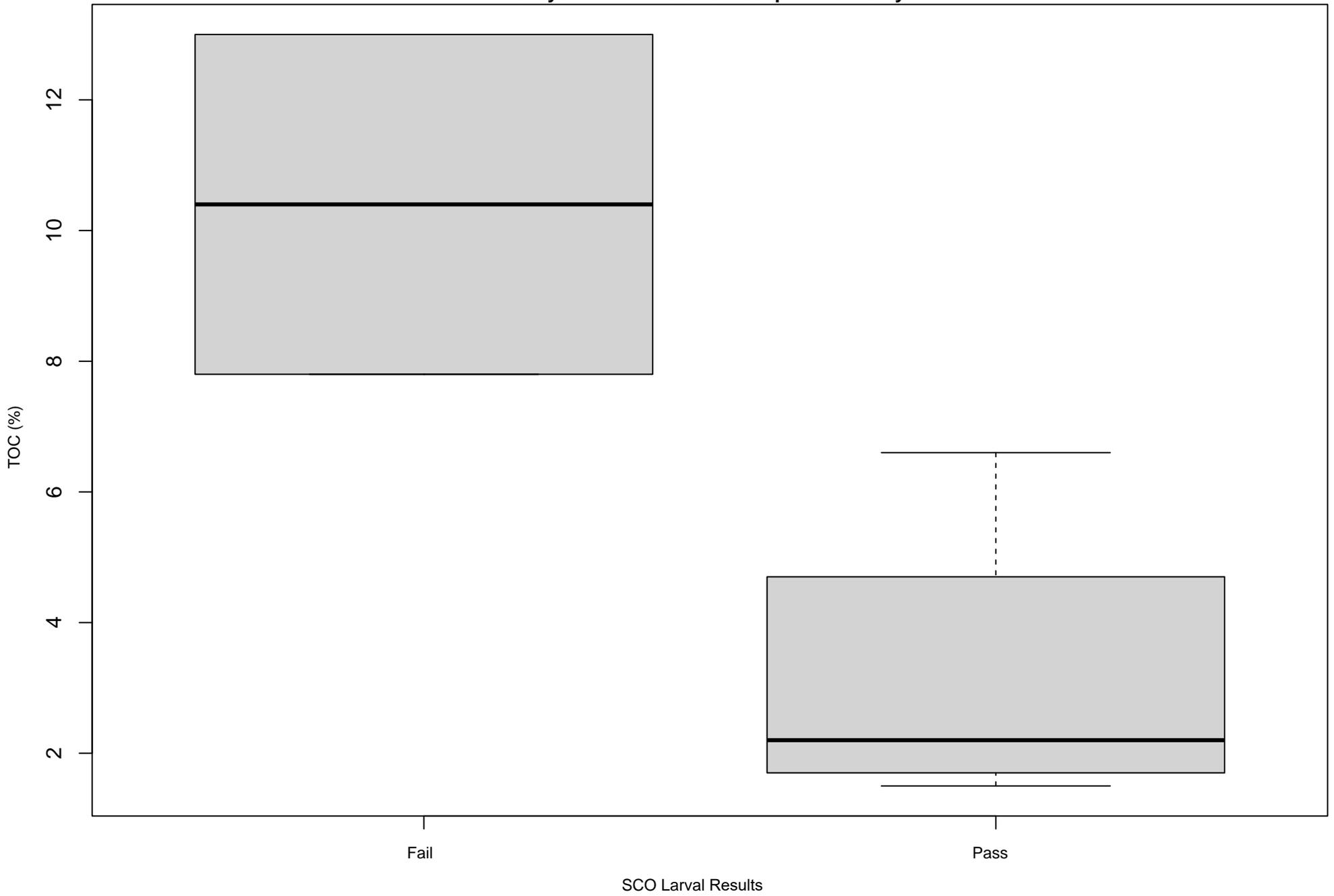
Legend

- AM PG LD
- Pass
- SCO Failure
- CSL Failure
- Surface Sample
- Subsurface Sample
- Seaport Authority Site
- Approximate Aquatic Lease Area
- Approximate Ordinary High Water Mark

Figure H-1
Bioassay Results
 Aberdeen, Washington

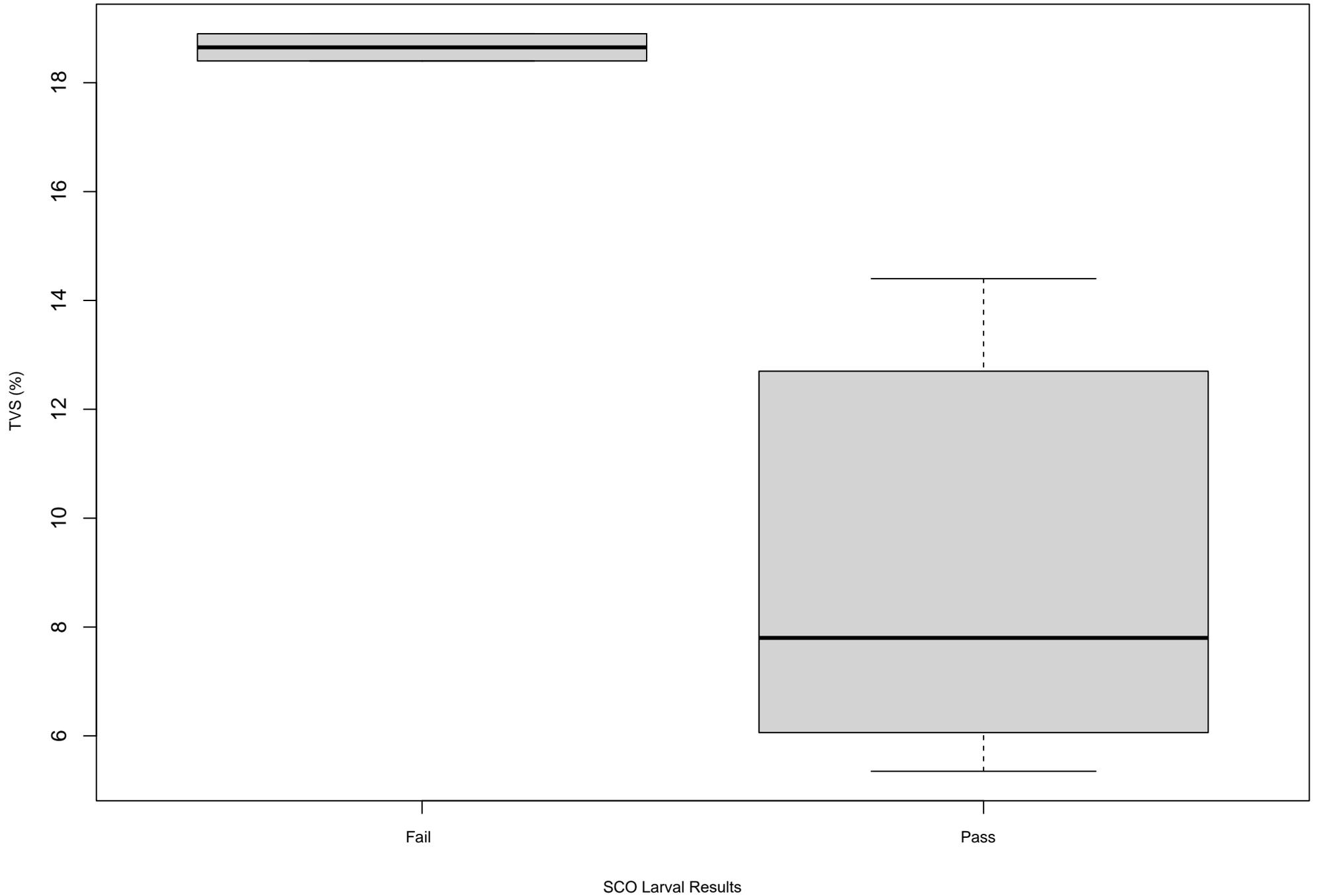


Figure H-2
TOC vs. Bioassay Results
Grays Harbor Historical Seaport Authority



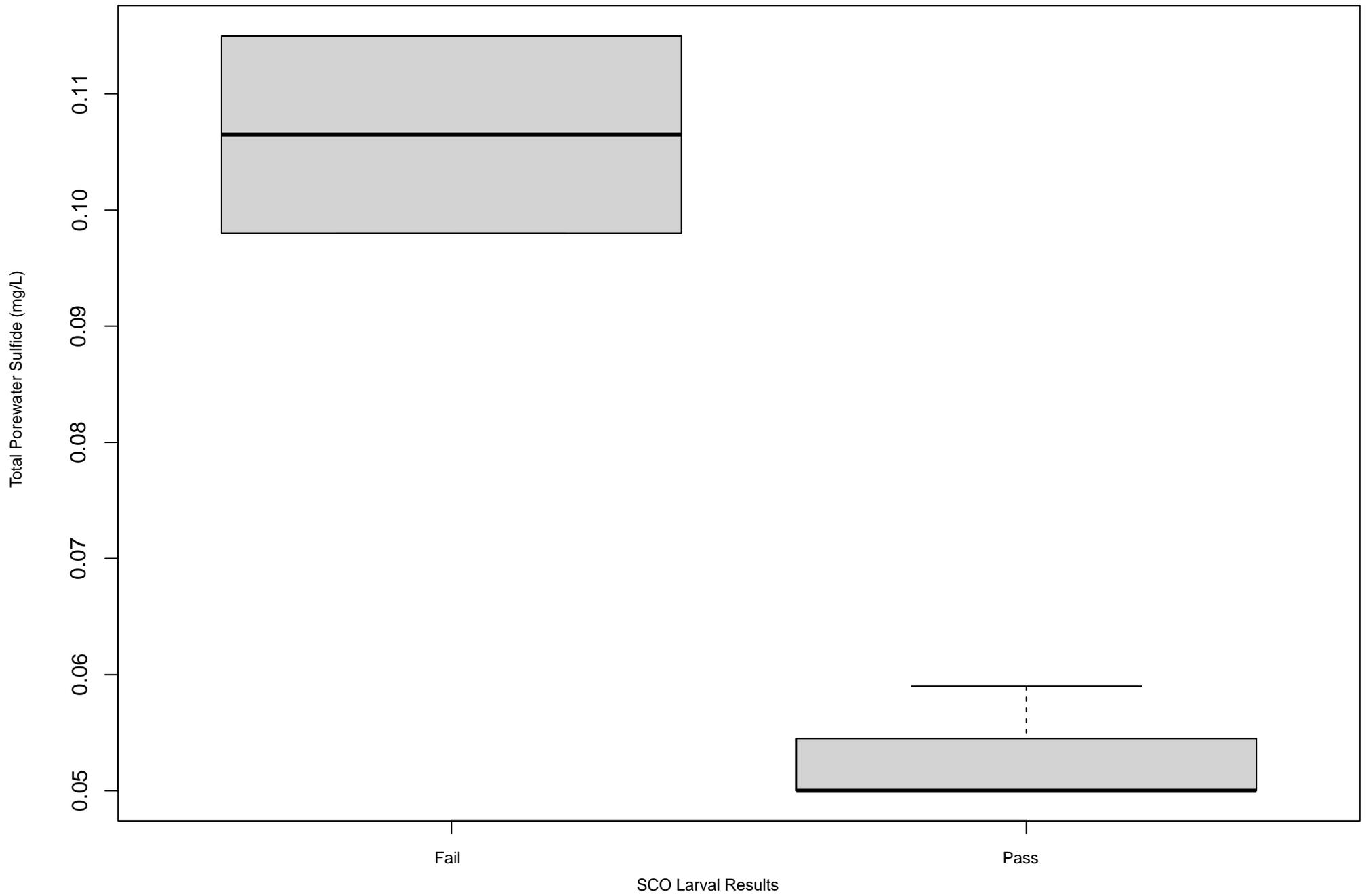
NOTES:
% = percent volume.
SCO = sediment cleanup objective.
TOC = total organic carbon.

Figure H-3
TVS vs. Bioassay Results
Grays Harbor Historical Seaport Authority



NOTES:
% = percent volume.
SCO = sediment cleanup objective.
TVS = total volatile solids.

Figure H-4
Porewater Sulfide vs. Bioassay Results
Grays Harbor Historical Seaport Authority



NOTES:
mg/L = milligrams per liter.
SCO = sediment cleanup objective.

Figure H-5
TOC vs. Porewater Sulfide Results
Grays Harbor Historical Seaport Authority

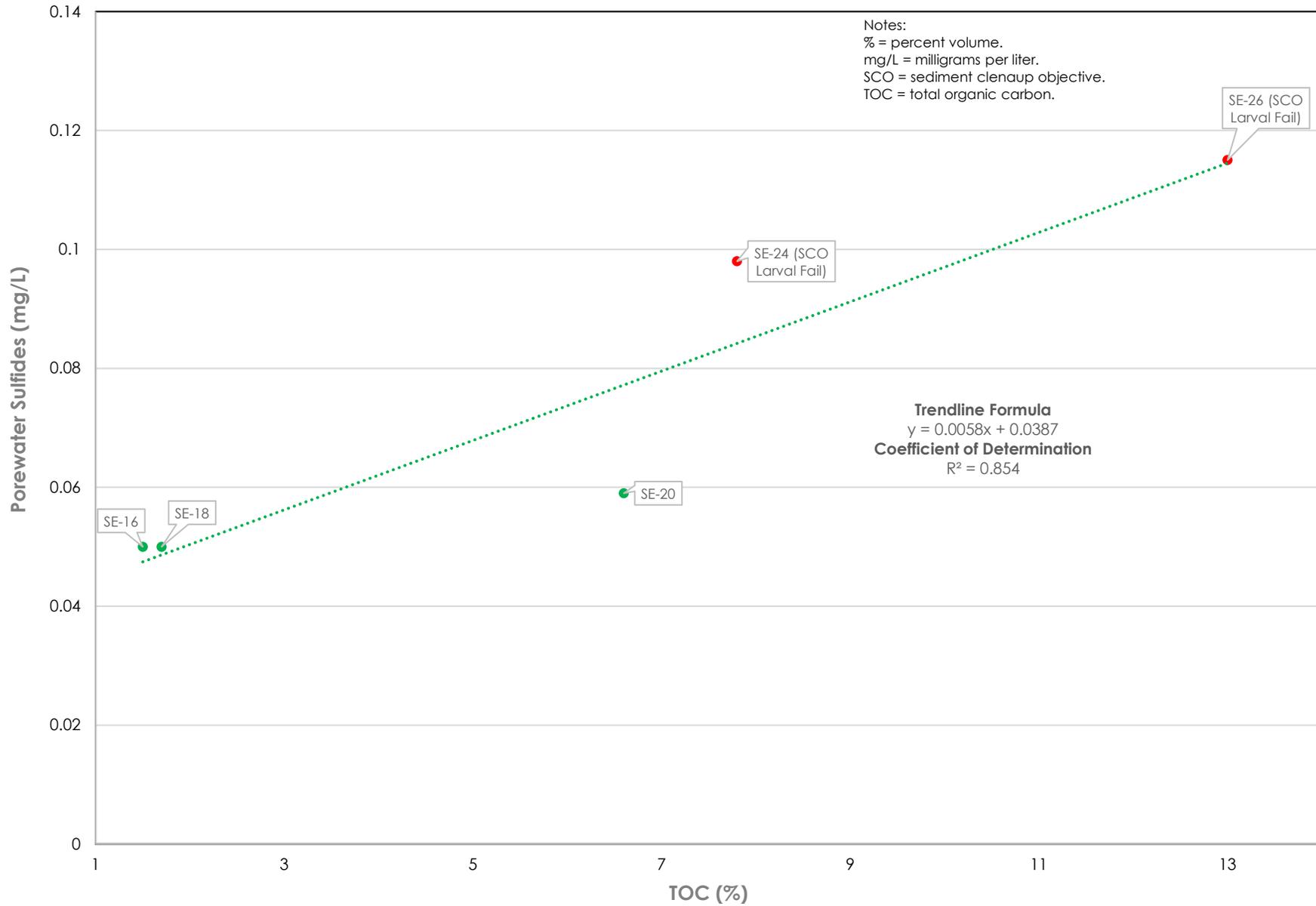


Figure H-6
TVS vs. Porewater Sulfide Results
Grays Harbor Historical Seaport Authority

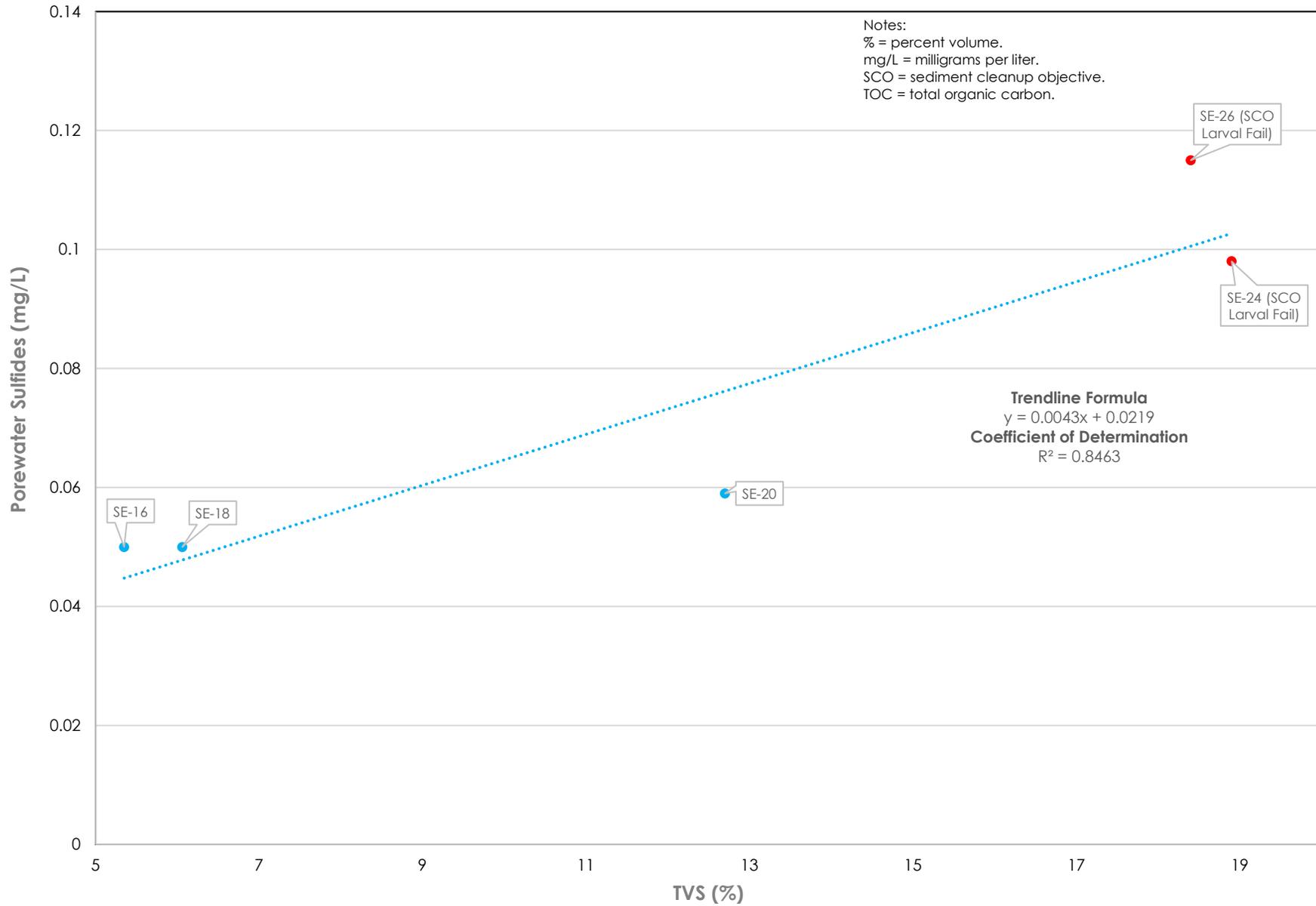
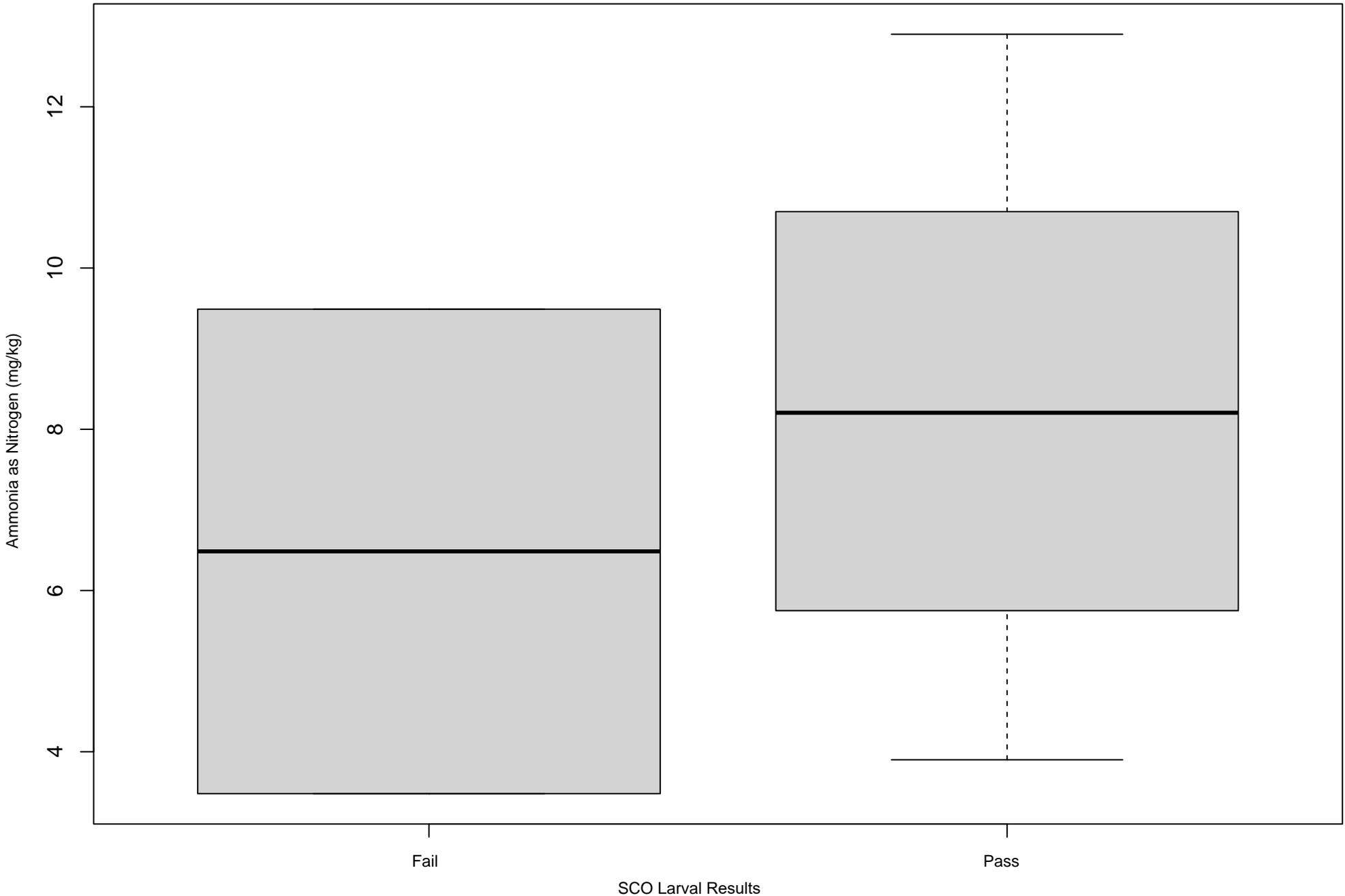
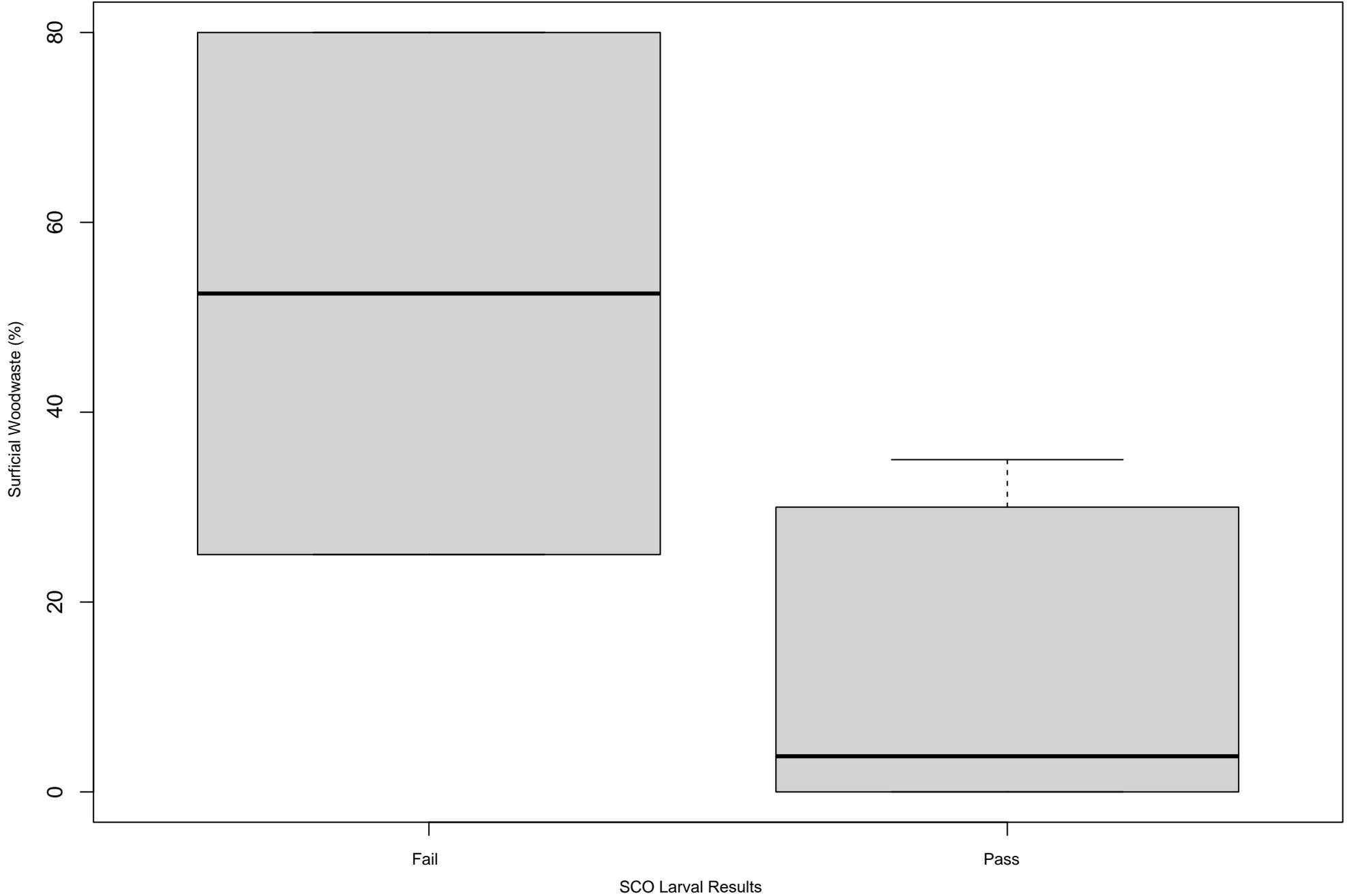


Figure H-7
Ammonia vs. Bioassay Results
Grays Harbor Historical Seaport Authority



NOTES:
mg/kg = milligrams per kilogram.
SCO = sediment cleanup objective.

Figure H-8
Wood Waste Percent vs. Bioassay Results
Grays Harbor Historical Seaport Authority



NOTES:

For visualization purposes, "trace" woodwaste observations are shown as 2.5% woodwaste.

% = percent volume.

SCO = sediment cleanup objective.

Figure H-9
Wood Waste Percent vs TOC Results
Grays Harbor Historical Seaport Authority

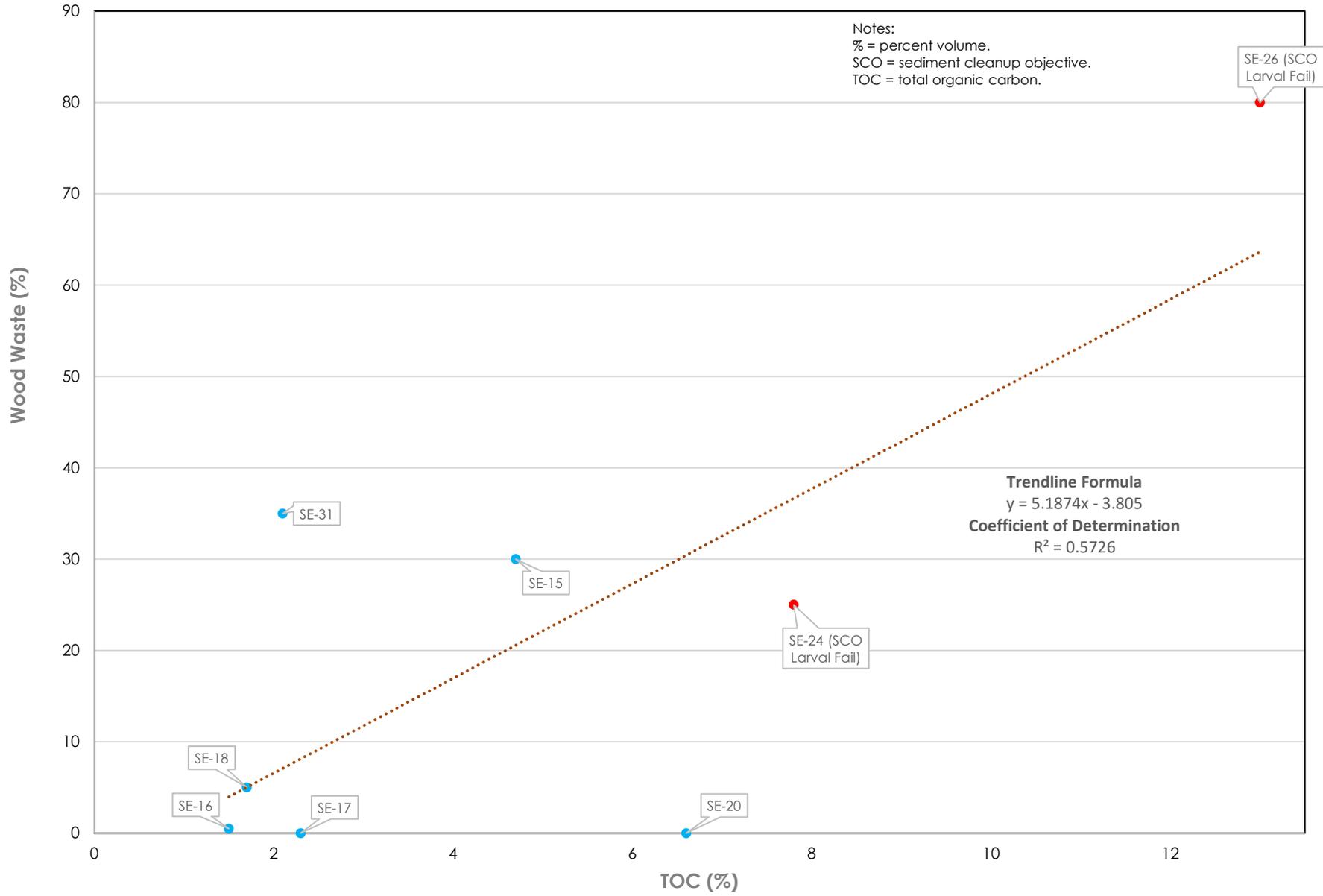


Figure H-10
Wood Waste Percent vs. TVS Results
Grays Harbor Historical Seaport Authority

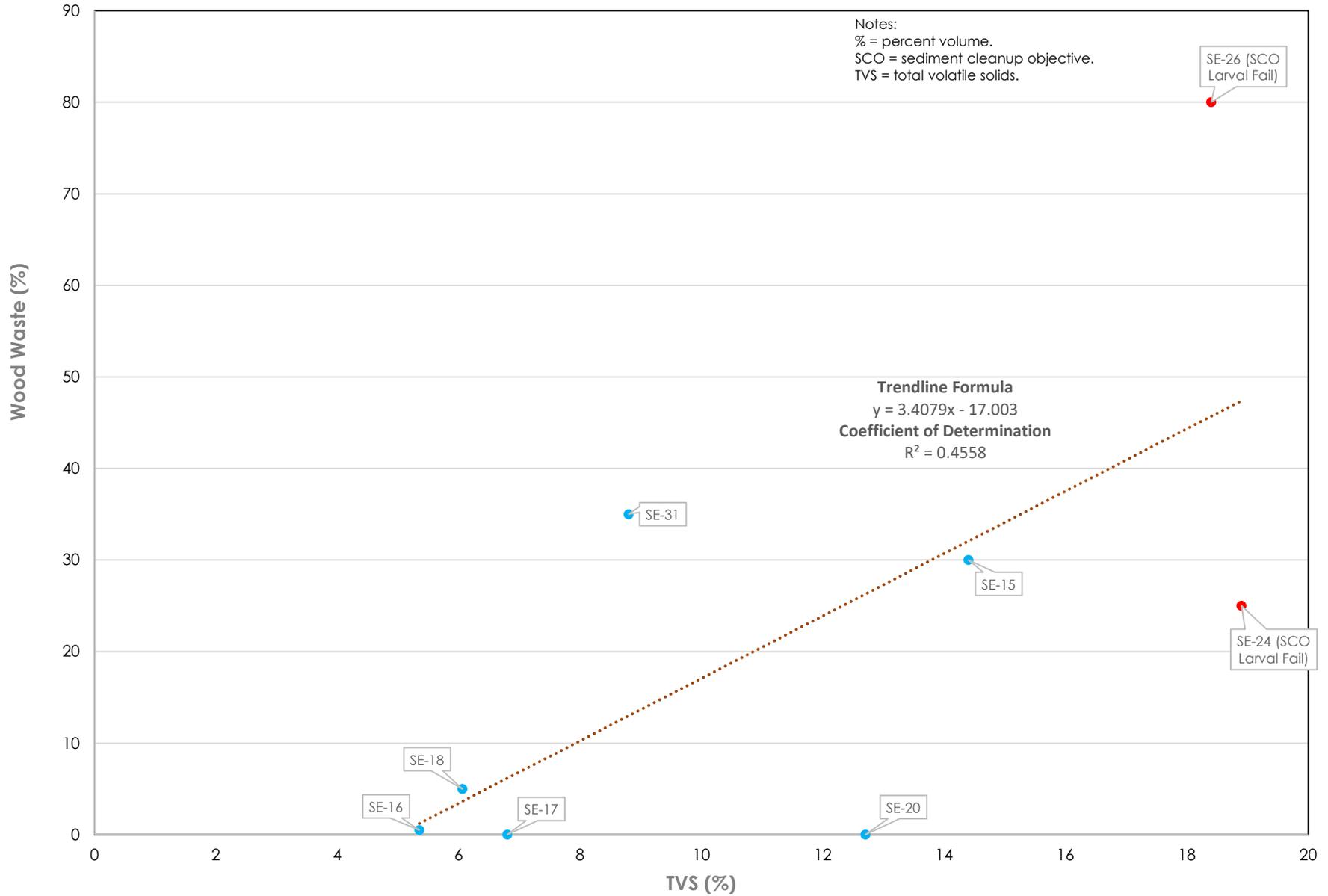


Figure H-11
Wood Waste Percent vs. Porewater Sulfide Results
Grays Harbor Historical Seaport Authority

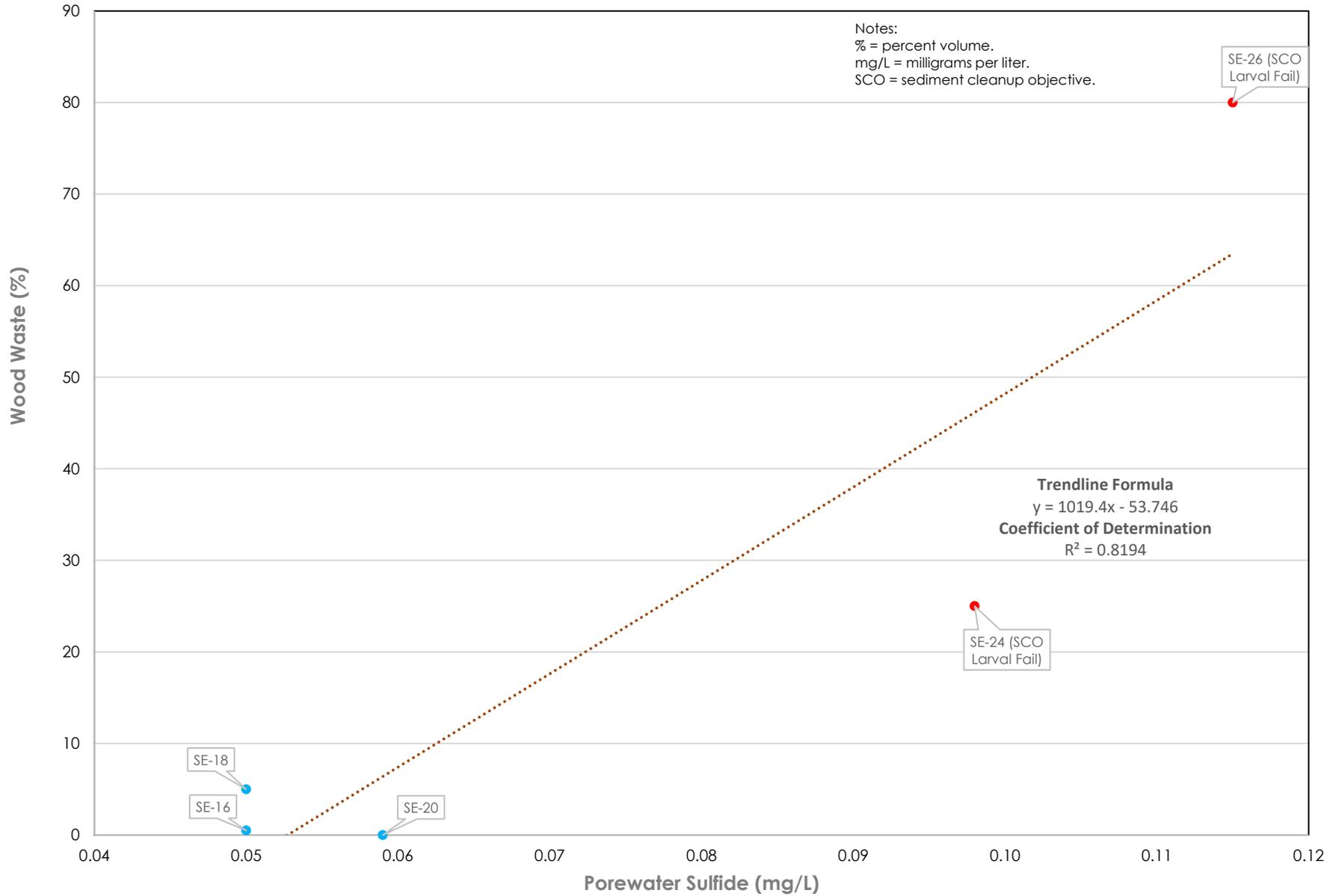


Figure H-12
Wood Waste Percent vs. Bulk Sulfide Results
Grays Harbor Historical Seaport Authority

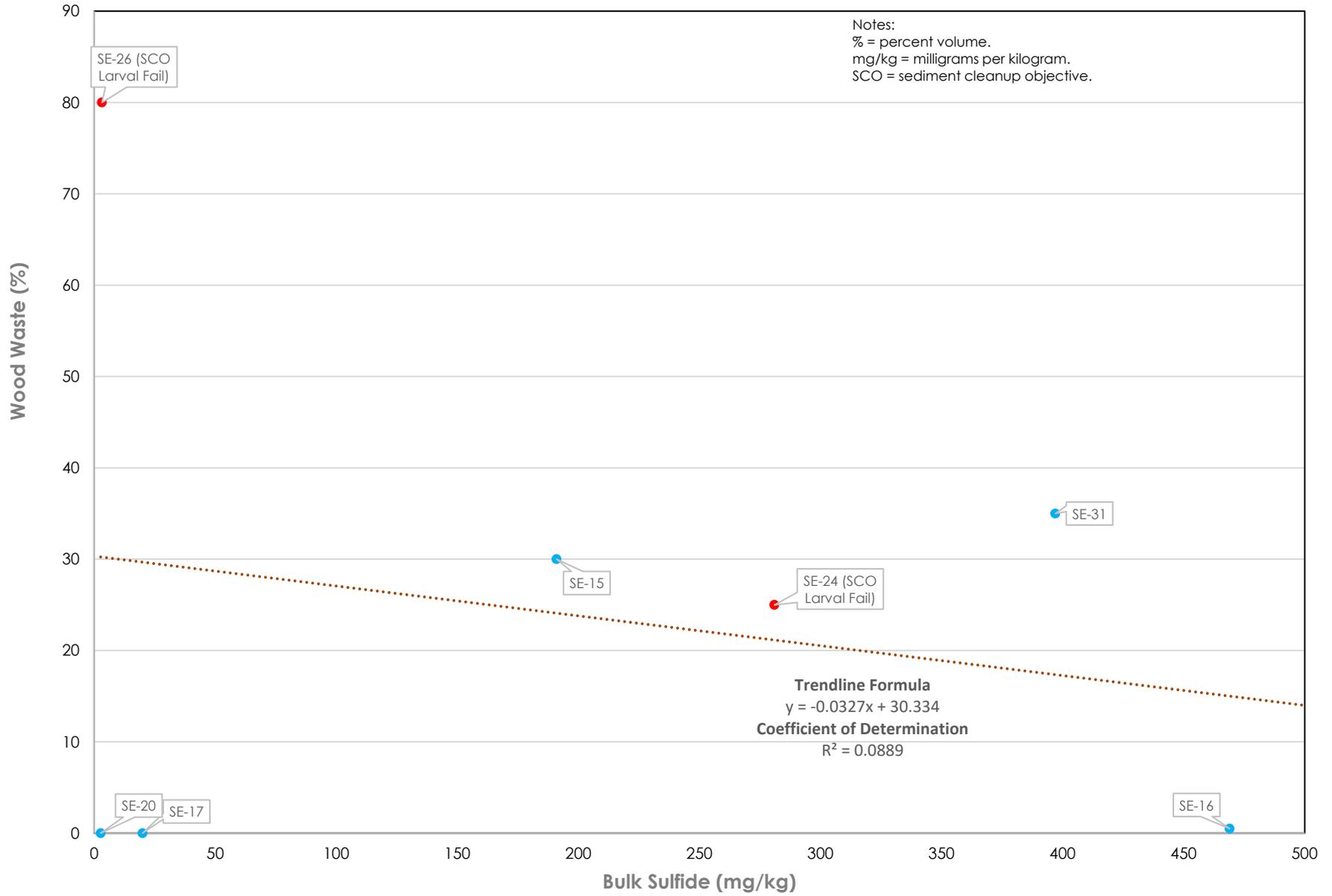


Figure H-13
Wood Waste Percent vs. Ammonia Results
Grays Harbor Historical Seaport Authority

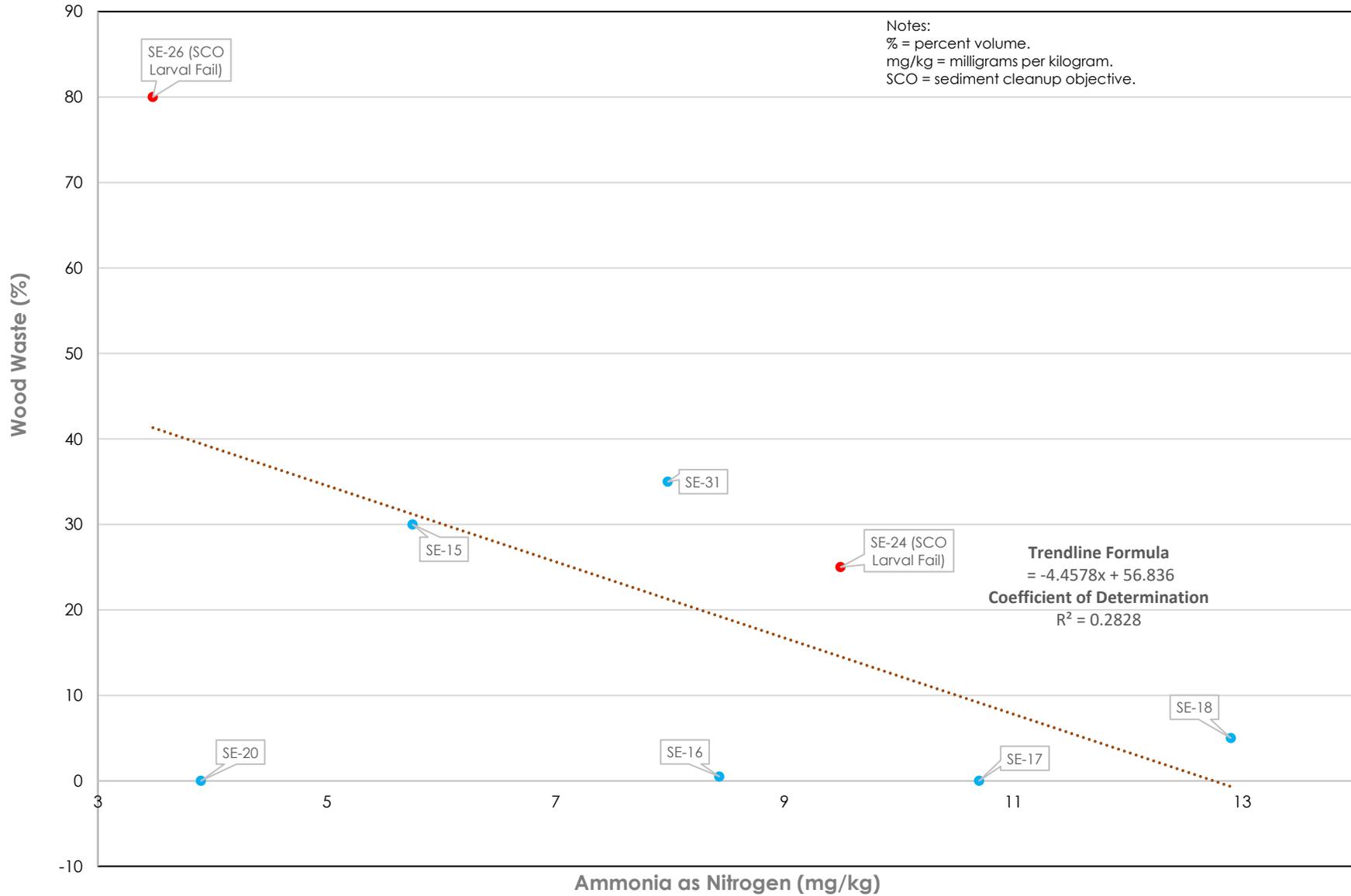
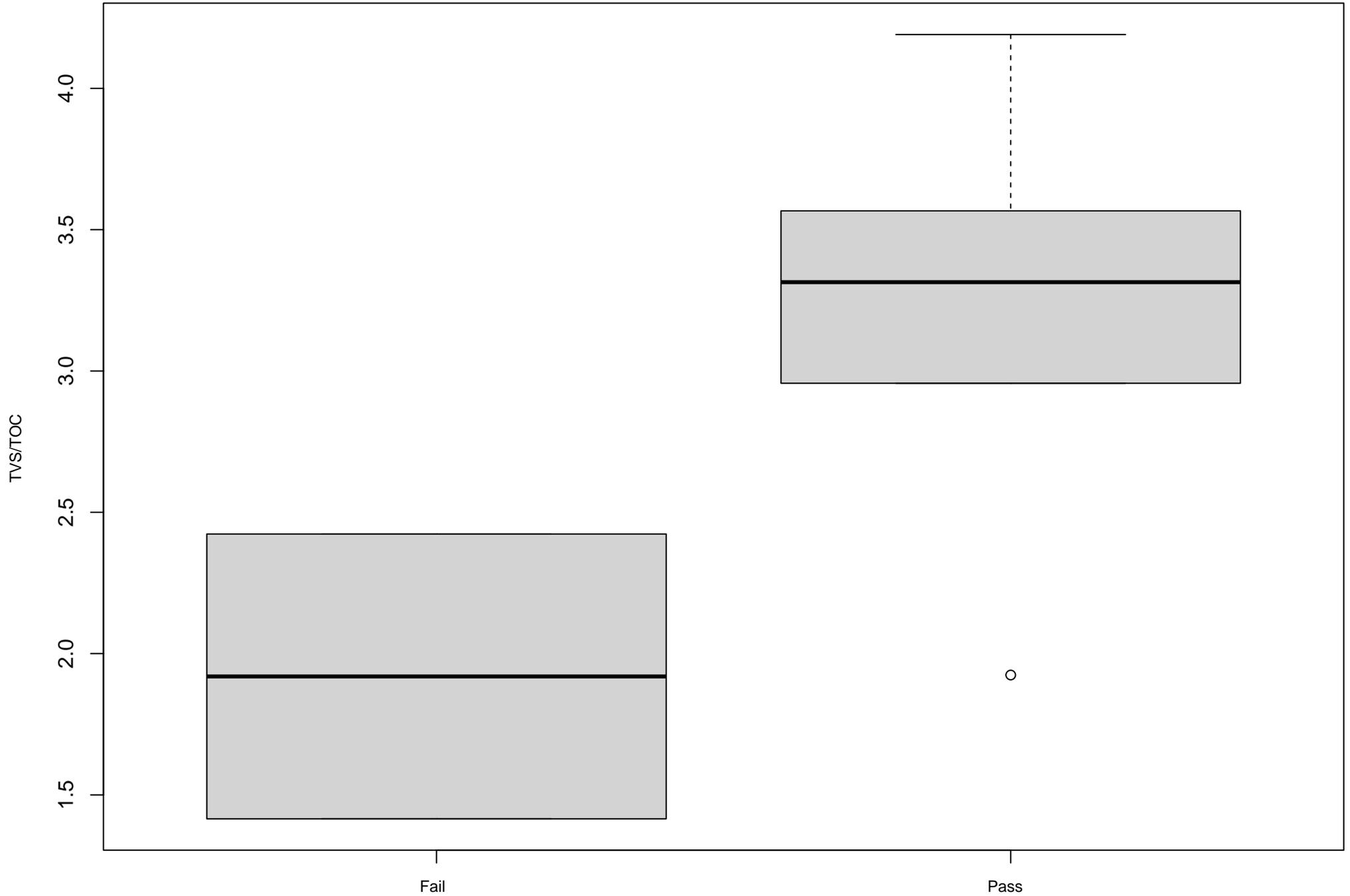


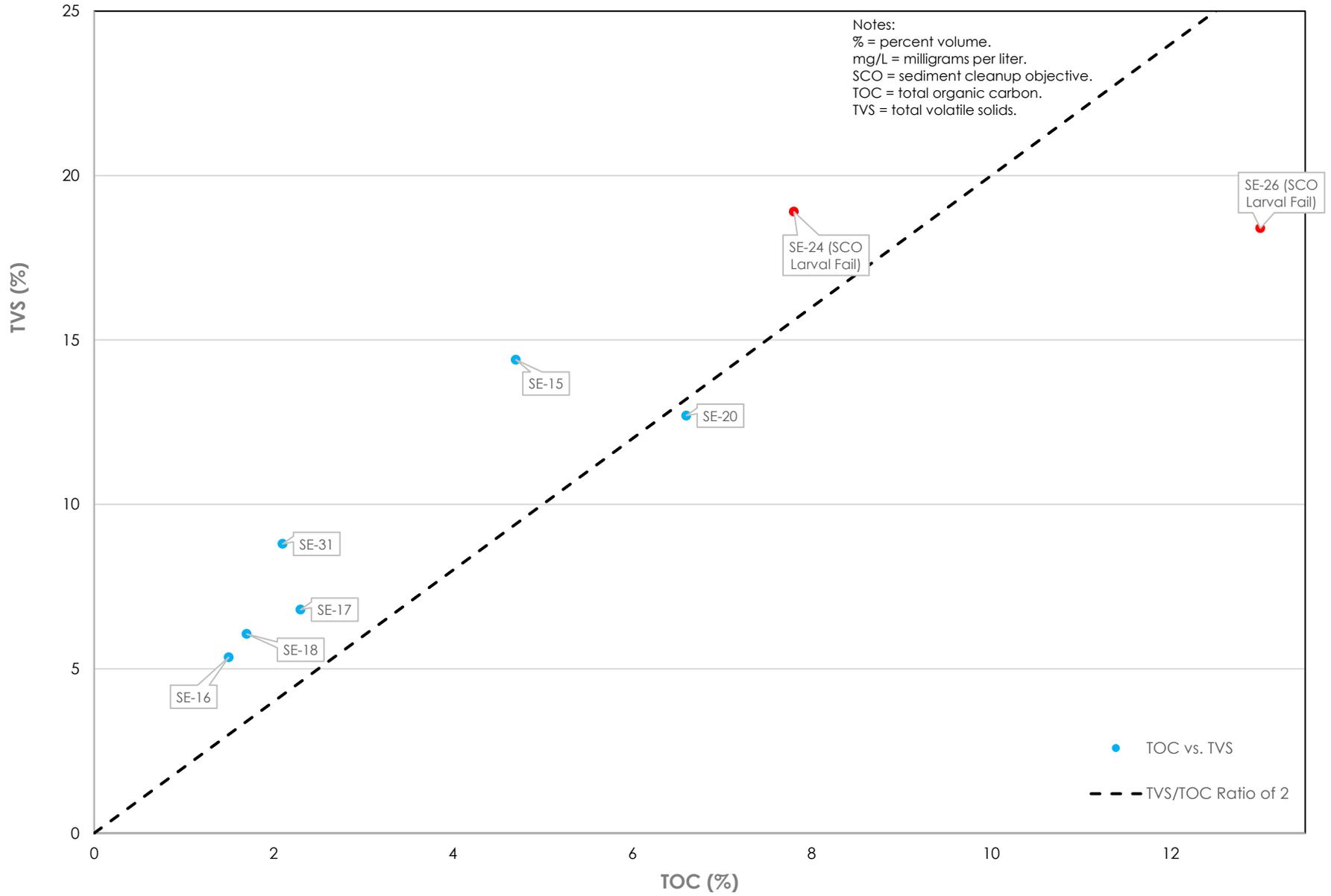
Figure H-14
TVS/TOC vs. Bioassay Results
Grays Harbor Historical Seaport Authority



NOTES:
SCO = sediment cleanup objective.
TOC = total organic carbon.
TVS = total volatile solids.

SCO Larval Pass/Fail

Figure H-15
TOC vs. TVS Results
Grays Harbor Historical Seaport Authority



APPENDIX I
LABORATORY REPORTS

DRAFT





AMENDED REPORT

Thursday, January 9, 2020
Emily Hess
Maul Foster & Alongi, INC.
2001 NW 19th Ave, STE 200
Portland, OR 97209

RE: A9I0822 - Seaport Tidelands - 1044.02.06-02

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

Enclosed are the results of analyses for work order A9I0822, which was received by the laboratory on 9/25/2019 at 12:32:00PM.

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

Please note: All samples will be disposed of within 30 days of sample receipt, unless prior arrangements have been made.

Cooler Receipt Information

(See Cooler Receipt Form for details)

Cooler #1 5.0 degC

This Final Report is the official version of the data results for this sample submission, unless superseded by a subsequent, labeled amended report.
All other deliverables derived from this data, including Electronic Data Deliverables (EDDs), CLP-like forms, client requested summary sheets, and all other products are considered secondary to this report.



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Philip Nerenberg, Lab Director



Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
EPA ID: OR01039

AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9I0822 - 01 09 20 1609
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ANALYTICAL REPORT FOR SAMPLES

SAMPLE INFORMATION

Client Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
SE-05a-2.0-3.0	A9I0822-01	Sediment	09/23/19 14:00	09/25/19 12:32
SE-29-0-2.0	A9I0822-02	Sediment	09/24/19 08:50	09/25/19 12:32
SE-08a-0-1.0	A9I0822-03	Sediment	09/24/19 10:00	09/25/19 12:32
SE-08c-3.2-4.2	A9I0822-05	Sediment	09/24/19 14:45	09/25/19 12:32

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Philip Nerenberg, Lab Director



Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
EPA ID: OR01039

AMENDED REPORT

Maul Foster & Alongi, INC.

2001 NW 19th Ave, STE 200
Portland, OR 97209

Project: **Seaport Tidelands**

Project Number: **1044.02.06-02**

Project Manager: **Emily Hess**

Report ID:

A910822 - 01 09 20 1609

ANALYTICAL CASE NARRATIVE

Work Order: A910822

Amended Report Revision 1:

This report supersedes all previous reports.

The previous report version was missing one of the subcontracted sulfide results, all are included in this version.

Philip Nerenberg
Lab Director
12/2/19

Amended Report Revision 2:

This report supersedes all previous reports.

Due to client request, 1-methylnaphthalene was added to the SVOC analyte list after the previous report version had been completed.

Philip Nerenberg
Lab Director
1/9/20

Apex Laboratories

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A910822 - 01 09 20 1609
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ANALYTICAL SAMPLE RESULTS

Diesel and/or Oil Hydrocarbons by NWTPH-Dx with Acid/Silica Gel Cleanup

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
SE-29-0-2.0 (A910822-02)				Matrix: Sediment		Batch: 9101201		
Diesel	ND	23.2	46.5	mg/kg dry	1	10/16/19 21:07	NWTPH-Dx/SG	
Oil	385	46.5	93.0	mg/kg dry	1	10/16/19 21:07	NWTPH-Dx/SG	F-03
<i>Surrogate: o-Terphenyl (Surr)</i>		<i>Recovery: 92 %</i>		<i>Limits: 50-150 %</i>		<i>1</i>	<i>10/16/19 21:07</i>	<i>NWTPH-Dx/SG</i>



Philip Nerenberg



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tideland Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A910822 - 01 09 20 1609
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ANALYTICAL SAMPLE RESULTS

Gasoline Range Hydrocarbons (Benzene through Naphthalene) by NWTPH-Gx

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
SE-29-0-2.0 (A910822-02)				Matrix: Sediment		Batch: 9091374		
Gasoline Range Organics	ND	9.53	19.1	mg/kg dry	50	09/27/19 12:43	NWTPH-Gx (MS)	
<i>Surrogate: 4-Bromofluorobenzene (Sur)</i>		<i>Recovery: 113 %</i>		<i>Limits: 50-150 %</i>		<i>1</i>	<i>09/27/19 12:43</i>	<i>NWTPH-Gx (MS)</i>
<i>1,4-Difluorobenzene (Sur)</i>		<i>104 %</i>		<i>50-150 %</i>		<i>1</i>	<i>09/27/19 12:43</i>	<i>NWTPH-Gx (MS)</i>

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AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A910822 - 01 09 20 1609
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ANALYTICAL SAMPLE RESULTS

Polychlorinated Biphenyls by EPA 8082A

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
SE-29-0-2.0 (A910822-02)				Matrix: Sediment		Batch: 9091456		C-07
Aroclor 1016	ND	11.6	23.2	ug/kg dry	1	10/03/19 17:48	EPA 8082A	
Aroclor 1221	ND	11.6	23.2	ug/kg dry	1	10/03/19 17:48	EPA 8082A	
Aroclor 1232	ND	11.6	23.2	ug/kg dry	1	10/03/19 17:48	EPA 8082A	
Aroclor 1242	ND	11.6	23.2	ug/kg dry	1	10/03/19 17:48	EPA 8082A	
Aroclor 1248	ND	11.6	23.2	ug/kg dry	1	10/03/19 17:48	EPA 8082A	
Aroclor 1254	ND	11.6	23.2	ug/kg dry	1	10/03/19 17:48	EPA 8082A	
Aroclor 1260	38.9	11.6	23.2	ug/kg dry	1	10/03/19 17:48	EPA 8082A	
<i>Surrogate: Decachlorobiphenyl (Surr)</i>		<i>Recovery: 83 %</i>		<i>Limits: 60-125 %</i>		<i>1</i>	<i>10/03/19 17:48</i>	<i>EPA 8082A</i>

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AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A910822 - 01 09 20 1609
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ANALYTICAL SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
SE-29-0-2.0 (A910822-02RE1)				Matrix: Sediment		Batch: 9100490		
Acenaphthene	0.135	0.0305	0.0612	mg/kg dry	10	10/02/19 13:40	EPA 8270D	Q-42
Acenaphthylene	ND	0.0305	0.0612	mg/kg dry	10	10/02/19 13:40	EPA 8270D	
Anthracene	0.204	0.0305	0.0612	mg/kg dry	10	10/02/19 13:40	EPA 8270D	Q-42
Benz(a)anthracene	0.218	0.0305	0.0612	mg/kg dry	10	10/02/19 13:40	EPA 8270D	Q-42
Benzo(a)pyrene	0.154	0.0458	0.0917	mg/kg dry	10	10/02/19 13:40	EPA 8270D	Q-42
Benzo(b)fluoranthene	0.180	0.0458	0.0917	mg/kg dry	10	10/02/19 13:40	EPA 8270D	Q-42
Benzo(k)fluoranthene	0.0758	0.0458	0.0917	mg/kg dry	10	10/02/19 13:40	EPA 8270D	Q-42, J
Benzo(g,h,i)perylene	0.0680	0.0305	0.0612	mg/kg dry	10	10/02/19 13:40	EPA 8270D	Q-42
Chrysene	0.199	0.0305	0.0612	mg/kg dry	10	10/02/19 13:40	EPA 8270D	Q-42
Dibenz(a,h)anthracene	ND	0.0305	0.0612	mg/kg dry	10	10/02/19 13:40	EPA 8270D	
Fluoranthene	1.15	0.0305	0.0612	mg/kg dry	10	10/02/19 13:40	EPA 8270D	Q-42
Fluorene	0.136	0.0305	0.0612	mg/kg dry	10	10/02/19 13:40	EPA 8270D	Q-42
Indeno(1,2,3-cd)pyrene	0.0695	0.0305	0.0612	mg/kg dry	10	10/02/19 13:40	EPA 8270D	Q-42
1-Methylnaphthalene	0.0767	0.0612	0.122	mg/kg dry	10	10/02/19 13:40	EPA 8270D	Q-42, J
2-Methylnaphthalene	0.149	0.0612	0.122	mg/kg dry	10	10/02/19 13:40	EPA 8270D	Q-42
Naphthalene	0.491	0.0612	0.122	mg/kg dry	10	10/02/19 13:40	EPA 8270D	Q-42
Phenanthrene	0.491	0.0305	0.0612	mg/kg dry	10	10/02/19 13:40	EPA 8270D	Q-42
Pyrene	0.823	0.0305	0.0612	mg/kg dry	10	10/02/19 13:40	EPA 8270D	Q-42
Dibenzofuran	0.145	0.0305	0.0612	mg/kg dry	10	10/02/19 13:40	EPA 8270D	Q-42
2,4-Dimethylphenol	ND	0.153	0.305	mg/kg dry	10	10/02/19 13:40	EPA 8270D	
2-Methylphenol	ND	0.0763	0.153	mg/kg dry	10	10/02/19 13:40	EPA 8270D	
3+4-Methylphenol(s)	1.60	0.0763	0.153	mg/kg dry	10	10/02/19 13:40	EPA 8270D	
Pentachlorophenol (PCP)	ND	0.305	0.612	mg/kg dry	10	10/02/19 13:40	EPA 8270D	
Phenol	0.571	0.0612	0.122	mg/kg dry	10	10/02/19 13:40	EPA 8270D	M-04, Q-42
Bis(2-ethylhexyl)phthalate	ND	0.458	0.917	mg/kg dry	10	10/02/19 13:40	EPA 8270D	
Butyl benzyl phthalate	ND	0.153	0.305	mg/kg dry	10	10/02/19 13:40	EPA 8270D	
Diethylphthalate	ND	0.153	0.305	mg/kg dry	10	10/02/19 13:40	EPA 8270D	
Dimethylphthalate	ND	0.153	0.305	mg/kg dry	10	10/02/19 13:40	EPA 8270D	
Di-n-butylphthalate	0.213	0.153	0.305	mg/kg dry	10	10/02/19 13:40	EPA 8270D	Q-42, J
Di-n-octyl phthalate	ND	0.245	0.305	mg/kg dry	10	10/02/19 13:40	EPA 8270D	
N-Nitrosodiphenylamine	ND	0.0763	0.153	mg/kg dry	10	10/02/19 13:40	EPA 8270D	
Hexachlorobenzene	ND	0.0305	0.0612	mg/kg dry	10	10/02/19 13:40	EPA 8270D	
Hexachlorobutadiene	ND	0.0763	0.153	mg/kg dry	10	10/02/19 13:40	EPA 8270D	

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A910822 - 01 09 20 1609
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ANALYTICAL SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
SE-29-0-2.0 (A910822-02RE1)				Matrix: Sediment		Batch: 9100490		
Hexachlorocyclopentadiene	ND	0.153	0.305	mg/kg dry	10	10/02/19 13:40	EPA 8270D	Q-42
1,2-Dichlorobenzene	ND	0.0763	0.153	mg/kg dry	10	10/02/19 13:40	EPA 8270D	
1,4-Dichlorobenzene	ND	0.0763	0.153	mg/kg dry	10	10/02/19 13:40	EPA 8270D	
1,2,4-Trichlorobenzene	ND	0.0763	0.153	mg/kg dry	10	10/02/19 13:40	EPA 8270D	
Benzoic acid	ND	3.83	7.63	mg/kg dry	10	10/02/19 13:40	EPA 8270D	
Benzyl alcohol	ND	0.153	0.305	mg/kg dry	10	10/02/19 13:40	EPA 8270D	
<i>Surrogate: Nitrobenzene-d5 (Surr)</i>		<i>Recovery: 69 %</i>		<i>Limits: 37-122 %</i>		<i>10</i>	<i>10/02/19 13:40</i>	<i>EPA 8270D</i>
<i>2-Fluorobiphenyl (Surr)</i>		<i>68 %</i>		<i>44-115 %</i>		<i>10</i>	<i>10/02/19 13:40</i>	<i>EPA 8270D</i>
<i>Phenol-d6 (Surr)</i>		<i>73 %</i>		<i>33-122 %</i>		<i>10</i>	<i>10/02/19 13:40</i>	<i>EPA 8270D</i>
<i>p-Terphenyl-d14 (Surr)</i>		<i>69 %</i>		<i>54-127 %</i>		<i>10</i>	<i>10/02/19 13:40</i>	<i>EPA 8270D</i>
<i>2-Fluorophenol (Surr)</i>		<i>68 %</i>		<i>35-115 %</i>		<i>10</i>	<i>10/02/19 13:40</i>	<i>EPA 8270D</i>
<i>2,4,6-Tribromophenol (Surr)</i>		<i>102 %</i>		<i>39-132 %</i>		<i>10</i>	<i>10/02/19 13:40</i>	<i>EPA 8270D</i>



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A910822 - 01 09 20 1609
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ANALYTICAL SAMPLE RESULTS

Total Metals by EPA 6020A (ICPMS)

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
SE-29-0-2.0 (A910822-02)		Matrix: Sediment						
Batch: 9100517								
Arsenic	7.45	0.579	1.16	mg/kg dry	5	10/03/19 00:28	EPA 6020A	
Cadmium	0.188	0.116	0.231	mg/kg dry	5	10/03/19 00:28	EPA 6020A	J
Chromium	35.1	0.579	1.16	mg/kg dry	5	10/03/19 00:28	EPA 6020A	
Copper	92.5	1.16	2.31	mg/kg dry	5	10/03/19 00:28	EPA 6020A	Q-42
Lead	16.2	0.116	0.231	mg/kg dry	5	10/03/19 00:28	EPA 6020A	Q-42
Nickel	33.8	2.31	4.63	mg/kg dry	5	10/03/19 00:28	EPA 6020A	
Selenium	0.644	0.579	1.16	mg/kg dry	5	10/03/19 00:28	EPA 6020A	J
Silver	ND	0.116	0.231	mg/kg dry	5	10/03/19 00:28	EPA 6020A	
Zinc	84.6	2.31	4.63	mg/kg dry	5	10/03/19 00:28	EPA 6020A	

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AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A910822 - 01 09 20 1609
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ANALYTICAL SAMPLE RESULTS

Ammonia by Plumb Extraction, Gas Diffusion and Colorimetric Detection

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
SE-05a-2.0-3.0 (A910822-01RE1)				Matrix: Sediment		Batch: 9091360		
Ammonia as N	47.1	0.205	0.205	mg/kg dry	1	09/27/19 15:25	Plumb/SM 4500-NH3 G	
SE-29-0-2.0 (A910822-02RE1)				Matrix: Sediment		Batch: 9091360		
Ammonia as N	4.76	0.222	0.222	mg/kg dry	1	09/27/19 15:27	Plumb/SM 4500-NH3 G	
SE-08a-0-1.0 (A910822-03RE1)				Matrix: Sediment		Batch: 9091360		
Ammonia as N	8.65	0.278	0.278	mg/kg dry	1	09/27/19 15:31	Plumb/SM 4500-NH3 G	
SE-08c-3.2-4.2 (A910822-05RE1)				Matrix: Sediment		Batch: 9091360		
Ammonia as N	36.3	0.220	0.220	mg/kg dry	1	09/27/19 15:33	Plumb/SM 4500-NH3 G	



AMENDED REPORT

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ANALYTICAL SAMPLE RESULTS

Demand Parameters									
Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes	
SE-05a-2.0-3.0 (A910822-01)					Matrix: Sediment				
Batch: 9091362									
Total Organic Carbon	23000	200	200	mg/kg	1	10/07/19 10:00	EPA 9060Amod		
SE-29-0-2.0 (A910822-02)					Matrix: Sediment				
Batch: 9091362									
Total Organic Carbon	99000	200	200	mg/kg	1	10/07/19 10:58	EPA 9060Amod		
SE-08a-0-1.0 (A910822-03)					Matrix: Sediment				
Batch: 9091362									
Total Organic Carbon	68000	200	200	mg/kg	1	10/07/19 13:00	EPA 9060Amod		
SE-08c-3.2-4.2 (A910822-05)					Matrix: Sediment				
Batch: 9091362									
Total Organic Carbon	71000	200	200	mg/kg	1	10/07/19 13:25	EPA 9060Amod		



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ANALYTICAL SAMPLE RESULTS

Solid and Moisture Determinations

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
SE-05a-2.0-3.0 (A910822-01) Matrix: Sediment								
Batch: 9091443								
Total Solids	47.8	1.00	1.00	%	1	10/01/19 13:08	PSEP 1986	
Batch: 9091474								
Total Volatile Solids	7.49	1.00	1.00	%	1	10/02/19 15:31	SM 2540 G	
SE-29-0-2.0 (A910822-02) Matrix: Sediment								
Batch: 9091443								
Total Solids	42.9	1.00	1.00	%	1	10/01/19 13:08	PSEP 1986	
Batch: 9091474								
Total Volatile Solids	27.4	1.00	1.00	%	1	10/02/19 15:31	SM 2540 G	
SE-08a-0-1.0 (A910822-03) Matrix: Sediment								
Batch: 9091443								
Total Solids	35.8	1.00	1.00	%	1	10/01/19 13:08	PSEP 1986	
Batch: 9091474								
Total Volatile Solids	31.7	1.00	1.00	%	1	10/02/19 15:31	SM 2540 G	
SE-08c-3.2-4.2 (A910822-05) Matrix: Sediment								
Batch: 9091443								
Total Solids	44.0	1.00	1.00	%	1	10/01/19 13:08	PSEP 1986	
Batch: 9091474								
Total Volatile Solids	19.8	1.00	1.00	%	1	10/02/19 15:31	SM 2540 G	



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ANALYTICAL SAMPLE RESULTS

Grain Size by ASTM D 422m/PSET Parameters

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
SE-29-0-2.0 (A910822-02)				Matrix: Sediment		Batch: 9100739		
Gravel (>2.00mm)	32.4	0.01	0.01	% of Total	1	10/14/19 13:41	D422mod	GS-01
Percent Retained 4.75 mm sieve (#4)	27.7	0.01	0.01	% of Total	1	10/14/19 13:41	D422mod	GS-01
Percent Retained 2.00 mm sieve (#10)	4.64	0.01	0.01	% of Total	1	10/14/19 13:41	D422mod	GS-01
Sand (0.063mm - 2.00mm)	26.8	0.01	0.01	% of Total	1	10/14/19 13:41	D422mod	GS-01
Percent Retained 0.85 mm sieve (#20)	4.27	0.01	0.01	% of Total	1	10/14/19 13:41	D422mod	GS-01
Percent Retained 0.425 mm sieve (#40)	4.79	0.01	0.01	% of Total	1	10/14/19 13:41	D422mod	GS-01
Percent Retained 0.250 mm sieve (#60)	4.44	0.01	0.01	% of Total	1	10/14/19 13:41	D422mod	GS-01
Percent Retained 0.150 mm sieve (#100)	3.56	0.01	0.01	% of Total	1	10/14/19 13:41	D422mod	GS-01
Percent Retained 0.106 mm sieve (#140)	3.05	0.01	0.01	% of Total	1	10/14/19 13:41	D422mod	GS-01
Percent Retained 0.075 mm sieve (#200)	4.17	0.01	0.01	% of Total	1	10/14/19 13:41	D422mod	GS-01
Percent Retained 0.063 mm sieve (#230)	2.55	0.01	0.01	% of Total	1	10/14/19 13:41	D422mod	GS-01
Silt (0.005mm < 0.063mm)	33.3	0.01	0.01	% of Total	1	10/14/19 13:41	D422mod	GS-01
Clay (< 0.005 mm)	7.50	0.01	0.01	% of Total	1	10/14/19 13:41	D422mod	GS-01



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ANALYTICAL SAMPLE RESULTS

Percent Dry Weight									
Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes	
SE-05a-2.0-3.0 (A910822-01)				Matrix: Sediment		Batch: 9091443			
% Solids	47.8	1.00	1.00	%	1	10/01/19 13:08	EPA 8000C		
SE-29-0-2.0 (A910822-02)				Matrix: Sediment		Batch: 9091443			
% Solids	42.9	1.00	1.00	%	1	10/01/19 13:08	EPA 8000C		
SE-08a-0-1.0 (A910822-03)				Matrix: Sediment		Batch: 9091443			
% Solids	35.8	1.00	1.00	%	1	10/01/19 13:08	EPA 8000C		
SE-08c-3.2-4.2 (A910822-05)				Matrix: Sediment		Batch: 9091443			
% Solids	44.0	1.00	1.00	%	1	10/01/19 13:08	EPA 8000C		

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Analytical Resources, Inc.

ANALYTICAL SAMPLE RESULTS (Subcontracted)

Metals and Metallic Compounds

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
SE-29-0-2.0 (A910822-02)				Matrix: Sediment		Batch: BHI0876		
Batch: BHI0876								
Mercury	0.107	0.00992	0.0472	mg/kg dry	1	10/01/19 14:58	EPA 7471B	

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AMENDED REPORT

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Analytical Resources, Inc.

ANALYTICAL SAMPLE RESULTS (Subcontracted)

Wet Chemistry

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
SE-05a-2.0-3.0 (A910822-01)				Matrix: Sediment		Batch: BHI0874		
Batch: BHI0874								
Total Solids, Sulfide	44.07	0.04	0.04	%	1	09/30/19 01:32	PSEP 1986	
Batch: BHI0893								
Sulfide	4040	408	408	mg/kg dry	200	10/03/19 15:30	SM 4500-S2 D-00	D
SE-29-0-2.0 (A910822-02)				Matrix: Sediment		Batch: BHI0874		
Batch: BHI0874								
Total Solids, Sulfide	40.27	0.04	0.04	%	1	09/30/19 01:32	PSEP 1986	
Batch: BHI0893								
Sulfide	1510	123	123	mg/kg dry	50	10/03/19 15:30	SM 4500-S2 D-00	D
SE-08a-0-1.0 (A910822-03)				Matrix: Sediment		Batch: BHI0874		
Batch: BHI0874								
Total Solids, Sulfide	34.15	0.04	0.04	%	1	09/30/19 01:32	PSEP 1986	
Batch: BHI0893								
Sulfide	153	13.8	13.8	mg/kg dry	5	10/03/19 15:33	SM 4500-S2 D-00	D
SE-08c-3.2-4.2 (A910822-05)				Matrix: Sediment		Batch: BHI0874		
Batch: BHI0874								
Total Solids, Sulfide	44.83	0.04	0.04	%	1	09/30/19 01:32	PSEP 1986	
Batch: BHI0893								
Sulfide	124	11.0	11.0	mg/kg dry	5	10/03/19 15:34	SM 4500-S2 D-00	D



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QUALITY CONTROL (QC) SAMPLE RESULTS

Diesel and/or Oil Hydrocarbons by NWTPH-Dx with Acid/Silica Gel Cleanup

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9101201 - EPA 3546 w/SG+Acid (NWTPH)						Sediment						
Blank (9101201-BLK1)						Prepared: 10/01/19 12:56 Analyzed: 10/16/19 20:20						
<u>NWTPH-Dx/SG</u>												
Diesel	ND	9.09	25.0	mg/kg wet	1	---	---	---	---	---	---	
Oil	ND	18.2	50.0	mg/kg wet	1	---	---	---	---	---	---	
<i>Surr: o-Terphenyl (Surr)</i>		<i>Recovery: 93 %</i>		<i>Limits: 50-150 %</i>		<i>Dilution: 1x</i>						
LCS (9101201-BS1)						Prepared: 10/01/19 12:56 Analyzed: 10/16/19 20:43						
<u>NWTPH-Dx/SG</u>												
Diesel	125	10.0	25.0	mg/kg wet	1	125	---	100	76-115%	---	---	
<i>Surr: o-Terphenyl (Surr)</i>		<i>Recovery: 97 %</i>		<i>Limits: 50-150 %</i>		<i>Dilution: 1x</i>						
Matrix Spike (9101201-MS1)						Prepared: 10/01/19 12:56 Analyzed: 10/16/19 21:31						
<u>QC Source Sample: SE-29-0-2.0 (A910822-02)</u>												
<u>NWTPH-Dx/SG</u>												
Diesel	251	23.3	46.5	mg/kg dry	1	291	ND	86	50-150%	---	---	
<i>Surr: o-Terphenyl (Surr)</i>		<i>Recovery: 90 %</i>		<i>Limits: 50-150 %</i>		<i>Dilution: 1x</i>						
Matrix Spike Dup (9101201-MSD1)						Prepared: 10/01/19 12:56 Analyzed: 10/16/19 21:55						
<u>QC Source Sample: SE-29-0-2.0 (A910822-02)</u>												
<u>NWTPH-Dx/SG</u>												
Diesel	308	23.0	46.1	mg/kg dry	1	288	ND	107	50-150%	20	50%	
<i>Surr: o-Terphenyl (Surr)</i>		<i>Recovery: 87 %</i>		<i>Limits: 50-150 %</i>		<i>Dilution: 1x</i>						

Philip Nerenberg



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QUALITY CONTROL (QC) SAMPLE RESULTS

Gasoline Range Hydrocarbons (Benzene through Naphthalene) by NWTPH-Gx

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Soil												
Batch 9091374 - EPA 5035A												
Blank (9091374-BLK1) Prepared: 09/27/19 10:00 Analyzed: 09/27/19 11:48												
<u>NWTPH-Gx (MS)</u>												
Gasoline Range Organics	ND	1.67	3.33	mg/kg wet	50	---	---	---	---	---	---	
Surr: 4-Bromofluorobenzene (Sur)		Recovery: 104 %	Limits: 50-150 %			Dilution: 1x						
1,4-Difluorobenzene (Sur)		103 %	50-150 %			"						
LCS (9091374-BS2) Prepared: 09/27/19 10:00 Analyzed: 09/27/19 11:21												
<u>NWTPH-Gx (MS)</u>												
Gasoline Range Organics	24.9	2.50	5.00	mg/kg wet	50	25.0	---	100	80-120%	---	---	
Surr: 4-Bromofluorobenzene (Sur)		Recovery: 107 %	Limits: 50-150 %			Dilution: 1x						
1,4-Difluorobenzene (Sur)		103 %	50-150 %			"						
Duplicate (9091374-DUP1) Prepared: 09/26/19 20:17 Analyzed: 09/27/19 18:49 V-15												
<u>QC Source Sample: Non-SDG (A910851-08)</u>												
Gasoline Range Organics	ND	2.93	5.85	mg/kg dry	50	---	ND	---	---	---	30%	
Surr: 4-Bromofluorobenzene (Sur)		Recovery: 109 %	Limits: 50-150 %			Dilution: 1x						
1,4-Difluorobenzene (Sur)		106 %	50-150 %			"						



AMENDED REPORT

Maul Foster & Alongi, INC.
2001 NW 19th Ave, STE 200
Portland, OR 97209

Project: **Seaport Tidelands**
Project Number: **1044.02.06-02**
Project Manager: **Emily Hess**

Report ID:
A910822 - 01 09 20 1609

QUALITY CONTROL (QC) SAMPLE RESULTS

Polychlorinated Biphenyls by EPA 8082A

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9091456 - EPA 3546												
Sediment												
Blank (9091456-BLK1)												
Prepared: 09/30/19 13:58 Analyzed: 10/03/19 17:13 C-07												
<u>EPA 8082A</u>												
Aroclor 1016	ND	4.55	9.09	ug/kg wet	1	---	---	---	---	---	---	
Aroclor 1221	ND	4.55	9.09	ug/kg wet	1	---	---	---	---	---	---	
Aroclor 1232	ND	4.55	9.09	ug/kg wet	1	---	---	---	---	---	---	
Aroclor 1242	ND	4.55	9.09	ug/kg wet	1	---	---	---	---	---	---	
Aroclor 1248	ND	4.55	9.09	ug/kg wet	1	---	---	---	---	---	---	
Aroclor 1254	ND	4.55	9.09	ug/kg wet	1	---	---	---	---	---	---	
Aroclor 1260	ND	4.55	9.09	ug/kg wet	1	---	---	---	---	---	---	
Surr: Decachlorobiphenyl (Surr) Recovery: 107 % Limits: 60-125 % Dilution: 1x												
LCS (9091456-BS1)												
Prepared: 09/30/19 13:58 Analyzed: 10/03/19 17:31 C-07												
<u>EPA 8082A</u>												
Aroclor 1016	178	5.00	10.0	ug/kg wet	1	250	---	71	47-134%	---	---	
Aroclor 1260	221	5.00	10.0	ug/kg wet	1	250	---	88	53-140%	---	---	
Surr: Decachlorobiphenyl (Surr) Recovery: 108 % Limits: 60-125 % Dilution: 1x												
Duplicate (9091456-DUP1)												
Prepared: 09/30/19 13:58 Analyzed: 10/03/19 18:24 C-07												
<u>QC Source Sample: SE-29-0-2.0 (A910822-02)</u>												
<u>EPA 8082A</u>												
Aroclor 1016	ND	11.5	23.1	ug/kg dry	1	---	ND	---	---	---	30%	
Aroclor 1221	ND	11.5	23.1	ug/kg dry	1	---	ND	---	---	---	30%	
Aroclor 1232	ND	11.5	23.1	ug/kg dry	1	---	ND	---	---	---	30%	
Aroclor 1242	ND	11.5	23.1	ug/kg dry	1	---	ND	---	---	---	30%	
Aroclor 1248	ND	11.5	23.1	ug/kg dry	1	---	ND	---	---	---	30%	
Aroclor 1254	ND	11.5	23.1	ug/kg dry	1	---	ND	---	---	---	30%	
Aroclor 1260	109	11.5	23.1	ug/kg dry	1	---	38.9	---	---	95	30%	Q-05
Surr: Decachlorobiphenyl (Surr) Recovery: 73 % Limits: 60-125 % Dilution: 1x												
Matrix Spike (9091456-MS1)												
Prepared: 09/30/19 13:58 Analyzed: 10/03/19 18:59 C-07												
<u>QC Source Sample: SE-29-0-2.0 (A910822-02)</u>												
<u>EPA 8082A</u>												
Aroclor 1016	389	11.4	22.9	ug/kg dry	1	572	ND	68	47-134%	---	---	
Aroclor 1260	585	11.4	22.9	ug/kg dry	1	572	38.9	95	53-140%	---	---	

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QUALITY CONTROL (QC) SAMPLE RESULTS

Polychlorinated Biphenyls by EPA 8082A

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9091456 - EPA 3546												
Sediment												
Matrix Spike (9091456-MS1) Prepared: 09/30/19 13:58 Analyzed: 10/03/19 18:59 C-07												
QC Source Sample: SE-29-0-2.0 (A910822-02)												
<i>Surr: Decachlorobiphenyl (Surr) Recovery: 91 % Limits: 60-125 % Dilution: 1x</i>												
Matrix Spike (9091456-MS2) Prepared: 09/30/19 14:01 Analyzed: 10/03/19 18:24 C-07												
QC Source Sample: Non-SDG (A910893-13)												
EPA 8082A												
Aroclor 1016	428	12.1	24.2	ug/kg dry	1	604	ND	71	47-134%	---	---	
Aroclor 1260	482	12.1	24.2	ug/kg dry	1	604	ND	80	53-140%	---	---	
<i>Surr: Decachlorobiphenyl (Surr) Recovery: 87 % Limits: 60-125 % Dilution: 1x</i>												
Matrix Spike Dup (9091456-MSD1) Prepared: 09/30/19 13:58 Analyzed: 10/03/19 19:34 C-07												
QC Source Sample: SE-29-0-2.0 (A910822-02)												
EPA 8082A												
Aroclor 1016	376	11.5	22.9	ug/kg dry	1	573	ND	66	47-134%	3	30%	
Aroclor 1260	554	11.5	22.9	ug/kg dry	1	573	38.9	90	53-140%	5	30%	
<i>Surr: Decachlorobiphenyl (Surr) Recovery: 96 % Limits: 60-125 % Dilution: 1x</i>												
Matrix Spike Dup (9091456-MSD2) Prepared: 09/30/19 14:01 Analyzed: 10/03/19 18:59 C-07												
QC Source Sample: Non-SDG (A910893-13)												
Aroclor 1016	353	12.2	24.4	ug/kg dry	1	609	ND	58	47-134%	19	30%	
Aroclor 1260	388	12.2	24.4	ug/kg dry	1	609	ND	64	53-140%	22	30%	
<i>Surr: Decachlorobiphenyl (Surr) Recovery: 70 % Limits: 60-125 % Dilution: 1x</i>												



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QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100490 - EPA 3546						Sediment						
Blank (9100490-BLK1)			Prepared: 10/01/19 10:34 Analyzed: 10/01/19 21:24									
EPA 8270D												
Acenaphthene	ND	0.00125	0.00250	mg/kg wet	1	---	---	---	---	---	---	
Acenaphthylene	ND	0.00125	0.00250	mg/kg wet	1	---	---	---	---	---	---	
Anthracene	ND	0.00125	0.00250	mg/kg wet	1	---	---	---	---	---	---	
Benz(a)anthracene	ND	0.00125	0.00250	mg/kg wet	1	---	---	---	---	---	---	
Benzo(a)pyrene	ND	0.00188	0.00375	mg/kg wet	1	---	---	---	---	---	---	
Benzo(b)fluoranthene	ND	0.00188	0.00375	mg/kg wet	1	---	---	---	---	---	---	
Benzo(k)fluoranthene	ND	0.00188	0.00375	mg/kg wet	1	---	---	---	---	---	---	
Benzo(g,h,i)perylene	ND	0.00125	0.00250	mg/kg wet	1	---	---	---	---	---	---	
Chrysene	ND	0.00125	0.00250	mg/kg wet	1	---	---	---	---	---	---	
Dibenz(a,h)anthracene	ND	0.00125	0.00250	mg/kg wet	1	---	---	---	---	---	---	
Fluoranthene	ND	0.00125	0.00250	mg/kg wet	1	---	---	---	---	---	---	
Fluorene	ND	0.00125	0.00250	mg/kg wet	1	---	---	---	---	---	---	
Indeno(1,2,3-cd)pyrene	ND	0.00125	0.00250	mg/kg wet	1	---	---	---	---	---	---	
1-Methylnaphthalene	ND	0.00250	0.00500	mg/kg wet	1	---	---	---	---	---	---	
2-Methylnaphthalene	ND	0.00250	0.00500	mg/kg wet	1	---	---	---	---	---	---	
Naphthalene	ND	0.00250	0.00500	mg/kg wet	1	---	---	---	---	---	---	
Phenanthrene	ND	0.00125	0.00250	mg/kg wet	1	---	---	---	---	---	---	
Pyrene	ND	0.00125	0.00250	mg/kg wet	1	---	---	---	---	---	---	
Carbazole	ND	0.00188	0.00375	mg/kg wet	1	---	---	---	---	---	---	
Dibenzofuran	ND	0.00125	0.00250	mg/kg wet	1	---	---	---	---	---	---	
4-Chloro-3-methylphenol	ND	0.0125	0.0250	mg/kg wet	1	---	---	---	---	---	---	
2-Chlorophenol	ND	0.00625	0.0125	mg/kg wet	1	---	---	---	---	---	---	
2,4-Dichlorophenol	ND	0.00625	0.0125	mg/kg wet	1	---	---	---	---	---	---	
2,4-Dimethylphenol	ND	0.00625	0.0125	mg/kg wet	1	---	---	---	---	---	---	
2,4-Dinitrophenol	ND	0.0312	0.0625	mg/kg wet	1	---	---	---	---	---	---	
4,6-Dinitro-2-methylphenol	ND	0.0312	0.0625	mg/kg wet	1	---	---	---	---	---	---	
2-Methylphenol	ND	0.00312	0.00625	mg/kg wet	1	---	---	---	---	---	---	
3+4-Methylphenol(s)	ND	0.00312	0.00625	mg/kg wet	1	---	---	---	---	---	---	
2-Nitrophenol	ND	0.0125	0.0250	mg/kg wet	1	---	---	---	---	---	---	
4-Nitrophenol	ND	0.0125	0.0250	mg/kg wet	1	---	---	---	---	---	---	
Pentachlorophenol (PCP)	ND	0.0125	0.0250	mg/kg wet	1	---	---	---	---	---	---	
Phenol	ND	0.00250	0.00500	mg/kg wet	1	---	---	---	---	---	---	
2,3,4,6-Tetrachlorophenol	ND	0.00625	0.0125	mg/kg wet	1	---	---	---	---	---	---	

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A910822 - 01 09 20 1609
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QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100490 - EPA 3546						Sediment						
Blank (9100490-BLK1)			Prepared: 10/01/19 10:34 Analyzed: 10/01/19 21:24									
2,3,5,6-Tetrachlorophenol	ND	0.00625	0.0125	mg/kg wet	1	---	---	---	---	---	---	
2,4,5-Trichlorophenol	ND	0.00625	0.0125	mg/kg wet	1	---	---	---	---	---	---	
2,4,6-Trichlorophenol	ND	0.00625	0.0125	mg/kg wet	1	---	---	---	---	---	---	
Bis(2-ethylhexyl)phthalate	ND	0.0188	0.0375	mg/kg wet	1	---	---	---	---	---	---	
Butyl benzyl phthalate	ND	0.00625	0.0125	mg/kg wet	1	---	---	---	---	---	---	
Diethylphthalate	ND	0.00625	0.0125	mg/kg wet	1	---	---	---	---	---	---	
Dimethylphthalate	ND	0.00625	0.0125	mg/kg wet	1	---	---	---	---	---	---	
Di-n-butylphthalate	ND	0.00625	0.0125	mg/kg wet	1	---	---	---	---	---	---	
Di-n-octyl phthalate	ND	0.0100	0.0125	mg/kg wet	1	---	---	---	---	---	---	
N-Nitrosodimethylamine	ND	0.00312	0.00625	mg/kg wet	1	---	---	---	---	---	---	
N-Nitroso-di-n-propylamine	ND	0.00312	0.00625	mg/kg wet	1	---	---	---	---	---	---	
N-Nitrosodiphenylamine	ND	0.00312	0.00625	mg/kg wet	1	---	---	---	---	---	---	
Bis(2-Chloroethoxy) methane	ND	0.00312	0.00625	mg/kg wet	1	---	---	---	---	---	---	
Bis(2-Chloroethyl) ether	ND	0.00312	0.00625	mg/kg wet	1	---	---	---	---	---	---	
2,2'-Oxybis(1-Chloropropane)	ND	0.00312	0.00625	mg/kg wet	1	---	---	---	---	---	---	
Hexachlorobenzene	ND	0.00125	0.00250	mg/kg wet	1	---	---	---	---	---	---	
Hexachlorobutadiene	ND	0.00312	0.00625	mg/kg wet	1	---	---	---	---	---	---	
Hexachlorocyclopentadiene	ND	0.00625	0.0125	mg/kg wet	1	---	---	---	---	---	---	
Hexachloroethane	ND	0.00312	0.00625	mg/kg wet	1	---	---	---	---	---	---	
2-Chloronaphthalene	ND	0.00125	0.00250	mg/kg wet	1	---	---	---	---	---	---	
1,2-Dichlorobenzene	ND	0.00312	0.00625	mg/kg wet	1	---	---	---	---	---	---	
1,3-Dichlorobenzene	ND	0.00312	0.00625	mg/kg wet	1	---	---	---	---	---	---	
1,4-Dichlorobenzene	ND	0.00312	0.00625	mg/kg wet	1	---	---	---	---	---	---	
1,2,4-Trichlorobenzene	ND	0.00312	0.00625	mg/kg wet	1	---	---	---	---	---	---	
4-Bromophenyl phenyl ether	ND	0.00312	0.00625	mg/kg wet	1	---	---	---	---	---	---	
4-Chlorophenyl phenyl ether	ND	0.00312	0.00625	mg/kg wet	1	---	---	---	---	---	---	
Aniline	ND	0.00625	0.0125	mg/kg wet	1	---	---	---	---	---	---	
4-Chloroaniline	ND	0.00312	0.00625	mg/kg wet	1	---	---	---	---	---	---	
2-Nitroaniline	ND	0.0250	0.0500	mg/kg wet	1	---	---	---	---	---	---	
3-Nitroaniline	ND	0.0250	0.0500	mg/kg wet	1	---	---	---	---	---	---	
4-Nitroaniline	ND	0.0250	0.0500	mg/kg wet	1	---	---	---	---	---	---	
Nitrobenzene	ND	0.0125	0.0250	mg/kg wet	1	---	---	---	---	---	---	
2,4-Dinitrotoluene	ND	0.0125	0.0250	mg/kg wet	1	---	---	---	---	---	---	
2,6-Dinitrotoluene	ND	0.0125	0.0250	mg/kg wet	1	---	---	---	---	---	---	

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A910822 - 01 09 20 1609
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QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100490 - EPA 3546												
Sediment												
Blank (9100490-BLK1)												
Prepared: 10/01/19 10:34 Analyzed: 10/01/19 21:24												
Benzoic acid	ND	0.157	0.312	mg/kg wet	1	---	---	---	---	---	---	
Benzyl alcohol	ND	0.00625	0.0125	mg/kg wet	1	---	---	---	---	---	---	
Isophorone	ND	0.00312	0.00625	mg/kg wet	1	---	---	---	---	---	---	
Azobenzene (1,2-DPH)	ND	0.00312	0.00625	mg/kg wet	1	---	---	---	---	---	---	
Bis(2-Ethylhexyl) adipate	ND	0.0312	0.0625	mg/kg wet	1	---	---	---	---	---	---	
3,3'-Dichlorobenzidine	ND	0.0250	0.0500	mg/kg wet	1	---	---	---	---	---	---	Q-52
1,2-Dinitrobenzene	ND	0.0312	0.0625	mg/kg wet	1	---	---	---	---	---	---	
1,3-Dinitrobenzene	ND	0.0312	0.0625	mg/kg wet	1	---	---	---	---	---	---	
1,4-Dinitrobenzene	ND	0.0312	0.0625	mg/kg wet	1	---	---	---	---	---	---	
Pyridine	ND	0.00625	0.0125	mg/kg wet	1	---	---	---	---	---	---	
<i>Surr: Nitrobenzene-d5 (Surr) Recovery: 69 % Limits: 37-122 % Dilution: 1x</i>												
<i>2-Fluorobiphenyl (Surr) 57 % 44-115 % "</i>												
<i>Phenol-d6 (Surr) 70 % 33-122 % "</i>												
<i>p-Terphenyl-d14 (Surr) 76 % 54-127 % "</i>												
<i>2-Fluorophenol (Surr) 64 % 35-115 % "</i>												
<i>2,4,6-Tribromophenol (Surr) 60 % 39-132 % "</i>												

LCS (9100490-BS1)												
Prepared: 10/01/19 10:34 Analyzed: 10/01/19 21:59												
EPA 8270D												
Acenaphthene	0.366	0.00532	0.0107	mg/kg wet	4	0.533	---	69	40-122%	---	---	
Acenaphthylene	0.391	0.00532	0.0107	mg/kg wet	4	0.533	---	73	32-132%	---	---	
Anthracene	0.415	0.00532	0.0107	mg/kg wet	4	0.533	---	78	47-123%	---	---	
Benz(a)anthracene	0.424	0.00532	0.0107	mg/kg wet	4	0.533	---	79	49-126%	---	---	
Benzo(a)pyrene	0.438	0.00800	0.0160	mg/kg wet	4	0.533	---	82	45-129%	---	---	
Benzo(b)fluoranthene	0.427	0.00800	0.0160	mg/kg wet	4	0.533	---	80	45-132%	---	---	
Benzo(k)fluoranthene	0.423	0.00800	0.0160	mg/kg wet	4	0.533	---	79	47-132%	---	---	
Benzo(g,h,i)perylene	0.445	0.00532	0.0107	mg/kg wet	4	0.533	---	83	43-134%	---	---	
Chrysene	0.414	0.00532	0.0107	mg/kg wet	4	0.533	---	78	50-124%	---	---	
Dibenz(a,h)anthracene	0.424	0.00532	0.0107	mg/kg wet	4	0.533	---	80	45-134%	---	---	
Fluoranthene	0.456	0.00532	0.0107	mg/kg wet	4	0.533	---	85	50-127%	---	---	
Fluorene	0.384	0.00532	0.0107	mg/kg wet	4	0.533	---	72	43-125%	---	---	
Indeno(1,2,3-cd)pyrene	0.402	0.00532	0.0107	mg/kg wet	4	0.533	---	75	45-133%	---	---	
1-Methylnaphthalene	0.368	0.0107	0.0213	mg/kg wet	4	0.533	---	69	40-120%	---	---	
2-Methylnaphthalene	0.374	0.0107	0.0213	mg/kg wet	4	0.533	---	70	38-122%	---	---	

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A910822 - 01 09 20 1609
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QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100490 - EPA 3546												
Sediment												
LCS (9100490-BS1)												
Prepared: 10/01/19 10:34						Analyzed: 10/01/19 21:59						
Naphthalene	0.359	0.0107	0.0213	mg/kg wet	4	0.533	---	67	35-123%	---	---	
Phenanthrene	0.395	0.00532	0.0107	mg/kg wet	4	0.533	---	74	50-121%	---	---	
Pyrene	0.464	0.00532	0.0107	mg/kg wet	4	0.533	---	87	47-127%	---	---	
Carbazole	0.464	0.00800	0.0160	mg/kg wet	4	0.533	---	87	50-122%	---	---	
Dibenzofuran	0.384	0.00532	0.0107	mg/kg wet	4	0.533	---	72	44-120%	---	---	
4-Chloro-3-methylphenol	0.415	0.0532	0.107	mg/kg wet	4	0.533	---	78	45-122%	---	---	
2-Chlorophenol	0.367	0.0267	0.0532	mg/kg wet	4	0.533	---	69	34-121%	---	---	
2,4-Dichlorophenol	0.384	0.0267	0.0532	mg/kg wet	4	0.533	---	72	40-122%	---	---	
2,4-Dimethylphenol	0.431	0.0267	0.0532	mg/kg wet	4	0.533	---	81	30-127%	---	---	
2,4-Dinitrophenol	0.466	0.133	0.267	mg/kg wet	4	0.533	---	87	5-137%	---	---	
4,6-Dinitro-2-methylphenol	0.517	0.133	0.267	mg/kg wet	4	0.533	---	97	29-132%	---	---	
2-Methylphenol	0.427	0.0133	0.0267	mg/kg wet	4	0.533	---	80	32-122%	---	---	
3+4-Methylphenol(s)	0.434	0.0133	0.0267	mg/kg wet	4	0.533	---	81	34-120%	---	---	
2-Nitrophenol	0.417	0.0532	0.107	mg/kg wet	4	0.533	---	78	36-123%	---	---	
4-Nitrophenol	0.495	0.0532	0.107	mg/kg wet	4	0.533	---	93	30-132%	---	---	
Pentachlorophenol (PCP)	0.434	0.0532	0.107	mg/kg wet	4	0.533	---	81	25-133%	---	---	
Phenol	0.393	0.0107	0.0213	mg/kg wet	4	0.533	---	74	34-120%	---	---	
2,3,4,6-Tetrachlorophenol	0.414	0.0267	0.0532	mg/kg wet	4	0.533	---	78	44-125%	---	---	
2,3,5,6-Tetrachlorophenol	0.429	0.0267	0.0532	mg/kg wet	4	0.533	---	80	40-120%	---	---	
2,4,5-Trichlorophenol	0.416	0.0267	0.0532	mg/kg wet	4	0.533	---	78	41-124%	---	---	
2,4,6-Trichlorophenol	0.405	0.0267	0.0532	mg/kg wet	4	0.533	---	76	39-126%	---	---	
Bis(2-ethylhexyl)phthalate	0.441	0.0800	0.160	mg/kg wet	4	0.533	---	83	51-133%	---	---	
Butyl benzyl phthalate	0.444	0.0267	0.0532	mg/kg wet	4	0.533	---	83	48-132%	---	---	
Diethylphthalate	0.436	0.0267	0.0532	mg/kg wet	4	0.533	---	82	50-124%	---	---	
Dimethylphthalate	0.409	0.0267	0.0532	mg/kg wet	4	0.533	---	77	48-124%	---	---	
Di-n-butylphthalate	0.448	0.0267	0.0532	mg/kg wet	4	0.533	---	84	51-128%	---	---	
Di-n-octyl phthalate	0.457	0.0428	0.0532	mg/kg wet	4	0.533	---	86	44-140%	---	---	
N-Nitrosodimethylamine	0.289	0.0133	0.0267	mg/kg wet	4	0.533	---	54	23-120%	---	---	
N-Nitroso-di-n-propylamine	0.382	0.0133	0.0267	mg/kg wet	4	0.533	---	72	36-120%	---	---	
N-Nitrosodiphenylamine	0.407	0.0133	0.0267	mg/kg wet	4	0.533	---	76	38-127%	---	---	
Bis(2-Chloroethoxy) methane	0.367	0.0133	0.0267	mg/kg wet	4	0.533	---	69	36-121%	---	---	
Bis(2-Chloroethyl) ether	0.316	0.0133	0.0267	mg/kg wet	4	0.533	---	59	31-120%	---	---	Q-41
2,2'-Oxybis(1-Chloropropane)	0.318	0.0133	0.0267	mg/kg wet	4	0.533	---	60	33-131%	---	---	
Hexachlorobenzene	0.403	0.00532	0.0107	mg/kg wet	4	0.533	---	76	44-122%	---	---	

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tideland Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A910822 - 01 09 20 1609
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QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100490 - EPA 3546												
Sediment												
LCS (9100490-BS1)			Prepared: 10/01/19 10:34 Analyzed: 10/01/19 21:59									
Hexachlorobutadiene	0.337	0.0133	0.0267	mg/kg wet	4	0.533	---	63	32-123%	---	---	
Hexachlorocyclopentadiene	0.420	0.0267	0.0532	mg/kg wet	4	0.533	---	79	5-140%	---	---	Q-41
Hexachloroethane	0.323	0.0133	0.0267	mg/kg wet	4	0.533	---	61	28-120%	---	---	
2-Chloronaphthalene	0.379	0.00532	0.0107	mg/kg wet	4	0.533	---	71	41-120%	---	---	
1,2-Dichlorobenzene	0.332	0.0133	0.0267	mg/kg wet	4	0.533	---	62	33-120%	---	---	
1,3-Dichlorobenzene	0.316	0.0133	0.0267	mg/kg wet	4	0.533	---	59	30-120%	---	---	
1,4-Dichlorobenzene	0.321	0.0133	0.0267	mg/kg wet	4	0.533	---	60	31-120%	---	---	
1,2,4-Trichlorobenzene	0.336	0.0133	0.0267	mg/kg wet	4	0.533	---	63	34-120%	---	---	
4-Bromophenyl phenyl ether	0.396	0.0133	0.0267	mg/kg wet	4	0.533	---	74	46-124%	---	---	
4-Chlorophenyl phenyl ether	0.378	0.0133	0.0267	mg/kg wet	4	0.533	---	71	45-121%	---	---	
Aniline	0.327	0.0267	0.0532	mg/kg wet	4	0.533	---	61	7-120%	---	---	
4-Chloroaniline	0.217	0.0133	0.0267	mg/kg wet	4	0.533	---	41	16-120%	---	---	Q-31
2-Nitroaniline	0.414	0.107	0.213	mg/kg wet	4	0.533	---	78	44-127%	---	---	
3-Nitroaniline	0.393	0.107	0.213	mg/kg wet	4	0.533	---	74	33-120%	---	---	
4-Nitroaniline	0.588	0.107	0.213	mg/kg wet	4	0.533	---	110	35-120%	---	---	Q-41
Nitrobenzene	0.375	0.0532	0.107	mg/kg wet	4	0.533	---	70	34-122%	---	---	
2,4-Dinitrotoluene	0.418	0.0532	0.107	mg/kg wet	4	0.533	---	78	48-126%	---	---	
2,6-Dinitrotoluene	0.412	0.0532	0.107	mg/kg wet	4	0.533	---	77	46-124%	---	---	
Benzoic acid	0.659	0.400	0.400	mg/kg wet	4	1.07	---	62	5-140%	---	---	
Benzyl alcohol	0.381	0.0267	0.0532	mg/kg wet	4	0.533	---	71	29-122%	---	---	
Isophorone	0.363	0.0133	0.0267	mg/kg wet	4	0.533	---	68	30-122%	---	---	
Azobenzene (1,2-DPH)	0.359	0.0133	0.0267	mg/kg wet	4	0.533	---	67	39-125%	---	---	
Bis(2-Ethylhexyl) adipate	0.440	0.133	0.267	mg/kg wet	4	0.533	---	83	60-121%	---	---	
3,3'-Dichlorobenzidine	1.32	0.107	0.213	mg/kg wet	4	1.07	---	124	22-121%	---	---	Q-29, Q-31
1,2-Dinitrobenzene	0.397	0.133	0.267	mg/kg wet	4	0.533	---	75	44-120%	---	---	
1,3-Dinitrobenzene	0.434	0.133	0.267	mg/kg wet	4	0.533	---	81	42-127%	---	---	
1,4-Dinitrobenzene	0.464	0.133	0.267	mg/kg wet	4	0.533	---	87	37-132%	---	---	
Pyridine	0.203	0.0267	0.0532	mg/kg wet	4	0.533	---	38	5-120%	---	---	
<i>Surr: Nitrobenzene-d5 (Surr)</i>		<i>Recovery: 70 %</i>		<i>Limits: 37-122 %</i>		<i>Dilution: 4x</i>						
<i>2-Fluorobiphenyl (Surr)</i>		<i>68 %</i>		<i>44-115 %</i>		<i>"</i>						
<i>Phenol-d6 (Surr)</i>		<i>73 %</i>		<i>33-122 %</i>		<i>"</i>						
<i>p-Terphenyl-d14 (Surr)</i>		<i>82 %</i>		<i>54-127 %</i>		<i>"</i>						
<i>2-Fluorophenol (Surr)</i>		<i>62 %</i>		<i>35-115 %</i>		<i>"</i>						
<i>2,4,6-Tribromophenol (Surr)</i>		<i>74 %</i>		<i>39-132 %</i>		<i>"</i>						



AMENDED REPORT

Maul Foster & Alongi, INC.
2001 NW 19th Ave, STE 200
Portland, OR 97209

Project: **Seaport Tidelands**
Project Number: **1044.02.06-02**
Project Manager: **Emily Hess**

Report ID:
A910822 - 01 09 20 1609

QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100490 - EPA 3546												
Sediment												
Duplicate (9100490-DUP2)												
Prepared: 10/01/19 10:34 Analyzed: 10/02/19 14:15												
QC Source Sample: SE-29-0-2.0 (A910822-02RE1)												
EPA 8270D												
Acenaphthene	0.0710	0.0306	0.0615	mg/kg dry	10	---	0.135	---	---	62	30%	Q-04
Acenaphthylene	ND	0.0306	0.0615	mg/kg dry	10	---	ND	---	---	---	30%	
Anthracene	0.103	0.0306	0.0615	mg/kg dry	10	---	0.204	---	---	66	30%	Q-04
Benz(a)anthracene	0.103	0.0306	0.0615	mg/kg dry	10	---	0.218	---	---	71	30%	Q-04
Benzo(a)pyrene	0.0937	0.0461	0.0922	mg/kg dry	10	---	0.154	---	---	48	30%	Q-04
Benzo(b)fluoranthene	0.100	0.0461	0.0922	mg/kg dry	10	---	0.180	---	---	57	30%	Q-04
Benzo(k)fluoranthene	0.0492	0.0461	0.0922	mg/kg dry	10	---	0.0758	---	---	42	30%	Q-04, J
Benzo(g,h,i)perylene	0.0400	0.0306	0.0615	mg/kg dry	10	---	0.0680	---	---	52	30%	Q-04, J
Chrysene	0.0879	0.0306	0.0615	mg/kg dry	10	---	0.199	---	---	78	30%	Q-04
Dibenz(a,h)anthracene	ND	0.0306	0.0615	mg/kg dry	10	---	ND	---	---	---	30%	
Fluoranthene	0.503	0.0306	0.0615	mg/kg dry	10	---	1.15	---	---	78	30%	Q-04
Fluorene	0.0660	0.0306	0.0615	mg/kg dry	10	---	0.136	---	---	69	30%	Q-04
Indeno(1,2,3-cd)pyrene	0.0339	0.0306	0.0615	mg/kg dry	10	---	0.0695	---	---	69	30%	Q-04, J
1-Methylnaphthalene	ND	0.0615	0.123	mg/kg dry	10	---	0.0767	---	---	***	30%	Q-04
2-Methylnaphthalene	0.0696	0.0615	0.123	mg/kg dry	10	---	0.149	---	---	72	30%	Q-04, J
Naphthalene	0.186	0.0615	0.123	mg/kg dry	10	---	0.491	---	---	90	30%	Q-04
Phenanthrene	0.255	0.0306	0.0615	mg/kg dry	10	---	0.491	---	---	63	30%	Q-04
Pyrene	0.347	0.0306	0.0615	mg/kg dry	10	---	0.823	---	---	81	30%	Q-04
Carbazole	ND	0.0461	0.0922	mg/kg dry	10	---	0.0536	---	---	***	30%	Q-04
Dibenzofuran	0.0566	0.0306	0.0615	mg/kg dry	10	---	0.145	---	---	88	30%	Q-04, J
4-Chloro-3-methylphenol	ND	0.306	0.615	mg/kg dry	10	---	ND	---	---	---	30%	
2-Chlorophenol	ND	0.154	0.306	mg/kg dry	10	---	ND	---	---	---	30%	
2,4-Dichlorophenol	ND	0.154	0.306	mg/kg dry	10	---	ND	---	---	---	30%	
2,4-Dimethylphenol	ND	0.154	0.306	mg/kg dry	10	---	ND	---	---	---	30%	
2,4-Dinitrophenol	ND	0.767	1.54	mg/kg dry	10	---	ND	---	---	---	30%	
4,6-Dinitro-2-methylphenol	ND	0.767	1.54	mg/kg dry	10	---	ND	---	---	---	30%	
2-Methylphenol	ND	0.0767	0.154	mg/kg dry	10	---	ND	---	---	---	30%	
3+4-Methylphenol(s)	1.59	0.0767	0.154	mg/kg dry	10	---	1.60	---	---	0.5	30%	
2-Nitrophenol	ND	0.306	0.615	mg/kg dry	10	---	ND	---	---	---	30%	
4-Nitrophenol	ND	0.306	0.615	mg/kg dry	10	---	ND	---	---	---	30%	
Pentachlorophenol (PCP)	ND	0.306	0.615	mg/kg dry	10	---	ND	---	---	---	30%	

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A910822 - 01 09 20 1609
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QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100490 - EPA 3546						Sediment						
Duplicate (9100490-DUP2)						Prepared: 10/01/19 10:34 Analyzed: 10/02/19 14:15						
QC Source Sample: SE-29-0-2.0 (A910822-02RE1)												
Phenol	0.199	0.0615	0.123	mg/kg dry	10	---	0.571	---	---	97	30%	M-04, Q-04
2,3,4,6-Tetrachlorophenol	ND	0.154	0.306	mg/kg dry	10	---	ND	---	---	---	30%	
2,3,5,6-Tetrachlorophenol	ND	0.154	0.306	mg/kg dry	10	---	ND	---	---	---	30%	
2,4,5-Trichlorophenol	ND	0.154	0.306	mg/kg dry	10	---	ND	---	---	---	30%	
2,4,6-Trichlorophenol	ND	0.154	0.306	mg/kg dry	10	---	ND	---	---	---	30%	
Bis(2-ethylhexyl)phthalate	ND	0.461	0.922	mg/kg dry	10	---	ND	---	---	---	30%	
Butyl benzyl phthalate	ND	0.154	0.306	mg/kg dry	10	---	ND	---	---	---	30%	
Diethylphthalate	ND	0.154	0.306	mg/kg dry	10	---	ND	---	---	---	30%	
Dimethylphthalate	ND	0.154	0.306	mg/kg dry	10	---	ND	---	---	---	30%	
Di-n-butylphthalate	ND	0.154	0.306	mg/kg dry	10	---	0.213	---	---	***	30%	Q-04
Di-n-octyl phthalate	ND	0.247	0.306	mg/kg dry	10	---	ND	---	---	---	30%	
N-Nitrosodimethylamine	ND	0.0767	0.154	mg/kg dry	10	---	ND	---	---	---	30%	
N-Nitroso-di-n-propylamine	ND	0.0767	0.154	mg/kg dry	10	---	ND	---	---	---	30%	
N-Nitrosodiphenylamine	ND	0.0767	0.154	mg/kg dry	10	---	ND	---	---	---	30%	
Bis(2-Chloroethoxy) methane	ND	0.0767	0.154	mg/kg dry	10	---	ND	---	---	---	30%	
Bis(2-Chloroethyl) ether	ND	0.0767	0.154	mg/kg dry	10	---	ND	---	---	---	30%	
2,2'-Oxybis(1-Chloropropane)	ND	0.0767	0.154	mg/kg dry	10	---	ND	---	---	---	30%	
Hexachlorobenzene	ND	0.0306	0.0615	mg/kg dry	10	---	ND	---	---	---	30%	
Hexachlorobutadiene	ND	0.0767	0.154	mg/kg dry	10	---	ND	---	---	---	30%	
Hexachlorocyclopentadiene	ND	0.154	0.306	mg/kg dry	10	---	ND	---	---	---	30%	
Hexachloroethane	ND	0.0767	0.154	mg/kg dry	10	---	ND	---	---	---	30%	
2-Chloronaphthalene	ND	0.0306	0.0615	mg/kg dry	10	---	ND	---	---	---	30%	
1,2-Dichlorobenzene	ND	0.0767	0.154	mg/kg dry	10	---	ND	---	---	---	30%	
1,3-Dichlorobenzene	ND	0.0767	0.154	mg/kg dry	10	---	ND	---	---	---	30%	
1,4-Dichlorobenzene	ND	0.0767	0.154	mg/kg dry	10	---	ND	---	---	---	30%	
1,2,4-Trichlorobenzene	ND	0.0767	0.154	mg/kg dry	10	---	ND	---	---	---	30%	
4-Bromophenyl phenyl ether	ND	0.0767	0.154	mg/kg dry	10	---	ND	---	---	---	30%	
4-Chlorophenyl phenyl ether	ND	0.0767	0.154	mg/kg dry	10	---	ND	---	---	---	30%	
Aniline	ND	0.306	0.306	mg/kg dry	10	---	ND	---	---	---	30%	
4-Chloroaniline	ND	0.0767	0.154	mg/kg dry	10	---	ND	---	---	---	30%	
2-Nitroaniline	ND	0.615	1.23	mg/kg dry	10	---	ND	---	---	---	30%	
3-Nitroaniline	ND	0.615	1.23	mg/kg dry	10	---	ND	---	---	---	30%	
4-Nitroaniline	ND	0.615	1.23	mg/kg dry	10	---	ND	---	---	---	30%	

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A910822 - 01 09 20 1609
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QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100490 - EPA 3546												
Sediment												
Duplicate (9100490-DUP2)												
Prepared: 10/01/19 10:34 Analyzed: 10/02/19 14:15												
QC Source Sample: SE-29-0-2.0 (A910822-02RE1)												
Nitrobenzene	ND	0.306	0.615	mg/kg dry	10	---	ND	---	---	---	30%	
2,4-Dinitrotoluene	ND	0.306	0.615	mg/kg dry	10	---	ND	---	---	---	30%	
2,6-Dinitrotoluene	ND	0.306	0.615	mg/kg dry	10	---	ND	---	---	---	30%	
Benzoic acid	ND	3.85	7.67	mg/kg dry	10	---	ND	---	---	---	30%	
Benzyl alcohol	ND	0.154	0.306	mg/kg dry	10	---	ND	---	---	---	30%	
Isophorone	ND	0.0767	0.154	mg/kg dry	10	---	ND	---	---	---	30%	
Azobenzene (1,2-DPH)	ND	0.0767	0.154	mg/kg dry	10	---	ND	---	---	---	30%	
Bis(2-Ethylhexyl) adipate	2.82	0.767	1.54	mg/kg dry	10	---	2.18	---	---	26	30%	
3,3'-Dichlorobenzidine	ND	0.615	1.23	mg/kg dry	10	---	ND	---	---	---	30%	Q-52
1,2-Dinitrobenzene	ND	0.767	1.54	mg/kg dry	10	---	ND	---	---	---	30%	
1,3-Dinitrobenzene	ND	0.767	1.54	mg/kg dry	10	---	ND	---	---	---	30%	
1,4-Dinitrobenzene	ND	0.767	1.54	mg/kg dry	10	---	ND	---	---	---	30%	
Pyridine	ND	0.154	0.306	mg/kg dry	10	---	ND	---	---	---	30%	
<i>Surr: Nitrobenzene-d5 (Surr) Recovery: 71 % Limits: 37-122 % Dilution: 10x</i>												
<i>2-Fluorobiphenyl (Surr) 64 % 44-115 % "</i>												
<i>Phenol-d6 (Surr) 73 % 33-122 % "</i>												
<i>p-Terphenyl-d14 (Surr) 73 % 54-127 % "</i>												
<i>2-Fluorophenol (Surr) 71 % 35-115 % "</i>												
<i>2,4,6-Tribromophenol (Surr) 107 % 39-132 % "</i>												

Matrix Spike (9100490-MS1)												
Prepared: 10/01/19 10:34 Analyzed: 10/02/19 14:51												
QC Source Sample: SE-29-0-2.0 (A910822-02RE1)												
EPA 8270D												
Acenaphthene	1.24	0.0306	0.0614	mg/kg dry	10	1.23	0.135	90	40-122%	---	---	
Acenaphthylene	1.29	0.0306	0.0614	mg/kg dry	10	1.23	ND	105	32-132%	---	---	
Anthracene	1.33	0.0306	0.0614	mg/kg dry	10	1.23	0.204	92	47-123%	---	---	
Benz(a)anthracene	1.27	0.0306	0.0614	mg/kg dry	10	1.23	0.218	85	49-126%	---	---	
Benzo(a)pyrene	1.31	0.0460	0.0920	mg/kg dry	10	1.23	0.154	94	45-129%	---	---	
Benzo(b)fluoranthene	1.29	0.0460	0.0920	mg/kg dry	10	1.23	0.180	90	45-132%	---	---	
Benzo(k)fluoranthene	1.20	0.0460	0.0920	mg/kg dry	10	1.23	0.0758	91	47-132%	---	---	
Benzo(g,h,i)perylene	1.31	0.0306	0.0614	mg/kg dry	10	1.23	0.0680	101	43-134%	---	---	
Chrysene	1.28	0.0306	0.0614	mg/kg dry	10	1.23	0.199	88	50-124%	---	---	
Dibenz(a,h)anthracene	1.22	0.0306	0.0614	mg/kg dry	10	1.23	ND	100	45-134%	---	---	

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tideland Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A910822 - 01 09 20 1609
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QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100490 - EPA 3546						Sediment						
Matrix Spike (9100490-MS1)						Prepared: 10/01/19 10:34 Analyzed: 10/02/19 14:51						
QC Source Sample: SE-29-0-2.0 (A910822-02RE1)												
Fluoranthene	1.58	0.0306	0.0614	mg/kg dry	10	1.23	1.15	35	50-127%	---	---	Q-01
Fluorene	1.30	0.0306	0.0614	mg/kg dry	10	1.23	0.136	95	43-125%	---	---	
Indeno(1,2,3-cd)pyrene	1.14	0.0306	0.0614	mg/kg dry	10	1.23	0.0695	87	45-133%	---	---	
1-Methylnaphthalene	1.25	0.0614	0.123	mg/kg dry	10	1.23	0.0767	96	40-120%	---	---	
2-Methylnaphthalene	1.28	0.0614	0.123	mg/kg dry	10	1.23	0.149	92	38-122%	---	---	
Naphthalene	1.37	0.0614	0.123	mg/kg dry	10	1.23	0.491	71	35-123%	---	---	
Phenanthrene	1.35	0.0306	0.0614	mg/kg dry	10	1.23	0.491	70	50-121%	---	---	
Pyrene	1.49	0.0306	0.0614	mg/kg dry	10	1.23	0.823	55	47-127%	---	---	
Carbazole	1.23	0.0460	0.0920	mg/kg dry	10	1.23	0.0536	96	50-122%	---	---	
Dibenzofuran	1.26	0.0306	0.0614	mg/kg dry	10	1.23	0.145	91	44-120%	---	---	
4-Chloro-3-methylphenol	1.32	0.306	0.614	mg/kg dry	10	1.23	ND	108	45-122%	---	---	
2-Chlorophenol	1.18	0.153	0.306	mg/kg dry	10	1.23	ND	96	34-121%	---	---	
2,4-Dichlorophenol	1.31	0.153	0.306	mg/kg dry	10	1.23	ND	107	40-122%	---	---	
2,4-Dimethylphenol	1.49	0.153	0.306	mg/kg dry	10	1.23	ND	122	30-127%	---	---	
2,4-Dinitrophenol	ND	0.766	1.53	mg/kg dry	10	1.23	ND		5-137%	---	---	Q-11, Q-41
4,6-Dinitro-2-methylphenol	0.921	0.766	1.53	mg/kg dry	10	1.23	ND	75	29-132%	---	---	Q-41, J
2-Methylphenol	1.21	0.0766	0.153	mg/kg dry	10	1.23	ND	98	32-122%	---	---	
3+4-Methylphenol(s)	2.87	0.0766	0.153	mg/kg dry	10	1.23	1.60	104	34-120%	---	---	
2-Nitrophenol	1.43	0.306	0.614	mg/kg dry	10	1.23	ND	116	36-123%	---	---	
4-Nitrophenol	1.30	0.306	0.614	mg/kg dry	10	1.23	ND	106	30-132%	---	---	
Pentachlorophenol (PCP)	1.48	0.306	0.614	mg/kg dry	10	1.23	ND	121	25-133%	---	---	
Phenol	1.29	0.0614	0.123	mg/kg dry	10	1.23	0.571	58	34-120%	---	---	
2,3,4,6-Tetrachlorophenol	1.30	0.153	0.306	mg/kg dry	10	1.23	ND	106	44-125%	---	---	
2,3,5,6-Tetrachlorophenol	1.41	0.153	0.306	mg/kg dry	10	1.23	ND	115	40-120%	---	---	
2,4,5-Trichlorophenol	1.36	0.153	0.306	mg/kg dry	10	1.23	ND	111	41-124%	---	---	
2,4,6-Trichlorophenol	1.37	0.153	0.306	mg/kg dry	10	1.23	ND	112	39-126%	---	---	
Bis(2-ethylhexyl)phthalate	1.57	0.460	0.920	mg/kg dry	10	1.23	ND	128	51-133%	---	---	
Butyl benzyl phthalate	1.46	0.153	0.306	mg/kg dry	10	1.23	ND	119	48-132%	---	---	
Diethylphthalate	1.33	0.153	0.306	mg/kg dry	10	1.23	ND	108	50-124%	---	---	
Dimethylphthalate	1.28	0.153	0.306	mg/kg dry	10	1.23	ND	105	48-124%	---	---	
Di-n-butylphthalate	1.41	0.153	0.306	mg/kg dry	10	1.23	0.213	97	51-128%	---	---	
Di-n-octyl phthalate	1.73	0.246	0.306	mg/kg dry	10	1.23	ND	141	44-140%	---	---	Q-01
N-Nitrosodimethylamine	0.793	0.0766	0.153	mg/kg dry	10	1.23	ND	65	23-120%	---	---	

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tideland Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A910822 - 01 09 20 1609
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QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100490 - EPA 3546												
Sediment												
Matrix Spike (9100490-MS1)												
Prepared: 10/01/19 10:34 Analyzed: 10/02/19 14:51												
QC Source Sample: SE-29-0-2.0 (A910822-02RE1)												
N-Nitroso-di-n-propylamine	1.10	0.0766	0.153	mg/kg dry	10	1.23	ND	90	36-120%	---	---	
N-Nitrosodiphenylamine	1.24	0.0766	0.153	mg/kg dry	10	1.23	ND	101	38-127%	---	---	
Bis(2-Chloroethoxy) methane	1.16	0.0766	0.153	mg/kg dry	10	1.23	ND	94	36-121%	---	---	
Bis(2-Chloroethyl) ether	0.923	0.0766	0.153	mg/kg dry	10	1.23	ND	75	31-120%	---	---	
2,2'-Oxybis(1-Chloropropane)	0.929	0.0766	0.153	mg/kg dry	10	1.23	ND	76	33-131%	---	---	
Hexachlorobenzene	1.24	0.0306	0.0614	mg/kg dry	10	1.23	ND	101	44-122%	---	---	
Hexachlorobutadiene	1.19	0.0766	0.153	mg/kg dry	10	1.23	ND	97	32-123%	---	---	
Hexachlorocyclopentadiene	ND	0.153	0.306	mg/kg dry	10	1.23	ND		5-140%	---	---	Q-01, Q-41
Hexachloroethane	1.03	0.0766	0.153	mg/kg dry	10	1.23	ND	84	28-120%	---	---	
2-Chloronaphthalene	1.25	0.0306	0.0614	mg/kg dry	10	1.23	ND	102	41-120%	---	---	
1,2-Dichlorobenzene	1.09	0.0766	0.153	mg/kg dry	10	1.23	ND	89	33-120%	---	---	
1,3-Dichlorobenzene	1.06	0.0766	0.153	mg/kg dry	10	1.23	ND	87	30-120%	---	---	
1,4-Dichlorobenzene	1.08	0.0766	0.153	mg/kg dry	10	1.23	ND	88	31-120%	---	---	
1,2,4-Trichlorobenzene	1.13	0.0766	0.153	mg/kg dry	10	1.23	ND	92	34-120%	---	---	
4-Bromophenyl phenyl ether	1.26	0.0766	0.153	mg/kg dry	10	1.23	ND	103	46-124%	---	---	
4-Chlorophenyl phenyl ether	1.22	0.0766	0.153	mg/kg dry	10	1.23	ND	100	45-121%	---	---	
Aniline	1.04	0.690	0.690	mg/kg dry	10	1.23	ND	85	7-120%	---	---	Q-31
4-Chloroaniline	0.438	0.0766	0.153	mg/kg dry	10	1.23	ND	36	16-120%	---	---	Q-31
2-Nitroaniline	1.45	0.614	1.23	mg/kg dry	10	1.23	ND	118	44-127%	---	---	
3-Nitroaniline	ND	0.614	1.23	mg/kg dry	10	1.23	ND		33-120%	---	---	Q-01
4-Nitroaniline	1.24	0.614	1.23	mg/kg dry	10	1.23	ND	101	35-120%	---	---	Q-41
Nitrobenzene	1.11	0.306	0.614	mg/kg dry	10	1.23	ND	91	34-122%	---	---	
2,4-Dinitrotoluene	1.24	0.306	0.614	mg/kg dry	10	1.23	ND	101	48-126%	---	---	
2,6-Dinitrotoluene	1.26	0.306	0.614	mg/kg dry	10	1.23	ND	103	46-124%	---	---	
Benzoic acid	ND	3.84	7.66	mg/kg dry	10	2.45	ND		5-140%	---	---	Q-11, Q-41
Benzyl alcohol	1.22	0.153	0.306	mg/kg dry	10	1.23	ND	99	29-122%	---	---	
Isophorone	1.14	0.0766	0.153	mg/kg dry	10	1.23	ND	93	30-122%	---	---	
Azobenzene (1,2-DPH)	1.15	0.0766	0.153	mg/kg dry	10	1.23	ND	94	39-125%	---	---	
Bis(2-Ethylhexyl) adipate	2.32	0.766	1.53	mg/kg dry	10	1.23	2.18	12	60-121%	---	---	Q-03
3,3'-Dichlorobenzidine	ND	0.614	1.23	mg/kg dry	10	2.45	ND		22-121%	---	---	Q-01, Q-31
1,2-Dinitrobenzene	1.03	0.766	1.53	mg/kg dry	10	1.23	ND	84	44-120%	---	---	J
1,3-Dinitrobenzene	1.26	0.766	1.53	mg/kg dry	10	1.23	ND	102	42-127%	---	---	J
1,4-Dinitrobenzene	0.975	0.766	1.53	mg/kg dry	10	1.23	ND	79	37-132%	---	---	J

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A910822 - 01 09 20 1609
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QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
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Batch 9100490 - EPA 3546 Sediment

Matrix Spike (9100490-MS1) Prepared: 10/01/19 10:34 Analyzed: 10/02/19 14:51

QC Source Sample: SE-29-0-2.0 (A910822-02RE1)

Pyridine	0.610	0.153	0.306	mg/kg dry	10	1.23	ND	50	5-120%	---	---	
<i>Surr: Nitrobenzene-d5 (Surr)</i>		<i>Recovery: 90 %</i>		<i>Limits: 37-122 %</i>		<i>Dilution: 10x</i>						
<i>2-Fluorobiphenyl (Surr)</i>		<i>93 %</i>		<i>44-115 %</i>		<i>"</i>						
<i>Phenol-d6 (Surr)</i>		<i>92 %</i>		<i>33-122 %</i>		<i>"</i>						
<i>p-Terphenyl-d14 (Surr)</i>		<i>101 %</i>		<i>54-127 %</i>		<i>"</i>						
<i>2-Fluorophenol (Surr)</i>		<i>90 %</i>		<i>35-115 %</i>		<i>"</i>						
<i>2,4,6-Tribromophenol (Surr)</i>		<i>110 %</i>		<i>39-132 %</i>		<i>"</i>						

Matrix Spike (9100490-MS2) Prepared: 10/01/19 10:35 Analyzed: 10/02/19 12:28

QC Source Sample: Non-SDG (A910893-13RE1)

EPA 8270D

Acenaphthene	1.39	0.0681	0.137	mg/kg dry	20	1.37	ND	102	40-122%	---	---	
Acenaphthylene	1.45	0.0681	0.137	mg/kg dry	20	1.37	ND	106	32-132%	---	---	
Anthracene	1.48	0.0681	0.137	mg/kg dry	20	1.37	ND	109	47-123%	---	---	
Benz(a)anthracene	1.42	0.0681	0.137	mg/kg dry	20	1.37	ND	104	49-126%	---	---	
Benzo(a)pyrene	1.60	0.102	0.205	mg/kg dry	20	1.37	0.167	105	45-129%	---	---	
Benzo(b)fluoranthene	1.48	0.102	0.205	mg/kg dry	20	1.37	0.121	100	45-132%	---	---	
Benzo(k)fluoranthene	1.39	0.102	0.205	mg/kg dry	20	1.37	ND	102	47-132%	---	---	
Benzo(g,h,i)perylene	1.53	0.0681	0.137	mg/kg dry	20	1.37	0.0734	107	43-134%	---	---	
Chrysene	1.43	0.0681	0.137	mg/kg dry	20	1.37	ND	104	50-124%	---	---	
Dibenz(a,h)anthracene	1.36	0.0681	0.137	mg/kg dry	20	1.37	ND	99	45-134%	---	---	
Fluoranthene	1.54	0.0681	0.137	mg/kg dry	20	1.37	0.0761	107	50-127%	---	---	
Fluorene	1.47	0.0681	0.137	mg/kg dry	20	1.37	ND	107	43-125%	---	---	
Indeno(1,2,3-cd)pyrene	1.37	0.0681	0.137	mg/kg dry	20	1.37	ND	100	45-133%	---	---	
1-Methylnaphthalene	1.38	0.137	0.273	mg/kg dry	20	1.37	ND	101	40-120%	---	---	
2-Methylnaphthalene	1.41	0.137	0.273	mg/kg dry	20	1.37	ND	104	38-122%	---	---	
Naphthalene	1.42	0.137	0.273	mg/kg dry	20	1.37	ND	104	35-123%	---	---	
Phenanthrene	1.46	0.0681	0.137	mg/kg dry	20	1.37	ND	107	50-121%	---	---	
Pyrene	1.62	0.0681	0.137	mg/kg dry	20	1.37	0.152	107	47-127%	---	---	
Carbazole	1.36	0.102	0.205	mg/kg dry	20	1.37	ND	99	50-122%	---	---	
Dibenzofuran	1.43	0.0681	0.137	mg/kg dry	20	1.37	ND	105	44-120%	---	---	
4-Chloro-3-methylphenol	1.37	0.681	1.37	mg/kg dry	20	1.37	ND	101	45-122%	---	---	
2-Chlorophenol	1.23	0.341	0.681	mg/kg dry	20	1.37	ND	90	34-121%	---	---	

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A910822 - 01 09 20 1609
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QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100490 - EPA 3546												
Sediment												
Matrix Spike (9100490-MS2)												
Prepared: 10/01/19 10:35 Analyzed: 10/02/19 12:28												
QC Source Sample: Non-SDG (A910893-13RE1)												
2,4-Dichlorophenol	1.45	0.341	0.681	mg/kg dry	20	1.37	ND	106	40-122%	---	---	
2,4-Dimethylphenol	1.54	0.341	0.681	mg/kg dry	20	1.37	ND	113	30-127%	---	---	
2,4-Dinitrophenol	ND	1.70	3.41	mg/kg dry	20	1.37	ND		5-137%	---	---	Q-11, Q-41
4,6-Dinitro-2-methylphenol	1.79	1.70	3.41	mg/kg dry	20	1.37	ND	131	29-132%	---	---	Q-41, J
2-Methylphenol	1.38	0.170	0.341	mg/kg dry	20	1.37	ND	101	32-122%	---	---	
3+4-Methylphenol(s)	1.71	0.170	0.341	mg/kg dry	20	1.37	0.309	102	34-120%	---	---	
2-Nitrophenol	1.86	0.681	1.37	mg/kg dry	20	1.37	ND	136	36-123%	---	---	Q-11
4-Nitrophenol	1.70	0.681	1.37	mg/kg dry	20	1.37	ND	125	30-132%	---	---	
Pentachlorophenol (PCP)	1.69	0.681	1.37	mg/kg dry	20	1.37	ND	124	25-133%	---	---	
Phenol	1.28	0.137	0.273	mg/kg dry	20	1.37	ND	94	34-120%	---	---	
2,3,4,6-Tetrachlorophenol	1.41	0.341	0.681	mg/kg dry	20	1.37	ND	103	44-125%	---	---	
2,3,5,6-Tetrachlorophenol	1.61	0.341	0.681	mg/kg dry	20	1.37	ND	118	40-120%	---	---	
2,4,5-Trichlorophenol	1.57	0.341	0.681	mg/kg dry	20	1.37	ND	115	41-124%	---	---	
2,4,6-Trichlorophenol	1.57	0.341	0.681	mg/kg dry	20	1.37	ND	115	39-126%	---	---	
Bis(2-ethylhexyl)phthalate	1.56	1.02	2.05	mg/kg dry	20	1.37	ND	114	51-133%	---	---	J
Butyl benzyl phthalate	1.71	0.341	0.681	mg/kg dry	20	1.37	ND	125	48-132%	---	---	
Diethylphthalate	1.49	0.341	0.681	mg/kg dry	20	1.37	ND	109	50-124%	---	---	
Dimethylphthalate	1.45	0.341	0.681	mg/kg dry	20	1.37	ND	106	48-124%	---	---	
Di-n-butylphthalate	1.55	0.341	0.681	mg/kg dry	20	1.37	ND	113	51-128%	---	---	
Di-n-octyl phthalate	2.02	0.548	0.681	mg/kg dry	20	1.37	ND	148	44-140%	---	---	Q-01
N-Nitrosodimethylamine	0.850	0.170	0.341	mg/kg dry	20	1.37	ND	62	23-120%	---	---	
N-Nitroso-di-n-propylamine	1.18	0.170	0.341	mg/kg dry	20	1.37	ND	86	36-120%	---	---	
N-Nitrosodiphenylamine	1.49	0.170	0.341	mg/kg dry	20	1.37	ND	109	38-127%	---	---	
Bis(2-Chloroethoxy) methane	1.31	0.170	0.341	mg/kg dry	20	1.37	ND	96	36-121%	---	---	
Bis(2-Chloroethyl) ether	0.997	0.170	0.341	mg/kg dry	20	1.37	ND	73	31-120%	---	---	
2,2'-Oxybis(1-Chloropropane)	1.05	0.170	0.341	mg/kg dry	20	1.37	ND	77	33-131%	---	---	
Hexachlorobenzene	1.38	0.0681	0.137	mg/kg dry	20	1.37	ND	101	44-122%	---	---	
Hexachlorobutadiene	1.29	0.170	0.341	mg/kg dry	20	1.37	ND	95	32-123%	---	---	
Hexachlorocyclopentadiene	0.373	0.341	0.681	mg/kg dry	20	1.37	ND	27	5-140%	---	---	Q-41, J
Hexachloroethane	1.13	0.170	0.341	mg/kg dry	20	1.37	ND	83	28-120%	---	---	
2-Chloronaphthalene	1.47	0.0681	0.137	mg/kg dry	20	1.37	ND	107	41-120%	---	---	
1,2-Dichlorobenzene	1.20	0.170	0.341	mg/kg dry	20	1.37	ND	88	33-120%	---	---	
1,3-Dichlorobenzene	1.21	0.170	0.341	mg/kg dry	20	1.37	ND	89	30-120%	---	---	

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A910822 - 01 09 20 1609
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QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100490 - EPA 3546												
Sediment												
Matrix Spike (9100490-MS2)												
Prepared: 10/01/19 10:35 Analyzed: 10/02/19 12:28												
QC Source Sample: Non-SDG (A910893-13RE1)												
1,4-Dichlorobenzene	1.16	0.170	0.341	mg/kg dry	20	1.37	ND	85	31-120%	---	---	
1,2,4-Trichlorobenzene	1.31	0.170	0.341	mg/kg dry	20	1.37	ND	96	34-120%	---	---	
4-Bromophenyl phenyl ether	1.45	0.170	0.341	mg/kg dry	20	1.37	ND	106	46-124%	---	---	
4-Chlorophenyl phenyl ether	1.48	0.170	0.341	mg/kg dry	20	1.37	ND	108	45-121%	---	---	
Aniline	0.837	0.341	0.681	mg/kg dry	20	1.37	ND	61	7-120%	---	---	Q-31
4-Chloroaniline	0.508	0.170	0.341	mg/kg dry	20	1.37	ND	37	16-120%	---	---	Q-31
2-Nitroaniline	1.60	1.37	2.73	mg/kg dry	20	1.37	ND	117	44-127%	---	---	J
3-Nitroaniline	ND	1.37	2.73	mg/kg dry	20	1.37	ND		33-120%	---	---	Q-11
4-Nitroaniline	ND	1.37	2.73	mg/kg dry	20	1.37	ND		35-120%	---	---	Q-11, Q-41
Nitrobenzene	1.19	0.681	1.37	mg/kg dry	20	1.37	ND	87	34-122%	---	---	J
2,4-Dinitrotoluene	1.54	0.681	1.37	mg/kg dry	20	1.37	ND	113	48-126%	---	---	
2,6-Dinitrotoluene	1.51	0.681	1.37	mg/kg dry	20	1.37	ND	111	46-124%	---	---	
Benzoic acid	ND	8.55	17.0	mg/kg dry	20	2.73	ND		5-140%	---	---	Q-11, Q-41
Benzyl alcohol	1.11	0.341	0.681	mg/kg dry	20	1.37	ND	81	29-122%	---	---	
Isophorone	1.21	0.170	0.341	mg/kg dry	20	1.37	ND	89	30-122%	---	---	
Azobenzene (1,2-DPH)	1.29	0.170	0.341	mg/kg dry	20	1.37	ND	95	39-125%	---	---	
Bis(2-Ethylhexyl) adipate	2.35	1.70	3.41	mg/kg dry	20	1.37	ND	172	60-121%	---	---	Q-11, J
3,3'-Dichlorobenzidine	2.03	1.37	2.73	mg/kg dry	20	2.73	ND	74	22-121%	---	---	Q-31, J
1,2-Dinitrobenzene	ND	1.70	3.41	mg/kg dry	20	1.37	ND		44-120%	---	---	Q-11
1,3-Dinitrobenzene	ND	1.70	3.41	mg/kg dry	20	1.37	ND		42-127%	---	---	Q-11
1,4-Dinitrobenzene	ND	1.70	3.41	mg/kg dry	20	1.37	ND		37-132%	---	---	Q-11
Pyridine	0.707	0.341	0.681	mg/kg dry	20	1.37	ND	52	5-120%	---	---	
<i>Surr: Nitrobenzene-d5 (Surr) Recovery: 81 % Limits: 37-122 % Dilution: 20x</i>												
<i>2-Fluorobiphenyl (Surr) 53 % 44-115 % "</i>												
<i>Phenol-d6 (Surr) 81 % 33-122 % "</i>												
<i>p-Terphenyl-d14 (Surr) 60 % 54-127 % "</i>												
<i>2-Fluorophenol (Surr) 85 % 35-115 % "</i>												
<i>2,4,6-Tribromophenol (Surr) 99 % 39-132 % "</i>												

Matrix Spike Dup (9100490-MSD1)												
Prepared: 10/01/19 10:34 Analyzed: 10/02/19 15:27												
QC Source Sample: SE-29-0-2.0 (A910822-02RE1)												
EPA 8270D												
Acenaphthene	1.28	0.0306	0.0614	mg/kg dry	10	1.23	0.135	94	40-122%	4	30%	

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A910822 - 01 09 20 1609
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QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100490 - EPA 3546						Sediment						
Matrix Spike Dup (9100490-MSD1)						Prepared: 10/01/19 10:34 Analyzed: 10/02/19 15:27						
QC Source Sample: SE-29-0-2.0 (A910822-02RE1)												
Acenaphthylene	1.32	0.0306	0.0614	mg/kg dry	10	1.23	ND	107	32-132%	2	30%	
Anthracene	1.36	0.0306	0.0614	mg/kg dry	10	1.23	0.204	94	47-123%	2	30%	
Benz(a)anthracene	1.30	0.0306	0.0614	mg/kg dry	10	1.23	0.218	89	49-126%	3	30%	
Benzo(a)pyrene	1.38	0.0460	0.0920	mg/kg dry	10	1.23	0.154	100	45-129%	5	30%	
Benzo(b)fluoranthene	1.32	0.0460	0.0920	mg/kg dry	10	1.23	0.180	93	45-132%	3	30%	
Benzo(k)fluoranthene	1.26	0.0460	0.0920	mg/kg dry	10	1.23	0.0758	97	47-132%	6	30%	
Benzo(g,h,i)perylene	1.40	0.0306	0.0614	mg/kg dry	10	1.23	0.0680	108	43-134%	6	30%	
Chrysene	1.33	0.0306	0.0614	mg/kg dry	10	1.23	0.199	92	50-124%	4	30%	
Dibenz(a,h)anthracene	1.26	0.0306	0.0614	mg/kg dry	10	1.23	ND	103	45-134%	3	30%	
Fluoranthene	1.59	0.0306	0.0614	mg/kg dry	10	1.23	1.15	35	50-127%	0.2	30%	Q-01
Fluorene	1.34	0.0306	0.0614	mg/kg dry	10	1.23	0.136	98	43-125%	3	30%	
Indeno(1,2,3-cd)pyrene	1.21	0.0306	0.0614	mg/kg dry	10	1.23	0.0695	93	45-133%	6	30%	
1-Methylnaphthalene	1.24	0.0614	0.123	mg/kg dry	10	1.23	0.0767	95	40-120%	0.9	30%	
2-Methylnaphthalene	1.28	0.0614	0.123	mg/kg dry	10	1.23	0.149	93	38-122%	0.5	30%	
Naphthalene	1.38	0.0614	0.123	mg/kg dry	10	1.23	0.491	73	35-123%	1	30%	
Phenanthrene	1.39	0.0306	0.0614	mg/kg dry	10	1.23	0.491	73	50-121%	3	30%	
Pyrene	1.55	0.0306	0.0614	mg/kg dry	10	1.23	0.823	59	47-127%	3	30%	
Carbazole	1.25	0.0460	0.0920	mg/kg dry	10	1.23	0.0536	98	50-122%	2	30%	
Dibenzofuran	1.29	0.0306	0.0614	mg/kg dry	10	1.23	0.145	94	44-120%	2	30%	
4-Chloro-3-methylphenol	1.29	0.306	0.614	mg/kg dry	10	1.23	ND	105	45-122%	3	30%	
2-Chlorophenol	1.12	0.153	0.306	mg/kg dry	10	1.23	ND	92	34-121%	5	30%	
2,4-Dichlorophenol	1.30	0.153	0.306	mg/kg dry	10	1.23	ND	106	40-122%	0.5	30%	
2,4-Dimethylphenol	1.49	0.153	0.306	mg/kg dry	10	1.23	ND	121	30-127%	0.3	30%	
2,4-Dinitrophenol	ND	0.766	1.53	mg/kg dry	10	1.23	ND		5-137%		30%	Q-11, Q-41
4,6-Dinitro-2-methylphenol	0.870	0.766	1.53	mg/kg dry	10	1.23	ND	71	29-132%	6	30%	Q-41, J
2-Methylphenol	1.24	0.0766	0.153	mg/kg dry	10	1.23	ND	101	32-122%	3	30%	
3+4-Methylphenol(s)	2.84	0.0766	0.153	mg/kg dry	10	1.23	1.60	101	34-120%	1	30%	
2-Nitrophenol	1.46	0.306	0.614	mg/kg dry	10	1.23	ND	119	36-123%	3	30%	
4-Nitrophenol	1.31	0.306	0.614	mg/kg dry	10	1.23	ND	107	30-132%	0.7	30%	
Pentachlorophenol (PCP)	1.50	0.306	0.614	mg/kg dry	10	1.23	ND	123	25-133%	1	30%	
Phenol	1.25	0.0614	0.123	mg/kg dry	10	1.23	0.571	56	34-120%	3	30%	
2,3,4,6-Tetrachlorophenol	1.31	0.153	0.306	mg/kg dry	10	1.23	ND	107	44-125%	1	30%	
2,3,5,6-Tetrachlorophenol	1.39	0.153	0.306	mg/kg dry	10	1.23	ND	113	40-120%	2	30%	

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The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tideland Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A910822 - 01 09 20 1609
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QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100490 - EPA 3546												
Sediment												
Matrix Spike Dup (9100490-MSD1)												
Prepared: 10/01/19 10:34 Analyzed: 10/02/19 15:27												
QC Source Sample: SE-29-0-2.0 (A910822-02RE1)												
2,4,5-Trichlorophenol	1.37	0.153	0.306	mg/kg dry	10	1.23	ND	112	41-124%	0.3	30%	
2,4,6-Trichlorophenol	1.39	0.153	0.306	mg/kg dry	10	1.23	ND	113	39-126%	1	30%	
Bis(2-ethylhexyl)phthalate	1.59	0.460	0.920	mg/kg dry	10	1.23	ND	130	51-133%	1	30%	
Butyl benzyl phthalate	1.58	0.153	0.306	mg/kg dry	10	1.23	ND	129	48-132%	8	30%	
Diethylphthalate	1.35	0.153	0.306	mg/kg dry	10	1.23	ND	110	50-124%	1	30%	
Dimethylphthalate	1.31	0.153	0.306	mg/kg dry	10	1.23	ND	107	48-124%	2	30%	
Di-n-butylphthalate	1.42	0.153	0.306	mg/kg dry	10	1.23	0.213	98	51-128%	0.9	30%	
Di-n-octyl phthalate	1.81	0.246	0.306	mg/kg dry	10	1.23	ND	148	44-140%	4	30%	Q-01
N-Nitrosodimethylamine	0.752	0.0766	0.153	mg/kg dry	10	1.23	ND	61	23-120%	5	30%	
N-Nitroso-di-n-propylamine	1.06	0.0766	0.153	mg/kg dry	10	1.23	ND	86	36-120%	4	30%	
N-Nitrosodiphenylamine	1.25	0.0766	0.153	mg/kg dry	10	1.23	ND	102	38-127%	0.8	30%	
Bis(2-Chloroethoxy) methane	1.15	0.0766	0.153	mg/kg dry	10	1.23	ND	94	36-121%	0.8	30%	
Bis(2-Chloroethyl) ether	0.886	0.0766	0.153	mg/kg dry	10	1.23	ND	72	31-120%	4	30%	
2,2'-Oxybis(1-Chloropropane)	0.915	0.0766	0.153	mg/kg dry	10	1.23	ND	75	33-131%	1	30%	
Hexachlorobenzene	1.27	0.0306	0.0614	mg/kg dry	10	1.23	ND	103	44-122%	2	30%	
Hexachlorobutadiene	1.19	0.0766	0.153	mg/kg dry	10	1.23	ND	97	32-123%	0.03	30%	
Hexachlorocyclopentadiene	0.373	0.153	0.306	mg/kg dry	10	1.23	ND	30	5-140%	200	30%	Q-01, Q-41
Hexachloroethane	1.05	0.0766	0.153	mg/kg dry	10	1.23	ND	86	28-120%	2	30%	
2-Chloronaphthalene	1.25	0.0306	0.0614	mg/kg dry	10	1.23	ND	102	41-120%	0.1	30%	
1,2-Dichlorobenzene	1.04	0.0766	0.153	mg/kg dry	10	1.23	ND	85	33-120%	5	30%	
1,3-Dichlorobenzene	1.04	0.0766	0.153	mg/kg dry	10	1.23	ND	85	30-120%	2	30%	
1,4-Dichlorobenzene	1.03	0.0766	0.153	mg/kg dry	10	1.23	ND	84	31-120%	5	30%	
1,2,4-Trichlorobenzene	1.15	0.0766	0.153	mg/kg dry	10	1.23	ND	94	34-120%	1	30%	
4-Bromophenyl phenyl ether	1.28	0.0766	0.153	mg/kg dry	10	1.23	ND	105	46-124%	2	30%	
4-Chlorophenyl phenyl ether	1.25	0.0766	0.153	mg/kg dry	10	1.23	ND	102	45-121%	2	30%	
Aniline	0.813	0.690	0.690	mg/kg dry	10	1.23	ND	66	7-120%	25	30%	Q-31
4-Chloroaniline	0.377	0.0766	0.153	mg/kg dry	10	1.23	ND	31	16-120%	15	30%	Q-31
2-Nitroaniline	1.50	0.614	1.23	mg/kg dry	10	1.23	ND	123	44-127%	3	30%	
3-Nitroaniline	0.655	0.614	1.23	mg/kg dry	10	1.23	ND	53	33-120%	200	30%	Q-01, J
4-Nitroaniline	1.27	0.614	1.23	mg/kg dry	10	1.23	ND	104	35-120%	3	30%	Q-41
Nitrobenzene	1.04	0.306	0.614	mg/kg dry	10	1.23	ND	85	34-122%	6	30%	
2,4-Dinitrotoluene	1.26	0.306	0.614	mg/kg dry	10	1.23	ND	103	48-126%	2	30%	
2,6-Dinitrotoluene	1.32	0.306	0.614	mg/kg dry	10	1.23	ND	107	46-124%	4	30%	

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A910822 - 01 09 20 1609
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QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100490 - EPA 3546												
Sediment												
Matrix Spike Dup (9100490-MSD1) Prepared: 10/01/19 10:34 Analyzed: 10/02/19 15:27												
QC Source Sample: SE-29-0-2.0 (A910822-02RE1)												
Benzoic acid	ND	3.84	7.66	mg/kg dry	10	2.45	ND		5-140%		30%	Q-11, Q-41
Benzyl alcohol	1.17	0.153	0.306	mg/kg dry	10	1.23	ND	95	29-122%	4	30%	
Isophorone	1.13	0.0766	0.153	mg/kg dry	10	1.23	ND	93	30-122%	0.8	30%	
Azobenzene (1,2-DPH)	1.17	0.0766	0.153	mg/kg dry	10	1.23	ND	96	39-125%	2	30%	
Bis(2-Ethylhexyl) adipate	5.77	0.766	1.53	mg/kg dry	10	1.23	2.18	293	60-121%	85	30%	Q-03
3,3'-Dichlorobenzidine	0.738	0.614	1.23	mg/kg dry	10	2.45	ND	30	22-121%	200	30%	Q-01, Q-31, J
1,2-Dinitrobenzene	1.03	0.766	1.53	mg/kg dry	10	1.23	ND	84	44-120%	0.1	30%	J
1,3-Dinitrobenzene	1.33	0.766	1.53	mg/kg dry	10	1.23	ND	108	42-127%	5	30%	J
1,4-Dinitrobenzene	1.09	0.766	1.53	mg/kg dry	10	1.23	ND	89	37-132%	11	30%	J
Pyridine	0.588	0.153	0.306	mg/kg dry	10	1.23	ND	48	5-120%	4	30%	
<i>Surr: Nitrobenzene-d5 (Surr) Recovery: 82% Limits: 37-122% Dilution: 10x</i>												
<i>2-Fluorobiphenyl (Surr) 85% 44-115% "</i>												
<i>Phenol-d6 (Surr) 87% 33-122% "</i>												
<i>p-Terphenyl-d14 (Surr) 95% 54-127% "</i>												
<i>2-Fluorophenol (Surr) 84% 35-115% "</i>												
<i>2,4,6-Tribromophenol (Surr) 113% 39-132% "</i>												

Matrix Spike Dup (9100490-MSD2) Prepared: 10/01/19 10:35 Analyzed: 10/02/19 13:04												
QC Source Sample: Non-SDG (A910893-13RE1)												
Acenaphthene	1.41	0.0676	0.136	mg/kg dry	20	1.35	ND	104	40-122%	1	30%	
Acenaphthylene	1.46	0.0676	0.136	mg/kg dry	20	1.35	ND	107	32-132%	0.3	30%	
Anthracene	1.49	0.0676	0.136	mg/kg dry	20	1.35	ND	110	47-123%	0.1	30%	
Benz(a)anthracene	1.46	0.0676	0.136	mg/kg dry	20	1.35	ND	107	49-126%	2	30%	
Benzo(a)pyrene	1.64	0.102	0.203	mg/kg dry	20	1.35	0.167	109	45-129%	2	30%	
Benzo(b)fluoranthene	1.54	0.102	0.203	mg/kg dry	20	1.35	0.121	105	45-132%	4	30%	
Benzo(k)fluoranthene	1.43	0.102	0.203	mg/kg dry	20	1.35	ND	105	47-132%	2	30%	
Benzo(g,h,i)perylene	1.58	0.0676	0.136	mg/kg dry	20	1.35	0.0734	111	43-134%	3	30%	
Chrysene	1.50	0.0676	0.136	mg/kg dry	20	1.35	ND	111	50-124%	5	30%	
Dibenz(a,h)anthracene	1.48	0.0676	0.136	mg/kg dry	20	1.35	ND	109	45-134%	9	30%	
Fluoranthene	1.56	0.0676	0.136	mg/kg dry	20	1.35	0.0761	110	50-127%	2	30%	
Fluorene	1.43	0.0676	0.136	mg/kg dry	20	1.35	ND	106	43-125%	2	30%	
Indeno(1,2,3-cd)pyrene	1.37	0.0676	0.136	mg/kg dry	20	1.35	ND	101	45-133%	0.1	30%	
1-Methylnaphthalene	1.39	0.136	0.271	mg/kg dry	20	1.35	ND	103	40-120%	1	30%	

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tideland Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A910822 - 01 09 20 1609
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QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100490 - EPA 3546												
Sediment												
Matrix Spike Dup (9100490-MSD2)												
Prepared: 10/01/19 10:35 Analyzed: 10/02/19 13:04												
QC Source Sample: Non-SDG (A910893-13RE1)												
2-Methylnaphthalene	1.40	0.136	0.271	mg/kg dry	20	1.35	ND	103	38-122%	1	30%	
Naphthalene	1.46	0.136	0.271	mg/kg dry	20	1.35	ND	108	35-123%	3	30%	
Phenanthrene	1.49	0.0676	0.136	mg/kg dry	20	1.35	ND	110	50-121%	2	30%	
Pyrene	1.63	0.0676	0.136	mg/kg dry	20	1.35	0.152	109	47-127%	1	30%	
Carbazole	1.40	0.102	0.203	mg/kg dry	20	1.35	ND	104	50-122%	3	30%	
Dibenzofuran	1.38	0.0676	0.136	mg/kg dry	20	1.35	ND	102	44-120%	3	30%	
4-Chloro-3-methylphenol	1.41	0.676	1.36	mg/kg dry	20	1.35	ND	104	45-122%	3	30%	
2-Chlorophenol	1.32	0.339	0.676	mg/kg dry	20	1.35	ND	98	34-121%	8	30%	
2,4-Dichlorophenol	1.47	0.339	0.676	mg/kg dry	20	1.35	ND	109	40-122%	1	30%	
2,4-Dimethylphenol	1.58	0.339	0.676	mg/kg dry	20	1.35	ND	117	30-127%	3	30%	
2,4-Dinitrophenol	ND	1.69	3.39	mg/kg dry	20	1.35	ND		5-137%		30%	Q-11, Q-41
4,6-Dinitro-2-methylphenol	1.80	1.69	3.39	mg/kg dry	20	1.35	ND	133	29-132%	0.8	30%	Q-11, Q-41, J
2-Methylphenol	1.39	0.169	0.339	mg/kg dry	20	1.35	ND	103	32-122%	1	30%	
3+4-Methylphenol(s)	2.11	0.169	0.339	mg/kg dry	20	1.35	0.309	133	34-120%	21	30%	Q-01
2-Nitrophenol	1.70	0.676	1.36	mg/kg dry	20	1.35	ND	126	36-123%	9	30%	Q-11
4-Nitrophenol	1.64	0.676	1.36	mg/kg dry	20	1.35	ND	121	30-132%	4	30%	
Pentachlorophenol (PCP)	1.85	0.676	1.36	mg/kg dry	20	1.35	ND	137	25-133%	9	30%	Q-01
Phenol	1.43	0.136	0.271	mg/kg dry	20	1.35	ND	106	34-120%	12	30%	
2,3,4,6-Tetrachlorophenol	1.53	0.339	0.676	mg/kg dry	20	1.35	ND	113	44-125%	9	30%	
2,3,5,6-Tetrachlorophenol	1.59	0.339	0.676	mg/kg dry	20	1.35	ND	117	40-120%	1	30%	
2,4,5-Trichlorophenol	1.60	0.339	0.676	mg/kg dry	20	1.35	ND	118	41-124%	2	30%	
2,4,6-Trichlorophenol	1.63	0.339	0.676	mg/kg dry	20	1.35	ND	120	39-126%	4	30%	
Bis(2-ethylhexyl)phthalate	1.74	1.02	2.03	mg/kg dry	20	1.35	ND	128	51-133%	11	30%	J
Butyl benzyl phthalate	1.83	0.339	0.676	mg/kg dry	20	1.35	ND	135	48-132%	7	30%	Q-01
Diethylphthalate	1.48	0.339	0.676	mg/kg dry	20	1.35	ND	109	50-124%	0.8	30%	
Dimethylphthalate	1.44	0.339	0.676	mg/kg dry	20	1.35	ND	106	48-124%	0.7	30%	
Di-n-butylphthalate	1.60	0.339	0.676	mg/kg dry	20	1.35	ND	118	51-128%	3	30%	
Di-n-octyl phthalate	2.15	0.543	0.676	mg/kg dry	20	1.35	ND	158	44-140%	6	30%	Q-01
N-Nitrosodimethylamine	0.856	0.169	0.339	mg/kg dry	20	1.35	ND	63	23-120%	0.6	30%	
N-Nitroso-di-n-propylamine	1.23	0.169	0.339	mg/kg dry	20	1.35	ND	91	36-120%	4	30%	
N-Nitrosodiphenylamine	1.50	0.169	0.339	mg/kg dry	20	1.35	ND	111	38-127%	0.8	30%	
Bis(2-Chloroethoxy) methane	1.32	0.169	0.339	mg/kg dry	20	1.35	ND	97	36-121%	0.7	30%	
Bis(2-Chloroethyl) ether	1.01	0.169	0.339	mg/kg dry	20	1.35	ND	75	31-120%	1	30%	



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tideland Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A910822 - 01 09 20 1609
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QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100490 - EPA 3546												
Sediment												
Matrix Spike Dup (9100490-MSD2)												
Prepared: 10/01/19 10:35 Analyzed: 10/02/19 13:04												
QC Source Sample: Non-SDG (A910893-13RE1)												
2,2'-Oxybis(1-Chloropropane)	1.10	0.169	0.339	mg/kg dry	20	1.35	ND	81	33-131%	5	30%	
Hexachlorobenzene	1.47	0.0676	0.136	mg/kg dry	20	1.35	ND	108	44-122%	6	30%	
Hexachlorobutadiene	1.39	0.169	0.339	mg/kg dry	20	1.35	ND	103	32-123%	8	30%	
Hexachlorocyclopentadiene	ND	0.339	0.676	mg/kg dry	20	1.35	ND		5-140%	200	30%	Q-11, Q-41
Hexachloroethane	1.17	0.169	0.339	mg/kg dry	20	1.35	ND	86	28-120%	3	30%	
2-Chloronaphthalene	1.45	0.0676	0.136	mg/kg dry	20	1.35	ND	107	41-120%	0.8	30%	
1,2-Dichlorobenzene	1.25	0.169	0.339	mg/kg dry	20	1.35	ND	92	33-120%	4	30%	
1,3-Dichlorobenzene	1.25	0.169	0.339	mg/kg dry	20	1.35	ND	92	30-120%	3	30%	
1,4-Dichlorobenzene	1.22	0.169	0.339	mg/kg dry	20	1.35	ND	90	31-120%	5	30%	
1,2,4-Trichlorobenzene	1.35	0.169	0.339	mg/kg dry	20	1.35	ND	100	34-120%	3	30%	
4-Bromophenyl phenyl ether	1.46	0.169	0.339	mg/kg dry	20	1.35	ND	108	46-124%	0.5	30%	
4-Chlorophenyl phenyl ether	1.42	0.169	0.339	mg/kg dry	20	1.35	ND	105	45-121%	4	30%	
Aniline	0.801	0.339	0.676	mg/kg dry	20	1.35	ND	59	7-120%	4	30%	Q-31
4-Chloroaniline	0.583	0.169	0.339	mg/kg dry	20	1.35	ND	43	16-120%	14	30%	Q-31
2-Nitroaniline	1.68	1.36	2.71	mg/kg dry	20	1.35	ND	124	44-127%	5	30%	J
3-Nitroaniline	ND	1.36	2.71	mg/kg dry	20	1.35	ND		33-120%		30%	Q-11
4-Nitroaniline	1.44	1.36	2.71	mg/kg dry	20	1.35	ND	107	35-120%	200	30%	Q-11, Q-41, J
Nitrobenzene	1.23	0.676	1.36	mg/kg dry	20	1.35	ND	91	34-122%	4	30%	J
2,4-Dinitrotoluene	1.49	0.676	1.36	mg/kg dry	20	1.35	ND	110	48-126%	3	30%	
2,6-Dinitrotoluene	1.47	0.676	1.36	mg/kg dry	20	1.35	ND	109	46-124%	3	30%	
Benzoic acid	ND	8.48	16.9	mg/kg dry	20	2.71	ND		5-140%		30%	Q-11, Q-41
Benzyl alcohol	1.24	0.339	0.676	mg/kg dry	20	1.35	ND	91	29-122%	11	30%	
Isophorone	1.32	0.169	0.339	mg/kg dry	20	1.35	ND	97	30-122%	9	30%	
Azobenzene (1,2-DPH)	1.31	0.169	0.339	mg/kg dry	20	1.35	ND	97	39-125%	1	30%	
Bis(2-Ethylhexyl) adipate	2.25	1.69	3.39	mg/kg dry	20	1.35	ND	166	60-121%	4	30%	Q-11, J
3,3'-Dichlorobenzidine	ND	1.36	2.71	mg/kg dry	20	2.71	ND		22-121%	200	30%	Q-01, Q-31
1,2-Dinitrobenzene	ND	1.69	3.39	mg/kg dry	20	1.35	ND		44-120%		30%	Q-11
1,3-Dinitrobenzene	ND	1.69	3.39	mg/kg dry	20	1.35	ND		42-127%		30%	Q-11
1,4-Dinitrobenzene	ND	1.69	3.39	mg/kg dry	20	1.35	ND		37-132%		30%	Q-11
Pyridine	0.598	0.339	0.676	mg/kg dry	20	1.35	ND	44	5-120%	17	30%	J

Surr: Nitrobenzene-d5 (Surr)	Recovery: 82 %	Limits: 37-122 %	Dilution: 20x
2-Fluorobiphenyl (Surr)	66 %	44-115 %	"
Phenol-d6 (Surr)	84 %	33-122 %	"

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Philip Nerenberg, Lab Director



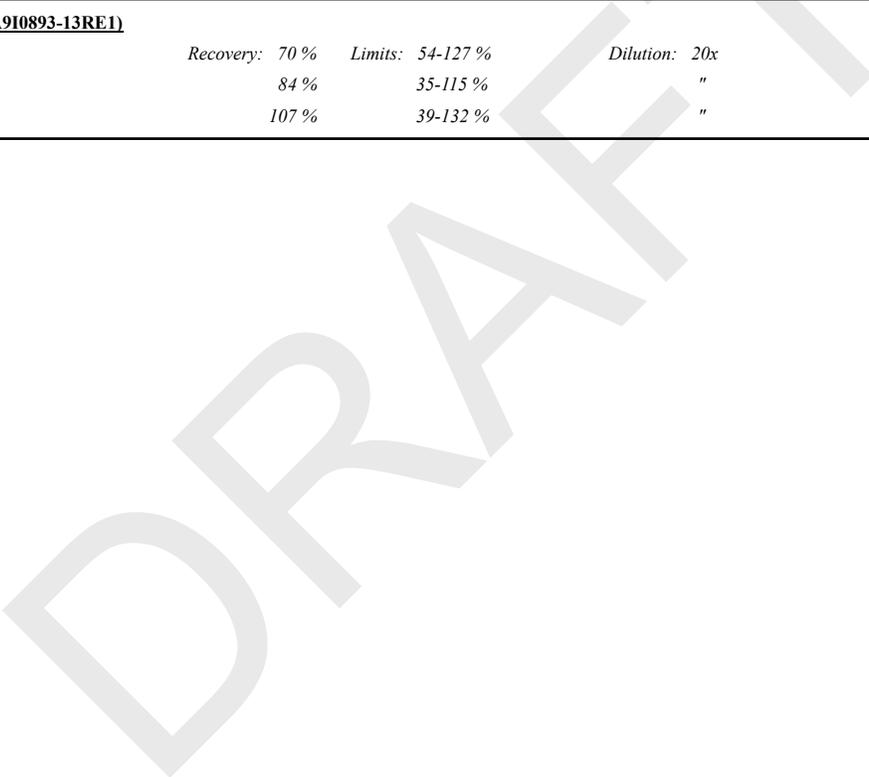
AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A910822 - 01 09 20 1609
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QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100490 - EPA 3546						Sediment						
Matrix Spike Dup (9100490-MSD2)			Prepared: 10/01/19 10:35 Analyzed: 10/02/19 13:04									
QC Source Sample: Non-SDG (A910893-13RE1)												
Surr: <i>p</i> -Terphenyl- <i>d</i> 14 (Surr)		Recovery: 70 %		Limits: 54-127 %		Dilution: 20x						
2-Fluorophenol (Surr)		84 %		35-115 %		"						
2,4,6-Tribromophenol (Surr)		107 %		39-132 %		"						





AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A910822 - 01 09 20 1609
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QUALITY CONTROL (QC) SAMPLE RESULTS

Total Metals by EPA 6020A (ICPMS)

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100517 - EPA 3051A												
Sediment												
Blank (9100517-BLK1) Prepared: 10/01/19 15:50 Analyzed: 10/03/19 00:11												
<u>EPA 6020A</u>												
Arsenic	ND	0.240	0.481	mg/kg wet	5	---	---	---	---	---	---	
Cadmium	ND	0.0481	0.0962	mg/kg wet	5	---	---	---	---	---	---	
Chromium	ND	0.240	0.481	mg/kg wet	5	---	---	---	---	---	---	
Copper	ND	0.481	0.962	mg/kg wet	5	---	---	---	---	---	---	
Lead	ND	0.0481	0.0962	mg/kg wet	5	---	---	---	---	---	---	
Nickel	ND	0.962	1.92	mg/kg wet	5	---	---	---	---	---	---	
Selenium	ND	0.240	0.481	mg/kg wet	5	---	---	---	---	---	---	
Silver	ND	0.0481	0.0962	mg/kg wet	5	---	---	---	---	---	---	
Zinc	ND	0.962	1.92	mg/kg wet	5	---	---	---	---	---	---	
LCS (9100517-BS1) Prepared: 10/01/19 15:50 Analyzed: 10/03/19 00:24												
<u>EPA 6020A</u>												
Arsenic	24.0	0.250	0.500	mg/kg wet	5	25.0	---	96	80-120%	---	---	
Cadmium	23.9	0.0500	0.100	mg/kg wet	5	25.0	---	96	80-120%	---	---	
Chromium	25.6	0.250	0.500	mg/kg wet	5	25.0	---	102	80-120%	---	---	
Copper	25.7	0.500	1.00	mg/kg wet	5	25.0	---	103	80-120%	---	---	
Lead	25.2	0.0500	0.100	mg/kg wet	5	25.0	---	101	80-120%	---	---	
Nickel	25.6	1.00	2.00	mg/kg wet	5	25.0	---	102	80-120%	---	---	
Selenium	11.6	0.250	0.500	mg/kg wet	5	12.5	---	92	80-120%	---	---	
Silver	13.5	0.0500	0.100	mg/kg wet	5	12.5	---	108	80-120%	---	---	
Zinc	24.4	1.00	2.00	mg/kg wet	5	25.0	---	97	80-120%	---	---	
Matrix Spike (9100517-MS1) Prepared: 10/01/19 15:50 Analyzed: 10/03/19 00:33												
<u>QC Source Sample: SE-29-0-2.0 (A910822-02)</u>												
<u>EPA 6020A</u>												
Arsenic	64.4	0.604	1.21	mg/kg dry	5	60.4	7.45	94	75-125%	---	---	
Cadmium	55.6	0.121	0.242	mg/kg dry	5	60.4	0.188	92	75-125%	---	---	
Chromium	95.3	0.604	1.21	mg/kg dry	5	60.4	35.1	100	75-125%	---	---	
Copper	173	1.21	2.42	mg/kg dry	5	60.4	92.5	133	75-125%	---	---	Q-03
Lead	218	0.121	0.242	mg/kg dry	5	60.4	16.2	334	75-125%	---	---	Q-03
Nickel	97.1	2.42	4.83	mg/kg dry	5	60.4	33.8	105	75-125%	---	---	
Selenium	28.5	0.604	1.21	mg/kg dry	5	30.2	0.644	92	75-125%	---	---	
Silver	30.9	0.121	0.242	mg/kg dry	5	30.2	ND	102	75-125%	---	---	

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QUALITY CONTROL (QC) SAMPLE RESULTS

Total Metals by EPA 6020A (ICPMS)

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100517 - EPA 3051A												
Sediment												
Matrix Spike (9100517-MS1)						Prepared: 10/01/19 15:50 Analyzed: 10/03/19 00:33						
QC Source Sample: SE-29-0-2.0 (A910822-02)												
Zinc	132	2.42	4.83	mg/kg dry	5	60.4	84.6	79	75-125%	---	---	
Matrix Spike Dup (9100517-MSD1)						Prepared: 10/01/19 15:50 Analyzed: 10/03/19 00:37						
QC Source Sample: SE-29-0-2.0 (A910822-02)												
EPA 6020A												
Arsenic	60.0	0.570	1.14	mg/kg dry	5	57.0	7.45	92	75-125%	7	40%	
Cadmium	53.5	0.114	0.228	mg/kg dry	5	57.0	0.188	94	75-125%	4	40%	
Chromium	89.9	0.570	1.14	mg/kg dry	5	57.0	35.1	96	75-125%	6	40%	
Copper	156	1.14	2.28	mg/kg dry	5	57.0	92.5	112	75-125%	10	40%	
Lead	81.6	0.114	0.228	mg/kg dry	5	57.0	16.2	115	75-125%	91	40%	Q-03
Nickel	90.9	2.28	4.56	mg/kg dry	5	57.0	33.8	100	75-125%	7	40%	
Selenium	27.6	0.570	1.14	mg/kg dry	5	28.5	0.644	95	75-125%	3	40%	
Silver	29.2	0.114	0.228	mg/kg dry	5	28.5	ND	102	75-125%	6	40%	
Zinc	140	2.28	4.56	mg/kg dry	5	57.0	84.6	97	75-125%	5	40%	



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QUALITY CONTROL (QC) SAMPLE RESULTS

Ammonia by Plumb Extraction, Gas Diffusion and Colorimetric Detection

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9091360 - Plumb 1981 Ammonia (Acidified KCl Leach)							Soil					
Blank (9091360-BLK1)			Prepared: 09/27/19 06:49 Analyzed: 09/27/19 14:19									
<u>Plumb/SM 4500-NH3 G</u>												
Ammonia as N	ND	0.100	0.100	mg/kg wet	1	---	---	---	---	---	---	
LCS (9091360-BS1)			Prepared: 09/27/19 06:49 Analyzed: 09/27/19 14:22									
<u>Plumb/SM 4500-NH3 G</u>												
Ammonia as N	9.66	0.100	0.100	mg/kg wet	1	10.0	---	97	80-120%	---	---	
Matrix Spike (9091360-MS2)			Prepared: 09/27/19 06:49 Analyzed: 09/27/19 15:28									
<u>QC Source Sample: SE-29-0-2.0 (A910822-02)</u>												
<u>Plumb/SM 4500-NH3 G</u>												
Ammonia as N	20.6	0.222	0.222	mg/kg dry	1	22.2	5.11	70	75-125%	---	---	Q-01, Q-16
Matrix Spike Dup (9091360-MSD2)			Prepared: 09/27/19 06:49 Analyzed: 09/27/19 15:30									
<u>QC Source Sample: SE-29-0-2.0 (A910822-02)</u>												
<u>Plumb/SM 4500-NH3 G</u>												
Ammonia as N	24.1	0.226	0.226	mg/kg dry	1	22.6	5.11	84	75-125%	16	20%	Q-16



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QUALITY CONTROL (QC) SAMPLE RESULTS

Demand Parameters

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9091362 - PSEP-5310B TOC						Sediment						
Blank (9091362-BLK1)			Prepared: 09/27/19 07:38 Analyzed: 10/07/19 08:37									
<u>EPA 9060Amod</u>												
Total Organic Carbon	ND	200	200	mg/kg	1	---	---	---	---	---	---	
LCS (9091362-BS1)			Prepared: 09/27/19 07:38 Analyzed: 10/07/19 09:15									
<u>EPA 9060Amod</u>												
Total Organic Carbon	9700			mg/kg	1	10000	---	97	90-110%	---	---	
Duplicate (9091362-DUP1)			Prepared: 09/27/19 07:38 Analyzed: 10/07/19 11:57									
<u>QC Source Sample: SE-29-0-2.0 (A910822-02)</u>												
<u>EPA 9060Amod</u>												
Total Organic Carbon	110000	200	200	mg/kg	1	---	99000	---	---	9	20%	

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QUALITY CONTROL (QC) SAMPLE RESULTS

Solid and Moisture Determinations

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9091443 - Total Solids (SM2540G/PSEP)							Sediment					
Duplicate (9091443-DUP1)					Prepared: 09/30/19 10:56 Analyzed: 10/01/19 13:08							
<u>QC Source Sample: SE-29-0-2.0 (A910822-02)</u>												
<u>PSEP 1986</u>												
Total Solids	48.6	1.00	1.00	%	1	---	42.9	---	---	12	20%	

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AMENDED REPORT

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QUALITY CONTROL (QC) SAMPLE RESULTS

Solid and Moisture Determinations

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9091474 - Total Volatile Solids (non-aq)							Solid					
Duplicate (9091474-DUP1)					Prepared: 09/30/19 17:28 Analyzed: 10/02/19 15:31							
<u>QC Source Sample: SE-29-0-2.0 (A910822-02)</u>												
<u>SM 2540 G</u>												
Total Volatile Solids	20.6	1.00	1.00	%	1	---	27.4	---	---	28	10%	Q-04

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QUALITY CONTROL (QC) SAMPLE RESULTS

Percent Dry Weight

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9091443 - Total Solids (SM2540G/PSEP)							Sediment					
Duplicate (9091443-DUP1)			Prepared: 09/30/19 10:56 Analyzed: 10/01/19 13:08									
QC Source Sample: SE-29-0-2.0 (A910822-02)												
EPA 8000C												
% Solids	48.6	1.00	1.00	%	1	---	42.9	---	---	12	10%	Q-04

No Client related Batch QC samples analyzed for this batch. See notes page for more information.

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Analytical Resources, Inc.

QUALITY CONTROL (QC) SAMPLE RESULTS

Metals and Metallic Compounds

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch BHI0876 - SMM EPA 7471B						Solid						
Blank (BHI0876-BLK1)			Prepared: 09/30/19 08:22 Analyzed: 10/01/19 14:54									
<u>EPA 7471B</u>												
Mercury	ND	0.00525	0.0250	mg/kg wet	1	---	---	---	---	---	---	U
LCS (BHI0876-BS1)			Prepared: 09/30/19 08:22 Analyzed: 10/01/19 14:56									
<u>EPA 7471B</u>												
Mercury	0.480	0.00525	0.0250	mg/kg wet	1	0.50000	---	96.0	80-120%	---	---	
Duplicate (BHI0876-DUP1)			Prepared: 09/30/19 08:22 Analyzed: 10/01/19 15:01									
<u>QC Source Sample: A910822-02 (A910822-02)</u>												
<u>EPA 7471B</u>												
Mercury	0.101	0.00984	0.0469	mg/kg dry	1	---	0.107	---	---	5.57	20%	
Matrix Spike (BHI0876-MS1)			Prepared: 09/30/19 08:22 Analyzed: 10/01/19 15:03									
<u>QC Source Sample: A910822-02 (A910822-02)</u>												
<u>EPA 7471B</u>												
Mercury	0.681	0.00972	0.0463	mg/kg dry	1	0.46296	0.107	124	75-125%	---	---	
Matrix Spike Dup (BHI0876-MSD1)			Prepared: 09/30/19 08:22 Analyzed: 10/01/19 15:05									
<u>QC Source Sample: A910822-02 (A910822-02)</u>												
<u>EPA 7471B</u>												
Mercury	0.692	0.00972	0.0463	mg/kg dry	1	0.46296	0.107	126	75-125%	1.61	20%	
Post Spike (BHI0876-PS1)			Prepared: 09/30/19 08:22 Analyzed: 10/01/19 16:02									
<u>QC Source Sample: A910822-02 (A910822-02)</u>												
<u>EPA 7471B</u>												
Mercury	0.00143			mg/L	1	0.0010000	0.107	121	0-200%		---	
Reference (BHI0876-SRM1)			Prepared: 09/30/19 08:22 Analyzed: 10/01/19 15:07									
<u>EPA 7471B</u>												
Mercury	12.6	0.0525	0.250	mg/kg wet	10	13.300		94.4	68-131.6%	---	---	D

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Analytical Resources, Inc.

QUALITY CONTROL (QC) SAMPLE RESULTS

Metals and Metallic Compounds

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch BHI0876 - SMM EPA 7471B							Solid					

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Analytical Resources, Inc.

QUALITY CONTROL (QC) SAMPLE RESULTS

Wet Chemistry

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch BHI0874 - No Prep Wet Chem						Solid						
Blank (BHI0874-BLK1)						Prepared: 09/30/19 00:59 Analyzed: 09/30/19 01:32						
<u>PSEP 1986</u>												
Total Solids, Sulfide	ND	0.04	0.04	%	1	---	---	---	---	---	---	U
Duplicate (BHI0874-DUP3)						Prepared: 09/30/19 00:59 Analyzed: 09/30/19 01:32						
<u>QC Source Sample: A910822-02 (A910822-02)</u>												
<u>PSEP 1986</u>												
Total Solids, Sulfide	41.80	0.04	0.04	%	1	---	40.27	---	---	3.74	20%	



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Analytical Resources, Inc.

QUALITY CONTROL (QC) SAMPLE RESULTS

Wet Chemistry

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch BHI0893 - EPA 9030B							Solid					
Blank (BHI0893-BLK1)			Prepared: 09/30/19 12:08 Analyzed: 10/03/19 15:28									
<u>SM 4500-S2 D-00</u>												
Sulfide	ND	1.00	1.00	mg/kg wet	1	---	---	---	---	---	---	U
LCS (BHI0893-BS1)			Prepared: 09/30/19 12:08 Analyzed: 10/03/19 15:28									
<u>SM 4500-S2 D-00</u>												
Sulfide	141	10.0	10.0	mg/kg wet	10	165.79	---	84.9	75-125%	---	---	D
Duplicate (BHI0893-DUP1)			Prepared: 09/30/19 12:08 Analyzed: 10/03/19 15:30									
<u>QC Source Sample: A910822-02 (A910822-02)</u>												
<u>SM 4500-S2 D-00</u>												
Sulfide	1470	116	116	mg/kg dry	50	---	1510	---	---	3.24	20%	D
Matrix Spike (BHI0893-MS1)			Prepared: 09/30/19 12:08 Analyzed: 10/03/19 15:31									
<u>QC Source Sample: A910822-02 (A910822-02)</u>												
<u>SM 4500-S2 D-00</u>												
Sulfide	2040	121	121	mg/kg dry	50	400.90	1510	132	75-125%	---	---	HC, D
Matrix Spike Dup (BHI0893-MSD2)			Prepared: 09/30/19 12:08 Analyzed: 10/03/19 16:08									
<u>QC Source Sample: A910822-02 (A910822-02)</u>												
<u>SM 4500-S2 D-00</u>												
Sulfide	1950	121	121	mg/kg dry	50	401.76	1510	108	75-125%	12.6	200%	D



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SAMPLE PREPARATION INFORMATION

Diesel and/or Oil Hydrocarbons by NWTPH-Dx with Acid/Silica Gel Cleanup

Prep: EPA 3546 w/SG+Acid (NWTPH)

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
Batch: 9101201							
A910822-02	Sediment	NWTPH-Dx/SG	09/24/19 08:50	10/01/19 12:56	10.02g/5mL	10g/5mL	1.00

Gasoline Range Hydrocarbons (Benzene through Naphthalene) by NWTPH-Gx

Prep: EPA 5035A

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
Batch: 9091374							
A910822-02	Sediment	NWTPH-Gx (MS)	09/24/19 08:50	09/24/19 08:50	4.69g/5mL	5g/5mL	1.07

Polychlorinated Biphenyls by EPA 8082A

Prep: EPA 3546

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
Batch: 9091456							
A910822-02	Sediment	EPA 8082A	09/24/19 08:50	09/30/19 13:58	10.05g/5mL	10g/5mL	1.00

Semivolatile Organic Compounds by EPA 8270D

Prep: EPA 3546

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
Batch: 9100490							
A910822-02RE1	Sediment	EPA 8270D	09/24/19 08:50	10/01/19 10:34	15.24g/2mL	15g/2mL	0.98

Total Metals by EPA 6020A (ICPMS)

Prep: EPA 3051A

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
Batch: 9100517							
A910822-02	Sediment	EPA 6020A	09/24/19 08:50	10/01/19 15:50	0.503g/50mL	0.5g/50mL	0.99

Ammonia by Plumb Extraction, Gas Diffusion and Colorimetric Detection

Prep: Plumb 1981 Ammonia (Acidified KCl Leach)

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
Batch: 9091360							

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SAMPLE PREPARATION INFORMATION

Ammonia by Plumb Extraction, Gas Diffusion and Colorimetric Detection

Prep: Plumb 1981 Ammonia (Acidified KCl Leach)

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
A910822-01RE1	Sediment	Plumb/SM 4500-NH3 G	09/23/19 14:00	09/27/19 06:49	10.233g/50mL	10g/50mL	0.98
A910822-02RE1	Sediment	Plumb/SM 4500-NH3 G	09/24/19 08:50	09/27/19 06:49	10.4904g/50mL	10g/50mL	0.95
A910822-03RE1	Sediment	Plumb/SM 4500-NH3 G	09/24/19 10:00	09/27/19 06:49	10.0427g/50mL	10g/50mL	1.00
A910822-05RE1	Sediment	Plumb/SM 4500-NH3 G	09/24/19 14:45	09/27/19 06:49	10.3173g/50mL	10g/50mL	0.97

Demand Parameters

Prep: PSEP-5310B TOC

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
Batch: 9091362							
A910822-01	Sediment	EPA 9060Amod	09/23/19 14:00	09/27/19 07:38			NA
A910822-02	Sediment	EPA 9060Amod	09/24/19 08:50	09/27/19 07:38			NA
A910822-03	Sediment	EPA 9060Amod	09/24/19 10:00	09/27/19 07:38			NA
A910822-05	Sediment	EPA 9060Amod	09/24/19 14:45	09/27/19 07:38			NA

Solid and Moisture Determinations

Prep: Total Solids (SM2540G/PSEP)

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
Batch: 9091443							
A910822-01	Sediment	PSEP 1986	09/23/19 14:00	09/30/19 10:56			NA
A910822-02	Sediment	PSEP 1986	09/24/19 08:50	09/30/19 10:56			NA
A910822-03	Sediment	PSEP 1986	09/24/19 10:00	09/30/19 10:56			NA
A910822-05	Sediment	PSEP 1986	09/24/19 14:45	09/30/19 10:56			NA

Prep: Total Volatile Solids (non-aq)

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
Batch: 9091474							
A910822-01	Sediment	SM 2540 G	09/23/19 14:00	09/30/19 17:28			NA
A910822-02	Sediment	SM 2540 G	09/24/19 08:50	09/30/19 17:28			NA
A910822-03	Sediment	SM 2540 G	09/24/19 10:00	09/30/19 17:28			NA
A910822-05	Sediment	SM 2540 G	09/24/19 14:45	09/30/19 17:28			NA

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg

Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A910822 - 01 09 20 1609
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SAMPLE PREPARATION INFORMATION

Grain Size by ASTM D 422m/PSET Parameters

Prep: ASTM D 421					Sample	Default	RL Prep
Lab Number	Matrix	Method	Sampled	Prepared	Initial/Final	Initial/Final	Factor
<u>Batch: 9100739</u>							
A910822-02	Sediment	D422mod	09/24/19 08:50	10/07/19 11:04			NA

Percent Dry Weight

Prep: Total Solids (SM2540G/PSEP)					Sample	Default	RL Prep
Lab Number	Matrix	Method	Sampled	Prepared	Initial/Final	Initial/Final	Factor
<u>Batch: 9091443</u>							
A910822-01	Sediment	EPA 8000C	09/23/19 14:00	09/30/19 10:56			NA
A910822-02	Sediment	EPA 8000C	09/24/19 08:50	09/30/19 10:56			NA
A910822-03	Sediment	EPA 8000C	09/24/19 10:00	09/30/19 10:56			NA
A910822-05	Sediment	EPA 8000C	09/24/19 14:45	09/30/19 10:56			NA

Philip Nerenberg



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A910822 - 01 09 20 1609
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Analytical Resources, Inc.

SAMPLE PREPARATION INFORMATION

Metals and Metallic Compounds

Prep: SMM EPA 7471B

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
<u>Batch: BH10876</u>							
A910822-02	Sediment	EPA 7471B	09/24/19 08:50	09/30/19 08:22	0.245g/50mL	0.2g/50mL	0.82

Wet Chemistry

Prep: EPA 9030B

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
<u>Batch: BH10893</u>							
A910822-01	Sediment	SM 4500-S2 D-00	09/23/19 14:00	09/30/19 12:08	5.567g/100mL	5g/100mL	0.90
A910822-02	Sediment	SM 4500-S2 D-00	09/24/19 08:50	09/30/19 12:08	5.054g/100mL	5g/100mL	0.99
A910822-03	Sediment	SM 4500-S2 D-00	09/24/19 10:00	09/30/19 12:08	5.32g/100mL	5g/100mL	0.94
A910822-05	Sediment	SM 4500-S2 D-00	09/24/19 14:45	09/30/19 12:08	5.056g/100mL	5g/100mL	0.99

Prep: No Prep Wet Chem

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
<u>Batch: BH10874</u>							
A910822-01	Sediment	PSEP 1986	09/23/19 14:00	09/30/19 00:59	5g/5g	5g/5g	1.00
A910822-02	Sediment	PSEP 1986	09/24/19 08:50	09/30/19 00:59	5g/5g	5g/5g	1.00
A910822-03	Sediment	PSEP 1986	09/24/19 10:00	09/30/19 00:59	5g/5g	5g/5g	1.00
A910822-05	Sediment	PSEP 1986	09/24/19 14:45	09/30/19 00:59	5g/5g	5g/5g	1.00

Philip Nerenberg



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tideland Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A910822 - 01 09 20 1609
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QUALIFIER DEFINITIONS

Client Sample and Quality Control (QC) Sample Qualifier Definitions:

Apex Laboratories

- C-07** Extract has undergone Sulfuric Acid Cleanup by EPA 3665A, Sulfur Cleanup by EPA 3660B, and Florisil Cleanup by EPA 3620B in order to minimize matrix interference.
- F-03** The result for this hydrocarbon range is elevated due to the presence of individual analyte peaks in the quantitation range that are not representative of the fuel pattern reported.
- GS-01** See detailed Particle Size Analysis results, accumulation curves, and Case Narratives at the end of this report.
- J** Estimated Result. Result detected below the lowest point of the calibration curve, but above the specified MDL.
- M-04** Due to matrix interference, this analyte cannot be accurately quantified. The reported result may contain a high bias.
- Q-01** Spike recovery and/or RPD is outside acceptance limits.
- Q-03** Spike recovery and/or RPD is outside control limits due to the high concentration of analyte present in the sample.
- Q-04** Spike recovery and/or RPD is outside control limits due to a non-homogeneous sample matrix.
- Q-05** Analyses are not controlled on RPD values from sample and duplicate concentrations that are below 5 times the reporting level.
- Q-11** Spike recovery cannot be accurately quantified due to sample dilution required for high analyte concentration and/or matrix interference.
- Q-16** Reanalysis of an original Batch QC sample.
- Q-29** Recovery for Lab Control Spike (LCS) is above the upper control limit. Data may be biased high.
- Q-31** Estimated Results. Recovery of Continuing Calibration Verification sample below lower control limit for this analyte. Results are likely biased low.
- Q-41** Estimated Results. Recovery of Continuing Calibration Verification sample above upper control limit for this analyte. Results are likely biased high.
- Q-42** Matrix Spike and/or Duplicate analysis was performed on this sample. % Recovery or RPD for this analyte is outside laboratory control limits. (Refer to the QC Section of Analytical Report.)
- Q-52** Due to erratic or low blank spike recoveries, results for this analyte are considered Estimated Values.
- V-15** Sample aliquot was subsampled from the sample container. The subsampled aliquot was preserved in the laboratory within 48 hours of sampling.

Analytical Resources, Inc.

- D** The reported value is from a dilution
- HC** The natural concentration of the spiked analyte is so much greater than the concentration spiked that an accurate determination of spike recovery is not possible
- U** This analyte is not detected above the reporting limit (RL) or if noted, not detected above the limit of detection (LOD).



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A910822 - 01 09 20 1609
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REPORTING NOTES AND CONVENTIONS:

Abbreviations:

- DET Analyte DETECTED at or above the detection or reporting limit.
- ND Analyte NOT DETECTED at or above the detection or reporting limit.
- NR Result Not Reported
- RPD Relative Percent Difference. RPDs for Matrix Spikes and Matrix Spike Duplicates are based on concentration, not recovery.

Detection Limits: Limit of Detection (LOD)

Limits of Detection (LODs) are normally set at a level of one half the validated Limit of Quantitation (LOQ).
If no value is listed ('-----'), then the data has not been evaluated below the Reporting Limit.

Reporting Limits: Limit of Quantitation (LOQ)

Validated Limits of Quantitation (LOQs) are reported as the Reporting Limits for all analyses where the LOQ, MRL, PQL or CRL are requested. The LOQ represents a level at or above the low point of the calibration curve, that has been validated according to Apex Laboratories' comprehensive LOQ policies and procedures.

Reporting Conventions:

- Basis: Results for soil samples are generally reported on a 100% dry weight basis. The Result Basis is listed following the units as "dry", "wet", or "" (blank) designation.
 - "dry" Sample results and Reporting Limits are reported on a dry weight basis. (i.e. "ug/kg dry")
See Percent Solids section for details of dry weight analysis.
 - "wet" Sample results and Reporting Limits for this analysis are normally dry weight corrected, but have not been modified in this case.
 - "" Results without 'wet' or 'dry' designation are not normally dry weight corrected. These results are considered 'As Received'.

QC Source:

In cases where there is insufficient sample provided for Sample Duplicates and/or Matrix Spikes, a Lab Control Sample Duplicate (LCS Dup) may be analyzed to demonstrate accuracy and precision of the extraction batch.

Non-Client Batch QC Samples (Duplicates and Matrix Spike/Duplicates) may not be included in this report. Please request a Full QC report if this data is required.

Miscellaneous Notes:

- " --- " QC results are not applicable. For example, % Recoveries for Blanks and Duplicates, % RPD for Blanks, Blank Spikes and Matrix Spikes, etc.
- " *** " Used to indicate a possible discrepancy with the Sample and Sample Duplicate results when the %RPD is not available. In this case, either the Sample or the Sample Duplicate has a reportable result for this analyte, while the other is Non Detect (ND).

Blanks:

Standard practice is to evaluate the results from Blank QC Samples down to a level equal to 1/2 the Reporting Limit (RL).
-For Blank hits falling between 1/2 the RL and the RL (J flagged hits), the associated sample and QC data will receive a 'B-02' qualifier.
-For Blank hits above the RL, the associated sample and QC data will receive a 'B' qualifier, per Apex Laboratories' Blank Policy.
For further details, please request a copy of this document.



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A910822 - 01 09 20 1609
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REPORTING NOTES AND CONVENTIONS (Cont.):

Blanks (Cont.):

Sample results flagged with a 'B' or 'B-02' qualifier are potentially biased high if the sample results are less than ten times the level found in the blank for inorganic analyses, or less than five times the level found in the blank for organic analyses.

'B' and 'B-02' qualifications are only applied to sample results detected above the Reporting Level.

Preparation Notes:

Mixed Matrix Samples:

Water Samples:

Water samples containing significant amounts of sediment are decanted or separated prior to extraction, and only the water portion analyzed, unless otherwise directed by the client.

Soil and Sediment Samples:

Soil and Sediment samples containing significant amounts of water are decanted prior to extraction, and only the solid portion analyzed, unless otherwise directed by the client.

Sampling and Preservation Notes:

Certain regulatory programs, such as National Pollutant Discharge Elimination System (NPDES), require that activities such as sample filtration (for dissolved metals, orthophosphate, hexavalent chromium, etc.) and testing of short hold analytes (pH, Dissolved Oxygen, etc.) be performed in the field (on-site) within a short time window. In addition, sample matrix spikes are required for some analyses, and sufficient volume must be provided, and billable site specific QC requested, if this is required. All regulatory permits should be reviewed to ensure that these requirements are being met.

Data users should be aware of which regulations pertain to the samples they submit for testing. If related sample collection activities are not approved for a particular regulatory program, results should be considered estimates. Apex Laboratories will qualify these analytes according to the most stringent requirements, however results for samples that are for non-regulatory purposes may be acceptable.

Samples that have been filtered and preserved at Apex Laboratories per client request are listed in the preparation section of the report with the date and time of filtration listed.

Apex Laboratories maintains detailed records on sample receipt, including client label verification, cooler temperature, sample preservation, hold time compliance and field filtration. Data is qualified as necessary, and the lack of qualification indicates compliance with required parameters.



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A910822 - 01 09 20 1609
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LABORATORY ACCREDITATION INFORMATION

TNI Certification ID: OR100062 (Primary Accreditation) - EPA ID: OR01039

All methods and analytes reported from work performed at Apex Laboratories are included on Apex Laboratories' ORELAP Scope of Certification, with the exception of any analyte(s) listed below:

Apex Laboratories

Matrix	Analysis	TNI_ID	Analyte	TNI_ID	Accreditation
<u>All reported analytes are included in Apex Laboratories' current ORELAP scope.</u>					

Secondary Accreditations

Apex Laboratories also maintains reciprocal accreditation with non-TNI states (Washington DOE), as well as other state specific accreditations not listed here.

Subcontract Laboratory Accreditations

Subcontracted data falls outside of Apex Laboratories' Scope of Accreditation. Please see the Subcontract Laboratory report for full details, or contact your Project Manager for more information.

Field Testing Parameters

Results for Field Tested data are provided by the client or sampler, and fall outside of Apex Laboratories' Scope of Accreditation.

Apex Laboratories

Philip Nerenberg, Lab Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



Apex Laboratories, LLC

6700 S.W. Sandburg Street

Tigard, OR 97223

503-718-2323

EPA ID: OR01039

AMENDED REPORT

Maul Foster & Alongi, INC.

2001 NW 19th Ave, STE 200

Portland, OR 97209

Project: Seaport Tidelands

Project Number: 1044.02.06-02

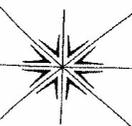
Project Manager: Emily Hess

Report ID:

A910822 - 01 09 20 1609

CHAIN OF CUSTODY RECORD

Specialty Analytical
11711 SE Capps Road
Clackamas, OR 97015
Phone: 503-607-1331
Fax: 503-607-1336



Contact Person/Project Manager: Emily Hess
Company: MFA
Address: 109 E 13th Street
New Caney, TX
Phone: (360) 433-0244
Project No: 1044.02.06-02
Project Name: Seaport In-water RE
Project Site Location OR: WA X Other
Invoice To: MFA
P.O. No: 1044.02.06-02

A910822

Page 1 of 1

Collected By:
Signature: [Signature]
Printed: Mckenzie Pollock
Signature: [Signature]
Printed: BAIR PAXLEY

Turn Around Time
Normal 5-7 Business Days
Rush

Rush Analyses Must Be Scheduled With The Lab In Advance

Table with columns: Date, Time, Sample I.D., Matrix, No. of Containers, Analyzes, For Laboratory Use (Lab Job No., Shipped Via, Air Bill No., Temperature On Receipt, etc.), Relinquished By, Date, Time, Received For Lab By, Date, Time.

Apex Laboratories

Philip Nerenberg

Philip Nerenberg, Lab Director

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AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A910822 - 01 09 20 1609
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APEX LABS COOLER RECEIPT FORM

Client: MFA 9/25/19 Element WO#: A910822

Project/Project #: Seaport Landys Int In-water / 1044.02.06-02

Delivery Info:

Date/time received: 9-25-19 @ 12:32 By: MFA

Delivered by: Apex Client ESS FedEx UPS Swift Servoy SDS Other

Cooler Inspection Date/time inspected: 9-25-19 @ 12:32 By: MFA

Chain of Custody included? Yes No Custody seals? Yes No

Signed/dated by client? Yes No

Signed/dated by Apex? Yes No

	Cooler #1	Cooler #2	Cooler #3	Cooler #4	Cooler #5	Cooler #6	Cooler #7
Temperature (°C)	<u>5.0</u>						
Received on ice? (Y/N)	<u>Y</u>						
Temp. blanks? (Y/N)	<u>N</u>						
Ice type: (Gel/Real/Other)	<u>Real</u>						
Condition:	<u>good</u>						

Cooler out of temp? (Y/N) Possible reason why: _____
If some coolers are in temp and some out, were green dots applied to out of temperature samples? Yes/No/NA

Out of temperature samples form initiated? Yes/No/NA

Samples Inspection: Date/time inspected: 9/25/19 @ 1614 By: [Signature]

All samples intact? Yes No Comments: _____

Bottle labels/COCs agree? Yes No Comments: _____

COC/container discrepancies form initiated? Yes No NA

Containers/volumes received appropriate for analysis? Yes No Comments: _____

Do VOA vials have visible headspace? Yes No NA

Comments: _____

Water samples: pH checked: Yes No NA pH appropriate? Yes No NA

Comments: _____

Additional information: _____

Subsampled by: [Signature]
Witnessed by: [Signature]

Labeled by: ST Witness: [Signature] Cooler Inspected by: [Signature] See Project Contact Form: Y

Philip Nerenberg

Apex Laboratories, LLC

Particle Size Analysis of Soil by ASTM D 422

Sample ID:	A9I0822-02	Client Sample ID:	SE-29-0-2.0	Batch Number:	9100739
Data Entered by:	SJL	Date:	10/14/19	Data Reviewed by:	JW
Date:				Date:	10/16/19
Sample Description:	Gravelly SILT with some Sand and Clay		Max Particle Size:	Gravel	
Particle Shape:	N/A		Hardness	N/A	

Whole Sample	Tare	Air Dry + Tare	Air Dry	Moisture	Dry Wt.
	11.865	252.547	240.68	8.29	222.3

Sieve Number	Opening (mm)	Tare	Dry + Tare	Weight Retained	Cumulative Wt. Retained	% Retained	% Passing
4	4.75	6.106	67.723	61.62	61.62	27.7	72.3
10	2.00	6.087	16.409	10.32	71.94	4.6	67.6
Pan		5.882	163.490	157.61	229.55	65.0	

Hygroscopic Moisture Correction

	Hygroscopic Correction Factor	Oven Sample	Pan No.	Tare	Air Dry + Tare	Oven Dry + Tare	Moisture
	0.9234		I822-02	1.316	20.448	18.983	8.29

Hydrometer Analysis

Start Date/Time	10/7/2019	11:04	Dispersing Agent	NaPO ₃
Air Dry Sample Wt. for Hydrometer Test (g)	53.808		G _s Correction Factor (α)	1.000
Percent Passing No. 10 Sieve	67.6		Specific Gravity (G _s)	2.65
Dry Weight of Soil Tested (g)	49.69		Corrected Dry Weight of Soil Tested (g) (W)	73.47

Elapsed Time (min)	Hydrometer Reading	Temperature (°C)	Corrected Hydrometer Reading [R]	% Finer of Hydrometer Sample	L	K	Particle Diameter (mm)	Percent Passing
1	34	19.8	27.71	37.7	10.5	0.01365	0.044	25.51
2	31	19.8	24.71	33.6	11.1	0.01365	0.032	22.75
4	26.5	19.8	20.21	27.5	11.7	0.01365	0.023	18.61
8	23.5	19.8	17.21	23.4	12.2	0.01365	0.017	15.85
15	20.5	19.9	14.25	19.4	12.7	0.01365	0.013	13.11
30	17.5	19.9	11.25	15.3	13.2	0.01365	0.009	10.35
60	15.5	19.8	9.21	12.5	13.5	0.01365	0.006	8.48
90	14.5	19.7	8.18	11.1	13.7	0.01365	0.005	7.53
120	13.5	19.7	7.18	9.8	13.8	0.01365	0.005	6.61
240	12	19.8	5.71	7.8	14.2	0.01365	0.003	5.26
360	11	19.5	4.61	6.3	14.3	0.01365	0.003	4.25
1440	9.5	19.2	3.01	4.1	14.5	0.01382	0.001	2.77

Sieve Analysis of Portion Finer Than No. 10 Sieve

Sieve Number	Opening (mm)	Tare	Dry + Tare	Weight Retained	Cumulative Retained	% Retained	% Passing
20	0.850	1.319	4.456	3.14	81.13	4.3	63.4
40	0.425	1.331	4.853	3.52	91.44	4.8	58.6
60	0.250	1.319	4.578	3.26	100.99	4.4	54.1
100	0.150	1.325	3.940	2.62	108.65	3.6	50.6
140	0.105	1.338	3.576	2.24	115.20	3.0	47.5
200	0.075	1.312	4.376	3.06	124.18	4.2	43.4
230	0.063	1.329	3.202	1.87	129.67	2.5	40.8
			Sum	19.71	230 Minus	29.98	

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

Sample ID: SE-29-0-2.0 (A9I0822-02)

Grain Size Analysis Summary from Sieving and Hydrometer Testing	Particle Size (mm)	Percent Finer	Total Percent of Sample
Gravel			32.37
Retained on No. 4 sieve	4.75	72.28	27.72
Gravel, passing No. 4 sieve and retained on No. 10 sieve	2.00	67.63	4.64
Sand			26.83
Coarse sand, passing No.10 sieve and retained on No. 20 sieve	0.8500	63.36	4.27
Medium sand, passing No.20 sieve and retained on No. 40 sieve	0.4250	58.57	4.79
Medium sand, passing No.40 sieve and retained on No. 60 sieve	0.2500	54.13	4.44
Medium sand, passing No. 60 sieve and retained on No.100 sieve	0.1500	50.57	3.56
Fine sand, passing No. 100 sieve and retained on No.140 sieve	0.1060	47.53	3.05
Fine sand passing No. 140 sieve and retained on No. 200 sieve	0.0750	43.36	4.17
Fine sand, passing No. 200 sieve and retained on No. 230 sieve	0.0630	40.81	2.55
Silt and Clay (Measurements in the Clay fraction are noted)			40.81
Hydrometer Test	0.0442	25.51	15.29
Hydrometer Test	0.0322	22.75	2.76
Hydrometer Test	0.0233	18.61	4.14
Hydrometer Test	0.0169	15.85	2.76
Hydrometer Test	0.0126	13.11	2.73
Hydrometer Test	0.0091	10.35	2.76
Hydrometer Test	0.0065	8.48	1.87
Hydrometer Test	0.0053	7.53	0.95
Hydrometer Test Clay	0.0046	6.61	0.92
Hydrometer Test Clay	0.0033	5.26	1.35
Hydrometer Test Clay	0.0027	4.25	1.01
Hydrometer Test Clay	0.0014	2.77	1.47

Grain Size Summary	Percent of Total Sample
Gravel	32.4
Sand	26.8
Coarse sand	4.3
Medium sand	12.8
Fine sand	9.8
Silt	33.3
Clay	7.5

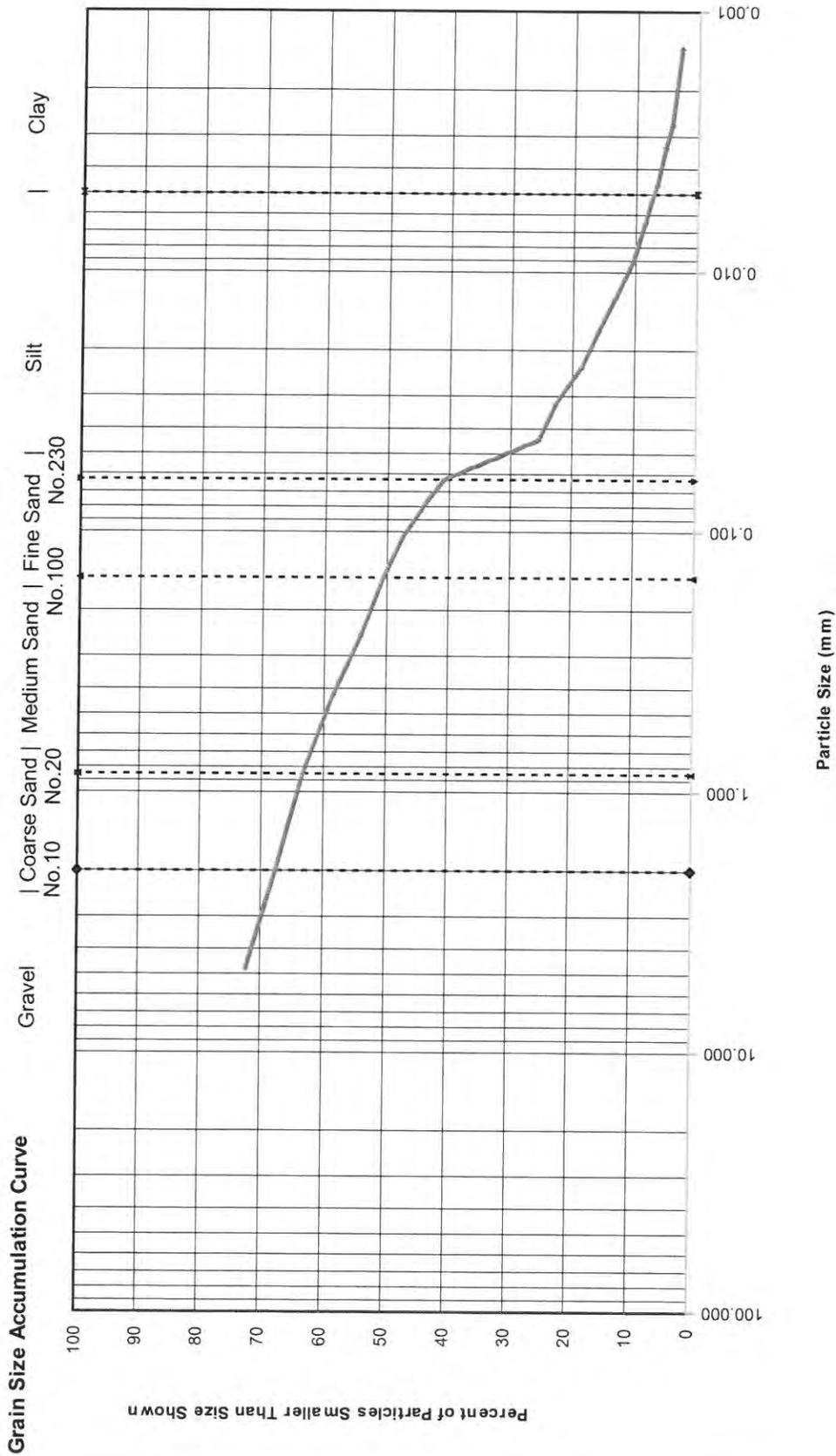
Case Narrative for Sample ID: SE-29-0-2.0 (A9I0822-02)

This data is not to be used for engineering purposes.
 No difficulty dispersing the fraction passing the No. 10 sieve.
 Dispersion device used: Commercial drink mixer operating at least 10,000 rpm for one minute.
 The assumed specific gravity used in the calculations was 2.65.
 +4 through +100 fractions consist almost entirely of organic material.



Expenses 12/31/19

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



Sample ID:	SE-29-0-2.0 (A910822-02)		
Specific Gravity	2.65	GRAVEL & SAND	
		PARTICLE SHAPE	HARDNESS
	Gravel	N/A	N/A
		SOIL DESCRIPTION	
		Gravelly SILT with some Sand and Clay	



AMENDED REPORT

Thursday, January 9, 2020

Emily Hess
Maul Foster & Alongi, INC.
2001 NW 19th Ave, STE 200
Portland, OR 97209

RE: A9I0893 - Seaport Tidelands - 1044.02.06-02

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

Enclosed are the results of analyses for work order A9I0893, which was received by the laboratory on 9/27/2019 at 12:10:00PM.

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

Please note: All samples will be disposed of within 30 days of sample receipt, unless prior arrangements have been made.

Cooler Receipt Information

(See Cooler Receipt Form for details)

Cooler #1	1.3 degC	Cooler #2	1.7 degC
Cooler #3	1.1 degC	Cooler #4	0.5 degC

This Final Report is the official version of the data results for this sample submission, unless superseded by a subsequent, labeled amended report.

All other deliverables derived from this data, including Electronic Data Deliverables (EDDs), CLP-like forms, client requested summary sheets, and all other products are considered secondary to this report.



Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9I0893 - 01 09 20 1624
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ANALYTICAL REPORT FOR SAMPLES

SAMPLE INFORMATION

Client Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
SE-01A-1.0-2.0	A9I0893-01	Sediment	09/25/19 08:10	09/27/19 12:10
SE-03A-0-1.0	A9I0893-05	Sediment	09/25/19 11:20	09/27/19 12:10
SE-06A-0.5-1.5	A9I0893-07	Sediment	09/25/19 14:15	09/27/19 12:10
SE-20-0-0.33	A9I0893-08	Sediment	09/25/19 18:15	09/27/19 12:10
SE-07A-0-1.0	A9I0893-09	Sediment	09/26/19 08:15	09/27/19 12:10
SE-02A-2.5-3.5	A9I0893-11	Sediment	09/26/19 11:50	09/27/19 12:10
SE-10-2.0-3.7	A9I0893-13	Sediment	09/26/19 13:50	09/27/19 12:10
SE-30-2.5-4.5	A9I0893-14	Sediment	09/26/19 15:40	09/27/19 12:10
Rinsate Blank	A9I0893-18	Water	09/26/19 18:40	09/27/19 12:10
SE-20-0-0.33 (Water)	A9I0893-19	Water	09/25/19 18:15	09/27/19 12:10
SE-20-0-0.33--Air Dried	A9I0893-20	Sediment	09/25/19 18:15	09/27/19 12:10
SE-10-2.0-3.7---Air Dried	A9I0893-21	Sediment	09/26/19 13:50	09/27/19 12:10
SE-30-2.5-4.5---Air Dried	A9I0893-22	Sediment	09/26/19 15:40	09/27/19 12:10



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EPA ID: OR01039

AMENDED REPORT

<u>Maul Foster & Alongi, INC.</u> 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: <u>Seaport Tidelands</u> Project Number: 1044.02.06-02 Project Manager: Emily Hess	<u>Report ID:</u> A910893 - 01 09 20 1624
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ANALYTICAL CASE NARRATIVE

Work Order: A910893

Amended Report Revision 1:

This report supersedes all previous reports.

Due to client request, 1-methylnaphthalene was added to the SVOC analyte list after the previous report version had been completed.

Philip Nerenberg
Lab Director
1/9/20

DRAFT

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A910893 - 01 09 20 1624
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ANALYTICAL SAMPLE RESULTS

Diesel and/or Oil Hydrocarbons by NWTPH-Dx with Acid/Silica Gel Cleanup

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
SE-20-0-0.33 (A910893-08)				Matrix: Sediment		Batch: 9101200		
Diesel	ND	26.7	53.4	mg/kg dry	1	10/16/19 23:29	NWTPH-Dx/SG	
Oil	610	53.4	107	mg/kg dry	1	10/16/19 23:29	NWTPH-Dx/SG	
<i>Surrogate: o-Terphenyl (Surr)</i>		<i>Recovery: 95 %</i>		<i>Limits: 50-150 %</i>		<i>1</i>	<i>10/16/19 23:29</i>	<i>NWTPH-Dx/SG</i>
SE-10-2.0-3.7 (A910893-13)				Matrix: Sediment		Batch: 9101200		
Diesel	ND	25.8	51.6	mg/kg dry	1	10/17/19 00:17	NWTPH-Dx/SG	
Oil	898	51.6	103	mg/kg dry	1	10/17/19 00:17	NWTPH-Dx/SG	
<i>Surrogate: o-Terphenyl (Surr)</i>		<i>Recovery: 93 %</i>		<i>Limits: 50-150 %</i>		<i>1</i>	<i>10/17/19 00:17</i>	<i>NWTPH-Dx/SG</i>
SE-30-2.5-4.5 (A910893-14)				Matrix: Sediment		Batch: 9101200		
Diesel	ND	20.6	41.3	mg/kg dry	1	10/17/19 01:27	NWTPH-Dx/SG	
Oil	393	41.3	82.5	mg/kg dry	1	10/17/19 01:27	NWTPH-Dx/SG	
<i>Surrogate: o-Terphenyl (Surr)</i>		<i>Recovery: 92 %</i>		<i>Limits: 50-150 %</i>		<i>1</i>	<i>10/17/19 01:27</i>	<i>NWTPH-Dx/SG</i>
Rinsate Blank (A910893-18)				Matrix: Water		Batch: 9101263		
Diesel	ND	0.222	0.222	mg/L	1	10/18/19 02:24	NWTPH-Dx/SG	
Oil	ND	0.222	0.444	mg/L	1	10/18/19 02:24	NWTPH-Dx/SG	
<i>Surrogate: o-Terphenyl (Surr)</i>		<i>Recovery: 100 %</i>		<i>Limits: 50-150 %</i>		<i>1</i>	<i>10/18/19 02:24</i>	<i>NWTPH-Dx/SG</i>



AMENDED REPORT

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ANALYTICAL SAMPLE RESULTS

Gasoline Range Hydrocarbons (Benzene through Naphthalene) by NWTPH-Gx

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
SE-20-0-0.33 (A910893-08)				Matrix: Sediment		Batch: 9091416		
Gasoline Range Organics	ND	13.4	26.8	mg/kg dry	50	09/28/19 18:56	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		Recovery: 103 %	Limits: 50-150 %	1	09/28/19 18:56	NWTPH-Gx (MS)		
1,4-Difluorobenzene (Sur)		101 %	50-150 %	1	09/28/19 18:56	NWTPH-Gx (MS)		
SE-10-2.0-3.7 (A910893-13)				Matrix: Sediment		Batch: 9091416		
Gasoline Range Organics	ND	11.8	23.6	mg/kg dry	50	09/28/19 19:50	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		Recovery: 106 %	Limits: 50-150 %	1	09/28/19 19:50	NWTPH-Gx (MS)		
1,4-Difluorobenzene (Sur)		102 %	50-150 %	1	09/28/19 19:50	NWTPH-Gx (MS)		
SE-30-2.5-4.5 (A910893-14)				Matrix: Sediment		Batch: 9091416		
Gasoline Range Organics	ND	7.95	15.9	mg/kg dry	50	09/28/19 20:17	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		Recovery: 104 %	Limits: 50-150 %	1	09/28/19 20:17	NWTPH-Gx (MS)		
1,4-Difluorobenzene (Sur)		102 %	50-150 %	1	09/28/19 20:17	NWTPH-Gx (MS)		
Rinsate Blank (A910893-18)				Matrix: Water		Batch: 9091419		
Gasoline Range Organics	ND	0.0500	0.100	mg/L	1	09/29/19 01:32	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		Recovery: 83 %	Limits: 50-150 %	1	09/29/19 01:32	NWTPH-Gx (MS)		
1,4-Difluorobenzene (Sur)		107 %	50-150 %	1	09/29/19 01:32	NWTPH-Gx (MS)		



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ANALYTICAL SAMPLE RESULTS

Polychlorinated Biphenyls by EPA 8082A

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
Rinsate Blank (A910893-18) Matrix: Water Batch: 9091465 C-07								
Aroclor 1016	ND	0.0562	0.112	ug/L	1	10/01/19 13:53	EPA 8082A	
Aroclor 1221	ND	0.0562	0.112	ug/L	1	10/01/19 13:53	EPA 8082A	
Aroclor 1232	ND	0.0562	0.112	ug/L	1	10/01/19 13:53	EPA 8082A	
Aroclor 1242	ND	0.0562	0.112	ug/L	1	10/01/19 13:53	EPA 8082A	
Aroclor 1248	ND	0.0562	0.112	ug/L	1	10/01/19 13:53	EPA 8082A	
Aroclor 1254	ND	0.0562	0.112	ug/L	1	10/01/19 13:53	EPA 8082A	
Aroclor 1260	ND	0.0562	0.112	ug/L	1	10/01/19 13:53	EPA 8082A	
<i>Surrogate: Decachlorobiphenyl (Surr)</i>		Recovery: 53 %		Limits: 40-135 %		1	10/01/19 13:53	EPA 8082A
SE-20-0-0.33--Air Dried (A910893-20) Matrix: Sediment Batch: 9101592 C-07								
Aroclor 1016	ND	2.12	4.24	ug/kg dry	1	10/28/19 09:59	EPA 8082A	
Aroclor 1221	ND	2.12	4.24	ug/kg dry	1	10/28/19 09:59	EPA 8082A	
Aroclor 1232	ND	2.12	4.24	ug/kg dry	1	10/28/19 09:59	EPA 8082A	
Aroclor 1242	ND	2.12	4.24	ug/kg dry	1	10/28/19 09:59	EPA 8082A	
Aroclor 1248	ND	2.12	4.24	ug/kg dry	1	10/28/19 09:59	EPA 8082A	
Aroclor 1254	2.38	2.12	4.24	ug/kg dry	1	10/28/19 09:59	EPA 8082A	J
Aroclor 1260	2.31	2.12	4.24	ug/kg dry	1	10/28/19 09:59	EPA 8082A	J
<i>Surrogate: Decachlorobiphenyl (Surr)</i>		Recovery: 75 %		Limits: 60-125 %		1	10/28/19 09:59	EPA 8082A
SE-10-2.0-3.7---Air Dried (A910893-21) Matrix: Sediment Batch: 9101592 C-07								
Aroclor 1016	ND	2.15	4.29	ug/kg dry	1	10/28/19 11:10	EPA 8082A	
Aroclor 1221	ND	2.15	4.29	ug/kg dry	1	10/28/19 11:10	EPA 8082A	
Aroclor 1232	ND	2.15	4.29	ug/kg dry	1	10/28/19 11:10	EPA 8082A	
Aroclor 1242	ND	2.15	4.29	ug/kg dry	1	10/28/19 11:10	EPA 8082A	
Aroclor 1248	ND	2.15	4.29	ug/kg dry	1	10/28/19 11:10	EPA 8082A	
Aroclor 1254	5.86	2.15	4.29	ug/kg dry	1	10/28/19 11:10	EPA 8082A	P-10
Aroclor 1260	7.17	2.15	4.29	ug/kg dry	1	10/28/19 11:10	EPA 8082A	P-10
<i>Surrogate: Decachlorobiphenyl (Surr)</i>		Recovery: 62 %		Limits: 60-125 %		1	10/28/19 11:10	EPA 8082A
SE-30-2.5-4.5---Air Dried (A910893-22) Matrix: Sediment Batch: 9101592 C-07								
Aroclor 1016	ND	7.24	7.24	ug/kg dry	1	10/28/19 12:56	EPA 8082A	R-02
Aroclor 1221	ND	4.13	4.13	ug/kg dry	1	10/28/19 12:56	EPA 8082A	
Aroclor 1232	ND	17.6	17.6	ug/kg dry	1	10/28/19 12:56	EPA 8082A	R-02

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Philip Nerenberg, Lab Director

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AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A910893 - 01 09 20 1624
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ANALYTICAL SAMPLE RESULTS

Polychlorinated Biphenyls by EPA 8082A

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
SE-30-2.5-4.5---Air Dried (A910893-22)				Matrix: Sediment		Batch: 9101592		C-07
Aroclor 1242	ND	10.3	10.3	ug/kg dry	1	10/28/19 12:56	EPA 8082A	R-02
Aroclor 1248	ND	13.4	13.4	ug/kg dry	1	10/28/19 12:56	EPA 8082A	R-02
Aroclor 1254	ND	11.4	11.4	ug/kg dry	1	10/28/19 12:56	EPA 8082A	R-02
Aroclor 1260	14.4	2.07	4.13	ug/kg dry	1	10/28/19 12:56	EPA 8082A	
<i>Surrogate: Decachlorobiphenyl (Surr)</i>		<i>Recovery: 78 %</i>		<i>Limits: 60-125 %</i>		<i>1</i>	<i>10/28/19 12:56</i>	<i>EPA 8082A</i>

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AMENDED REPORT

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ANALYTICAL SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
SE-20-0-0.33 (A910893-08RE1)				Matrix: Sediment		Batch: 9100490		R-04
Acenaphthene	ND	0.0143	0.0287	mg/kg dry	4	10/02/19 12:07	EPA 8270D	
Acenaphthylene	ND	0.0143	0.0287	mg/kg dry	4	10/02/19 12:07	EPA 8270D	
Anthracene	ND	0.0143	0.0287	mg/kg dry	4	10/02/19 12:07	EPA 8270D	
Benz(a)anthracene	ND	0.0143	0.0287	mg/kg dry	4	10/02/19 12:07	EPA 8270D	
Benzo(a)pyrene	ND	0.0215	0.0430	mg/kg dry	4	10/02/19 12:07	EPA 8270D	
Benzo(b)fluoranthene	ND	0.0215	0.0430	mg/kg dry	4	10/02/19 12:07	EPA 8270D	
Benzo(k)fluoranthene	ND	0.0215	0.0430	mg/kg dry	4	10/02/19 12:07	EPA 8270D	
Benzo(g,h,i)perylene	ND	0.0143	0.0287	mg/kg dry	4	10/02/19 12:07	EPA 8270D	
Chrysene	ND	0.0143	0.0287	mg/kg dry	4	10/02/19 12:07	EPA 8270D	
Dibenz(a,h)anthracene	ND	0.0143	0.0287	mg/kg dry	4	10/02/19 12:07	EPA 8270D	
Fluoranthene	0.0169	0.0143	0.0287	mg/kg dry	4	10/02/19 12:07	EPA 8270D	J
Fluorene	ND	0.0143	0.0287	mg/kg dry	4	10/02/19 12:07	EPA 8270D	
Indeno(1,2,3-cd)pyrene	ND	0.0143	0.0287	mg/kg dry	4	10/02/19 12:07	EPA 8270D	
1-Methylnaphthalene	ND	0.0287	0.0574	mg/kg dry	4	10/02/19 12:07	EPA 8270D	
2-Methylnaphthalene	ND	0.0287	0.0574	mg/kg dry	4	10/02/19 12:07	EPA 8270D	
Naphthalene	ND	0.0287	0.0574	mg/kg dry	4	10/02/19 12:07	EPA 8270D	
Phenanthrene	ND	0.0143	0.0287	mg/kg dry	4	10/02/19 12:07	EPA 8270D	
Pyrene	0.0174	0.0143	0.0287	mg/kg dry	4	10/02/19 12:07	EPA 8270D	J
Dibenzofuran	ND	0.0143	0.0287	mg/kg dry	4	10/02/19 12:07	EPA 8270D	
2,4-Dimethylphenol	ND	0.0718	0.143	mg/kg dry	4	10/02/19 12:07	EPA 8270D	
2-Methylphenol	ND	0.0358	0.0718	mg/kg dry	4	10/02/19 12:07	EPA 8270D	
3+4-Methylphenol(s)	0.0432	0.0358	0.0718	mg/kg dry	4	10/02/19 12:07	EPA 8270D	J
Pentachlorophenol (PCP)	ND	0.143	0.287	mg/kg dry	4	10/02/19 12:07	EPA 8270D	
Phenol	ND	0.0287	0.0574	mg/kg dry	4	10/02/19 12:07	EPA 8270D	
Bis(2-ethylhexyl)phthalate	ND	0.215	0.430	mg/kg dry	4	10/02/19 12:07	EPA 8270D	
Butyl benzyl phthalate	ND	0.0718	0.143	mg/kg dry	4	10/02/19 12:07	EPA 8270D	
Diethylphthalate	ND	0.0718	0.143	mg/kg dry	4	10/02/19 12:07	EPA 8270D	
Dimethylphthalate	ND	0.0718	0.143	mg/kg dry	4	10/02/19 12:07	EPA 8270D	
Di-n-butylphthalate	ND	0.0718	0.143	mg/kg dry	4	10/02/19 12:07	EPA 8270D	
Di-n-octyl phthalate	ND	0.115	0.143	mg/kg dry	4	10/02/19 12:07	EPA 8270D	
N-Nitrosodiphenylamine	ND	0.0358	0.0718	mg/kg dry	4	10/02/19 12:07	EPA 8270D	
Hexachlorobenzene	ND	0.0143	0.0287	mg/kg dry	4	10/02/19 12:07	EPA 8270D	
Hexachlorobutadiene	ND	0.0358	0.0718	mg/kg dry	4	10/02/19 12:07	EPA 8270D	

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Philip Nerenberg, Lab Director



AMENDED REPORT

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ANALYTICAL SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
SE-20-0-0.33 (A910893-08RE1)			Matrix: Sediment			Batch: 9100490		R-04
Hexachlorocyclopentadiene	ND	0.0718	0.143	mg/kg dry	4	10/02/19 12:07	EPA 8270D	
1,2-Dichlorobenzene	ND	0.0358	0.0718	mg/kg dry	4	10/02/19 12:07	EPA 8270D	
1,4-Dichlorobenzene	ND	0.0358	0.0718	mg/kg dry	4	10/02/19 12:07	EPA 8270D	
1,2,4-Trichlorobenzene	ND	0.0358	0.0718	mg/kg dry	4	10/02/19 12:07	EPA 8270D	
Benzoic acid	ND	1.80	3.58	mg/kg dry	4	10/02/19 12:07	EPA 8270D	
Benzyl alcohol	ND	0.0718	0.143	mg/kg dry	4	10/02/19 12:07	EPA 8270D	
<i>Surrogate: Nitrobenzene-d5 (Surr)</i>		<i>Recovery: 63 %</i>		<i>Limits: 37-122 %</i>		<i>4</i>	<i>10/02/19 12:07</i>	<i>EPA 8270D</i>
<i>2-Fluorobiphenyl (Surr)</i>		<i>65 %</i>		<i>44-115 %</i>		<i>4</i>	<i>10/02/19 12:07</i>	<i>EPA 8270D</i>
<i>Phenol-d6 (Surr)</i>		<i>60 %</i>		<i>33-122 %</i>		<i>4</i>	<i>10/02/19 12:07</i>	<i>EPA 8270D</i>
<i>p-Terphenyl-d14 (Surr)</i>		<i>69 %</i>		<i>54-127 %</i>		<i>4</i>	<i>10/02/19 12:07</i>	<i>EPA 8270D</i>
<i>2-Fluorophenol (Surr)</i>		<i>55 %</i>		<i>35-115 %</i>		<i>4</i>	<i>10/02/19 12:07</i>	<i>EPA 8270D</i>
<i>2,4,6-Tribromophenol (Surr)</i>		<i>101 %</i>		<i>39-132 %</i>		<i>4</i>	<i>10/02/19 12:07</i>	<i>EPA 8270D</i>
SE-10-2.0-3.7 (A910893-13RE1)			Matrix: Sediment			Batch: 9100490		
Acenaphthene	ND	0.0681	0.137	mg/kg dry	20	10/02/19 11:51	EPA 8270D	
Acenaphthylene	ND	0.0681	0.137	mg/kg dry	20	10/02/19 11:51	EPA 8270D	
Anthracene	ND	0.0681	0.137	mg/kg dry	20	10/02/19 11:51	EPA 8270D	
Benz(a)anthracene	ND	0.0681	0.137	mg/kg dry	20	10/02/19 11:51	EPA 8270D	
Benzo(a)pyrene	0.167	0.102	0.205	mg/kg dry	20	10/02/19 11:51	EPA 8270D	J
Benzo(b)fluoranthene	0.121	0.102	0.205	mg/kg dry	20	10/02/19 11:51	EPA 8270D	J
Benzo(k)fluoranthene	ND	0.102	0.205	mg/kg dry	20	10/02/19 11:51	EPA 8270D	
Benzo(g,h,i)perylene	0.0734	0.0681	0.137	mg/kg dry	20	10/02/19 11:51	EPA 8270D	J
Chrysene	ND	0.0681	0.137	mg/kg dry	20	10/02/19 11:51	EPA 8270D	
Dibenz(a,h)anthracene	ND	0.0681	0.137	mg/kg dry	20	10/02/19 11:51	EPA 8270D	
Fluoranthene	0.0761	0.0681	0.137	mg/kg dry	20	10/02/19 11:51	EPA 8270D	J
Fluorene	ND	0.0681	0.137	mg/kg dry	20	10/02/19 11:51	EPA 8270D	
Indeno(1,2,3-cd)pyrene	ND	0.0681	0.137	mg/kg dry	20	10/02/19 11:51	EPA 8270D	
1-Methylnaphthalene	ND	0.137	0.273	mg/kg dry	20	10/02/19 11:51	EPA 8270D	
2-Methylnaphthalene	ND	0.137	0.273	mg/kg dry	20	10/02/19 11:51	EPA 8270D	
Naphthalene	ND	0.137	0.273	mg/kg dry	20	10/02/19 11:51	EPA 8270D	
Phenanthrene	ND	0.0681	0.137	mg/kg dry	20	10/02/19 11:51	EPA 8270D	
Pyrene	0.152	0.0681	0.137	mg/kg dry	20	10/02/19 11:51	EPA 8270D	
Dibenzofuran	ND	0.0681	0.137	mg/kg dry	20	10/02/19 11:51	EPA 8270D	
2,4-Dimethylphenol	ND	0.341	0.681	mg/kg dry	20	10/02/19 11:51	EPA 8270D	

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A910893 - 01 09 20 1624
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ANALYTICAL SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
SE-10-2.0-3.7 (A910893-13RE1)				Matrix: Sediment		Batch: 9100490		
2-Methylphenol	ND	0.170	0.341	mg/kg dry	20	10/02/19 11:51	EPA 8270D	
3+4-Methylphenol(s)	0.309	0.170	0.341	mg/kg dry	20	10/02/19 11:51	EPA 8270D	J
Pentachlorophenol (PCP)	ND	0.681	1.37	mg/kg dry	20	10/02/19 11:51	EPA 8270D	
Phenol	ND	0.137	0.273	mg/kg dry	20	10/02/19 11:51	EPA 8270D	
Bis(2-ethylhexyl)phthalate	ND	1.02	2.05	mg/kg dry	20	10/02/19 11:51	EPA 8270D	
Butyl benzyl phthalate	ND	0.341	0.681	mg/kg dry	20	10/02/19 11:51	EPA 8270D	
Diethylphthalate	ND	0.341	0.681	mg/kg dry	20	10/02/19 11:51	EPA 8270D	
Dimethylphthalate	ND	0.341	0.681	mg/kg dry	20	10/02/19 11:51	EPA 8270D	
Di-n-butylphthalate	ND	0.341	0.681	mg/kg dry	20	10/02/19 11:51	EPA 8270D	
Di-n-octyl phthalate	ND	0.548	0.681	mg/kg dry	20	10/02/19 11:51	EPA 8270D	
N-Nitrosodiphenylamine	ND	0.170	0.341	mg/kg dry	20	10/02/19 11:51	EPA 8270D	
Hexachlorobenzene	ND	0.0681	0.137	mg/kg dry	20	10/02/19 11:51	EPA 8270D	
Hexachlorobutadiene	ND	0.170	0.341	mg/kg dry	20	10/02/19 11:51	EPA 8270D	
Hexachlorocyclopentadiene	ND	0.341	0.681	mg/kg dry	20	10/02/19 11:51	EPA 8270D	
1,2-Dichlorobenzene	ND	0.170	0.341	mg/kg dry	20	10/02/19 11:51	EPA 8270D	
1,4-Dichlorobenzene	ND	0.170	0.341	mg/kg dry	20	10/02/19 11:51	EPA 8270D	
1,2,4-Trichlorobenzene	ND	0.170	0.341	mg/kg dry	20	10/02/19 11:51	EPA 8270D	
Benzoic acid	ND	8.55	17.0	mg/kg dry	20	10/02/19 11:51	EPA 8270D	
Benzyl alcohol	ND	0.341	0.681	mg/kg dry	20	10/02/19 11:51	EPA 8270D	
<i>Surrogate: Nitrobenzene-d5 (Surr)</i>		<i>Recovery: 77 %</i>		<i>Limits: 37-122 %</i>		<i>20</i>	<i>10/02/19 11:51</i>	<i>EPA 8270D</i>
<i>2-Fluorobiphenyl (Surr)</i>		<i>61 %</i>		<i>44-115 %</i>		<i>20</i>	<i>10/02/19 11:51</i>	<i>EPA 8270D</i>
<i>Phenol-d6 (Surr)</i>		<i>71 %</i>		<i>33-122 %</i>		<i>20</i>	<i>10/02/19 11:51</i>	<i>EPA 8270D</i>
<i>p-Terphenyl-d14 (Surr)</i>		<i>67 %</i>		<i>54-127 %</i>		<i>20</i>	<i>10/02/19 11:51</i>	<i>EPA 8270D</i>
<i>2-Fluorophenol (Surr)</i>		<i>70 %</i>		<i>35-115 %</i>		<i>20</i>	<i>10/02/19 11:51</i>	<i>EPA 8270D</i>
<i>2,4,6-Tribromophenol (Surr)</i>		<i>97 %</i>		<i>39-132 %</i>		<i>20</i>	<i>10/02/19 11:51</i>	<i>EPA 8270D</i>

SE-30-2.5-4.5 (A910893-14RE1) **Matrix: Sediment** **Batch: 9100490**

Acenaphthene	0.148	0.0275	0.0552	mg/kg dry	10	10/02/19 12:42	EPA 8270D	
Acenaphthylene	ND	0.0275	0.0552	mg/kg dry	10	10/02/19 12:42	EPA 8270D	
Anthracene	0.0368	0.0275	0.0552	mg/kg dry	10	10/02/19 12:42	EPA 8270D	J
Benz(a)anthracene	0.0537	0.0275	0.0552	mg/kg dry	10	10/02/19 12:42	EPA 8270D	J
Benzo(a)pyrene	0.0438	0.0413	0.0826	mg/kg dry	10	10/02/19 12:42	EPA 8270D	J
Benzo(b)fluoranthene	ND	0.0413	0.0826	mg/kg dry	10	10/02/19 12:42	EPA 8270D	
Benzo(k)fluoranthene	ND	0.0413	0.0826	mg/kg dry	10	10/02/19 12:42	EPA 8270D	

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A910893 - 01 09 20 1624
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ANALYTICAL SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
SE-30-2.5-4.5 (A910893-14RE1)				Matrix: Sediment		Batch: 9100490		
Benzo(g,h,i)perylene	ND	0.0275	0.0552	mg/kg dry	10	10/02/19 12:42	EPA 8270D	
Chrysene	0.0604	0.0275	0.0552	mg/kg dry	10	10/02/19 12:42	EPA 8270D	
Dibenz(a,h)anthracene	ND	0.0275	0.0552	mg/kg dry	10	10/02/19 12:42	EPA 8270D	
Fluoranthene	0.198	0.0275	0.0552	mg/kg dry	10	10/02/19 12:42	EPA 8270D	
Fluorene	0.0618	0.0275	0.0552	mg/kg dry	10	10/02/19 12:42	EPA 8270D	
Indeno(1,2,3-cd)pyrene	ND	0.0275	0.0552	mg/kg dry	10	10/02/19 12:42	EPA 8270D	
1-Methylnaphthalene	ND	0.0552	0.110	mg/kg dry	10	10/02/19 12:42	EPA 8270D	
2-Methylnaphthalene	ND	0.0552	0.110	mg/kg dry	10	10/02/19 12:42	EPA 8270D	
Naphthalene	ND	0.0552	0.110	mg/kg dry	10	10/02/19 12:42	EPA 8270D	
Phenanthrene	0.148	0.0275	0.0552	mg/kg dry	10	10/02/19 12:42	EPA 8270D	
Pyrene	0.168	0.0275	0.0552	mg/kg dry	10	10/02/19 12:42	EPA 8270D	
Dibenzofuran	0.0356	0.0275	0.0552	mg/kg dry	10	10/02/19 12:42	EPA 8270D	J
2,4-Dimethylphenol	ND	0.138	0.275	mg/kg dry	10	10/02/19 12:42	EPA 8270D	
2-Methylphenol	ND	0.0688	0.138	mg/kg dry	10	10/02/19 12:42	EPA 8270D	
3+4-Methylphenol(s)	0.164	0.0688	0.138	mg/kg dry	10	10/02/19 12:42	EPA 8270D	
Pentachlorophenol (PCP)	ND	0.275	0.552	mg/kg dry	10	10/02/19 12:42	EPA 8270D	
Phenol	0.0647	0.0552	0.110	mg/kg dry	10	10/02/19 12:42	EPA 8270D	J
Bis(2-ethylhexyl)phthalate	ND	0.413	0.826	mg/kg dry	10	10/02/19 12:42	EPA 8270D	
Butyl benzyl phthalate	ND	0.138	0.275	mg/kg dry	10	10/02/19 12:42	EPA 8270D	
Diethylphthalate	ND	0.138	0.275	mg/kg dry	10	10/02/19 12:42	EPA 8270D	
Dimethylphthalate	ND	0.138	0.275	mg/kg dry	10	10/02/19 12:42	EPA 8270D	
Di-n-butylphthalate	ND	0.138	0.275	mg/kg dry	10	10/02/19 12:42	EPA 8270D	
Di-n-octyl phthalate	ND	0.221	0.275	mg/kg dry	10	10/02/19 12:42	EPA 8270D	
N-Nitrosodiphenylamine	ND	0.0688	0.138	mg/kg dry	10	10/02/19 12:42	EPA 8270D	
Hexachlorobenzene	ND	0.0275	0.0552	mg/kg dry	10	10/02/19 12:42	EPA 8270D	
Hexachlorobutadiene	ND	0.0688	0.138	mg/kg dry	10	10/02/19 12:42	EPA 8270D	
Hexachlorocyclopentadiene	ND	0.138	0.275	mg/kg dry	10	10/02/19 12:42	EPA 8270D	
1,2-Dichlorobenzene	ND	0.0688	0.138	mg/kg dry	10	10/02/19 12:42	EPA 8270D	
1,4-Dichlorobenzene	ND	0.0688	0.138	mg/kg dry	10	10/02/19 12:42	EPA 8270D	
1,2,4-Trichlorobenzene	ND	0.0688	0.138	mg/kg dry	10	10/02/19 12:42	EPA 8270D	
Benzoic acid	ND	3.45	6.88	mg/kg dry	10	10/02/19 12:42	EPA 8270D	
Benzyl alcohol	ND	0.138	0.275	mg/kg dry	10	10/02/19 12:42	EPA 8270D	

Surrogate: Nitrobenzene-d5 (Surr) Recovery: 62 % Limits: 37-122 % 10 10/02/19 12:42 EPA 8270D

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A910893 - 01 09 20 1624
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ANALYTICAL SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
SE-30-2.5-4.5 (A910893-14RE1)				Matrix: Sediment		Batch: 9100490		
<i>Surrogate: 2-Fluorobiphenyl (Surr)</i>			Recovery: 62 %	Limits: 44-115 %	10	10/02/19 12:42	EPA 8270D	
<i>Phenol-d6 (Surr)</i>			59 %	33-122 %	10	10/02/19 12:42	EPA 8270D	
<i>p-Terphenyl-d14 (Surr)</i>			67 %	54-127 %	10	10/02/19 12:42	EPA 8270D	
<i>2-Fluorophenol (Surr)</i>			54 %	35-115 %	10	10/02/19 12:42	EPA 8270D	
<i>2,4,6-Tribromophenol (Surr)</i>			102 %	39-132 %	10	10/02/19 12:42	EPA 8270D	

Rinsate Blank (A910893-18RE1)				Matrix: Water		Batch: 9100614		
Acenaphthene	ND	0.0595	0.0595	ug/L	1	10/03/19 20:13	EPA 8270D	R-02
Acenaphthylene	ND	0.0119	0.0238	ug/L	1	10/03/19 20:13	EPA 8270D	
Anthracene	ND	0.0119	0.0238	ug/L	1	10/03/19 20:13	EPA 8270D	
Benz(a)anthracene	ND	0.0119	0.0238	ug/L	1	10/03/19 20:13	EPA 8270D	
Benzo(a)pyrene	ND	0.0179	0.0357	ug/L	1	10/03/19 20:13	EPA 8270D	
Benzo(b)fluoranthene	ND	0.0179	0.0357	ug/L	1	10/03/19 20:13	EPA 8270D	
Benzo(k)fluoranthene	ND	0.0179	0.0357	ug/L	1	10/03/19 20:13	EPA 8270D	
Benzo(g,h,i)perylene	ND	0.0119	0.0238	ug/L	1	10/03/19 20:13	EPA 8270D	
Chrysene	ND	0.0119	0.0238	ug/L	1	10/03/19 20:13	EPA 8270D	
Dibenz(a,h)anthracene	ND	0.0119	0.0238	ug/L	1	10/03/19 20:13	EPA 8270D	
Fluoranthene	ND	0.0119	0.0238	ug/L	1	10/03/19 20:13	EPA 8270D	
Fluorene	ND	0.0119	0.0238	ug/L	1	10/03/19 20:13	EPA 8270D	
Indeno(1,2,3-cd)pyrene	ND	0.0119	0.0238	ug/L	1	10/03/19 20:13	EPA 8270D	
1-Methylnaphthalene	ND	0.0238	0.0476	ug/L	1	10/03/19 20:13	EPA 8270D	
2-Methylnaphthalene	ND	0.0238	0.0476	ug/L	1	10/03/19 20:13	EPA 8270D	
Naphthalene	0.0597	0.0238	0.0476	ug/L	1	10/03/19 20:13	EPA 8270D	B-02
Phenanthrene	0.0163	0.0119	0.0238	ug/L	1	10/03/19 20:13	EPA 8270D	J
Pyrene	ND	0.0119	0.0238	ug/L	1	10/03/19 20:13	EPA 8270D	
Carbazole	ND	0.0179	0.0357	ug/L	1	10/03/19 20:13	EPA 8270D	
Dibenzofuran	ND	0.0119	0.0238	ug/L	1	10/03/19 20:13	EPA 8270D	
4-Chloro-3-methylphenol	ND	0.119	0.238	ug/L	1	10/03/19 20:13	EPA 8270D	
2-Chlorophenol	ND	0.0595	0.119	ug/L	1	10/03/19 20:13	EPA 8270D	
2,4-Dichlorophenol	ND	0.0595	0.119	ug/L	1	10/03/19 20:13	EPA 8270D	
2,4-Dimethylphenol	ND	0.0595	0.119	ug/L	1	10/03/19 20:13	EPA 8270D	
2,4-Dinitrophenol	ND	0.298	0.595	ug/L	1	10/03/19 20:13	EPA 8270D	
4,6-Dinitro-2-methylphenol	ND	0.298	0.595	ug/L	1	10/03/19 20:13	EPA 8270D	
2-Methylphenol	ND	0.0298	0.0595	ug/L	1	10/03/19 20:13	EPA 8270D	

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AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A910893 - 01 09 20 1624
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ANALYTICAL SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
Rinsate Blank (A910893-18RE1)				Matrix: Water		Batch: 9100614		
3+4-Methylphenol(s)	ND	0.0298	0.0595	ug/L	1	10/03/19 20:13	EPA 8270D	
2-Nitrophenol	ND	0.119	0.238	ug/L	1	10/03/19 20:13	EPA 8270D	
4-Nitrophenol	ND	0.238	0.238	ug/L	1	10/03/19 20:13	EPA 8270D	
Pentachlorophenol (PCP)	ND	0.119	0.238	ug/L	1	10/03/19 20:13	EPA 8270D	
Phenol	ND	0.238	0.476	ug/L	1	10/03/19 20:13	EPA 8270D	
2,3,4,6-Tetrachlorophenol	ND	0.0595	0.119	ug/L	1	10/03/19 20:13	EPA 8270D	
2,3,5,6-Tetrachlorophenol	ND	0.0595	0.119	ug/L	1	10/03/19 20:13	EPA 8270D	
2,4,5-Trichlorophenol	ND	0.0595	0.119	ug/L	1	10/03/19 20:13	EPA 8270D	
2,4,6-Trichlorophenol	ND	0.0595	0.119	ug/L	1	10/03/19 20:13	EPA 8270D	
Bis(2-ethylhexyl)phthalate	ND	0.238	0.476	ug/L	1	10/03/19 20:13	EPA 8270D	
Butyl benzyl phthalate	ND	0.238	0.476	ug/L	1	10/03/19 20:13	EPA 8270D	
Diethylphthalate	ND	0.238	0.476	ug/L	1	10/03/19 20:13	EPA 8270D	
Dimethylphthalate	ND	0.238	0.476	ug/L	1	10/03/19 20:13	EPA 8270D	
Di-n-butylphthalate	ND	0.238	0.476	ug/L	1	10/03/19 20:13	EPA 8270D	
Di-n-octyl phthalate	ND	0.238	0.476	ug/L	1	10/03/19 20:13	EPA 8270D	
N-Nitrosodimethylamine	ND	0.0298	0.0595	ug/L	1	10/03/19 20:13	EPA 8270D	
N-Nitroso-di-n-propylamine	ND	0.0298	0.0595	ug/L	1	10/03/19 20:13	EPA 8270D	
N-Nitrosodiphenylamine	ND	0.0298	0.0595	ug/L	1	10/03/19 20:13	EPA 8270D	
Bis(2-Chloroethoxy) methane	ND	0.0298	0.0595	ug/L	1	10/03/19 20:13	EPA 8270D	
Bis(2-Chloroethyl) ether	ND	0.0298	0.0595	ug/L	1	10/03/19 20:13	EPA 8270D	
2,2'-Oxybis(1-Chloropropane)	ND	0.0298	0.0595	ug/L	1	10/03/19 20:13	EPA 8270D	
Hexachlorobenzene	ND	0.0119	0.0238	ug/L	1	10/03/19 20:13	EPA 8270D	
Hexachlorobutadiene	ND	0.0298	0.0595	ug/L	1	10/03/19 20:13	EPA 8270D	
Hexachlorocyclopentadiene	ND	0.0595	0.119	ug/L	1	10/03/19 20:13	EPA 8270D	
Hexachloroethane	ND	0.0298	0.0595	ug/L	1	10/03/19 20:13	EPA 8270D	
2-Chloronaphthalene	ND	0.0119	0.0238	ug/L	1	10/03/19 20:13	EPA 8270D	
1,2-Dichlorobenzene	ND	0.0298	0.0595	ug/L	1	10/03/19 20:13	EPA 8270D	
1,3-Dichlorobenzene	ND	0.0298	0.0595	ug/L	1	10/03/19 20:13	EPA 8270D	
1,4-Dichlorobenzene	ND	0.0298	0.0595	ug/L	1	10/03/19 20:13	EPA 8270D	
1,2,4-Trichlorobenzene	ND	0.0298	0.0595	ug/L	1	10/03/19 20:13	EPA 8270D	
4-Bromophenyl phenyl ether	ND	0.0298	0.0595	ug/L	1	10/03/19 20:13	EPA 8270D	
4-Chlorophenyl phenyl ether	ND	0.0298	0.0595	ug/L	1	10/03/19 20:13	EPA 8270D	
Aniline	ND	0.0595	0.119	ug/L	1	10/03/19 20:13	EPA 8270D	

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ANALYTICAL SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
Rinsate Blank (A910893-18RE1)				Matrix: Water		Batch: 9100614		
4-Chloroaniline	ND	0.0298	0.0595	ug/L	1	10/03/19 20:13	EPA 8270D	
2-Nitroaniline	ND	0.238	0.476	ug/L	1	10/03/19 20:13	EPA 8270D	
3-Nitroaniline	ND	0.238	0.476	ug/L	1	10/03/19 20:13	EPA 8270D	
4-Nitroaniline	ND	0.238	0.476	ug/L	1	10/03/19 20:13	EPA 8270D	
Nitrobenzene	ND	0.119	0.238	ug/L	1	10/03/19 20:13	EPA 8270D	
2,4-Dinitrotoluene	ND	0.119	0.238	ug/L	1	10/03/19 20:13	EPA 8270D	
2,6-Dinitrotoluene	ND	0.119	0.238	ug/L	1	10/03/19 20:13	EPA 8270D	
Benzoic acid	ND	1.49	2.98	ug/L	1	10/03/19 20:13	EPA 8270D	
Benzyl alcohol	ND	0.119	0.238	ug/L	1	10/03/19 20:13	EPA 8270D	
Isophorone	ND	0.0298	0.0595	ug/L	1	10/03/19 20:13	EPA 8270D	
Azobenzene (1,2-DPH)	ND	0.536	0.536	ug/L	1	10/03/19 20:13	EPA 8270D	R-02
Bis(2-Ethylhexyl) adipate	ND	0.298	0.595	ug/L	1	10/03/19 20:13	EPA 8270D	
3,3'-Dichlorobenzidine	ND	0.595	1.19	ug/L	1	10/03/19 20:13	EPA 8270D	Q-52
1,2-Dinitrobenzene	ND	0.298	0.595	ug/L	1	10/03/19 20:13	EPA 8270D	
1,3-Dinitrobenzene	ND	0.298	0.595	ug/L	1	10/03/19 20:13	EPA 8270D	
1,4-Dinitrobenzene	ND	0.298	0.595	ug/L	1	10/03/19 20:13	EPA 8270D	
Pyridine	ND	0.119	0.238	ug/L	1	10/03/19 20:13	EPA 8270D	
<i>Surrogate: Nitrobenzene-d5 (Surr)</i>		<i>Recovery: 44 %</i>		<i>Limits: 44-120 %</i>		<i>1</i>	<i>10/03/19 20:13</i>	<i>EPA 8270D</i>
<i>2-Fluorobiphenyl (Surr)</i>		<i>37 %</i>		<i>44-120 %</i>		<i>1</i>	<i>10/03/19 20:13</i>	<i>EPA 8270D</i>
<i>Phenol-d6 (Surr)</i>		<i>18 %</i>		<i>10-120 %</i>		<i>1</i>	<i>10/03/19 20:13</i>	<i>EPA 8270D</i>
<i>p-Terphenyl-d14 (Surr)</i>		<i>63 %</i>		<i>50-133 %</i>		<i>1</i>	<i>10/03/19 20:13</i>	<i>EPA 8270D</i>
<i>2-Fluorophenol (Surr)</i>		<i>25 %</i>		<i>19-120 %</i>		<i>1</i>	<i>10/03/19 20:13</i>	<i>EPA 8270D</i>
<i>2,4,6-Tribromophenol (Surr)</i>		<i>52 %</i>		<i>43-140 %</i>		<i>1</i>	<i>10/03/19 20:13</i>	<i>EPA 8270D</i>

Philip Nerenberg



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A910893 - 01 09 20 1624
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ANALYTICAL SAMPLE RESULTS

Total Metals by EPA 6020A (ICPMS)

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
SE-20-0-0.33 (A910893-08) Matrix: Sediment								
Batch: 9100629								
Arsenic	7.96	0.670	1.34	mg/kg dry	5	10/07/19 20:20	EPA 6020A	
Cadmium	0.239	0.134	0.268	mg/kg dry	5	10/07/19 20:20	EPA 6020A	J
Chromium	32.9	0.670	1.34	mg/kg dry	5	10/07/19 20:20	EPA 6020A	
Copper	64.6	0.670	1.34	mg/kg dry	5	10/07/19 20:20	EPA 6020A	
Lead	11.7	0.134	0.268	mg/kg dry	5	10/07/19 20:20	EPA 6020A	
Nickel	25.4	1.34	2.68	mg/kg dry	5	10/07/19 20:20	EPA 6020A	
Selenium	0.941	0.670	1.34	mg/kg dry	5	10/07/19 20:20	EPA 6020A	J
Silver	0.144	0.134	0.268	mg/kg dry	5	10/07/19 20:20	EPA 6020A	J
Zinc	142	2.68	5.36	mg/kg dry	5	10/07/19 20:20	EPA 6020A	
SE-10-2.0-3.7 (A910893-13) Matrix: Sediment								
Batch: 9100629								
Arsenic	5.47	0.640	1.28	mg/kg dry	5	10/07/19 20:24	EPA 6020A	
Cadmium	0.595	0.128	0.256	mg/kg dry	5	10/07/19 20:24	EPA 6020A	
Chromium	25.2	0.640	1.28	mg/kg dry	5	10/07/19 20:24	EPA 6020A	
Copper	56.1	0.640	1.28	mg/kg dry	5	10/07/19 20:24	EPA 6020A	
Lead	24.0	0.128	0.256	mg/kg dry	5	10/07/19 20:24	EPA 6020A	
Nickel	25.1	1.28	2.56	mg/kg dry	5	10/07/19 20:24	EPA 6020A	
Selenium	0.667	0.640	1.28	mg/kg dry	5	10/07/19 20:24	EPA 6020A	J
Silver	0.138	0.128	0.256	mg/kg dry	5	10/07/19 20:24	EPA 6020A	J
Zinc	71.9	2.56	5.12	mg/kg dry	5	10/07/19 20:24	EPA 6020A	
SE-30-2.5-4.5 (A910893-14) Matrix: Sediment								
Batch: 9100629								
Arsenic	7.52	0.538	1.08	mg/kg dry	5	10/07/19 20:38	EPA 6020A	
Cadmium	0.246	0.108	0.215	mg/kg dry	5	10/07/19 20:38	EPA 6020A	
Chromium	41.4	0.538	1.08	mg/kg dry	5	10/07/19 20:38	EPA 6020A	
Copper	66.0	0.538	1.08	mg/kg dry	5	10/07/19 20:38	EPA 6020A	
Lead	14.9	0.108	0.215	mg/kg dry	5	10/07/19 20:38	EPA 6020A	
Nickel	27.7	1.08	2.15	mg/kg dry	5	10/07/19 20:38	EPA 6020A	
Selenium	0.993	0.538	1.08	mg/kg dry	5	10/07/19 20:38	EPA 6020A	J
Silver	0.260	0.108	0.215	mg/kg dry	5	10/07/19 20:38	EPA 6020A	
Zinc	98.3	2.15	4.30	mg/kg dry	5	10/07/19 20:38	EPA 6020A	

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Philip Nerenberg, Lab Director



AMENDED REPORT

<u>Maul Foster & Alongi, INC.</u> 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: <u>Seaport Tidelands</u> Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A910893 - 01 09 20 1624
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ANALYTICAL SAMPLE RESULTS

Total Metals by EPA 6020A (ICPMS)

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes	
Rinsate Blank (A910893-18)					Matrix: Water				
Batch: 9100588									
Lead	ND	0.100	0.200	ug/L	1	10/03/19 18:58	EPA 6020A		
Rinsate Blank (A910893-18RE1)					Matrix: Water				
Batch: 9100588									
Arsenic	ND	0.500	1.00	ug/L	1	10/05/19 16:33	EPA 6020A		
Cadmium	ND	0.0400	0.200	ug/L	1	10/05/19 16:33	EPA 6020A		
Chromium	ND	0.500	1.00	ug/L	1	10/05/19 16:33	EPA 6020A		
Copper	ND	0.500	1.00	ug/L	1	10/05/19 16:33	EPA 6020A		
Nickel	ND	0.500	1.00	ug/L	1	10/05/19 16:33	EPA 6020A		
Selenium	ND	0.500	1.00	ug/L	1	10/05/19 16:33	EPA 6020A		
Silver	ND	0.100	0.200	ug/L	1	10/05/19 16:33	EPA 6020A		
Zinc	ND	2.00	4.00	ug/L	1	10/05/19 16:33	EPA 6020A		

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Apex Laboratories, LLC

6700 S.W. Sandburg Street

Tigard, OR 97223

503-718-2323

EPA ID: OR01039

AMENDED REPORT

Maul Foster & Alongi, INC.

2001 NW 19th Ave, STE 200

Portland, OR 97209

Project: **Seaport Tidelands**

Project Number: **1044.02.06-02**

Project Manager: **Emily Hess**

Report ID:

A910893 - 01 09 20 1624

ANALYTICAL SAMPLE RESULTS

Ammonia by Gas Diffusion and Colorimetric Detection

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
Rinsate Blank (A910893-18)				Matrix: Water		Batch: 9100540		
Ammonia as N	ND	0.0200	0.0200	mg/L	1	10/02/19 15:15	SM 4500-NH3 G	

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AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A910893 - 01 09 20 1624
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ANALYTICAL SAMPLE RESULTS

Ammonia by Plumb Extraction, Gas Diffusion and Colorimetric Detection

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
SE-01A-1.0-2.0 (A910893-01)				Matrix: Sediment		Batch: 9101224		
Ammonia as N	290	3.82	3.82	mg/kg dry	20	10/17/19 14:21	Plumb/SM 4500-NH3 G	H-06
SE-03A-0-1.0 (A910893-05)				Matrix: Sediment		Batch: 9101224		
Ammonia as N	168	2.12	2.12	mg/kg dry	10	10/17/19 14:22	Plumb/SM 4500-NH3 G	H-06
SE-06A-0.5-1.5 (A910893-07)				Matrix: Sediment		Batch: 9101224		
Ammonia as N	408	1.72	1.72	mg/kg dry	10	10/17/19 14:34	Plumb/SM 4500-NH3 G	H-06
SE-20-0-0.33 (A910893-08)				Matrix: Sediment		Batch: 9100459		
Ammonia as N	3.90	0.252	0.252	mg/kg dry	1	10/02/19 14:06	Plumb/SM 4500-NH3 G	
SE-07A-0-1.0 (A910893-09RE1)				Matrix: Sediment		Batch: 9101224		
Ammonia as N	7.73	0.282	0.282	mg/kg dry	1	10/17/19 15:45	Plumb/SM 4500-NH3 G	H-06
SE-02A-2.5-3.5 (A910893-11)				Matrix: Sediment		Batch: 9101224		
Ammonia as N	230	1.75	1.75	mg/kg dry	10	10/17/19 14:37	Plumb/SM 4500-NH3 G	H-06
SE-10-2.0-3.7 (A910893-13)				Matrix: Sediment		Batch: 9100459		
Ammonia as N	5.37	0.249	0.249	mg/kg dry	1	10/02/19 14:08	Plumb/SM 4500-NH3 G	
SE-30-2.5-4.5 (A910893-14)				Matrix: Sediment		Batch: 9100459		
Ammonia as N	112	2.00	2.00	mg/kg dry	10	10/02/19 14:21	Plumb/SM 4500-NH3 G	

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ANALYTICAL SAMPLE RESULTS

Demand Parameters									
Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes	
SE-01A-1.0-2.0 (A910893-01RE1)					Matrix: Sediment				
Batch: 9101222									
Total Organic Carbon	44000	200	200	mg/kg	1	10/23/19 12:14	EPA 9060Amod		
SE-03A-0-1.0 (A910893-05)					Matrix: Sediment				
Batch: 9101222									
Total Organic Carbon	23000	200	200	mg/kg	1	10/23/19 00:35	EPA 9060Amod		
SE-06A-0.5-1.5 (A910893-07)					Matrix: Sediment				
Batch: 9101222									
Total Organic Carbon	32000	200	200	mg/kg	1	10/23/19 00:46	EPA 9060Amod		
SE-20-0-0.33 (A910893-08)					Matrix: Sediment				
Batch: 9100512									
Total Organic Carbon	66000	200	200	mg/kg	1	10/08/19 09:18	EPA 9060Amod		
SE-07A-0-1.0 (A910893-09)					Matrix: Sediment				
Batch: 9101222									
Total Organic Carbon	63000	200	200	mg/kg	1	10/23/19 01:19	EPA 9060Amod		
SE-02A-2.5-3.5 (A910893-11)					Matrix: Sediment				
Batch: 9101222									
Total Organic Carbon	33000	200	200	mg/kg	1	10/23/19 01:30	EPA 9060Amod		
SE-10-2.0-3.7 (A910893-13)					Matrix: Sediment				
Batch: 9100512									
Total Organic Carbon	79000	200	200	mg/kg	1	10/08/19 10:00	EPA 9060Amod		
SE-30-2.5-4.5 (A910893-14)					Matrix: Sediment				
Batch: 9100512									
Total Organic Carbon	51000	200	200	mg/kg	1	10/08/19 13:14	EPA 9060Amod		

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ANALYTICAL SAMPLE RESULTS

Total Organic Carbon (Non-Purgeable) by Persulfate Oxidation by Standard Method 5310C

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
Rinsate Blank (A910893-18)				Matrix: Water		Batch: 9091432		
Total Organic Carbon	1.66	1.00	1.00	mg/L	1	10/01/19 14:44	SM 5310 C	

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ANALYTICAL SAMPLE RESULTS

Solid and Moisture Determinations

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
SE-01A-1.0-2.0 (A910893-01) Matrix: Sediment								
Batch: 9101195								
Total Solids	51.9	1.00	1.00	%	1	10/17/19 03:40	PSEP 1986	
Batch: 9101266								
Total Volatile Solids	11.9	1.00	1.00	%	1	10/17/19 17:08	SM 2540 G	H-06
SE-03A-0-1.0 (A910893-05) Matrix: Sediment								
Batch: 9101195								
Total Solids	45.6	1.00	1.00	%	1	10/17/19 03:40	PSEP 1986	
Batch: 9101266								
Total Volatile Solids	8.11	1.00	1.00	%	1	10/17/19 17:08	SM 2540 G	H-06
SE-06A-0.5-1.5 (A910893-07) Matrix: Sediment								
Batch: 9101195								
Total Solids	55.6	1.00	1.00	%	1	10/17/19 03:40	PSEP 1986	
Batch: 9101266								
Total Volatile Solids	9.92	1.00	1.00	%	1	10/17/19 17:08	SM 2540 G	H-06
SE-20-0-0.33 (A910893-08) Matrix: Sediment								
Batch: 9091443								
Total Solids	36.8	1.00	1.00	%	1	10/01/19 13:08	PSEP 1986	
Batch: 9091474								
Total Volatile Solids	12.7	1.00	1.00	%	1	10/02/19 15:31	SM 2540 G	
SE-07A-0-1.0 (A910893-09) Matrix: Sediment								
Batch: 9101195								
Total Solids	34.0	1.00	1.00	%	1	10/17/19 03:40	PSEP 1986	
Batch: 9101266								
Total Volatile Solids	20.7	1.00	1.00	%	1	10/17/19 17:08	SM 2540 G	H-06
SE-02A-2.5-3.5 (A910893-11) Matrix: Sediment								
Batch: 9101195								
Total Solids	55.5	1.00	1.00	%	1	10/17/19 03:40	PSEP 1986	
Batch: 9101266								
Total Volatile Solids	7.94	1.00	1.00	%	1	10/17/19 17:08	SM 2540 G	H-06
SE-10-2.0-3.7 (A910893-13) Matrix: Sediment								

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ANALYTICAL SAMPLE RESULTS

Solid and Moisture Determinations

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
SE-10-2.0-3.7 (A910893-13) Matrix: Sediment								
Batch: 9091443								
Total Solids	38.3	1.00	1.00	%	1	10/01/19 13:08	PSEP 1986	
Batch: 9091474								
Total Volatile Solids	30.1	1.00	1.00	%	1	10/02/19 15:31	SM 2540 G	
SE-30-2.5-4.5 (A910893-14) Matrix: Sediment								
Batch: 9091443								
Total Solids	47.6	1.00	1.00	%	1	10/01/19 13:08	PSEP 1986	
Batch: 9091474								
Total Volatile Solids	14.7	1.00	1.00	%	1	10/02/19 15:31	SM 2540 G	

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ANALYTICAL SAMPLE RESULTS

Grain Size by ASTM D 422m/PSET Parameters

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
SE-20-0-0.33 (A910893-08)				Matrix: Sediment		Batch: 9100739		
Gravel (>2.00mm)	5.18	0.01	0.01	% of Total	1	10/14/19 13:41	D422mod	GS-01
Percent Retained 4.75 mm sieve (#4)	4.59	0.01	0.01	% of Total	1	10/14/19 13:41	D422mod	GS-01
Percent Retained 2.00 mm sieve (#10)	0.59	0.01	0.01	% of Total	1	10/14/19 13:41	D422mod	GS-01
Sand (0.063mm - 2.00mm)	9.74	0.01	0.01	% of Total	1	10/14/19 13:41	D422mod	GS-01
Percent Retained 0.85 mm sieve (#20)	0.37	0.01	0.01	% of Total	1	10/14/19 13:41	D422mod	GS-01
Percent Retained 0.425 mm sieve (#40)	1.75	0.01	0.01	% of Total	1	10/14/19 13:41	D422mod	GS-01
Percent Retained 0.250 mm sieve (#60)	1.92	0.01	0.01	% of Total	1	10/14/19 13:41	D422mod	GS-01
Percent Retained 0.150 mm sieve (#100)	2.19	0.01	0.01	% of Total	1	10/14/19 13:41	D422mod	GS-01
Percent Retained 0.106 mm sieve (#140)	1.36	0.01	0.01	% of Total	1	10/14/19 13:41	D422mod	GS-01
Percent Retained 0.075 mm sieve (#200)	1.53	0.01	0.01	% of Total	1	10/14/19 13:41	D422mod	GS-01
Percent Retained 0.063 mm sieve (#230)	0.62	0.01	0.01	% of Total	1	10/14/19 13:41	D422mod	GS-01
Silt (0.005mm < 0.063mm)	58.5	0.01	0.01	% of Total	1	10/14/19 13:41	D422mod	GS-01
Clay (< 0.005 mm)	26.6	0.01	0.01	% of Total	1	10/14/19 13:41	D422mod	GS-01
SE-10-2.0-3.7 (A910893-13)				Matrix: Sediment		Batch: 9100739		
Gravel (>2.00mm)	15.5	0.01	0.01	% of Total	1	10/14/19 13:41	D422mod	GS-01
Percent Retained 4.75 mm sieve (#4)	10.7	0.01	0.01	% of Total	1	10/14/19 13:41	D422mod	GS-01
Percent Retained 2.00 mm sieve (#10)	4.75	0.01	0.01	% of Total	1	10/14/19 13:41	D422mod	GS-01
Sand (0.063mm - 2.00mm)	29.4	0.01	0.01	% of Total	1	10/14/19 13:41	D422mod	GS-01
Percent Retained 0.85 mm sieve (#20)	5.66	0.01	0.01	% of Total	1	10/14/19 13:41	D422mod	GS-01
Percent Retained 0.425 mm sieve (#40)	7.63	0.01	0.01	% of Total	1	10/14/19 13:41	D422mod	GS-01
Percent Retained 0.250 mm sieve (#60)	6.44	0.01	0.01	% of Total	1	10/14/19 13:41	D422mod	GS-01
Percent Retained 0.150 mm sieve (#100)	3.41	0.01	0.01	% of Total	1	10/14/19 13:41	D422mod	GS-01
Percent Retained 0.106 mm sieve (#140)	2.20	0.01	0.01	% of Total	1	10/14/19 13:41	D422mod	GS-01
Percent Retained 0.075 mm sieve (#200)	2.54	0.01	0.01	% of Total	1	10/14/19 13:41	D422mod	GS-01
Percent Retained 0.063 mm sieve (#230)	1.48	0.01	0.01	% of Total	1	10/14/19 13:41	D422mod	GS-01
Silt (0.005mm < 0.063mm)	39.5	0.01	0.01	% of Total	1	10/14/19 13:41	D422mod	GS-01

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ANALYTICAL SAMPLE RESULTS

Grain Size by ASTM D 422m/PSET Parameters

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
SE-10-2.0-3.7 (A910893-13)				Matrix: Sediment		Batch: 9100739		
Clay (< 0.005 mm)	15.7	0.01	0.01	% of Total	1	10/14/19 13:41	D422mod	GS-01
SE-30-2.5-4.5 (A910893-14)				Matrix: Sediment		Batch: 9100739		
Gravel (>2.00mm)	5.79	0.01	0.01	% of Total	1	10/14/19 13:41	D422mod	GS-01
Percent Retained 4.75 mm sieve (#4)	4.12	0.01	0.01	% of Total	1	10/14/19 13:41	D422mod	GS-01
Percent Retained 2.00 mm sieve (#10)	1.67	0.01	0.01	% of Total	1	10/14/19 13:41	D422mod	GS-01
Sand (0.063mm - 2.00mm)	11.4	0.01	0.01	% of Total	1	10/14/19 13:41	D422mod	GS-01
Percent Retained 0.85 mm sieve (#20)	1.34	0.01	0.01	% of Total	1	10/14/19 13:41	D422mod	GS-01
Percent Retained 0.425 mm sieve (#40)	2.04	0.01	0.01	% of Total	1	10/14/19 13:41	D422mod	GS-01
Percent Retained 0.250 mm sieve (#60)	1.48	0.01	0.01	% of Total	1	10/14/19 13:41	D422mod	GS-01
Percent Retained 0.150 mm sieve (#100)	1.55	0.01	0.01	% of Total	1	10/14/19 13:41	D422mod	GS-01
Percent Retained 0.106 mm sieve (#140)	1.26	0.01	0.01	% of Total	1	10/14/19 13:41	D422mod	GS-01
Percent Retained 0.075 mm sieve (#200)	2.19	0.01	0.01	% of Total	1	10/14/19 13:41	D422mod	GS-01
Percent Retained 0.063 mm sieve (#230)	1.55	0.01	0.01	% of Total	1	10/14/19 13:41	D422mod	GS-01
Silt (0.005mm < 0.063mm)	56.2	0.01	0.01	% of Total	1	10/14/19 13:41	D422mod	GS-01
Clay (< 0.005 mm)	26.6	0.01	0.01	% of Total	1	10/14/19 13:41	D422mod	GS-01



AMENDED REPORT

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ANALYTICAL SAMPLE RESULTS

Percent Dry Weight									
Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes	
SE-01A-1.0-2.0 (A910893-01)				Matrix: Sediment		Batch: 9101195			
% Solids	51.9	1.00	1.00	%	1	10/17/19 03:40	EPA 8000C		
SE-03A-0-1.0 (A910893-05)				Matrix: Sediment		Batch: 9101195			
% Solids	45.6	1.00	1.00	%	1	10/17/19 03:40	EPA 8000C		
SE-06A-0.5-1.5 (A910893-07)				Matrix: Sediment		Batch: 9101195			
% Solids	55.6	1.00	1.00	%	1	10/17/19 03:40	EPA 8000C		
SE-20-0-0.33 (A910893-08)				Matrix: Sediment		Batch: 9091443			
% Solids	36.8	1.00	1.00	%	1	10/01/19 13:08	EPA 8000C		
SE-07A-0-1.0 (A910893-09)				Matrix: Sediment		Batch: 9101195			
% Solids	34.0	1.00	1.00	%	1	10/17/19 03:40	EPA 8000C		
SE-02A-2.5-3.5 (A910893-11)				Matrix: Sediment		Batch: 9101195			
% Solids	55.5	1.00	1.00	%	1	10/17/19 03:40	EPA 8000C		
SE-10-2.0-3.7 (A910893-13)				Matrix: Sediment		Batch: 9091443			
% Solids	38.3	1.00	1.00	%	1	10/01/19 13:08	EPA 8000C		
SE-30-2.5-4.5 (A910893-14)				Matrix: Sediment		Batch: 9091443			
% Solids	47.6	1.00	1.00	%	1	10/01/19 13:08	EPA 8000C		
SE-20-0-0.33--Air Dried (A910893-20)				Matrix: Sediment		Batch: 9101585			
% Solids	91.8	1.00	1.00	%	1	10/28/19 07:41	EPA 8000C		
SE-10-2.0-3.7---Air Dried (A910893-21)				Matrix: Sediment		Batch: 9101585			
% Solids	91.3	1.00	1.00	%	1	10/28/19 07:41	EPA 8000C		
SE-30-2.5-4.5---Air Dried (A910893-22)				Matrix: Sediment		Batch: 9101585			
% Solids	92.6	1.00	1.00	%	1	10/28/19 07:41	EPA 8000C		

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Analytical Resources, Inc.

ANALYTICAL SAMPLE RESULTS (Subcontracted)

Metals and Metallic Compounds

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
SE-20-0-0.33 (A910893-08)				Matrix: Sediment		Batch: BHJ0281		
Batch: BHJ0281								
Mercury	0.0690	0.0136	0.0648	mg/kg dry	1	10/10/19 16:03	EPA 7471B	
SE-07A-0-1.0 (A910893-09)				Matrix: Sediment		Batch: BHJ0281		
Batch: BHJ0281								
Mercury	0.226	0.0129	0.0613	mg/kg dry	1	10/10/19 16:10	EPA 7471B	
SE-02A-2.5-3.5 (A910893-11)				Matrix: Sediment		Batch: BHJ0281		
Batch: BHJ0281								
Mercury	0.103	0.00901	0.0429	mg/kg dry	1	10/10/19 16:13	EPA 7471B	
SE-10-2.0-3.7 (A910893-13)				Matrix: Sediment		Batch: BHJ0281		
Batch: BHJ0281								
Mercury	0.129	0.0110	0.0524	mg/kg dry	1	10/10/19 15:45	EPA 7471B	
SE-30-2.5-4.5 (A910893-14)				Matrix: Sediment		Batch: BHJ0281		
Batch: BHJ0281								
Mercury	0.0865	0.00799	0.0380	mg/kg dry	1	10/10/19 16:15	EPA 7471B	
Rinsate Blank (A910893-18)				Matrix: Water		Batch: BHJ0100		
Batch: BHJ0100								
Mercury	ND	0.000013	0.000100	mg/L	1	10/04/19 11:36	EPA 7470A	U



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Analytical Resources, Inc.

ANALYTICAL SAMPLE RESULTS (Subcontracted)

TCLP Metals and Metallic Compounds

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
SE-10-2.0-3.7 (A910893-13)		Matrix: Sediment			Batch: BHJ0442			
Batch: BHJ0442								
Lead	ND	0.0065	0.100	mg/L	5	10/16/19 16:45	EPA 6010C	U
Batch: BHJ0444								
Mercury	ND	0.000007	0.000100	mg/L	1	10/17/19 12:01	EPA 7470A	U
SE-30-2.5-4.5 (A910893-14)		Matrix: Sediment			Batch: BHJ0442			
Batch: BHJ0442								
Lead	ND	0.0065	0.100	mg/L	5	10/16/19 16:40	EPA 6010C	U
Batch: BHJ0444								
Mercury	ND	0.000007	0.000100	mg/L	1	10/17/19 12:10	EPA 7470A	U



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Analytical Resources, Inc.

ANALYTICAL SAMPLE RESULTS (Subcontracted)

Wet Chemistry

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
SE-01A-1.0-2.0 (A910893-01)			Matrix: Sediment		Batch: BHJ0036			
Batch: BHJ0036								
Total Solids, Sulfide	47.15	0.04	0.04	%	1	10/01/19 23:14	PSEP 1986	
Batch: BHJ0054								
Sulfide	865	105	105	mg/kg dry	50	10/03/19 15:51	SM 4500-S2 D-00	D
SE-03A-0-1.0 (A910893-05)			Matrix: Sediment		Batch: BHJ0036			
Batch: BHJ0036								
Total Solids, Sulfide	43.08	0.04	0.04	%	1	10/01/19 23:14	PSEP 1986	
Batch: BHJ0054								
Sulfide	856	46.1	46.1	mg/kg dry	20	10/03/19 15:51	SM 4500-S2 D-00	D
SE-20-0-0.33 (A910893-08)			Matrix: Sediment		Batch: BHJ0036			
Batch: BHJ0036								
Total Solids, Sulfide	34.44	0.04	0.04	%	1	10/01/19 23:14	PSEP 1986	
Batch: BHJ0054								
Sulfide	ND	2.70	2.70	mg/kg dry	1	10/03/19 15:51	SM 4500-S2 D-00	U
SE-07A-0-1.0 (A910893-09)			Matrix: Sediment		Batch: BHJ0036			
Batch: BHJ0036								
Total Solids, Sulfide	33.63	0.04	0.04	%	1	10/01/19 23:14	PSEP 1986	
Batch: BHJ0054								
Sulfide	639	56.3	56.3	mg/kg dry	20	10/03/19 15:52	SM 4500-S2 D-00	D
SE-02A-2.5-3.5 (A910893-11)			Matrix: Sediment		Batch: BHJ0036			
Batch: BHJ0036								
Total Solids, Sulfide	51.29	0.04	0.04	%	1	10/01/19 23:14	PSEP 1986	
Batch: BHJ0054								
Sulfide	977	91.6	91.6	mg/kg dry	50	10/03/19 15:54	SM 4500-S2 D-00	D
SE-10-2.0-3.7 (A910893-13)			Matrix: Sediment		Batch: BHJ0036			
Batch: BHJ0036								
Total Solids, Sulfide	33.04	0.04	0.04	%	1	10/01/19 23:14	PSEP 1986	
Batch: BHJ0054								
Sulfide	228	59.4	59.4	mg/kg dry	20	10/03/19 15:54	SM 4500-S2 D-00	D

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Analytical Resources, Inc.

ANALYTICAL SAMPLE RESULTS (Subcontracted)

Wet Chemistry

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
SE-30-2.5-4.5 (A910893-14)			Matrix: Sediment		Batch: BHJ0036			
Batch: BHJ0036								
Total Solids, Sulfide	43.84	0.04	0.04	%	1	10/01/19 23:14	PSEP 1986	
Batch: BHJ0054								
Sulfide	492	42.6	42.6	mg/kg dry	20	10/03/19 15:54	SM 4500-S2 D-00	D
Rinsate Blank (A910893-18)			Matrix: Water		Batch: BHJ0097			
Batch: BHJ0097								
Sulfide	ND	0.050	0.050	mg/L	1	10/03/19 13:47	SM 4500-S2 D-00	U
SE-20-0-0.33 (Water) (A910893-19)			Matrix: Water		Batch: BHJ0145			
Batch: BHJ0145								
Sulfide	0.059	0.050	0.050	mg/L	1	10/04/19 14:56	SM 4500-S2 D-00	H



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QUALITY CONTROL (QC) SAMPLE RESULTS

Diesel and/or Oil Hydrocarbons by NWTPH-Dx with Acid/Silica Gel Cleanup

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9101200 - EPA 3546 w/SG+Acid (NWTPH)												
Sediment												
Blank (9101200-BLK1)						Prepared: 10/03/19 13:22 Analyzed: 10/16/19 22:42						
<u>NWTPH-Dx/SG</u>												
Diesel	ND	9.09	25.0	mg/kg wet	1	---	---	---	---	---	---	
Oil	ND	18.2	50.0	mg/kg wet	1	---	---	---	---	---	---	
<i>Surr: o-Terphenyl (Surr)</i>		<i>Recovery: 93 %</i>		<i>Limits: 50-150 %</i>		<i>Dilution: 1x</i>						
LCS (9101200-BS1)						Prepared: 10/03/19 13:22 Analyzed: 10/16/19 23:05						
<u>NWTPH-Dx/SG</u>												
Diesel	112	10.0	25.0	mg/kg wet	1	125	---	90	76-115%	---	---	
<i>Surr: o-Terphenyl (Surr)</i>		<i>Recovery: 96 %</i>		<i>Limits: 50-150 %</i>		<i>Dilution: 1x</i>						
Duplicate (9101200-DUP1)						Prepared: 10/03/19 13:22 Analyzed: 10/16/19 23:53						
<u>QC Source Sample: SE-20-0-0.33 (A910893-08)</u>												
<u>NWTPH-Dx/SG</u>												
Diesel	ND	26.6	53.2	mg/kg dry	1	---	ND	---	---	---	30%	
Oil	786	53.2	106	mg/kg dry	1	---	610	---	---	25	30%	
<i>Surr: o-Terphenyl (Surr)</i>		<i>Recovery: 86 %</i>		<i>Limits: 50-150 %</i>		<i>Dilution: 1x</i>						
Duplicate (9101200-DUP2)						Prepared: 10/03/19 13:22 Analyzed: 10/17/19 08:59						
<u>QC Source Sample: Non-SDG (A9J0006-25)</u>												
Diesel	ND	26.0	52.0	mg/kg dry	1	---	ND	---	---	---	30%	
Oil	86.0	52.0	104	mg/kg dry	1	---	72.2	---	---	17	30%	J
<i>Surr: o-Terphenyl (Surr)</i>		<i>Recovery: 95 %</i>		<i>Limits: 50-150 %</i>		<i>Dilution: 1x</i>						
Matrix Spike (9101200-MS1)						Prepared: 10/03/19 13:22 Analyzed: 10/17/19 00:41						
<u>QC Source Sample: SE-10-2.0-3.7 (A910893-13)</u>												
<u>NWTPH-Dx/SG</u>												
Diesel	447	25.7	51.5	mg/kg dry	1	322	ND	139	50-150%	---	---	
<i>Surr: o-Terphenyl (Surr)</i>		<i>Recovery: 96 %</i>		<i>Limits: 50-150 %</i>		<i>Dilution: 1x</i>						
Matrix Spike Dup (9101200-MSD1)						Prepared: 10/03/19 13:22 Analyzed: 10/17/19 01:04						
<u>QC Source Sample: SE-10-2.0-3.7 (A910893-13)</u>												
<u>NWTPH-Dx/SG</u>												

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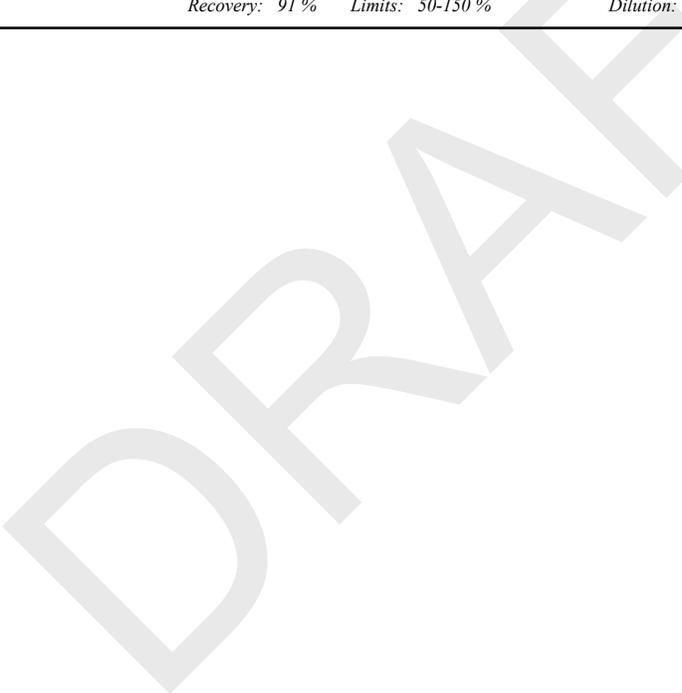
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QUALITY CONTROL (QC) SAMPLE RESULTS

Diesel and/or Oil Hydrocarbons by NWTPH-Dx with Acid/Silica Gel Cleanup

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9101200 - EPA 3546 w/SG+Acid (NWTPH)						Sediment						
Matrix Spike Dup (9101200-MSD1)						Prepared: 10/03/19 13:22 Analyzed: 10/17/19 01:04						
QC Source Sample: SE-10-2.0-3.7 (A910893-13)												
Diesel	376	25.8	51.5	mg/kg dry	1	322	ND	117	50-150%	17	50%	
<i>Surr: o-Terphenyl (Surr)</i>		<i>Recovery: 91 %</i>		<i>Limits: 50-150 %</i>		<i>Dilution: 1x</i>						



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QUALITY CONTROL (QC) SAMPLE RESULTS

Diesel and/or Oil Hydrocarbons by NWTPH-Dx with Acid/Silica Gel Cleanup

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9101263 - EPA 3510C (Fuels/Acid Ext.) w/Silica Gel + Acid							Water					
Blank (9101263-BLK2)			Prepared: 10/01/19 11:15 Analyzed: 10/18/19 07:34									
<u>NWTPH-Dx/SG</u>												
Diesel	ND	0.0909	0.182	mg/L	1	---	---	---	---	---	---	
Oil	ND	0.182	0.364	mg/L	1	---	---	---	---	---	---	
<i>Surr: o-Terphenyl (Surr)</i>		<i>Recovery: 107 %</i>		<i>Limits: 50-150 %</i>		<i>Dilution: 1x</i>						
LCS (9101263-BS1)			Prepared: 10/01/19 11:15 Analyzed: 10/18/19 01:39									
<u>NWTPH-Dx/SG</u>												
Diesel	0.990	0.100	0.200	mg/L	1	1.25	---	79	58-115%	---	---	
<i>Surr: o-Terphenyl (Surr)</i>		<i>Recovery: 96 %</i>		<i>Limits: 50-150 %</i>		<i>Dilution: 1x</i>						
LCS Dup (9101263-BSD1)			Prepared: 10/01/19 11:15 Analyzed: 10/18/19 02:01									Q-19
<u>NWTPH-Dx/SG</u>												
Diesel	1.19	0.100	0.200	mg/L	1	1.25	---	96	58-115%	19	20%	
<i>Surr: o-Terphenyl (Surr)</i>		<i>Recovery: 115 %</i>		<i>Limits: 50-150 %</i>		<i>Dilution: 1x</i>						



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QUALITY CONTROL (QC) SAMPLE RESULTS

Gasoline Range Hydrocarbons (Benzene through Naphthalene) by NWTPH-Gx

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Soil												
Batch 9091416 - EPA 5035A												
Blank (9091416-BLK1) Prepared: 09/28/19 10:30 Analyzed: 09/28/19 12:42												
<u>NWTPH-Gx (MS)</u>												
Gasoline Range Organics	ND	1.67	3.33	mg/kg wet	50	---	---	---	---	---	---	
Surr: 4-Bromofluorobenzene (Sur)		Recovery: 99 %	Limits: 50-150 %			Dilution: 1x						
1,4-Difluorobenzene (Sur)		100 %	50-150 %			"						
LCS (9091416-BS2) Prepared: 09/28/19 10:30 Analyzed: 09/28/19 12:15												
<u>NWTPH-Gx (MS)</u>												
Gasoline Range Organics	27.4	2.50	5.00	mg/kg wet	50	25.0	---	109	80-120%	---	---	
Surr: 4-Bromofluorobenzene (Sur)		Recovery: 100 %	Limits: 50-150 %			Dilution: 1x						
1,4-Difluorobenzene (Sur)		99 %	50-150 %			"						
Duplicate (9091416-DUP1) Prepared: 09/27/19 08:15 Analyzed: 09/28/19 13:35												
<u>QC Source Sample: Non-SDG (A910881-01)</u>												
Gasoline Range Organics	ND	4.24	8.48	mg/kg dry	50	---	ND	---	---	---	30%	
Surr: 4-Bromofluorobenzene (Sur)		Recovery: 102 %	Limits: 50-150 %			Dilution: 1x						
1,4-Difluorobenzene (Sur)		101 %	50-150 %			"						
Duplicate (9091416-DUP2) Prepared: 09/25/19 18:15 Analyzed: 09/28/19 19:23												
<u>QC Source Sample: SE-20-0-0.33 (A910893-08)</u>												
<u>NWTPH-Gx (MS)</u>												
Gasoline Range Organics	ND	15.4	30.8	mg/kg dry	50	---	ND	---	---	---	30%	
Surr: 4-Bromofluorobenzene (Sur)		Recovery: 105 %	Limits: 50-150 %			Dilution: 1x						
1,4-Difluorobenzene (Sur)		102 %	50-150 %			"						

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QUALITY CONTROL (QC) SAMPLE RESULTS

Gasoline Range Hydrocarbons (Benzene through Naphthalene) by NWTPH-Gx

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9091419 - EPA 5030B												
Water												
Blank (9091419-BLK1) Prepared: 09/28/19 17:54 Analyzed: 09/28/19 20:27												
<u>NWTPH-Gx (MS)</u>												
Gasoline Range Organics	ND	0.0500	0.100	mg/L	1	---	---	---	---	---	---	
Surr: 4-Bromofluorobenzene (Sur)		Recovery: 87 %	Limits: 50-150 %			Dilution: 1x						
1,4-Difluorobenzene (Sur)		111 %	50-150 %			"						
LCS (9091419-BS2) Prepared: 09/28/19 17:54 Analyzed: 09/28/19 20:00												
<u>NWTPH-Gx (MS)</u>												
Gasoline Range Organics	0.432	0.0500	0.100	mg/L	1	0.500	---	86	80-120%	---	---	
Surr: 4-Bromofluorobenzene (Sur)		Recovery: 88 %	Limits: 50-150 %			Dilution: 1x						
1,4-Difluorobenzene (Sur)		103 %	50-150 %			"						
Duplicate (9091419-DUP1) Prepared: 09/28/19 20:41 Analyzed: 09/29/19 04:39												
<u>QC Source Sample: Non-SDG (A910862-03)</u>												
Gasoline Range Organics	3.93	2.50	5.00	mg/L	50	---	3.72	---	---	6	30%	J
Surr: 4-Bromofluorobenzene (Sur)		Recovery: 88 %	Limits: 50-150 %			Dilution: 1x						
1,4-Difluorobenzene (Sur)		110 %	50-150 %			"						
Duplicate (9091419-DUP2) Prepared: 09/28/19 20:41 Analyzed: 09/29/19 05:32												
<u>QC Source Sample: Non-SDG (A910862-04)</u>												
Gasoline Range Organics	5.70	2.50	5.00	mg/L	50	---	5.75	---	---	1	30%	
Surr: 4-Bromofluorobenzene (Sur)		Recovery: 82 %	Limits: 50-150 %			Dilution: 1x						
1,4-Difluorobenzene (Sur)		105 %	50-150 %			"						



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QUALITY CONTROL (QC) SAMPLE RESULTS

Polychlorinated Biphenyls by EPA 8082A

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9091456 - EPA 3546												
Sediment												
Blank (9091456-BLK1) Prepared: 09/30/19 13:58 Analyzed: 10/03/19 17:13 C-07												
<u>EPA 8082A</u>												
Aroclor 1016	ND	4.55	9.09	ug/kg wet	1	---	---	---	---	---	---	
Aroclor 1221	ND	4.55	9.09	ug/kg wet	1	---	---	---	---	---	---	
Aroclor 1232	ND	4.55	9.09	ug/kg wet	1	---	---	---	---	---	---	
Aroclor 1242	ND	4.55	9.09	ug/kg wet	1	---	---	---	---	---	---	
Aroclor 1248	ND	4.55	9.09	ug/kg wet	1	---	---	---	---	---	---	
Aroclor 1254	ND	4.55	9.09	ug/kg wet	1	---	---	---	---	---	---	
Aroclor 1260	ND	4.55	9.09	ug/kg wet	1	---	---	---	---	---	---	
<i>Surr: Decachlorobiphenyl (Surr)</i>		<i>Recovery: 107 %</i>		<i>Limits: 60-125 %</i>		<i>Dilution: 1x</i>						
LCS (9091456-BS1) Prepared: 09/30/19 13:58 Analyzed: 10/03/19 17:31 C-07												
<u>EPA 8082A</u>												
Aroclor 1016	178	5.00	10.0	ug/kg wet	1	250	---	71	47-134%	---	---	
Aroclor 1260	221	5.00	10.0	ug/kg wet	1	250	---	88	53-140%	---	---	
<i>Surr: Decachlorobiphenyl (Surr)</i>		<i>Recovery: 108 %</i>		<i>Limits: 60-125 %</i>		<i>Dilution: 1x</i>						
Duplicate (9091456-DUP1) Prepared: 09/30/19 13:58 Analyzed: 10/03/19 18:24 C-07												
<u>QC Source Sample: Non-SDG (A910822-02)</u>												
Aroclor 1016	ND	11.5	23.1	ug/kg dry	1	---	ND	---	---	---	30%	
Aroclor 1221	ND	11.5	23.1	ug/kg dry	1	---	ND	---	---	---	30%	
Aroclor 1232	ND	11.5	23.1	ug/kg dry	1	---	ND	---	---	---	30%	
Aroclor 1242	ND	11.5	23.1	ug/kg dry	1	---	ND	---	---	---	30%	
Aroclor 1248	ND	11.5	23.1	ug/kg dry	1	---	ND	---	---	---	30%	
Aroclor 1254	ND	11.5	23.1	ug/kg dry	1	---	ND	---	---	---	30%	
Aroclor 1260	109	11.5	23.1	ug/kg dry	1	---	38.9	---	---	95	30%	Q-05
<i>Surr: Decachlorobiphenyl (Surr)</i>		<i>Recovery: 73 %</i>		<i>Limits: 60-125 %</i>		<i>Dilution: 1x</i>						
Matrix Spike (9091456-MS1) Prepared: 09/30/19 13:58 Analyzed: 10/03/19 18:59 C-07												
<u>QC Source Sample: Non-SDG (A910822-02)</u>												
<u>EPA 8082A</u>												
Aroclor 1016	389	11.4	22.9	ug/kg dry	1	572	ND	68	47-134%	---	---	
Aroclor 1260	585	11.4	22.9	ug/kg dry	1	572	38.9	95	53-140%	---	---	
<i>Surr: Decachlorobiphenyl (Surr)</i>		<i>Recovery: 91 %</i>		<i>Limits: 60-125 %</i>		<i>Dilution: 1x</i>						

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A910893 - 01 09 20 1624
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QUALITY CONTROL (QC) SAMPLE RESULTS

Polychlorinated Biphenyls by EPA 8082A

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9091456 - EPA 3546												
Sediment												
Matrix Spike (9091456-MS2)			Prepared: 09/30/19 14:01 Analyzed: 10/03/19 18:24						C-07			
QC Source Sample: SE-10-2.0-3.7 (A910893-13)												
EPA 8082A												
Aroclor 1016	428	12.1	24.2	ug/kg dry	1	604	ND	71	47-134%	---	---	
Aroclor 1260	482	12.1	24.2	ug/kg dry	1	604	ND	80	53-140%	---	---	
<i>Surr: Decachlorobiphenyl (Surr)</i>		<i>Recovery: 87 %</i>		<i>Limits: 60-125 %</i>		<i>Dilution: 1x</i>						
Matrix Spike Dup (9091456-MSD1)			Prepared: 09/30/19 13:58 Analyzed: 10/03/19 19:34						C-07			
QC Source Sample: Non-SDG (A910822-02)												
EPA 8082A												
Aroclor 1016	376	11.5	22.9	ug/kg dry	1	573	ND	66	47-134%	3	30%	
Aroclor 1260	554	11.5	22.9	ug/kg dry	1	573	38.9	90	53-140%	5	30%	
<i>Surr: Decachlorobiphenyl (Surr)</i>		<i>Recovery: 96 %</i>		<i>Limits: 60-125 %</i>		<i>Dilution: 1x</i>						
Matrix Spike Dup (9091456-MSD2)			Prepared: 09/30/19 14:01 Analyzed: 10/03/19 18:59						C-07			
QC Source Sample: SE-10-2.0-3.7 (A910893-13)												
EPA 8082A												
Aroclor 1016	353	12.2	24.4	ug/kg dry	1	609	ND	58	47-134%	19	30%	
Aroclor 1260	388	12.2	24.4	ug/kg dry	1	609	ND	64	53-140%	22	30%	
<i>Surr: Decachlorobiphenyl (Surr)</i>		<i>Recovery: 70 %</i>		<i>Limits: 60-125 %</i>		<i>Dilution: 1x</i>						



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QUALITY CONTROL (QC) SAMPLE RESULTS

Polychlorinated Biphenyls by EPA 8082A

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9091465 - EPA 3510C (Neutral pH)							Water					
Blank (9091465-BLK1)			Prepared: 09/30/19 15:11 Analyzed: 10/01/19 12:25				C-07					
EPA 8082A												
Aroclor 1016	ND	0.0455	0.0909	ug/L	1	---	---	---	---	---	---	
Aroclor 1221	ND	0.0455	0.0909	ug/L	1	---	---	---	---	---	---	
Aroclor 1232	ND	0.0455	0.0909	ug/L	1	---	---	---	---	---	---	
Aroclor 1242	ND	0.0455	0.0909	ug/L	1	---	---	---	---	---	---	
Aroclor 1248	ND	0.0455	0.0909	ug/L	1	---	---	---	---	---	---	
Aroclor 1254	ND	0.0455	0.0909	ug/L	1	---	---	---	---	---	---	
Aroclor 1260	ND	0.0455	0.0909	ug/L	1	---	---	---	---	---	---	
<i>Surr: Decachlorobiphenyl (Surr)</i>		<i>Recovery: 70 %</i>		<i>Limits: 40-135 %</i>		<i>Dilution: 1x</i>						
LCS (9091465-BS1)			Prepared: 09/30/19 15:11 Analyzed: 10/01/19 12:43				C-07					
EPA 8082A												
Aroclor 1016	1.24	0.0500	0.100	ug/L	1	2.50	---	50	46-129%	---	---	
Aroclor 1260	1.59	0.0500	0.100	ug/L	1	2.50	---	64	45-134%	---	---	
<i>Surr: Decachlorobiphenyl (Surr)</i>		<i>Recovery: 68 %</i>		<i>Limits: 40-135 %</i>		<i>Dilution: 1x</i>						
LCS Dup (9091465-BSD1)			Prepared: 09/30/19 15:11 Analyzed: 10/01/19 13:01				C-07, Q-19					
EPA 8082A												
Aroclor 1016	1.34	0.0500	0.100	ug/L	1	2.50	---	54	46-129%	7	30%	
Aroclor 1260	1.75	0.0500	0.100	ug/L	1	2.50	---	70	45-134%	9	30%	
<i>Surr: Decachlorobiphenyl (Surr)</i>		<i>Recovery: 74 %</i>		<i>Limits: 40-135 %</i>		<i>Dilution: 1x</i>						



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A910893 - 01 09 20 1624
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QUALITY CONTROL (QC) SAMPLE RESULTS

Polychlorinated Biphenyls by EPA 8082A

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9101592 - EPA 3546												
Sediment												
Blank (9101592-BLK1) Prepared: 10/25/19 10:03 Analyzed: 10/28/19 09:24 C-07												
<u>EPA 8082A</u>												
Aroclor 1016	ND	1.82	3.64	ug/kg wet	1	---	---	---	---	---	---	
Aroclor 1221	ND	1.82	3.64	ug/kg wet	1	---	---	---	---	---	---	
Aroclor 1232	ND	1.82	3.64	ug/kg wet	1	---	---	---	---	---	---	
Aroclor 1242	ND	1.82	3.64	ug/kg wet	1	---	---	---	---	---	---	
Aroclor 1248	ND	1.82	3.64	ug/kg wet	1	---	---	---	---	---	---	
Aroclor 1254	ND	1.82	3.64	ug/kg wet	1	---	---	---	---	---	---	
Aroclor 1260	ND	1.82	3.64	ug/kg wet	1	---	---	---	---	---	---	
<i>Surr: Decachlorobiphenyl (Surr) Recovery: 90% Limits: 60-125% Dilution: 1x</i>												
LCS (9101592-BS1) Prepared: 10/25/19 10:03 Analyzed: 10/28/19 09:42 C-07												
<u>EPA 8082A</u>												
Aroclor 1016	166	2.00	4.00	ug/kg wet	1	250	---	66	47-134%	---	---	
Aroclor 1260	203	2.00	4.00	ug/kg wet	1	250	---	81	53-140%	---	---	
<i>Surr: Decachlorobiphenyl (Surr) Recovery: 97% Limits: 60-125% Dilution: 1x</i>												
Duplicate (9101592-DUP1) Prepared: 10/25/19 10:03 Analyzed: 10/28/19 10:35 C-07												
<u>QC Source Sample: SE-20-0-0.33--Air Dried (A910893-20)</u>												
<u>EPA 8082A</u>												
Aroclor 1016	ND	2.10	4.21	ug/kg dry	1	---	ND	---	---	---	30%	
Aroclor 1221	ND	2.10	4.21	ug/kg dry	1	---	ND	---	---	---	30%	
Aroclor 1232	ND	2.10	4.21	ug/kg dry	1	---	ND	---	---	---	30%	
Aroclor 1242	ND	2.10	4.21	ug/kg dry	1	---	ND	---	---	---	30%	
Aroclor 1248	ND	2.10	4.21	ug/kg dry	1	---	ND	---	---	---	30%	
Aroclor 1254	2.25	2.10	4.21	ug/kg dry	1	---	2.38	---	---	6	30%	J
Aroclor 1260	2.12	2.10	4.21	ug/kg dry	1	---	2.31	---	---	9	30%	J
<i>Surr: Decachlorobiphenyl (Surr) Recovery: 77% Limits: 60-125% Dilution: 1x</i>												
Duplicate (9101592-DUP2) Prepared: 10/25/19 14:47 Analyzed: 10/28/19 10:34 C-07												
<u>QC Source Sample: Non-SDG (A9J0670-02)</u>												
Aroclor 1016	ND	4.78	9.56	ug/kg dry	1	---	ND	---	---	---	30%	
Aroclor 1221	ND	4.78	9.56	ug/kg dry	1	---	ND	---	---	---	30%	
Aroclor 1232	ND	4.78	9.56	ug/kg dry	1	---	ND	---	---	---	30%	

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A910893 - 01 09 20 1624
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QUALITY CONTROL (QC) SAMPLE RESULTS

Polychlorinated Biphenyls by EPA 8082A

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9101592 - EPA 3546						Sediment						
Duplicate (9101592-DUP2)						Prepared: 10/25/19 14:47 Analyzed: 10/28/19 10:34						C-07
QC Source Sample: Non-SDG (A9J0670-02)												
Aroclor 1242	26.1	4.78	9.56	ug/kg dry	1	---	28.0	---	---	7	30%	P-10
Aroclor 1248	ND	4.78	9.56	ug/kg dry	1	---	ND	---	---	---	30%	
Aroclor 1254	33.4	4.78	9.56	ug/kg dry	1	---	36.5	---	---	9	30%	P-10
Aroclor 1260	18.8	4.78	9.56	ug/kg dry	1	---	20.0	---	---	6	30%	P-10
Surr: Decachlorobiphenyl (Surr)		Recovery: 78 %		Limits: 60-125 %		Dilution: 1x						
Matrix Spike (9101592-MS1)						Prepared: 10/25/19 10:03 Analyzed: 10/28/19 11:45						C-07
QC Source Sample: SE-10-2.0-3.7--Air Dried (A910893-21)												
EPA 8082A												
Aroclor 1016	150	2.12	4.24	ug/kg dry	1	265	ND	56	47-134%	---	---	
Aroclor 1260	178	2.12	4.24	ug/kg dry	1	265	7.17	64	53-140%	---	---	
Surr: Decachlorobiphenyl (Surr)		Recovery: 66 %		Limits: 60-125 %		Dilution: 1x						
Matrix Spike Dup (9101592-MSD1)						Prepared: 10/25/19 10:03 Analyzed: 10/28/19 12:20						C-07
QC Source Sample: SE-10-2.0-3.7--Air Dried (A910893-21)												
EPA 8082A												
Aroclor 1016	133	2.15	4.30	ug/kg dry	1	269	ND	50	47-134%	12	30%	
Aroclor 1260	165	2.15	4.30	ug/kg dry	1	269	7.17	59	53-140%	8	30%	
Surr: Decachlorobiphenyl (Surr)		Recovery: 64 %		Limits: 60-125 %		Dilution: 1x						

Philip Nerenberg



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A910893 - 01 09 20 1624
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QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100456 - EPA 3510C (Acid/Base Neutral)						Water						
Blank (9100456-BLK1)			Prepared: 10/01/19 06:34 Analyzed: 10/01/19 14:52									
EPA 8270D												
2,3,4,6- & 2,3,4,5-Tetrachlorophenol(s)	ND	0.0909	0.182	ug/L	1	---	---	---	---	---	---	A-01
Acenaphthene	0.0572	0.00909	0.0182	ug/L	1	---	---	---	---	---	---	B
Acenaphthylene	ND	0.00909	0.0182	ug/L	1	---	---	---	---	---	---	
Anthracene	ND	0.00909	0.0182	ug/L	1	---	---	---	---	---	---	
Benz(a)anthracene	ND	0.00909	0.0182	ug/L	1	---	---	---	---	---	---	
Benzo(a)pyrene	ND	0.0136	0.0273	ug/L	1	---	---	---	---	---	---	
Benzo(b)fluoranthene	ND	0.0136	0.0273	ug/L	1	---	---	---	---	---	---	
Benzo(k)fluoranthene	ND	0.0136	0.0273	ug/L	1	---	---	---	---	---	---	
Benzo(g,h,i)perylene	ND	0.00909	0.0182	ug/L	1	---	---	---	---	---	---	
Chrysene	ND	0.00909	0.0182	ug/L	1	---	---	---	---	---	---	
Dibenz(a,h)anthracene	ND	0.00909	0.0182	ug/L	1	---	---	---	---	---	---	
Fluoranthene	ND	0.00909	0.0182	ug/L	1	---	---	---	---	---	---	
Fluorene	0.0148	0.00909	0.0182	ug/L	1	---	---	---	---	---	---	B-02, J
Indeno(1,2,3-cd)pyrene	ND	0.00909	0.0182	ug/L	1	---	---	---	---	---	---	
1-Methylnaphthalene	0.0609	0.0182	0.0364	ug/L	1	---	---	---	---	---	---	B
2-Methylnaphthalene	ND	0.0182	0.0364	ug/L	1	---	---	---	---	---	---	
Naphthalene	0.0206	0.0182	0.0364	ug/L	1	---	---	---	---	---	---	B-02, J
Phenanthrene	ND	0.00909	0.0182	ug/L	1	---	---	---	---	---	---	
Pyrene	ND	0.00909	0.0182	ug/L	1	---	---	---	---	---	---	
Carbazole	ND	0.0136	0.0273	ug/L	1	---	---	---	---	---	---	
Dibenzofuran	0.0156	0.00909	0.0182	ug/L	1	---	---	---	---	---	---	B-02, J
4-Chloro-3-methylphenol	ND	0.0909	0.182	ug/L	1	---	---	---	---	---	---	
2-Chlorophenol	ND	0.0455	0.0909	ug/L	1	---	---	---	---	---	---	
2,4-Dichlorophenol	ND	0.0455	0.0909	ug/L	1	---	---	---	---	---	---	
2,4-Dimethylphenol	ND	0.0455	0.0909	ug/L	1	---	---	---	---	---	---	
2,4-Dinitrophenol	ND	0.227	0.455	ug/L	1	---	---	---	---	---	---	
4,6-Dinitro-2-methylphenol	ND	0.227	0.455	ug/L	1	---	---	---	---	---	---	
2-Methylphenol	ND	0.0227	0.0455	ug/L	1	---	---	---	---	---	---	
3+4-Methylphenol(s)	ND	0.0227	0.0455	ug/L	1	---	---	---	---	---	---	
2-Nitrophenol	ND	0.0909	0.182	ug/L	1	---	---	---	---	---	---	
4-Nitrophenol	ND	0.0909	0.182	ug/L	1	---	---	---	---	---	---	
Pentachlorophenol (PCP)	ND	0.0909	0.182	ug/L	1	---	---	---	---	---	---	
Phenol	ND	0.182	0.364	ug/L	1	---	---	---	---	---	---	

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AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A910893 - 01 09 20 1624
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QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100456 - EPA 3510C (Acid/Base Neutral)						Water						
Blank (9100456-BLK1)			Prepared: 10/01/19 06:34 Analyzed: 10/01/19 14:52									
2,3,5,6-Tetrachlorophenol	ND	0.0455	0.0909	ug/L	1	---	---	---	---	---	---	
2,4,5-Trichlorophenol	ND	0.0455	0.0909	ug/L	1	---	---	---	---	---	---	
2,4,6-Trichlorophenol	ND	0.0455	0.0909	ug/L	1	---	---	---	---	---	---	
Bis(2-ethylhexyl)phthalate	ND	0.182	0.364	ug/L	1	---	---	---	---	---	---	
Butyl benzyl phthalate	ND	0.182	0.364	ug/L	1	---	---	---	---	---	---	
Diethylphthalate	ND	0.182	0.364	ug/L	1	---	---	---	---	---	---	
Dimethylphthalate	ND	0.182	0.364	ug/L	1	---	---	---	---	---	---	
Di-n-butylphthalate	ND	0.182	0.364	ug/L	1	---	---	---	---	---	---	
Di-n-octyl phthalate	ND	0.182	0.364	ug/L	1	---	---	---	---	---	---	
N-Nitrosodimethylamine	ND	0.0227	0.0455	ug/L	1	---	---	---	---	---	---	
N-Nitroso-di-n-propylamine	ND	0.0227	0.0455	ug/L	1	---	---	---	---	---	---	
N-Nitrosodiphenylamine	ND	0.0227	0.0455	ug/L	1	---	---	---	---	---	---	
Bis(2-Chloroethoxy) methane	ND	0.0227	0.0455	ug/L	1	---	---	---	---	---	---	
Bis(2-Chloroethyl) ether	ND	0.0227	0.0455	ug/L	1	---	---	---	---	---	---	
2,2'-Oxybis(1-Chloropropane)	ND	0.0227	0.0455	ug/L	1	---	---	---	---	---	---	
Hexachlorobenzene	ND	0.00909	0.0182	ug/L	1	---	---	---	---	---	---	
Hexachlorobutadiene	ND	0.0227	0.0455	ug/L	1	---	---	---	---	---	---	
Hexachlorocyclopentadiene	ND	0.0455	0.0909	ug/L	1	---	---	---	---	---	---	
Hexachloroethane	ND	0.0227	0.0455	ug/L	1	---	---	---	---	---	---	
2-Chloronaphthalene	ND	0.00909	0.0182	ug/L	1	---	---	---	---	---	---	
1,2-Dichlorobenzene	ND	0.0227	0.0455	ug/L	1	---	---	---	---	---	---	
1,3-Dichlorobenzene	ND	0.0227	0.0455	ug/L	1	---	---	---	---	---	---	
1,4-Dichlorobenzene	ND	0.0227	0.0455	ug/L	1	---	---	---	---	---	---	
1,2,4-Trichlorobenzene	ND	0.0227	0.0455	ug/L	1	---	---	---	---	---	---	
4-Bromophenyl phenyl ether	ND	0.0227	0.0455	ug/L	1	---	---	---	---	---	---	
4-Chlorophenyl phenyl ether	ND	0.0227	0.0455	ug/L	1	---	---	---	---	---	---	
Aniline	ND	0.0455	0.0909	ug/L	1	---	---	---	---	---	---	
4-Chloroaniline	ND	0.0227	0.0455	ug/L	1	---	---	---	---	---	---	
2-Nitroaniline	ND	0.182	0.364	ug/L	1	---	---	---	---	---	---	
3-Nitroaniline	ND	0.182	0.364	ug/L	1	---	---	---	---	---	---	
4-Nitroaniline	ND	0.182	0.364	ug/L	1	---	---	---	---	---	---	
Nitrobenzene	ND	0.0909	0.182	ug/L	1	---	---	---	---	---	---	
2,4-Dinitrotoluene	ND	0.0909	0.182	ug/L	1	---	---	---	---	---	---	
2,6-Dinitrotoluene	ND	0.0909	0.182	ug/L	1	---	---	---	---	---	---	

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AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A910893 - 01 09 20 1624
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QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100456 - EPA 3510C (Acid/Base Neutral)						Water						
Blank (9100456-BLK1)			Prepared: 10/01/19 06:34 Analyzed: 10/01/19 14:52									
Benzoic acid	ND	1.14	2.27	ug/L	1	---	---	---	---	---	---	
Benzyl alcohol	ND	0.0909	0.182	ug/L	1	---	---	---	---	---	---	
Isophorone	ND	0.0227	0.0455	ug/L	1	---	---	---	---	---	---	
Azobenzene (1,2-DPH)	ND	0.0227	0.0455	ug/L	1	---	---	---	---	---	---	
Bis(2-Ethylhexyl) adipate	ND	0.227	0.455	ug/L	1	---	---	---	---	---	---	
3,3'-Dichlorobenzidine	ND	0.455	0.909	ug/L	1	---	---	---	---	---	---	Q-52
1,2-Dinitrobenzene	ND	0.227	0.455	ug/L	1	---	---	---	---	---	---	
1,3-Dinitrobenzene	ND	0.227	0.455	ug/L	1	---	---	---	---	---	---	
1,4-Dinitrobenzene	ND	0.227	0.455	ug/L	1	---	---	---	---	---	---	
Pyridine	ND	0.0909	0.182	ug/L	1	---	---	---	---	---	---	
<i>Surr: Nitrobenzene-d5 (Surr)</i>		<i>Recovery: 67 %</i>		<i>Limits: 44-120 %</i>		<i>Dilution: 1x</i>						
<i>2-Fluorobiphenyl (Surr)</i>		<i>55 %</i>		<i>44-120 %</i>		<i>"</i>						
<i>Phenol-d6 (Surr)</i>		<i>20 %</i>		<i>10-120 %</i>		<i>"</i>						
<i>p-Terphenyl-d14 (Surr)</i>		<i>69 %</i>		<i>50-133 %</i>		<i>"</i>						
<i>2-Fluorophenol (Surr)</i>		<i>36 %</i>		<i>19-120 %</i>		<i>"</i>						
<i>2,4,6-Tribromophenol (Surr)</i>		<i>65 %</i>		<i>43-140 %</i>		<i>"</i>						

LCS (9100456-BS1)			Prepared: 10/01/19 06:34 Analyzed: 10/01/19 15:28									
EPA 8270D												
Acenaphthene	3.11	0.0400	0.0800	ug/L	4	4.00	---	78	47-122%	---	---	B
Acenaphthylene	3.24	0.0400	0.0800	ug/L	4	4.00	---	81	41-130%	---	---	
Anthracene	3.34	0.0400	0.0800	ug/L	4	4.00	---	83	57-123%	---	---	
Benz(a)anthracene	3.37	0.0400	0.0800	ug/L	4	4.00	---	84	58-125%	---	---	
Benzo(a)pyrene	3.35	0.0600	0.120	ug/L	4	4.00	---	84	54-128%	---	---	
Benzo(b)fluoranthene	3.39	0.0600	0.120	ug/L	4	4.00	---	85	53-131%	---	---	
Benzo(k)fluoranthene	3.36	0.0600	0.120	ug/L	4	4.00	---	84	57-129%	---	---	
Benzo(g,h,i)perylene	3.59	0.0400	0.0800	ug/L	4	4.00	---	90	50-134%	---	---	
Chrysene	3.44	0.0400	0.0800	ug/L	4	4.00	---	86	59-123%	---	---	
Dibenz(a,h)anthracene	3.43	0.0400	0.0800	ug/L	4	4.00	---	86	51-134%	---	---	
Fluoranthene	3.69	0.0400	0.0800	ug/L	4	4.00	---	92	57-128%	---	---	
Fluorene	3.22	0.0400	0.0800	ug/L	4	4.00	---	80	52-124%	---	---	B-02
Indeno(1,2,3-cd)pyrene	3.22	0.0400	0.0800	ug/L	4	4.00	---	81	52-133%	---	---	
1-Methylnaphthalene	3.03	0.0800	0.160	ug/L	4	4.00	---	76	41-120%	---	---	B
2-Methylnaphthalene	2.96	0.0800	0.160	ug/L	4	4.00	---	74	40-121%	---	---	

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tideland Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A910893 - 01 09 20 1624
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QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100456 - EPA 3510C (Acid/Base Neutral)						Water						
LCS (9100456-BS1)			Prepared: 10/01/19 06:34 Analyzed: 10/01/19 15:28									
Naphthalene	2.88	0.0800	0.160	ug/L	4	4.00	---	72	40-121%	---	---	B-02
Phenanthrene	3.19	0.0400	0.0800	ug/L	4	4.00	---	80	59-120%	---	---	
Pyrene	3.79	0.0400	0.0800	ug/L	4	4.00	---	95	57-126%	---	---	
Carbazole	3.47	0.0600	0.120	ug/L	4	4.00	---	87	60-122%	---	---	
Dibenzofuran	3.23	0.0400	0.0800	ug/L	4	4.00	---	81	53-120%	---	---	B-02
4-Chloro-3-methylphenol	3.28	0.400	0.800	ug/L	4	4.00	---	82	52-120%	---	---	
2-Chlorophenol	2.93	0.200	0.400	ug/L	4	4.00	---	73	38-120%	---	---	
2,4-Dichlorophenol	3.22	0.200	0.400	ug/L	4	4.00	---	81	47-121%	---	---	
2,4-Dimethylphenol	3.23	0.200	0.400	ug/L	4	4.00	---	81	31-124%	---	---	
2,4-Dinitrophenol	3.52	1.00	2.00	ug/L	4	4.00	---	88	23-143%	---	---	
4,6-Dinitro-2-methylphenol	3.81	1.00	2.00	ug/L	4	4.00	---	95	44-137%	---	---	
2-Methylphenol	2.78	0.100	0.200	ug/L	4	4.00	---	70	30-120%	---	---	
3+4-Methylphenol(s)	2.55	0.100	0.200	ug/L	4	4.00	---	64	29-120%	---	---	
2-Nitrophenol	3.81	0.400	0.800	ug/L	4	4.00	---	95	47-123%	---	---	
4-Nitrophenol	1.55	0.400	0.800	ug/L	4	4.00	---	39	5-120%	---	---	
Pentachlorophenol (PCP)	3.30	0.400	0.800	ug/L	4	4.00	---	82	35-138%	---	---	
Phenol	1.30	0.800	0.800	ug/L	4	4.00	---	32	5-120%	---	---	
2,3,4,6-Tetrachlorophenol	3.18	0.200	0.400	ug/L	4	4.00	---	79	50-128%	---	---	
2,3,5,6-Tetrachlorophenol	3.31	0.200	0.400	ug/L	4	4.00	---	83	50-121%	---	---	
2,4,5-Trichlorophenol	3.34	0.200	0.400	ug/L	4	4.00	---	83	53-123%	---	---	
2,4,6-Trichlorophenol	3.38	0.200	0.400	ug/L	4	4.00	---	84	50-125%	---	---	
Bis(2-ethylhexyl)phthalate	3.49	0.800	1.60	ug/L	4	4.00	---	87	55-135%	---	---	
Butyl benzyl phthalate	3.40	0.800	1.60	ug/L	4	4.00	---	85	53-134%	---	---	
Diethylphthalate	3.46	0.800	1.60	ug/L	4	4.00	---	87	55-125%	---	---	
Dimethylphthalate	3.34	0.800	1.60	ug/L	4	4.00	---	84	45-127%	---	---	
Di-n-butylphthalate	3.65	0.800	1.60	ug/L	4	4.00	---	91	59-127%	---	---	
Di-n-octyl phthalate	3.31	0.800	1.60	ug/L	4	4.00	---	83	51-140%	---	---	
N-Nitrosodimethylamine	1.78	0.100	0.200	ug/L	4	4.00	---	44	6-120%	---	---	
N-Nitroso-di-n-propylamine	3.17	0.100	0.200	ug/L	4	4.00	---	79	49-120%	---	---	
N-Nitrosodiphenylamine	3.28	0.100	0.200	ug/L	4	4.00	---	82	51-123%	---	---	
Bis(2-Chloroethoxy) methane	3.20	0.100	0.200	ug/L	4	4.00	---	80	48-120%	---	---	
Bis(2-Chloroethyl) ether	2.69	0.100	0.200	ug/L	4	4.00	---	67	43-120%	---	---	Q-41
2,2'-Oxybis(1-Chloropropane)	2.66	0.100	0.200	ug/L	4	4.00	---	67	37-130%	---	---	
Hexachlorobenzene	3.26	0.0400	0.0800	ug/L	4	4.00	---	81	52-125%	---	---	

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tideland Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A910893 - 01 09 20 1624
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QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100456 - EPA 3510C (Acid/Base Neutral)						Water						
LCS (9100456-BS1)			Prepared: 10/01/19 06:34 Analyzed: 10/01/19 15:28									
Hexachlorobutadiene	2.30	0.100	0.200	ug/L	4	4.00	---	58	22-124%	---	---	
Hexachlorocyclopentadiene	2.97	0.200	0.400	ug/L	4	4.00	---	74	5-127%	---	---	Q-41
Hexachloroethane	2.06	0.100	0.200	ug/L	4	4.00	---	51	21-120%	---	---	
2-Chloronaphthalene	3.11	0.0400	0.0800	ug/L	4	4.00	---	78	40-120%	---	---	
1,2-Dichlorobenzene	2.31	0.100	0.200	ug/L	4	4.00	---	58	32-120%	---	---	
1,3-Dichlorobenzene	2.11	0.100	0.200	ug/L	4	4.00	---	53	28-120%	---	---	
1,4-Dichlorobenzene	2.20	0.100	0.200	ug/L	4	4.00	---	55	29-120%	---	---	
1,2,4-Trichlorobenzene	2.59	0.100	0.200	ug/L	4	4.00	---	65	29-120%	---	---	
4-Bromophenyl phenyl ether	3.21	0.100	0.200	ug/L	4	4.00	---	80	54-124%	---	---	
4-Chlorophenyl phenyl ether	3.16	0.100	0.200	ug/L	4	4.00	---	79	53-121%	---	---	
Aniline	2.76	0.200	0.400	ug/L	4	4.00	---	69	6-120%	---	---	
4-Chloroaniline	1.92	0.100	0.200	ug/L	4	4.00	---	48	33-120%	---	---	Q-31
2-Nitroaniline	3.39	0.800	1.60	ug/L	4	4.00	---	85	54-127%	---	---	
3-Nitroaniline	3.01	0.800	1.60	ug/L	4	4.00	---	75	41-128%	---	---	
4-Nitroaniline	4.31	0.800	1.60	ug/L	4	4.00	---	108	35-120%	---	---	Q-41
Nitrobenzene	3.16	0.400	0.800	ug/L	4	4.00	---	79	45-121%	---	---	
2,4-Dinitrotoluene	3.31	0.400	0.800	ug/L	4	4.00	---	83	57-128%	---	---	
2,6-Dinitrotoluene	3.13	0.400	0.800	ug/L	4	4.00	---	78	57-124%	---	---	
Benzoic acid	4.34	4.00	4.00	ug/L	4	8.00	---	54	5-120%	---	---	
Benzyl alcohol	2.75	0.400	0.800	ug/L	4	4.00	---	69	31-120%	---	---	
Isophorone	3.09	0.100	0.200	ug/L	4	4.00	---	77	42-124%	---	---	
Azobenzene (1,2-DPH)	2.96	0.100	0.200	ug/L	4	4.00	---	74	61-120%	---	---	
Bis(2-Ethylhexyl) adipate	3.39	1.00	2.00	ug/L	4	4.00	---	85	40-125%	---	---	
3,3'-Dichlorobenzidine	7.83	2.00	4.00	ug/L	4	8.00	---	98	27-129%	---	---	Q-31
1,2-Dinitrobenzene	3.08	1.00	2.00	ug/L	4	4.00	---	77	59-120%	---	---	
1,3-Dinitrobenzene	3.49	1.00	2.00	ug/L	4	4.00	---	87	49-128%	---	---	
1,4-Dinitrobenzene	3.77	1.00	2.00	ug/L	4	4.00	---	94	40-120%	---	---	
Pyridine	0.973	0.400	0.800	ug/L	4	4.00	---	24	5-120%	---	---	
<i>Surr: Nitrobenzene-d5 (Surr)</i>		<i>Recovery: 77 %</i>		<i>Limits: 44-120 %</i>		<i>Dilution: 4x</i>						
<i>2-Fluorobiphenyl (Surr)</i>		<i>71 %</i>		<i>44-120 %</i>		<i>"</i>						
<i>Phenol-d6 (Surr)</i>		<i>26 %</i>		<i>10-120 %</i>		<i>"</i>						
<i>p-Terphenyl-d14 (Surr)</i>		<i>81 %</i>		<i>50-133 %</i>		<i>"</i>						
<i>2-Fluorophenol (Surr)</i>		<i>42 %</i>		<i>19-120 %</i>		<i>"</i>						
<i>2,4,6-Tribromophenol (Surr)</i>		<i>72 %</i>		<i>43-140 %</i>		<i>"</i>						



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tideland Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A910893 - 01 09 20 1624
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QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100456 - EPA 3510C (Acid/Base Neutral)							Water					
Matrix Spike (9100456-MS2)			Prepared: 10/01/19 06:34 Analyzed: 10/03/19 21:25									
QC Source Sample: Non-SDG (A910854-09RE1)												
EPA 8270D												
Acenaphthene	104	0.472	0.943	ug/L	50	3.77	100	106	47-122%	---	---	B
Acenaphthylene	4.46	1.42	1.42	ug/L	50	3.77	ND	118	41-130%	---	---	
Anthracene	8.83	0.472	0.943	ug/L	50	3.77	5.18	97	57-123%	---	---	
Benz(a)anthracene	3.79	0.472	0.943	ug/L	50	3.77	0.499	87	58-125%	---	---	
Benzo(a)pyrene	3.62	0.708	1.42	ug/L	50	3.77	ND	96	54-128%	---	---	
Benzo(b)fluoranthene	3.59	0.708	1.42	ug/L	50	3.77	ND	95	53-131%	---	---	
Benzo(k)fluoranthene	3.38	0.708	1.42	ug/L	50	3.77	ND	90	57-129%	---	---	
Benzo(g,h,i)perylene	3.37	0.472	0.943	ug/L	50	3.77	ND	89	50-134%	---	---	
Chrysene	3.63	0.472	0.943	ug/L	50	3.77	ND	96	59-123%	---	---	
Dibenz(a,h)anthracene	3.27	0.472	0.943	ug/L	50	3.77	ND	87	51-134%	---	---	
Fluoranthene	12.6	0.472	0.943	ug/L	50	3.77	8.21	115	57-128%	---	---	
Fluorene	48.2	0.472	0.943	ug/L	50	3.77	43.9	114	52-124%	---	---	B-02
Indeno(1,2,3-cd)pyrene	3.20	0.472	0.943	ug/L	50	3.77	ND	85	52-133%	---	---	
1-Methylnaphthalene	72.6	0.943	1.89	ug/L	50	3.77	69.6	80	41-120%	---	---	B
2-Methylnaphthalene	6.16	0.943	1.89	ug/L	50	3.77	3.95	59	40-121%	---	---	
Naphthalene	3.11	0.943	1.89	ug/L	50	3.77	ND	82	40-121%	---	---	B-02
Phenanthrene	30.6	0.472	0.943	ug/L	50	3.77	26.8	102	59-120%	---	---	
Pyrene	10.5	0.472	0.943	ug/L	50	3.77	6.24	113	57-126%	---	---	
Carbazole	11.5	0.708	1.42	ug/L	50	3.77	8.11	89	60-122%	---	---	
Dibenzofuran	40.9	0.472	0.943	ug/L	50	3.77	37.1	100	53-120%	---	---	B-02
4-Chloro-3-methylphenol	ND	4.72	9.43	ug/L	50	3.77	ND		52-120%	---	---	Q-11
2-Chlorophenol	2.81	2.36	4.72	ug/L	50	3.77	ND	74	38-120%	---	---	J
2,4-Dichlorophenol	4.68	2.36	4.72	ug/L	50	3.77	ND	124	47-121%	---	---	Q-11, J
2,4-Dimethylphenol	5.29	2.36	4.72	ug/L	50	3.77	ND	140	31-124%	---	---	Q-11
2,4-Dinitrophenol	13.5	11.8	23.6	ug/L	50	3.77	ND	359	23-143%	---	---	Q-11, Q-41, J
4,6-Dinitro-2-methylphenol	ND	11.8	23.6	ug/L	50	3.77	ND		44-137%	---	---	Q-11, Q-41
2-Methylphenol	2.85	1.18	2.36	ug/L	50	3.77	ND	76	30-120%	---	---	
3+4-Methylphenol(s)	2.34	1.18	2.36	ug/L	50	3.77	ND	62	29-120%	---	---	J
2-Nitrophenol	5.83	4.72	9.43	ug/L	50	3.77	ND	154	47-123%	---	---	Q-11, J
4-Nitrophenol	5.35	4.72	9.43	ug/L	50	3.77	ND	142	5-120%	---	---	Q-11, Q-41, J
Pentachlorophenol (PCP)	17.3	4.72	9.43	ug/L	50	3.77	13.6	98	35-138%	---	---	

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A910893 - 01 09 20 1624
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QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100456 - EPA 3510C (Acid/Base Neutral)							Water					
Matrix Spike (9100456-MS2)			Prepared: 10/01/19 06:34 Analyzed: 10/03/19 21:25									
QC Source Sample: Non-SDG (A910854-09RE1)												
Phenol	ND	9.43	18.9	ug/L	50	3.77	ND		5-120%	---	---	Q-11
2,3,4,6-Tetrachlorophenol	6.80	2.36	4.72	ug/L	50	3.77	3.92	76	50-128%	---	---	
2,3,5,6-Tetrachlorophenol	7.63	2.36	4.72	ug/L	50	3.77	3.82	101	50-121%	---	---	
2,4,5-Trichlorophenol	4.34	2.36	4.72	ug/L	50	3.77	ND	115	53-123%	---	---	J
2,4,6-Trichlorophenol	4.35	2.36	4.72	ug/L	50	3.77	ND	115	50-125%	---	---	J
Bis(2-ethylhexyl)phthalate	ND	9.43	18.9	ug/L	50	3.77	ND		55-135%	---	---	Q-11
Butyl benzyl phthalate	ND	9.43	18.9	ug/L	50	3.77	ND		53-134%	---	---	Q-11
Diethylphthalate	ND	9.43	18.9	ug/L	50	3.77	ND		55-125%	---	---	Q-11
Dimethylphthalate	ND	9.43	18.9	ug/L	50	3.77	ND		45-127%	---	---	Q-11
Di-n-butylphthalate	ND	9.43	18.9	ug/L	50	3.77	ND		59-127%	---	---	Q-11
Di-n-octyl phthalate	ND	9.43	18.9	ug/L	50	3.77	ND		50-140%	---	---	Q-11
N-Nitrosodimethylamine	1.26	1.18	2.36	ug/L	50	3.77	ND	33	6-120%	---	---	J
N-Nitroso-di-n-propylamine	2.77	1.18	2.36	ug/L	50	3.77	ND	73	49-120%	---	---	
N-Nitrosodiphenylamine	4.65	1.18	2.36	ug/L	50	3.77	ND	123	51-123%	---	---	
Bis(2-Chloroethoxy) methane	3.35	1.18	2.36	ug/L	50	3.77	ND	89	48-120%	---	---	
Bis(2-Chloroethyl) ether	2.54	1.18	2.36	ug/L	50	3.77	ND	67	43-120%	---	---	
2,2'-Oxybis(1-Chloropropane)	2.45	1.18	2.36	ug/L	50	3.77	ND	65	37-130%	---	---	Q-31
Hexachlorobenzene	3.31	0.472	0.943	ug/L	50	3.77	ND	88	52-125%	---	---	
Hexachlorobutadiene	2.23	1.18	2.36	ug/L	50	3.77	ND	59	22-124%	---	---	J
Hexachlorocyclopentadiene	ND	2.36	4.72	ug/L	50	3.77	ND		5-127%	---	---	Q-11, Q-41
Hexachloroethane	2.05	1.18	2.36	ug/L	50	3.77	ND	54	21-120%	---	---	J
2-Chloronaphthalene	3.34	0.472	0.943	ug/L	50	3.77	ND	89	40-120%	---	---	
1,2-Dichlorobenzene	2.22	1.18	2.36	ug/L	50	3.77	ND	59	32-120%	---	---	J
1,3-Dichlorobenzene	2.18	1.18	2.36	ug/L	50	3.77	ND	58	28-120%	---	---	J
1,4-Dichlorobenzene	2.21	1.18	2.36	ug/L	50	3.77	ND	58	29-120%	---	---	J
1,2,4-Trichlorobenzene	2.57	1.18	2.36	ug/L	50	3.77	ND	68	29-120%	---	---	
4-Bromophenyl phenyl ether	3.30	1.18	2.36	ug/L	50	3.77	ND	88	54-124%	---	---	
4-Chlorophenyl phenyl ether	3.31	1.18	2.36	ug/L	50	3.77	ND	88	53-121%	---	---	
Aniline	ND	2.36	4.72	ug/L	50	3.77	ND		6-120%	---	---	Q-11, Q-31
4-Chloroaniline	2.65	1.18	2.36	ug/L	50	3.77	ND	70	33-120%	---	---	Q-31
2-Nitroaniline	ND	9.43	18.9	ug/L	50	3.77	ND		54-127%	---	---	Q-11
3-Nitroaniline	ND	9.43	18.9	ug/L	50	3.77	ND		41-128%	---	---	Q-11
4-Nitroaniline	ND	9.43	18.9	ug/L	50	3.77	ND		35-120%	---	---	Q-11, Q-41

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A910893 - 01 09 20 1624
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QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100456 - EPA 3510C (Acid/Base Neutral)							Water					
Matrix Spike (9100456-MS2)			Prepared: 10/01/19 06:34 Analyzed: 10/03/19 21:25									
QC Source Sample: Non-SDG (A910854-09RE1)												
Nitrobenzene	ND	4.72	9.43	ug/L	50	3.77	ND		45-121%	---	---	Q-11
2,4-Dinitrotoluene	5.22	4.72	9.43	ug/L	50	3.77	ND	138	57-128%	---	---	Q-11, J
2,6-Dinitrotoluene	ND	4.72	9.43	ug/L	50	3.77	ND		57-124%	---	---	Q-11
Benzoic acid	ND	59.0	118	ug/L	50	7.55	ND		5-120%	---	---	Q-11, Q-41
Benzyl alcohol	ND	4.72	9.43	ug/L	50	3.77	ND		31-120%	---	---	Q-11
Isophorone	3.02	1.18	2.36	ug/L	50	3.77	ND	80	42-124%	---	---	
Azobenzene (1,2-DPH)	2.98	1.18	2.36	ug/L	50	3.77	ND	79	61-120%	---	---	
Bis(2-Ethylhexyl) adipate	ND	11.8	23.6	ug/L	50	3.77	ND		40-125%	---	---	Q-11
3,3'-Dichlorobenzidine	ND	23.6	47.2	ug/L	50	7.55	ND		27-129%	---	---	Q-11, Q-31
1,2-Dinitrobenzene	ND	11.8	23.6	ug/L	50	3.77	ND		59-120%	---	---	Q-11
1,3-Dinitrobenzene	ND	11.8	23.6	ug/L	50	3.77	ND		49-128%	---	---	Q-11
1,4-Dinitrobenzene	ND	11.8	23.6	ug/L	50	3.77	ND		40-120%	---	---	Q-11, Q-41
Pyridine	ND	4.72	9.43	ug/L	50	3.77	ND		5-120%	---	---	Q-11
<i>Surr: Nitrobenzene-d5 (Surr)</i>		<i>Recovery: 74 %</i>		<i>Limits: 44-120 %</i>		<i>Dilution: 50x</i>						
<i>2-Fluorobiphenyl (Surr)</i>		<i>83 %</i>		<i>44-120 %</i>		<i>"</i>						
<i>Phenol-d6 (Surr)</i>		<i>23 %</i>		<i>10-120 %</i>		<i>"</i>						
<i>p-Terphenyl-d14 (Surr)</i>		<i>70 %</i>		<i>50-133 %</i>		<i>"</i>						
<i>2-Fluorophenol (Surr)</i>		<i>34 %</i>		<i>19-120 %</i>		<i>"</i>						
<i>2,4,6-Tribromophenol (Surr)</i>		<i>108 %</i>		<i>43-140 %</i>		<i>"</i>						

Matrix Spike Dup (9100456-MSD2)			Prepared: 10/01/19 06:34 Analyzed: 10/03/19 22:01									
QC Source Sample: Non-SDG (A910854-09RE1)												
Acenaphthene	103	0.467	0.935	ug/L	50	3.74	100	62	47-122%	2	30%	B
Acenaphthylene	4.45	0.467	0.935	ug/L	50	3.74	ND	87	41-130%	0.2	30%	
Anthracene	8.68	0.467	0.935	ug/L	50	3.74	5.18	94	57-123%	2	30%	
Benz(a)anthracene	3.73	0.467	0.935	ug/L	50	3.74	0.499	86	58-125%	2	30%	
Benzo(a)pyrene	3.48	0.701	1.40	ug/L	50	3.74	ND	93	54-128%	4	30%	
Benzo(b)fluoranthene	3.54	0.701	1.40	ug/L	50	3.74	ND	95	53-131%	2	30%	
Benzo(k)fluoranthene	3.35	0.701	1.40	ug/L	50	3.74	ND	90	57-129%	1	30%	
Benzo(g,h,i)perylene	3.24	0.467	0.935	ug/L	50	3.74	ND	87	50-134%	4	30%	
Chrysene	3.61	0.467	0.935	ug/L	50	3.74	ND	97	59-123%	0.5	30%	
Dibenz(a,h)anthracene	3.19	0.467	0.935	ug/L	50	3.74	ND	85	51-134%	3	30%	
Fluoranthene	12.4	0.467	0.935	ug/L	50	3.74	8.21	113	57-128%	0.8	30%	

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A910893 - 01 09 20 1624
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QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100456 - EPA 3510C (Acid/Base Neutral)							Water					
Matrix Spike Dup (9100456-MSD2)				Prepared: 10/01/19 06:34 Analyzed: 10/03/19 22:01								
QC Source Sample: Non-SDG (A910854-09RE1)												
Fluorene	45.9	0.467	0.935	ug/L	50	3.74	43.9	52	52-124%	5	30%	B-02
Indeno(1,2,3-cd)pyrene	3.19	0.467	0.935	ug/L	50	3.74	ND	85	52-133%	0.5	30%	
1-Methylnaphthalene	69.5	0.935	1.87	ug/L	50	3.74	69.6	-2	41-120%	4	30%	B, Q-03
2-Methylnaphthalene	4.65	0.935	1.87	ug/L	50	3.74	3.95	19	40-121%	28	30%	Q-03
Naphthalene	3.39	0.935	1.87	ug/L	50	3.74	ND	91	40-121%	9	30%	B-02
Phenanthrene	30.1	0.467	0.935	ug/L	50	3.74	26.8	89	59-120%	2	30%	
Pyrene	10.3	0.467	0.935	ug/L	50	3.74	6.24	110	57-126%	2	30%	
Carbazole	11.3	0.701	1.40	ug/L	50	3.74	8.11	87	60-122%	1	30%	
Dibenzofuran	39.3	0.467	0.935	ug/L	50	3.74	37.1	58	53-120%	4	30%	B-02
4-Chloro-3-methylphenol	ND	4.67	9.35	ug/L	50	3.74	ND		52-120%		30%	Q-11
2-Chlorophenol	2.70	2.34	4.67	ug/L	50	3.74	ND	72	38-120%	4	30%	J
2,4-Dichlorophenol	4.46	2.34	4.67	ug/L	50	3.74	ND	119	47-121%	5	30%	J
2,4-Dimethylphenol	5.09	2.34	4.67	ug/L	50	3.74	ND	136	31-124%	4	30%	Q-11
2,4-Dinitrophenol	13.2	11.7	23.4	ug/L	50	3.74	ND	353	23-143%	3	30%	Q-11, Q-41, J
4,6-Dinitro-2-methylphenol	ND	11.7	23.4	ug/L	50	3.74	ND		44-137%		30%	Q-11, Q-41
2-Methylphenol	3.02	1.17	2.34	ug/L	50	3.74	ND	81	30-120%	6	30%	
3+4-Methylphenol(s)	2.32	1.17	2.34	ug/L	50	3.74	ND	62	29-120%	0.9	30%	J
2-Nitrophenol	ND	4.67	9.35	ug/L	50	3.74	ND		47-123%	200	30%	Q-11
4-Nitrophenol	ND	4.67	9.35	ug/L	50	3.74	ND		5-120%	200	30%	Q-11, Q-41
Pentachlorophenol (PCP)	16.7	4.67	9.35	ug/L	50	3.74	13.6	84	35-138%	3	30%	
Phenol	ND	9.35	18.7	ug/L	50	3.74	ND		5-120%		30%	Q-11
2,3,4,6-Tetrachlorophenol	6.64	2.34	4.67	ug/L	50	3.74	3.92	73	50-128%	2	30%	
2,3,5,6-Tetrachlorophenol	7.12	2.34	4.67	ug/L	50	3.74	3.82	88	50-121%	7	30%	
2,4,5-Trichlorophenol	4.19	2.34	4.67	ug/L	50	3.74	ND	112	53-123%	4	30%	J
2,4,6-Trichlorophenol	4.30	2.34	4.67	ug/L	50	3.74	ND	115	50-125%	1	30%	J
Bis(2-ethylhexyl)phthalate	ND	9.35	18.7	ug/L	50	3.74	ND		55-135%		30%	Q-11
Butyl benzyl phthalate	ND	9.35	18.7	ug/L	50	3.74	ND		53-134%		30%	Q-11
Diethylphthalate	ND	9.35	18.7	ug/L	50	3.74	ND		55-125%		30%	Q-11
Dimethylphthalate	ND	9.35	18.7	ug/L	50	3.74	ND		45-127%		30%	Q-11
Di-n-butylphthalate	ND	9.35	18.7	ug/L	50	3.74	ND		59-127%		30%	Q-11
Di-n-octyl phthalate	ND	9.35	18.7	ug/L	50	3.74	ND		50-140%		30%	Q-11
N-Nitrosodimethylamine	ND	1.17	2.34	ug/L	50	3.74	ND		6-120%	200	30%	Q-01
N-Nitroso-di-n-propylamine	2.64	1.17	2.34	ug/L	50	3.74	ND	71	49-120%	5	30%	

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A910893 - 01 09 20 1624
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QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100456 - EPA 3510C (Acid/Base Neutral)							Water					
Matrix Spike Dup (9100456-MSD2)				Prepared: 10/01/19 06:34 Analyzed: 10/03/19 22:01								
QC Source Sample: Non-SDG (A910854-09RE1)												
N-Nitrosodiphenylamine	4.64	1.17	2.34	ug/L	50	3.74	ND	124	51-123%	0.3	30%	Q-01
Bis(2-Chloroethoxy) methane	3.15	1.17	2.34	ug/L	50	3.74	ND	84	48-120%	6	30%	
Bis(2-Chloroethyl) ether	2.47	1.17	2.34	ug/L	50	3.74	ND	66	43-120%	3	30%	
2,2'-Oxybis(1-Chloropropane)	2.22	1.17	2.34	ug/L	50	3.74	ND	59	37-130%	10	30%	Q-31, J
Hexachlorobenzene	3.57	0.467	0.935	ug/L	50	3.74	ND	95	52-125%	8	30%	
Hexachlorobutadiene	2.22	1.17	2.34	ug/L	50	3.74	ND	59	22-124%	0.09	30%	J
Hexachlorocyclopentadiene	ND	2.34	4.67	ug/L	50	3.74	ND		5-127%		30%	Q-11, Q-41
Hexachloroethane	1.90	1.17	2.34	ug/L	50	3.74	ND	51	21-120%	8	30%	J
2-Chloronaphthalene	3.18	0.467	0.935	ug/L	50	3.74	ND	85	40-120%	5	30%	
1,2-Dichlorobenzene	2.15	1.17	2.34	ug/L	50	3.74	ND	57	32-120%	4	30%	J
1,3-Dichlorobenzene	2.02	1.17	2.34	ug/L	50	3.74	ND	54	28-120%	8	30%	J
1,4-Dichlorobenzene	2.10	1.17	2.34	ug/L	50	3.74	ND	56	29-120%	5	30%	J
1,2,4-Trichlorobenzene	2.55	1.17	2.34	ug/L	50	3.74	ND	68	29-120%	0.9	30%	
4-Bromophenyl phenyl ether	3.24	1.17	2.34	ug/L	50	3.74	ND	87	54-124%	2	30%	
4-Chlorophenyl phenyl ether	3.12	1.17	2.34	ug/L	50	3.74	ND	84	53-121%	6	30%	
Aniline	ND	2.34	4.67	ug/L	50	3.74	ND		6-120%		30%	Q-11, Q-31
4-Chloroaniline	2.37	1.17	2.34	ug/L	50	3.74	ND	63	33-120%	11	30%	Q-31
2-Nitroaniline	ND	9.35	18.7	ug/L	50	3.74	ND		54-127%		30%	Q-11
3-Nitroaniline	ND	9.35	18.7	ug/L	50	3.74	ND		41-128%		30%	Q-11
4-Nitroaniline	ND	9.35	18.7	ug/L	50	3.74	ND		35-120%		30%	Q-11, Q-41
Nitrobenzene	ND	4.67	9.35	ug/L	50	3.74	ND		45-121%		30%	Q-11
2,4-Dinitrotoluene	4.82	4.67	9.35	ug/L	50	3.74	ND	129	57-128%	8	30%	Q-11, J
2,6-Dinitrotoluene	ND	4.67	9.35	ug/L	50	3.74	ND		57-124%		30%	Q-11
Benzoic acid	ND	58.4	117	ug/L	50	7.48	ND		5-120%		30%	Q-11, Q-41
Benzyl alcohol	ND	4.67	9.35	ug/L	50	3.74	ND		31-120%		30%	Q-11
Isophorone	2.90	1.17	2.34	ug/L	50	3.74	ND	78	42-124%	4	30%	
Azobenzene (1,2-DPH)	2.87	1.17	2.34	ug/L	50	3.74	ND	77	61-120%	4	30%	
Bis(2-Ethylhexyl) adipate	ND	11.7	23.4	ug/L	50	3.74	ND		40-125%		30%	Q-11
3,3'-Dichlorobenzidine	ND	23.4	46.7	ug/L	50	7.48	ND		27-129%		30%	Q-11, Q-31
1,2-Dinitrobenzene	ND	11.7	23.4	ug/L	50	3.74	ND		59-120%		30%	Q-11
1,3-Dinitrobenzene	ND	11.7	23.4	ug/L	50	3.74	ND		49-128%		30%	Q-11
1,4-Dinitrobenzene	ND	11.7	23.4	ug/L	50	3.74	ND		40-120%		30%	Q-11, Q-41
Pyridine	ND	4.67	9.35	ug/L	50	3.74	ND		5-120%		30%	Q-11

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Philip Nerenberg, Lab Director



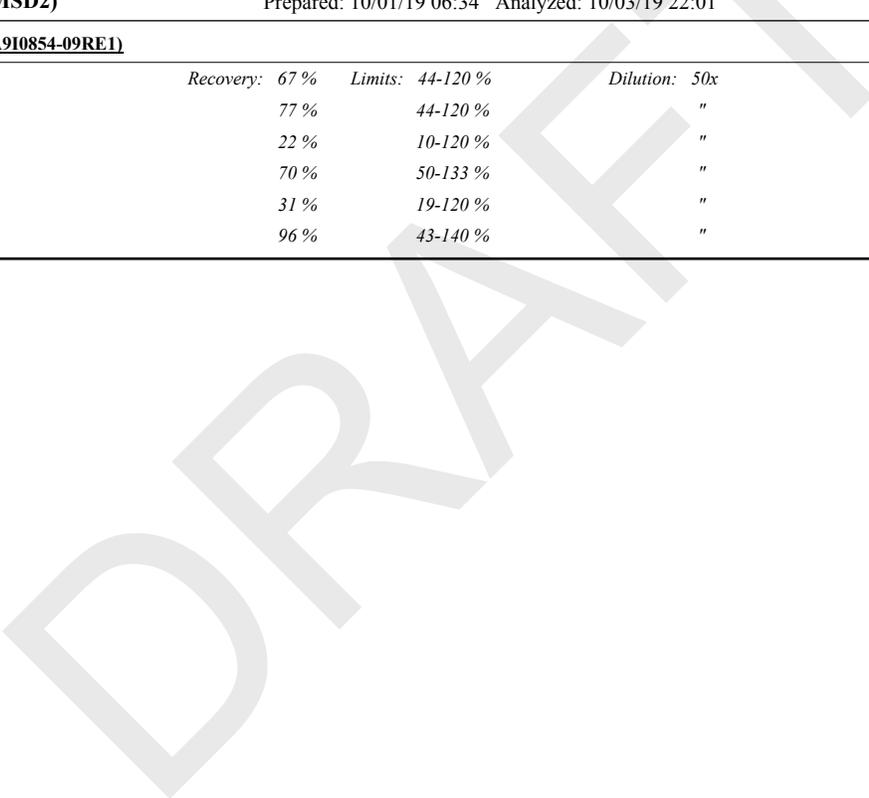
AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A910893 - 01 09 20 1624
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QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100456 - EPA 3510C (Acid/Base Neutral)							Water					
Matrix Spike Dup (9100456-MSD2)					Prepared: 10/01/19 06:34 Analyzed: 10/03/19 22:01							
QC Source Sample: Non-SDG (A910854-09RE1)												
<i>Surr: Nitrobenzene-d5 (Surr)</i>		<i>Recovery: 67 %</i>		<i>Limits: 44-120 %</i>		<i>Dilution: 50x</i>						
<i>2-Fluorobiphenyl (Surr)</i>		<i>77 %</i>		<i>44-120 %</i>		<i>"</i>						
<i>Phenol-d6 (Surr)</i>		<i>22 %</i>		<i>10-120 %</i>		<i>"</i>						
<i>p-Terphenyl-d14 (Surr)</i>		<i>70 %</i>		<i>50-133 %</i>		<i>"</i>						
<i>2-Fluorophenol (Surr)</i>		<i>31 %</i>		<i>19-120 %</i>		<i>"</i>						
<i>2,4,6-Tribromophenol (Surr)</i>		<i>96 %</i>		<i>43-140 %</i>		<i>"</i>						



Philip Nerenberg



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A910893 - 01 09 20 1624
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QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100490 - EPA 3546						Sediment						
Blank (9100490-BLK1)			Prepared: 10/01/19 10:34 Analyzed: 10/01/19 21:24									
EPA 8270D												
Acenaphthene	ND	0.00125	0.00250	mg/kg wet	1	---	---	---	---	---	---	
Acenaphthylene	ND	0.00125	0.00250	mg/kg wet	1	---	---	---	---	---	---	
Anthracene	ND	0.00125	0.00250	mg/kg wet	1	---	---	---	---	---	---	
Benz(a)anthracene	ND	0.00125	0.00250	mg/kg wet	1	---	---	---	---	---	---	
Benzo(a)pyrene	ND	0.00188	0.00375	mg/kg wet	1	---	---	---	---	---	---	
Benzo(b)fluoranthene	ND	0.00188	0.00375	mg/kg wet	1	---	---	---	---	---	---	
Benzo(k)fluoranthene	ND	0.00188	0.00375	mg/kg wet	1	---	---	---	---	---	---	
Benzo(g,h,i)perylene	ND	0.00125	0.00250	mg/kg wet	1	---	---	---	---	---	---	
Chrysene	ND	0.00125	0.00250	mg/kg wet	1	---	---	---	---	---	---	
Dibenz(a,h)anthracene	ND	0.00125	0.00250	mg/kg wet	1	---	---	---	---	---	---	
Fluoranthene	ND	0.00125	0.00250	mg/kg wet	1	---	---	---	---	---	---	
Fluorene	ND	0.00125	0.00250	mg/kg wet	1	---	---	---	---	---	---	
Indeno(1,2,3-cd)pyrene	ND	0.00125	0.00250	mg/kg wet	1	---	---	---	---	---	---	
1-Methylnaphthalene	ND	0.00250	0.00500	mg/kg wet	1	---	---	---	---	---	---	
2-Methylnaphthalene	ND	0.00250	0.00500	mg/kg wet	1	---	---	---	---	---	---	
Naphthalene	ND	0.00250	0.00500	mg/kg wet	1	---	---	---	---	---	---	
Phenanthrene	ND	0.00125	0.00250	mg/kg wet	1	---	---	---	---	---	---	
Pyrene	ND	0.00125	0.00250	mg/kg wet	1	---	---	---	---	---	---	
Carbazole	ND	0.00188	0.00375	mg/kg wet	1	---	---	---	---	---	---	
Dibenzofuran	ND	0.00125	0.00250	mg/kg wet	1	---	---	---	---	---	---	
4-Chloro-3-methylphenol	ND	0.0125	0.0250	mg/kg wet	1	---	---	---	---	---	---	
2-Chlorophenol	ND	0.00625	0.0125	mg/kg wet	1	---	---	---	---	---	---	
2,4-Dichlorophenol	ND	0.00625	0.0125	mg/kg wet	1	---	---	---	---	---	---	
2,4-Dimethylphenol	ND	0.00625	0.0125	mg/kg wet	1	---	---	---	---	---	---	
2,4-Dinitrophenol	ND	0.0312	0.0625	mg/kg wet	1	---	---	---	---	---	---	
4,6-Dinitro-2-methylphenol	ND	0.0312	0.0625	mg/kg wet	1	---	---	---	---	---	---	
2-Methylphenol	ND	0.00312	0.00625	mg/kg wet	1	---	---	---	---	---	---	
3+4-Methylphenol(s)	ND	0.00312	0.00625	mg/kg wet	1	---	---	---	---	---	---	
2-Nitrophenol	ND	0.0125	0.0250	mg/kg wet	1	---	---	---	---	---	---	
4-Nitrophenol	ND	0.0125	0.0250	mg/kg wet	1	---	---	---	---	---	---	
Pentachlorophenol (PCP)	ND	0.0125	0.0250	mg/kg wet	1	---	---	---	---	---	---	
Phenol	ND	0.00250	0.00500	mg/kg wet	1	---	---	---	---	---	---	
2,3,4,6-Tetrachlorophenol	ND	0.00625	0.0125	mg/kg wet	1	---	---	---	---	---	---	

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A910893 - 01 09 20 1624
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QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100490 - EPA 3546						Sediment						
Blank (9100490-BLK1)			Prepared: 10/01/19 10:34 Analyzed: 10/01/19 21:24									
2,3,5,6-Tetrachlorophenol	ND	0.00625	0.0125	mg/kg wet	1	---	---	---	---	---	---	
2,4,5-Trichlorophenol	ND	0.00625	0.0125	mg/kg wet	1	---	---	---	---	---	---	
2,4,6-Trichlorophenol	ND	0.00625	0.0125	mg/kg wet	1	---	---	---	---	---	---	
Bis(2-ethylhexyl)phthalate	ND	0.0188	0.0375	mg/kg wet	1	---	---	---	---	---	---	
Butyl benzyl phthalate	ND	0.00625	0.0125	mg/kg wet	1	---	---	---	---	---	---	
Diethylphthalate	ND	0.00625	0.0125	mg/kg wet	1	---	---	---	---	---	---	
Dimethylphthalate	ND	0.00625	0.0125	mg/kg wet	1	---	---	---	---	---	---	
Di-n-butylphthalate	ND	0.00625	0.0125	mg/kg wet	1	---	---	---	---	---	---	
Di-n-octyl phthalate	ND	0.0100	0.0125	mg/kg wet	1	---	---	---	---	---	---	
N-Nitrosodimethylamine	ND	0.00312	0.00625	mg/kg wet	1	---	---	---	---	---	---	
N-Nitroso-di-n-propylamine	ND	0.00312	0.00625	mg/kg wet	1	---	---	---	---	---	---	
N-Nitrosodiphenylamine	ND	0.00312	0.00625	mg/kg wet	1	---	---	---	---	---	---	
Bis(2-Chloroethoxy) methane	ND	0.00312	0.00625	mg/kg wet	1	---	---	---	---	---	---	
Bis(2-Chloroethyl) ether	ND	0.00312	0.00625	mg/kg wet	1	---	---	---	---	---	---	
2,2'-Oxybis(1-Chloropropane)	ND	0.00312	0.00625	mg/kg wet	1	---	---	---	---	---	---	
Hexachlorobenzene	ND	0.00125	0.00250	mg/kg wet	1	---	---	---	---	---	---	
Hexachlorobutadiene	ND	0.00312	0.00625	mg/kg wet	1	---	---	---	---	---	---	
Hexachlorocyclopentadiene	ND	0.00625	0.0125	mg/kg wet	1	---	---	---	---	---	---	
Hexachloroethane	ND	0.00312	0.00625	mg/kg wet	1	---	---	---	---	---	---	
2-Chloronaphthalene	ND	0.00125	0.00250	mg/kg wet	1	---	---	---	---	---	---	
1,2-Dichlorobenzene	ND	0.00312	0.00625	mg/kg wet	1	---	---	---	---	---	---	
1,3-Dichlorobenzene	ND	0.00312	0.00625	mg/kg wet	1	---	---	---	---	---	---	
1,4-Dichlorobenzene	ND	0.00312	0.00625	mg/kg wet	1	---	---	---	---	---	---	
1,2,4-Trichlorobenzene	ND	0.00312	0.00625	mg/kg wet	1	---	---	---	---	---	---	
4-Bromophenyl phenyl ether	ND	0.00312	0.00625	mg/kg wet	1	---	---	---	---	---	---	
4-Chlorophenyl phenyl ether	ND	0.00312	0.00625	mg/kg wet	1	---	---	---	---	---	---	
Aniline	ND	0.00625	0.0125	mg/kg wet	1	---	---	---	---	---	---	
4-Chloroaniline	ND	0.00312	0.00625	mg/kg wet	1	---	---	---	---	---	---	
2-Nitroaniline	ND	0.0250	0.0500	mg/kg wet	1	---	---	---	---	---	---	
3-Nitroaniline	ND	0.0250	0.0500	mg/kg wet	1	---	---	---	---	---	---	
4-Nitroaniline	ND	0.0250	0.0500	mg/kg wet	1	---	---	---	---	---	---	
Nitrobenzene	ND	0.0125	0.0250	mg/kg wet	1	---	---	---	---	---	---	
2,4-Dinitrotoluene	ND	0.0125	0.0250	mg/kg wet	1	---	---	---	---	---	---	
2,6-Dinitrotoluene	ND	0.0125	0.0250	mg/kg wet	1	---	---	---	---	---	---	

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A910893 - 01 09 20 1624
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QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100490 - EPA 3546												
Sediment												
Blank (9100490-BLK1)												
Prepared: 10/01/19 10:34 Analyzed: 10/01/19 21:24												
Benzoic acid	ND	0.157	0.312	mg/kg wet	1	---	---	---	---	---	---	
Benzyl alcohol	ND	0.00625	0.0125	mg/kg wet	1	---	---	---	---	---	---	
Isophorone	ND	0.00312	0.00625	mg/kg wet	1	---	---	---	---	---	---	
Azobenzene (1,2-DPH)	ND	0.00312	0.00625	mg/kg wet	1	---	---	---	---	---	---	
Bis(2-Ethylhexyl) adipate	ND	0.0312	0.0625	mg/kg wet	1	---	---	---	---	---	---	
3,3'-Dichlorobenzidine	ND	0.0250	0.0500	mg/kg wet	1	---	---	---	---	---	---	Q-52
1,2-Dinitrobenzene	ND	0.0312	0.0625	mg/kg wet	1	---	---	---	---	---	---	
1,3-Dinitrobenzene	ND	0.0312	0.0625	mg/kg wet	1	---	---	---	---	---	---	
1,4-Dinitrobenzene	ND	0.0312	0.0625	mg/kg wet	1	---	---	---	---	---	---	
Pyridine	ND	0.00625	0.0125	mg/kg wet	1	---	---	---	---	---	---	
<i>Surr: Nitrobenzene-d5 (Surr) Recovery: 69 % Limits: 37-122 % Dilution: 1x</i>												
<i>2-Fluorobiphenyl (Surr) 57 % 44-115 % "</i>												
<i>Phenol-d6 (Surr) 70 % 33-122 % "</i>												
<i>p-Terphenyl-d14 (Surr) 76 % 54-127 % "</i>												
<i>2-Fluorophenol (Surr) 64 % 35-115 % "</i>												
<i>2,4,6-Tribromophenol (Surr) 60 % 39-132 % "</i>												

LCS (9100490-BS1)												
Prepared: 10/01/19 10:34 Analyzed: 10/01/19 21:59												
EPA 8270D												
Acenaphthene	0.366	0.00532	0.0107	mg/kg wet	4	0.533	---	69	40-122%	---	---	
Acenaphthylene	0.391	0.00532	0.0107	mg/kg wet	4	0.533	---	73	32-132%	---	---	
Anthracene	0.415	0.00532	0.0107	mg/kg wet	4	0.533	---	78	47-123%	---	---	
Benz(a)anthracene	0.424	0.00532	0.0107	mg/kg wet	4	0.533	---	79	49-126%	---	---	
Benzo(a)pyrene	0.438	0.00800	0.0160	mg/kg wet	4	0.533	---	82	45-129%	---	---	
Benzo(b)fluoranthene	0.427	0.00800	0.0160	mg/kg wet	4	0.533	---	80	45-132%	---	---	
Benzo(k)fluoranthene	0.423	0.00800	0.0160	mg/kg wet	4	0.533	---	79	47-132%	---	---	
Benzo(g,h,i)perylene	0.445	0.00532	0.0107	mg/kg wet	4	0.533	---	83	43-134%	---	---	
Chrysene	0.414	0.00532	0.0107	mg/kg wet	4	0.533	---	78	50-124%	---	---	
Dibenz(a,h)anthracene	0.424	0.00532	0.0107	mg/kg wet	4	0.533	---	80	45-134%	---	---	
Fluoranthene	0.456	0.00532	0.0107	mg/kg wet	4	0.533	---	85	50-127%	---	---	
Fluorene	0.384	0.00532	0.0107	mg/kg wet	4	0.533	---	72	43-125%	---	---	
Indeno(1,2,3-cd)pyrene	0.402	0.00532	0.0107	mg/kg wet	4	0.533	---	75	45-133%	---	---	
1-Methylnaphthalene	0.368	0.0107	0.0213	mg/kg wet	4	0.533	---	69	40-120%	---	---	
2-Methylnaphthalene	0.374	0.0107	0.0213	mg/kg wet	4	0.533	---	70	38-122%	---	---	

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A910893 - 01 09 20 1624
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QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100490 - EPA 3546												
						Sediment						
LCS (9100490-BS1)			Prepared: 10/01/19 10:34 Analyzed: 10/01/19 21:59									
Naphthalene	0.359	0.0107	0.0213	mg/kg wet	4	0.533	---	67	35-123%	---	---	
Phenanthrene	0.395	0.00532	0.0107	mg/kg wet	4	0.533	---	74	50-121%	---	---	
Pyrene	0.464	0.00532	0.0107	mg/kg wet	4	0.533	---	87	47-127%	---	---	
Carbazole	0.464	0.00800	0.0160	mg/kg wet	4	0.533	---	87	50-122%	---	---	
Dibenzofuran	0.384	0.00532	0.0107	mg/kg wet	4	0.533	---	72	44-120%	---	---	
4-Chloro-3-methylphenol	0.415	0.0532	0.107	mg/kg wet	4	0.533	---	78	45-122%	---	---	
2-Chlorophenol	0.367	0.0267	0.0532	mg/kg wet	4	0.533	---	69	34-121%	---	---	
2,4-Dichlorophenol	0.384	0.0267	0.0532	mg/kg wet	4	0.533	---	72	40-122%	---	---	
2,4-Dimethylphenol	0.431	0.0267	0.0532	mg/kg wet	4	0.533	---	81	30-127%	---	---	
2,4-Dinitrophenol	0.466	0.133	0.267	mg/kg wet	4	0.533	---	87	5-137%	---	---	
4,6-Dinitro-2-methylphenol	0.517	0.133	0.267	mg/kg wet	4	0.533	---	97	29-132%	---	---	
2-Methylphenol	0.427	0.0133	0.0267	mg/kg wet	4	0.533	---	80	32-122%	---	---	
3+4-Methylphenol(s)	0.434	0.0133	0.0267	mg/kg wet	4	0.533	---	81	34-120%	---	---	
2-Nitrophenol	0.417	0.0532	0.107	mg/kg wet	4	0.533	---	78	36-123%	---	---	
4-Nitrophenol	0.495	0.0532	0.107	mg/kg wet	4	0.533	---	93	30-132%	---	---	
Pentachlorophenol (PCP)	0.434	0.0532	0.107	mg/kg wet	4	0.533	---	81	25-133%	---	---	
Phenol	0.393	0.0107	0.0213	mg/kg wet	4	0.533	---	74	34-120%	---	---	
2,3,4,6-Tetrachlorophenol	0.414	0.0267	0.0532	mg/kg wet	4	0.533	---	78	44-125%	---	---	
2,3,5,6-Tetrachlorophenol	0.429	0.0267	0.0532	mg/kg wet	4	0.533	---	80	40-120%	---	---	
2,4,5-Trichlorophenol	0.416	0.0267	0.0532	mg/kg wet	4	0.533	---	78	41-124%	---	---	
2,4,6-Trichlorophenol	0.405	0.0267	0.0532	mg/kg wet	4	0.533	---	76	39-126%	---	---	
Bis(2-ethylhexyl)phthalate	0.441	0.0800	0.160	mg/kg wet	4	0.533	---	83	51-133%	---	---	
Butyl benzyl phthalate	0.444	0.0267	0.0532	mg/kg wet	4	0.533	---	83	48-132%	---	---	
Diethylphthalate	0.436	0.0267	0.0532	mg/kg wet	4	0.533	---	82	50-124%	---	---	
Dimethylphthalate	0.409	0.0267	0.0532	mg/kg wet	4	0.533	---	77	48-124%	---	---	
Di-n-butylphthalate	0.448	0.0267	0.0532	mg/kg wet	4	0.533	---	84	51-128%	---	---	
Di-n-octyl phthalate	0.457	0.0428	0.0532	mg/kg wet	4	0.533	---	86	44-140%	---	---	
N-Nitrosodimethylamine	0.289	0.0133	0.0267	mg/kg wet	4	0.533	---	54	23-120%	---	---	
N-Nitroso-di-n-propylamine	0.382	0.0133	0.0267	mg/kg wet	4	0.533	---	72	36-120%	---	---	
N-Nitrosodiphenylamine	0.407	0.0133	0.0267	mg/kg wet	4	0.533	---	76	38-127%	---	---	
Bis(2-Chloroethoxy) methane	0.367	0.0133	0.0267	mg/kg wet	4	0.533	---	69	36-121%	---	---	
Bis(2-Chloroethyl) ether	0.316	0.0133	0.0267	mg/kg wet	4	0.533	---	59	31-120%	---	---	Q-41
2,2'-Oxybis(1-Chloropropane)	0.318	0.0133	0.0267	mg/kg wet	4	0.533	---	60	33-131%	---	---	
Hexachlorobenzene	0.403	0.00532	0.0107	mg/kg wet	4	0.533	---	76	44-122%	---	---	

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tideland Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A910893 - 01 09 20 1624
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QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100490 - EPA 3546												
Sediment												
LCS (9100490-BS1)												
Prepared: 10/01/19 10:34 Analyzed: 10/01/19 21:59												
Hexachlorobutadiene	0.337	0.0133	0.0267	mg/kg wet	4	0.533	---	63	32-123%	---	---	
Hexachlorocyclopentadiene	0.420	0.0267	0.0532	mg/kg wet	4	0.533	---	79	5-140%	---	---	Q-41
Hexachloroethane	0.323	0.0133	0.0267	mg/kg wet	4	0.533	---	61	28-120%	---	---	
2-Chloronaphthalene	0.379	0.00532	0.0107	mg/kg wet	4	0.533	---	71	41-120%	---	---	
1,2-Dichlorobenzene	0.332	0.0133	0.0267	mg/kg wet	4	0.533	---	62	33-120%	---	---	
1,3-Dichlorobenzene	0.316	0.0133	0.0267	mg/kg wet	4	0.533	---	59	30-120%	---	---	
1,4-Dichlorobenzene	0.321	0.0133	0.0267	mg/kg wet	4	0.533	---	60	31-120%	---	---	
1,2,4-Trichlorobenzene	0.336	0.0133	0.0267	mg/kg wet	4	0.533	---	63	34-120%	---	---	
4-Bromophenyl phenyl ether	0.396	0.0133	0.0267	mg/kg wet	4	0.533	---	74	46-124%	---	---	
4-Chlorophenyl phenyl ether	0.378	0.0133	0.0267	mg/kg wet	4	0.533	---	71	45-121%	---	---	
Aniline	0.327	0.0267	0.0532	mg/kg wet	4	0.533	---	61	7-120%	---	---	
4-Chloroaniline	0.217	0.0133	0.0267	mg/kg wet	4	0.533	---	41	16-120%	---	---	Q-31
2-Nitroaniline	0.414	0.107	0.213	mg/kg wet	4	0.533	---	78	44-127%	---	---	
3-Nitroaniline	0.393	0.107	0.213	mg/kg wet	4	0.533	---	74	33-120%	---	---	
4-Nitroaniline	0.588	0.107	0.213	mg/kg wet	4	0.533	---	110	35-120%	---	---	Q-41
Nitrobenzene	0.375	0.0532	0.107	mg/kg wet	4	0.533	---	70	34-122%	---	---	
2,4-Dinitrotoluene	0.418	0.0532	0.107	mg/kg wet	4	0.533	---	78	48-126%	---	---	
2,6-Dinitrotoluene	0.412	0.0532	0.107	mg/kg wet	4	0.533	---	77	46-124%	---	---	
Benzoic acid	0.659	0.400	0.400	mg/kg wet	4	1.07	---	62	5-140%	---	---	
Benzyl alcohol	0.381	0.0267	0.0532	mg/kg wet	4	0.533	---	71	29-122%	---	---	
Isophorone	0.363	0.0133	0.0267	mg/kg wet	4	0.533	---	68	30-122%	---	---	
Azobenzene (1,2-DPH)	0.359	0.0133	0.0267	mg/kg wet	4	0.533	---	67	39-125%	---	---	
Bis(2-Ethylhexyl) adipate	0.440	0.133	0.267	mg/kg wet	4	0.533	---	83	60-121%	---	---	
3,3'-Dichlorobenzidine	1.32	0.107	0.213	mg/kg wet	4	1.07	---	124	22-121%	---	---	Q-29, Q-31
1,2-Dinitrobenzene	0.397	0.133	0.267	mg/kg wet	4	0.533	---	75	44-120%	---	---	
1,3-Dinitrobenzene	0.434	0.133	0.267	mg/kg wet	4	0.533	---	81	42-127%	---	---	
1,4-Dinitrobenzene	0.464	0.133	0.267	mg/kg wet	4	0.533	---	87	37-132%	---	---	
Pyridine	0.203	0.0267	0.0532	mg/kg wet	4	0.533	---	38	5-120%	---	---	
<i>Surr: Nitrobenzene-d5 (Surr) Recovery: 70 % Limits: 37-122 % Dilution: 4x</i>												
<i>2-Fluorobiphenyl (Surr) 68 % 44-115 % "</i>												
<i>Phenol-d6 (Surr) 73 % 33-122 % "</i>												
<i>p-Terphenyl-d14 (Surr) 82 % 54-127 % "</i>												
<i>2-Fluorophenol (Surr) 62 % 35-115 % "</i>												
<i>2,4,6-Tribromophenol (Surr) 74 % 39-132 % "</i>												

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A910893 - 01 09 20 1624
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QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100490 - EPA 3546												
Sediment												
Duplicate (9100490-DUP2)												
Prepared: 10/01/19 10:34 Analyzed: 10/02/19 14:15												
QC Source Sample: Non-SDG (A910822-02RE1)												
Acenaphthene	0.0710	0.0306	0.0615	mg/kg dry	10	---	0.135	---	---	62	30%	Q-04
Acenaphthylene	ND	0.0306	0.0615	mg/kg dry	10	---	ND	---	---	---	30%	
Anthracene	0.103	0.0306	0.0615	mg/kg dry	10	---	0.204	---	---	66	30%	Q-04
Benz(a)anthracene	0.103	0.0306	0.0615	mg/kg dry	10	---	0.218	---	---	71	30%	Q-04
Benzo(a)pyrene	0.0937	0.0461	0.0922	mg/kg dry	10	---	0.154	---	---	48	30%	Q-04
Benzo(b)fluoranthene	0.100	0.0461	0.0922	mg/kg dry	10	---	0.180	---	---	57	30%	Q-04
Benzo(k)fluoranthene	0.0492	0.0461	0.0922	mg/kg dry	10	---	0.0758	---	---	42	30%	Q-04, J
Benzo(g,h,i)perylene	0.0400	0.0306	0.0615	mg/kg dry	10	---	0.0680	---	---	52	30%	Q-04, J
Chrysene	0.0879	0.0306	0.0615	mg/kg dry	10	---	0.199	---	---	78	30%	Q-04
Dibenz(a,h)anthracene	ND	0.0306	0.0615	mg/kg dry	10	---	ND	---	---	---	30%	
Fluoranthene	0.503	0.0306	0.0615	mg/kg dry	10	---	1.15	---	---	78	30%	Q-04
Fluorene	0.0660	0.0306	0.0615	mg/kg dry	10	---	0.136	---	---	69	30%	Q-04
Indeno(1,2,3-cd)pyrene	0.0339	0.0306	0.0615	mg/kg dry	10	---	0.0695	---	---	69	30%	Q-04, J
1-Methylnaphthalene	ND	0.0615	0.123	mg/kg dry	10	---	0.0767	---	---	***	30%	Q-04
2-Methylnaphthalene	0.0696	0.0615	0.123	mg/kg dry	10	---	0.149	---	---	72	30%	Q-04, J
Naphthalene	0.186	0.0615	0.123	mg/kg dry	10	---	0.491	---	---	90	30%	Q-04
Phenanthrene	0.255	0.0306	0.0615	mg/kg dry	10	---	0.491	---	---	63	30%	Q-04
Pyrene	0.347	0.0306	0.0615	mg/kg dry	10	---	0.823	---	---	81	30%	Q-04
Carbazole	ND	0.0461	0.0922	mg/kg dry	10	---	0.0536	---	---	***	30%	Q-04
Dibenzofuran	0.0566	0.0306	0.0615	mg/kg dry	10	---	0.145	---	---	88	30%	Q-04, J
4-Chloro-3-methylphenol	ND	0.306	0.615	mg/kg dry	10	---	ND	---	---	---	30%	
2-Chlorophenol	ND	0.154	0.306	mg/kg dry	10	---	ND	---	---	---	30%	
2,4-Dichlorophenol	ND	0.154	0.306	mg/kg dry	10	---	ND	---	---	---	30%	
2,4-Dimethylphenol	ND	0.154	0.306	mg/kg dry	10	---	ND	---	---	---	30%	
2,4-Dinitrophenol	ND	0.767	1.54	mg/kg dry	10	---	ND	---	---	---	30%	
4,6-Dinitro-2-methylphenol	ND	0.767	1.54	mg/kg dry	10	---	ND	---	---	---	30%	
2-Methylphenol	ND	0.0767	0.154	mg/kg dry	10	---	ND	---	---	---	30%	
3+4-Methylphenol(s)	1.59	0.0767	0.154	mg/kg dry	10	---	1.60	---	---	0.5	30%	
2-Nitrophenol	ND	0.306	0.615	mg/kg dry	10	---	ND	---	---	---	30%	
4-Nitrophenol	ND	0.306	0.615	mg/kg dry	10	---	ND	---	---	---	30%	
Pentachlorophenol (PCP)	ND	0.306	0.615	mg/kg dry	10	---	ND	---	---	---	30%	
Phenol	0.199	0.0615	0.123	mg/kg dry	10	---	0.571	---	---	97	30%	M-04, Q-04

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A910893 - 01 09 20 1624
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QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100490 - EPA 3546												
Sediment												
Duplicate (9100490-DUP2)												
						Prepared: 10/01/19 10:34 Analyzed: 10/02/19 14:15						
QC Source Sample: Non-SDG (A910822-02RE1)												
2,3,4,6-Tetrachlorophenol	ND	0.154	0.306	mg/kg dry	10	---	ND	---	---	---	30%	
2,3,5,6-Tetrachlorophenol	ND	0.154	0.306	mg/kg dry	10	---	ND	---	---	---	30%	
2,4,5-Trichlorophenol	ND	0.154	0.306	mg/kg dry	10	---	ND	---	---	---	30%	
2,4,6-Trichlorophenol	ND	0.154	0.306	mg/kg dry	10	---	ND	---	---	---	30%	
Bis(2-ethylhexyl)phthalate	ND	0.461	0.922	mg/kg dry	10	---	ND	---	---	---	30%	
Butyl benzyl phthalate	ND	0.154	0.306	mg/kg dry	10	---	ND	---	---	---	30%	
Diethylphthalate	ND	0.154	0.306	mg/kg dry	10	---	ND	---	---	---	30%	
Dimethylphthalate	ND	0.154	0.306	mg/kg dry	10	---	ND	---	---	---	30%	
Di-n-butylphthalate	ND	0.154	0.306	mg/kg dry	10	---	0.213	---	---	***	30%	Q-04
Di-n-octyl phthalate	ND	0.247	0.306	mg/kg dry	10	---	ND	---	---	---	30%	
N-Nitrosodimethylamine	ND	0.0767	0.154	mg/kg dry	10	---	ND	---	---	---	30%	
N-Nitroso-di-n-propylamine	ND	0.0767	0.154	mg/kg dry	10	---	ND	---	---	---	30%	
N-Nitrosodiphenylamine	ND	0.0767	0.154	mg/kg dry	10	---	ND	---	---	---	30%	
Bis(2-Chloroethoxy) methane	ND	0.0767	0.154	mg/kg dry	10	---	ND	---	---	---	30%	
Bis(2-Chloroethyl) ether	ND	0.0767	0.154	mg/kg dry	10	---	ND	---	---	---	30%	
2,2'-Oxybis(1-Chloropropane)	ND	0.0767	0.154	mg/kg dry	10	---	ND	---	---	---	30%	
Hexachlorobenzene	ND	0.0306	0.0615	mg/kg dry	10	---	ND	---	---	---	30%	
Hexachlorobutadiene	ND	0.0767	0.154	mg/kg dry	10	---	ND	---	---	---	30%	
Hexachlorocyclopentadiene	ND	0.154	0.306	mg/kg dry	10	---	ND	---	---	---	30%	
Hexachloroethane	ND	0.0767	0.154	mg/kg dry	10	---	ND	---	---	---	30%	
2-Chloronaphthalene	ND	0.0306	0.0615	mg/kg dry	10	---	ND	---	---	---	30%	
1,2-Dichlorobenzene	ND	0.0767	0.154	mg/kg dry	10	---	ND	---	---	---	30%	
1,3-Dichlorobenzene	ND	0.0767	0.154	mg/kg dry	10	---	ND	---	---	---	30%	
1,4-Dichlorobenzene	ND	0.0767	0.154	mg/kg dry	10	---	ND	---	---	---	30%	
1,2,4-Trichlorobenzene	ND	0.0767	0.154	mg/kg dry	10	---	ND	---	---	---	30%	
4-Bromophenyl phenyl ether	ND	0.0767	0.154	mg/kg dry	10	---	ND	---	---	---	30%	
4-Chlorophenyl phenyl ether	ND	0.0767	0.154	mg/kg dry	10	---	ND	---	---	---	30%	
Aniline	ND	0.306	0.306	mg/kg dry	10	---	ND	---	---	---	30%	
4-Chloroaniline	ND	0.0767	0.154	mg/kg dry	10	---	ND	---	---	---	30%	
2-Nitroaniline	ND	0.615	1.23	mg/kg dry	10	---	ND	---	---	---	30%	
3-Nitroaniline	ND	0.615	1.23	mg/kg dry	10	---	ND	---	---	---	30%	
4-Nitroaniline	ND	0.615	1.23	mg/kg dry	10	---	ND	---	---	---	30%	
Nitrobenzene	ND	0.306	0.615	mg/kg dry	10	---	ND	---	---	---	30%	

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tideland Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A910893 - 01 09 20 1624
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QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100490 - EPA 3546												
Sediment												
Duplicate (9100490-DUP2)												
Prepared: 10/01/19 10:34 Analyzed: 10/02/19 14:15												
QC Source Sample: Non-SDG (A910822-02RE1)												
2,4-Dinitrotoluene	ND	0.306	0.615	mg/kg dry	10	---	ND	---	---	---	30%	
2,6-Dinitrotoluene	ND	0.306	0.615	mg/kg dry	10	---	ND	---	---	---	30%	
Benzoic acid	ND	3.85	7.67	mg/kg dry	10	---	ND	---	---	---	30%	
Benzyl alcohol	ND	0.154	0.306	mg/kg dry	10	---	ND	---	---	---	30%	
Isophorone	ND	0.0767	0.154	mg/kg dry	10	---	ND	---	---	---	30%	
Azobenzene (1,2-DPH)	ND	0.0767	0.154	mg/kg dry	10	---	ND	---	---	---	30%	
Bis(2-Ethylhexyl) adipate	2.82	0.767	1.54	mg/kg dry	10	---	2.18	---	---	26	30%	
3,3'-Dichlorobenzidine	ND	0.615	1.23	mg/kg dry	10	---	ND	---	---	---	30%	Q-52
1,2-Dinitrobenzene	ND	0.767	1.54	mg/kg dry	10	---	ND	---	---	---	30%	
1,3-Dinitrobenzene	ND	0.767	1.54	mg/kg dry	10	---	ND	---	---	---	30%	
1,4-Dinitrobenzene	ND	0.767	1.54	mg/kg dry	10	---	ND	---	---	---	30%	
Pyridine	ND	0.154	0.306	mg/kg dry	10	---	ND	---	---	---	30%	

<i>Surr: Nitrobenzene-d5 (Surr)</i>	<i>Recovery: 71 %</i>	<i>Limits: 37-122 %</i>	<i>Dilution: 10x</i>
<i>2-Fluorobiphenyl (Surr)</i>	<i>64 %</i>	<i>44-115 %</i>	<i>"</i>
<i>Phenol-d6 (Surr)</i>	<i>73 %</i>	<i>33-122 %</i>	<i>"</i>
<i>p-Terphenyl-d14 (Surr)</i>	<i>73 %</i>	<i>54-127 %</i>	<i>"</i>
<i>2-Fluorophenol (Surr)</i>	<i>71 %</i>	<i>35-115 %</i>	<i>"</i>
<i>2,4,6-Tribromophenol (Surr)</i>	<i>107 %</i>	<i>39-132 %</i>	<i>"</i>

Matrix Spike (9100490-MS1) Prepared: 10/01/19 10:34 Analyzed: 10/02/19 14:51

QC Source Sample: Non-SDG (A910822-02RE1)												
EPA 8270D												
Acenaphthene	1.24	0.0306	0.0614	mg/kg dry	10	1.23	0.135	90	40-122%	---	---	
Acenaphthylene	1.29	0.0306	0.0614	mg/kg dry	10	1.23	ND	105	32-132%	---	---	
Anthracene	1.33	0.0306	0.0614	mg/kg dry	10	1.23	0.204	92	47-123%	---	---	
Benz(a)anthracene	1.27	0.0306	0.0614	mg/kg dry	10	1.23	0.218	85	49-126%	---	---	
Benzo(a)pyrene	1.31	0.0460	0.0920	mg/kg dry	10	1.23	0.154	94	45-129%	---	---	
Benzo(b)fluoranthene	1.29	0.0460	0.0920	mg/kg dry	10	1.23	0.180	90	45-132%	---	---	
Benzo(k)fluoranthene	1.20	0.0460	0.0920	mg/kg dry	10	1.23	0.0758	91	47-132%	---	---	
Benzo(g,h,i)perylene	1.31	0.0306	0.0614	mg/kg dry	10	1.23	0.0680	101	43-134%	---	---	
Chrysene	1.28	0.0306	0.0614	mg/kg dry	10	1.23	0.199	88	50-124%	---	---	
Dibenz(a,h)anthracene	1.22	0.0306	0.0614	mg/kg dry	10	1.23	ND	100	45-134%	---	---	
Fluoranthene	1.58	0.0306	0.0614	mg/kg dry	10	1.23	1.15	35	50-127%	---	---	Q-01

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A910893 - 01 09 20 1624
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100490 - EPA 3546						Sediment						
Matrix Spike (9100490-MS1)			Prepared: 10/01/19 10:34 Analyzed: 10/02/19 14:51									
QC Source Sample: Non-SDG (A910822-02RE1)												
Fluorene	1.30	0.0306	0.0614	mg/kg dry	10	1.23	0.136	95	43-125%	---	---	
Indeno(1,2,3-cd)pyrene	1.14	0.0306	0.0614	mg/kg dry	10	1.23	0.0695	87	45-133%	---	---	
1-Methylnaphthalene	1.25	0.0614	0.123	mg/kg dry	10	1.23	0.0767	96	40-120%	---	---	
2-Methylnaphthalene	1.28	0.0614	0.123	mg/kg dry	10	1.23	0.149	92	38-122%	---	---	
Naphthalene	1.37	0.0614	0.123	mg/kg dry	10	1.23	0.491	71	35-123%	---	---	
Phenanthrene	1.35	0.0306	0.0614	mg/kg dry	10	1.23	0.491	70	50-121%	---	---	
Pyrene	1.49	0.0306	0.0614	mg/kg dry	10	1.23	0.823	55	47-127%	---	---	
Carbazole	1.23	0.0460	0.0920	mg/kg dry	10	1.23	0.0536	96	50-122%	---	---	
Dibenzofuran	1.26	0.0306	0.0614	mg/kg dry	10	1.23	0.145	91	44-120%	---	---	
4-Chloro-3-methylphenol	1.32	0.306	0.614	mg/kg dry	10	1.23	ND	108	45-122%	---	---	
2-Chlorophenol	1.18	0.153	0.306	mg/kg dry	10	1.23	ND	96	34-121%	---	---	
2,4-Dichlorophenol	1.31	0.153	0.306	mg/kg dry	10	1.23	ND	107	40-122%	---	---	
2,4-Dimethylphenol	1.49	0.153	0.306	mg/kg dry	10	1.23	ND	122	30-127%	---	---	
2,4-Dinitrophenol	ND	0.766	1.53	mg/kg dry	10	1.23	ND		5-137%	---	---	Q-11, Q-41
4,6-Dinitro-2-methylphenol	0.921	0.766	1.53	mg/kg dry	10	1.23	ND	75	29-132%	---	---	Q-41, J
2-Methylphenol	1.21	0.0766	0.153	mg/kg dry	10	1.23	ND	98	32-122%	---	---	
3+4-Methylphenol(s)	2.87	0.0766	0.153	mg/kg dry	10	1.23	1.60	104	34-120%	---	---	
2-Nitrophenol	1.43	0.306	0.614	mg/kg dry	10	1.23	ND	116	36-123%	---	---	
4-Nitrophenol	1.30	0.306	0.614	mg/kg dry	10	1.23	ND	106	30-132%	---	---	
Pentachlorophenol (PCP)	1.48	0.306	0.614	mg/kg dry	10	1.23	ND	121	25-133%	---	---	
Phenol	1.29	0.0614	0.123	mg/kg dry	10	1.23	0.571	58	34-120%	---	---	
2,3,4,6-Tetrachlorophenol	1.30	0.153	0.306	mg/kg dry	10	1.23	ND	106	44-125%	---	---	
2,3,5,6-Tetrachlorophenol	1.41	0.153	0.306	mg/kg dry	10	1.23	ND	115	40-120%	---	---	
2,4,5-Trichlorophenol	1.36	0.153	0.306	mg/kg dry	10	1.23	ND	111	41-124%	---	---	
2,4,6-Trichlorophenol	1.37	0.153	0.306	mg/kg dry	10	1.23	ND	112	39-126%	---	---	
Bis(2-ethylhexyl)phthalate	1.57	0.460	0.920	mg/kg dry	10	1.23	ND	128	51-133%	---	---	
Butyl benzyl phthalate	1.46	0.153	0.306	mg/kg dry	10	1.23	ND	119	48-132%	---	---	
Diethylphthalate	1.33	0.153	0.306	mg/kg dry	10	1.23	ND	108	50-124%	---	---	
Dimethylphthalate	1.28	0.153	0.306	mg/kg dry	10	1.23	ND	105	48-124%	---	---	
Di-n-butylphthalate	1.41	0.153	0.306	mg/kg dry	10	1.23	0.213	97	51-128%	---	---	
Di-n-octyl phthalate	1.73	0.246	0.306	mg/kg dry	10	1.23	ND	141	44-140%	---	---	Q-01
N-Nitrosodimethylamine	0.793	0.0766	0.153	mg/kg dry	10	1.23	ND	65	23-120%	---	---	
N-Nitroso-di-n-propylamine	1.10	0.0766	0.153	mg/kg dry	10	1.23	ND	90	36-120%	---	---	

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A910893 - 01 09 20 1624
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QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100490 - EPA 3546												
Sediment												
Matrix Spike (9100490-MS1)												
Prepared: 10/01/19 10:34 Analyzed: 10/02/19 14:51												
QC Source Sample: Non-SDG (A910822-02RE1)												
N-Nitrosodiphenylamine	1.24	0.0766	0.153	mg/kg dry	10	1.23	ND	101	38-127%	---	---	
Bis(2-Chloroethoxy) methane	1.16	0.0766	0.153	mg/kg dry	10	1.23	ND	94	36-121%	---	---	
Bis(2-Chloroethyl) ether	0.923	0.0766	0.153	mg/kg dry	10	1.23	ND	75	31-120%	---	---	
2,2'-Oxybis(1-Chloropropane)	0.929	0.0766	0.153	mg/kg dry	10	1.23	ND	76	33-131%	---	---	
Hexachlorobenzene	1.24	0.0306	0.0614	mg/kg dry	10	1.23	ND	101	44-122%	---	---	
Hexachlorobutadiene	1.19	0.0766	0.153	mg/kg dry	10	1.23	ND	97	32-123%	---	---	
Hexachlorocyclopentadiene	ND	0.153	0.306	mg/kg dry	10	1.23	ND		5-140%	---	---	Q-01, Q-41
Hexachloroethane	1.03	0.0766	0.153	mg/kg dry	10	1.23	ND	84	28-120%	---	---	
2-Chloronaphthalene	1.25	0.0306	0.0614	mg/kg dry	10	1.23	ND	102	41-120%	---	---	
1,2-Dichlorobenzene	1.09	0.0766	0.153	mg/kg dry	10	1.23	ND	89	33-120%	---	---	
1,3-Dichlorobenzene	1.06	0.0766	0.153	mg/kg dry	10	1.23	ND	87	30-120%	---	---	
1,4-Dichlorobenzene	1.08	0.0766	0.153	mg/kg dry	10	1.23	ND	88	31-120%	---	---	
1,2,4-Trichlorobenzene	1.13	0.0766	0.153	mg/kg dry	10	1.23	ND	92	34-120%	---	---	
4-Bromophenyl phenyl ether	1.26	0.0766	0.153	mg/kg dry	10	1.23	ND	103	46-124%	---	---	
4-Chlorophenyl phenyl ether	1.22	0.0766	0.153	mg/kg dry	10	1.23	ND	100	45-121%	---	---	
Aniline	1.04	0.690	0.690	mg/kg dry	10	1.23	ND	85	7-120%	---	---	Q-31
4-Chloroaniline	0.438	0.0766	0.153	mg/kg dry	10	1.23	ND	36	16-120%	---	---	Q-31
2-Nitroaniline	1.45	0.614	1.23	mg/kg dry	10	1.23	ND	118	44-127%	---	---	
3-Nitroaniline	ND	0.614	1.23	mg/kg dry	10	1.23	ND		33-120%	---	---	Q-01
4-Nitroaniline	1.24	0.614	1.23	mg/kg dry	10	1.23	ND	101	35-120%	---	---	Q-41
Nitrobenzene	1.11	0.306	0.614	mg/kg dry	10	1.23	ND	91	34-122%	---	---	
2,4-Dinitrotoluene	1.24	0.306	0.614	mg/kg dry	10	1.23	ND	101	48-126%	---	---	
2,6-Dinitrotoluene	1.26	0.306	0.614	mg/kg dry	10	1.23	ND	103	46-124%	---	---	
Benzoic acid	ND	3.84	7.66	mg/kg dry	10	2.45	ND		5-140%	---	---	Q-11, Q-41
Benzyl alcohol	1.22	0.153	0.306	mg/kg dry	10	1.23	ND	99	29-122%	---	---	
Isophorone	1.14	0.0766	0.153	mg/kg dry	10	1.23	ND	93	30-122%	---	---	
Azobenzene (1,2-DPH)	1.15	0.0766	0.153	mg/kg dry	10	1.23	ND	94	39-125%	---	---	
Bis(2-Ethylhexyl) adipate	2.32	0.766	1.53	mg/kg dry	10	1.23	2.18	12	60-121%	---	---	Q-03
3,3'-Dichlorobenzidine	ND	0.614	1.23	mg/kg dry	10	2.45	ND		22-121%	---	---	Q-01, Q-31
1,2-Dinitrobenzene	1.03	0.766	1.53	mg/kg dry	10	1.23	ND	84	44-120%	---	---	J
1,3-Dinitrobenzene	1.26	0.766	1.53	mg/kg dry	10	1.23	ND	102	42-127%	---	---	J
1,4-Dinitrobenzene	0.975	0.766	1.53	mg/kg dry	10	1.23	ND	79	37-132%	---	---	J
Pyridine	0.610	0.153	0.306	mg/kg dry	10	1.23	ND	50	5-120%	---	---	

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tideland Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A910893 - 01 09 20 1624
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QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100490 - EPA 3546												
Sediment												
Matrix Spike (9100490-MS1) Prepared: 10/01/19 10:34 Analyzed: 10/02/19 14:51												
QC Source Sample: Non-SDG (A910822-02RE1)												
Surr: Nitrobenzene-d5 (Surr)			Recovery: 90 %	Limits: 37-122 %		Dilution: 10x						
2-Fluorobiphenyl (Surr)			93 %	44-115 %		"						
Phenol-d6 (Surr)			92 %	33-122 %		"						
p-Terphenyl-d14 (Surr)			101 %	54-127 %		"						
2-Fluorophenol (Surr)			90 %	35-115 %		"						
2,4,6-Tribromophenol (Surr)			110 %	39-132 %		"						

Matrix Spike (9100490-MS2) Prepared: 10/01/19 10:35 Analyzed: 10/02/19 12:28												
QC Source Sample: SE-10-2.0-3.7 (A910893-13RE1)												
EPA 8270D												
Acenaphthene	1.39	0.0681	0.137	mg/kg dry	20	1.37	ND	102	40-122%	---	---	
Acenaphthylene	1.45	0.0681	0.137	mg/kg dry	20	1.37	ND	106	32-132%	---	---	
Anthracene	1.48	0.0681	0.137	mg/kg dry	20	1.37	ND	109	47-123%	---	---	
Benz(a)anthracene	1.42	0.0681	0.137	mg/kg dry	20	1.37	ND	104	49-126%	---	---	
Benzo(a)pyrene	1.60	0.102	0.205	mg/kg dry	20	1.37	0.167	105	45-129%	---	---	
Benzo(b)fluoranthene	1.48	0.102	0.205	mg/kg dry	20	1.37	0.121	100	45-132%	---	---	
Benzo(k)fluoranthene	1.39	0.102	0.205	mg/kg dry	20	1.37	ND	102	47-132%	---	---	
Benzo(g,h,i)perylene	1.53	0.0681	0.137	mg/kg dry	20	1.37	0.0734	107	43-134%	---	---	
Chrysene	1.43	0.0681	0.137	mg/kg dry	20	1.37	ND	104	50-124%	---	---	
Dibenz(a,h)anthracene	1.36	0.0681	0.137	mg/kg dry	20	1.37	ND	99	45-134%	---	---	
Fluoranthene	1.54	0.0681	0.137	mg/kg dry	20	1.37	0.0761	107	50-127%	---	---	
Fluorene	1.47	0.0681	0.137	mg/kg dry	20	1.37	ND	107	43-125%	---	---	
Indeno(1,2,3-cd)pyrene	1.37	0.0681	0.137	mg/kg dry	20	1.37	ND	100	45-133%	---	---	
1-Methylnaphthalene	1.38	0.137	0.273	mg/kg dry	20	1.37	ND	101	40-120%	---	---	
2-Methylnaphthalene	1.41	0.137	0.273	mg/kg dry	20	1.37	ND	104	38-122%	---	---	
Naphthalene	1.42	0.137	0.273	mg/kg dry	20	1.37	ND	104	35-123%	---	---	
Phenanthrene	1.46	0.0681	0.137	mg/kg dry	20	1.37	ND	107	50-121%	---	---	
Pyrene	1.62	0.0681	0.137	mg/kg dry	20	1.37	0.152	107	47-127%	---	---	
Carbazole	1.36	0.102	0.205	mg/kg dry	20	1.37	ND	99	50-122%	---	---	
Dibenzofuran	1.43	0.0681	0.137	mg/kg dry	20	1.37	ND	105	44-120%	---	---	
4-Chloro-3-methylphenol	1.37	0.681	1.37	mg/kg dry	20	1.37	ND	101	45-122%	---	---	
2-Chlorophenol	1.23	0.341	0.681	mg/kg dry	20	1.37	ND	90	34-121%	---	---	
2,4-Dichlorophenol	1.45	0.341	0.681	mg/kg dry	20	1.37	ND	106	40-122%	---	---	

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tideland Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A910893 - 01 09 20 1624
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QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100490 - EPA 3546												
Sediment												
Matrix Spike (9100490-MS2)												
Prepared: 10/01/19 10:35 Analyzed: 10/02/19 12:28												
QC Source Sample: SE-10-2.0-3.7 (A910893-13RE1)												
2,4-Dimethylphenol	1.54	0.341	0.681	mg/kg dry	20	1.37	ND	113	30-127%	---	---	
2,4-Dinitrophenol	ND	1.70	3.41	mg/kg dry	20	1.37	ND		5-137%	---	---	Q-11, Q-41
4,6-Dinitro-2-methylphenol	1.79	1.70	3.41	mg/kg dry	20	1.37	ND	131	29-132%	---	---	Q-41, J
2-Methylphenol	1.38	0.170	0.341	mg/kg dry	20	1.37	ND	101	32-122%	---	---	
3+4-Methylphenol(s)	1.71	0.170	0.341	mg/kg dry	20	1.37	0.309	102	34-120%	---	---	
2-Nitrophenol	1.86	0.681	1.37	mg/kg dry	20	1.37	ND	136	36-123%	---	---	Q-11
4-Nitrophenol	1.70	0.681	1.37	mg/kg dry	20	1.37	ND	125	30-132%	---	---	
Pentachlorophenol (PCP)	1.69	0.681	1.37	mg/kg dry	20	1.37	ND	124	25-133%	---	---	
Phenol	1.28	0.137	0.273	mg/kg dry	20	1.37	ND	94	34-120%	---	---	
2,3,4,6-Tetrachlorophenol	1.41	0.341	0.681	mg/kg dry	20	1.37	ND	103	44-125%	---	---	
2,3,5,6-Tetrachlorophenol	1.61	0.341	0.681	mg/kg dry	20	1.37	ND	118	40-120%	---	---	
2,4,5-Trichlorophenol	1.57	0.341	0.681	mg/kg dry	20	1.37	ND	115	41-124%	---	---	
2,4,6-Trichlorophenol	1.57	0.341	0.681	mg/kg dry	20	1.37	ND	115	39-126%	---	---	
Bis(2-ethylhexyl)phthalate	1.56	1.02	2.05	mg/kg dry	20	1.37	ND	114	51-133%	---	---	J
Butyl benzyl phthalate	1.71	0.341	0.681	mg/kg dry	20	1.37	ND	125	48-132%	---	---	
Diethylphthalate	1.49	0.341	0.681	mg/kg dry	20	1.37	ND	109	50-124%	---	---	
Dimethylphthalate	1.45	0.341	0.681	mg/kg dry	20	1.37	ND	106	48-124%	---	---	
Di-n-butylphthalate	1.55	0.341	0.681	mg/kg dry	20	1.37	ND	113	51-128%	---	---	
Di-n-octyl phthalate	2.02	0.548	0.681	mg/kg dry	20	1.37	ND	148	44-140%	---	---	Q-01
N-Nitrosodimethylamine	0.850	0.170	0.341	mg/kg dry	20	1.37	ND	62	23-120%	---	---	
N-Nitroso-di-n-propylamine	1.18	0.170	0.341	mg/kg dry	20	1.37	ND	86	36-120%	---	---	
N-Nitrosodiphenylamine	1.49	0.170	0.341	mg/kg dry	20	1.37	ND	109	38-127%	---	---	
Bis(2-Chloroethoxy) methane	1.31	0.170	0.341	mg/kg dry	20	1.37	ND	96	36-121%	---	---	
Bis(2-Chloroethyl) ether	0.997	0.170	0.341	mg/kg dry	20	1.37	ND	73	31-120%	---	---	
2,2'-Oxybis(1-Chloropropane)	1.05	0.170	0.341	mg/kg dry	20	1.37	ND	77	33-131%	---	---	
Hexachlorobenzene	1.38	0.0681	0.137	mg/kg dry	20	1.37	ND	101	44-122%	---	---	
Hexachlorobutadiene	1.29	0.170	0.341	mg/kg dry	20	1.37	ND	95	32-123%	---	---	
Hexachlorocyclopentadiene	0.373	0.341	0.681	mg/kg dry	20	1.37	ND	27	5-140%	---	---	Q-41, J
Hexachloroethane	1.13	0.170	0.341	mg/kg dry	20	1.37	ND	83	28-120%	---	---	
2-Chloronaphthalene	1.47	0.0681	0.137	mg/kg dry	20	1.37	ND	107	41-120%	---	---	
1,2-Dichlorobenzene	1.20	0.170	0.341	mg/kg dry	20	1.37	ND	88	33-120%	---	---	
1,3-Dichlorobenzene	1.21	0.170	0.341	mg/kg dry	20	1.37	ND	89	30-120%	---	---	
1,4-Dichlorobenzene	1.16	0.170	0.341	mg/kg dry	20	1.37	ND	85	31-120%	---	---	

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tideland Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A910893 - 01 09 20 1624
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QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100490 - EPA 3546												
Sediment												
Matrix Spike (9100490-MS2) Prepared: 10/01/19 10:35 Analyzed: 10/02/19 12:28												
QC Source Sample: SE-10-2.0-3.7 (A910893-13RE1)												
1,2,4-Trichlorobenzene	1.31	0.170	0.341	mg/kg dry	20	1.37	ND	96	34-120%	---	---	
4-Bromophenyl phenyl ether	1.45	0.170	0.341	mg/kg dry	20	1.37	ND	106	46-124%	---	---	
4-Chlorophenyl phenyl ether	1.48	0.170	0.341	mg/kg dry	20	1.37	ND	108	45-121%	---	---	
Aniline	0.837	0.341	0.681	mg/kg dry	20	1.37	ND	61	7-120%	---	---	Q-31
4-Chloroaniline	0.508	0.170	0.341	mg/kg dry	20	1.37	ND	37	16-120%	---	---	Q-31
2-Nitroaniline	1.60	1.37	2.73	mg/kg dry	20	1.37	ND	117	44-127%	---	---	J
3-Nitroaniline	ND	1.37	2.73	mg/kg dry	20	1.37	ND		33-120%	---	---	Q-11
4-Nitroaniline	ND	1.37	2.73	mg/kg dry	20	1.37	ND		35-120%	---	---	Q-11, Q-41
Nitrobenzene	1.19	0.681	1.37	mg/kg dry	20	1.37	ND	87	34-122%	---	---	J
2,4-Dinitrotoluene	1.54	0.681	1.37	mg/kg dry	20	1.37	ND	113	48-126%	---	---	
2,6-Dinitrotoluene	1.51	0.681	1.37	mg/kg dry	20	1.37	ND	111	46-124%	---	---	
Benzoic acid	ND	8.55	17.0	mg/kg dry	20	2.73	ND		5-140%	---	---	Q-41, Q-11
Benzyl alcohol	1.11	0.341	0.681	mg/kg dry	20	1.37	ND	81	29-122%	---	---	
Isophorone	1.21	0.170	0.341	mg/kg dry	20	1.37	ND	89	30-122%	---	---	
Azobenzene (1,2-DPH)	1.29	0.170	0.341	mg/kg dry	20	1.37	ND	95	39-125%	---	---	
Bis(2-Ethylhexyl) adipate	2.35	1.70	3.41	mg/kg dry	20	1.37	ND	172	60-121%	---	---	Q-11, J
3,3'-Dichlorobenzidine	2.03	1.37	2.73	mg/kg dry	20	2.73	ND	74	22-121%	---	---	Q-31, J
1,2-Dinitrobenzene	ND	1.70	3.41	mg/kg dry	20	1.37	ND		44-120%	---	---	Q-11
1,3-Dinitrobenzene	ND	1.70	3.41	mg/kg dry	20	1.37	ND		42-127%	---	---	Q-11
1,4-Dinitrobenzene	ND	1.70	3.41	mg/kg dry	20	1.37	ND		37-132%	---	---	Q-11
Pyridine	0.707	0.341	0.681	mg/kg dry	20	1.37	ND	52	5-120%	---	---	
<i>Surr: Nitrobenzene-d5 (Surr) Recovery: 81 % Limits: 37-122 % Dilution: 20x</i>												
<i>2-Fluorobiphenyl (Surr) 53 % 44-115 % "</i>												
<i>Phenol-d6 (Surr) 81 % 33-122 % "</i>												
<i>p-Terphenyl-d14 (Surr) 60 % 54-127 % "</i>												
<i>2-Fluorophenol (Surr) 85 % 35-115 % "</i>												
<i>2,4,6-Tribromophenol (Surr) 99 % 39-132 % "</i>												

Matrix Spike Dup (9100490-MSD1) Prepared: 10/01/19 10:34 Analyzed: 10/02/19 15:27												
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QC Source Sample: Non-SDG (A910822-02RE1)												
Acenaphthene	1.28	0.0306	0.0614	mg/kg dry	10	1.23	0.135	94	40-122%	4	30%	
Acenaphthylene	1.32	0.0306	0.0614	mg/kg dry	10	1.23	ND	107	32-132%	2	30%	
Anthracene	1.36	0.0306	0.0614	mg/kg dry	10	1.23	0.204	94	47-123%	2	30%	

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tideland Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A910893 - 01 09 20 1624
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QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100490 - EPA 3546												
Sediment												
Matrix Spike Dup (9100490-MSD1)						Prepared: 10/01/19 10:34 Analyzed: 10/02/19 15:27						
QC Source Sample: Non-SDG (A910822-02RE1)												
Benz(a)anthracene	1.30	0.0306	0.0614	mg/kg dry	10	1.23	0.218	89	49-126%	3	30%	
Benzo(a)pyrene	1.38	0.0460	0.0920	mg/kg dry	10	1.23	0.154	100	45-129%	5	30%	
Benzo(b)fluoranthene	1.32	0.0460	0.0920	mg/kg dry	10	1.23	0.180	93	45-132%	3	30%	
Benzo(k)fluoranthene	1.26	0.0460	0.0920	mg/kg dry	10	1.23	0.0758	97	47-132%	6	30%	
Benzo(g,h,i)perylene	1.40	0.0306	0.0614	mg/kg dry	10	1.23	0.0680	108	43-134%	6	30%	
Chrysene	1.33	0.0306	0.0614	mg/kg dry	10	1.23	0.199	92	50-124%	4	30%	
Dibenz(a,h)anthracene	1.26	0.0306	0.0614	mg/kg dry	10	1.23	ND	103	45-134%	3	30%	
Fluoranthene	1.59	0.0306	0.0614	mg/kg dry	10	1.23	1.15	35	50-127%	0.2	30%	Q-01
Fluorene	1.34	0.0306	0.0614	mg/kg dry	10	1.23	0.136	98	43-125%	3	30%	
Indeno(1,2,3-cd)pyrene	1.21	0.0306	0.0614	mg/kg dry	10	1.23	0.0695	93	45-133%	6	30%	
1-Methylnaphthalene	1.24	0.0614	0.123	mg/kg dry	10	1.23	0.0767	95	40-120%	0.9	30%	
2-Methylnaphthalene	1.28	0.0614	0.123	mg/kg dry	10	1.23	0.149	93	38-122%	0.5	30%	
Naphthalene	1.38	0.0614	0.123	mg/kg dry	10	1.23	0.491	73	35-123%	1	30%	
Phenanthrene	1.39	0.0306	0.0614	mg/kg dry	10	1.23	0.491	73	50-121%	3	30%	
Pyrene	1.55	0.0306	0.0614	mg/kg dry	10	1.23	0.823	59	47-127%	3	30%	
Carbazole	1.25	0.0460	0.0920	mg/kg dry	10	1.23	0.0536	98	50-122%	2	30%	
Dibenzofuran	1.29	0.0306	0.0614	mg/kg dry	10	1.23	0.145	94	44-120%	2	30%	
4-Chloro-3-methylphenol	1.29	0.306	0.614	mg/kg dry	10	1.23	ND	105	45-122%	3	30%	
2-Chlorophenol	1.12	0.153	0.306	mg/kg dry	10	1.23	ND	92	34-121%	5	30%	
2,4-Dichlorophenol	1.30	0.153	0.306	mg/kg dry	10	1.23	ND	106	40-122%	0.5	30%	
2,4-Dimethylphenol	1.49	0.153	0.306	mg/kg dry	10	1.23	ND	121	30-127%	0.3	30%	
2,4-Dinitrophenol	ND	0.766	1.53	mg/kg dry	10	1.23	ND		5-137%		30%	Q-11, Q-41
4,6-Dinitro-2-methylphenol	0.870	0.766	1.53	mg/kg dry	10	1.23	ND	71	29-132%	6	30%	Q-41, J
2-Methylphenol	1.24	0.0766	0.153	mg/kg dry	10	1.23	ND	101	32-122%	3	30%	
3+4-Methylphenol(s)	2.84	0.0766	0.153	mg/kg dry	10	1.23	1.60	101	34-120%	1	30%	
2-Nitrophenol	1.46	0.306	0.614	mg/kg dry	10	1.23	ND	119	36-123%	3	30%	
4-Nitrophenol	1.31	0.306	0.614	mg/kg dry	10	1.23	ND	107	30-132%	0.7	30%	
Pentachlorophenol (PCP)	1.50	0.306	0.614	mg/kg dry	10	1.23	ND	123	25-133%	1	30%	
Phenol	1.25	0.0614	0.123	mg/kg dry	10	1.23	0.571	56	34-120%	3	30%	
2,3,4,6-Tetrachlorophenol	1.31	0.153	0.306	mg/kg dry	10	1.23	ND	107	44-125%	1	30%	
2,3,5,6-Tetrachlorophenol	1.39	0.153	0.306	mg/kg dry	10	1.23	ND	113	40-120%	2	30%	
2,4,5-Trichlorophenol	1.37	0.153	0.306	mg/kg dry	10	1.23	ND	112	41-124%	0.3	30%	
2,4,6-Trichlorophenol	1.39	0.153	0.306	mg/kg dry	10	1.23	ND	113	39-126%	1	30%	

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tideland Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A910893 - 01 09 20 1624
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QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100490 - EPA 3546												
Sediment												
Matrix Spike Dup (9100490-MSD1)			Prepared: 10/01/19 10:34 Analyzed: 10/02/19 15:27									
QC Source Sample: Non-SDG (A910822-02RE1)												
Bis(2-ethylhexyl)phthalate	1.59	0.460	0.920	mg/kg dry	10	1.23	ND	130	51-133%	1	30%	
Butyl benzyl phthalate	1.58	0.153	0.306	mg/kg dry	10	1.23	ND	129	48-132%	8	30%	
Diethylphthalate	1.35	0.153	0.306	mg/kg dry	10	1.23	ND	110	50-124%	1	30%	
Dimethylphthalate	1.31	0.153	0.306	mg/kg dry	10	1.23	ND	107	48-124%	2	30%	
Di-n-butylphthalate	1.42	0.153	0.306	mg/kg dry	10	1.23	0.213	98	51-128%	0.9	30%	
Di-n-octyl phthalate	1.81	0.246	0.306	mg/kg dry	10	1.23	ND	148	44-140%	4	30%	Q-01
N-Nitrosodimethylamine	0.752	0.0766	0.153	mg/kg dry	10	1.23	ND	61	23-120%	5	30%	
N-Nitroso-di-n-propylamine	1.06	0.0766	0.153	mg/kg dry	10	1.23	ND	86	36-120%	4	30%	
N-Nitrosodiphenylamine	1.25	0.0766	0.153	mg/kg dry	10	1.23	ND	102	38-127%	0.8	30%	
Bis(2-Chloroethoxy) methane	1.15	0.0766	0.153	mg/kg dry	10	1.23	ND	94	36-121%	0.8	30%	
Bis(2-Chloroethyl) ether	0.886	0.0766	0.153	mg/kg dry	10	1.23	ND	72	31-120%	4	30%	
2,2'-Oxybis(1-Chloropropane)	0.915	0.0766	0.153	mg/kg dry	10	1.23	ND	75	33-131%	1	30%	
Hexachlorobenzene	1.27	0.0306	0.0614	mg/kg dry	10	1.23	ND	103	44-122%	2	30%	
Hexachlorobutadiene	1.19	0.0766	0.153	mg/kg dry	10	1.23	ND	97	32-123%	0.03	30%	
Hexachlorocyclopentadiene	0.373	0.153	0.306	mg/kg dry	10	1.23	ND	30	5-140%	200	30%	Q-01, Q-41
Hexachloroethane	1.05	0.0766	0.153	mg/kg dry	10	1.23	ND	86	28-120%	2	30%	
2-Chloronaphthalene	1.25	0.0306	0.0614	mg/kg dry	10	1.23	ND	102	41-120%	0.1	30%	
1,2-Dichlorobenzene	1.04	0.0766	0.153	mg/kg dry	10	1.23	ND	85	33-120%	5	30%	
1,3-Dichlorobenzene	1.04	0.0766	0.153	mg/kg dry	10	1.23	ND	85	30-120%	2	30%	
1,4-Dichlorobenzene	1.03	0.0766	0.153	mg/kg dry	10	1.23	ND	84	31-120%	5	30%	
1,2,4-Trichlorobenzene	1.15	0.0766	0.153	mg/kg dry	10	1.23	ND	94	34-120%	1	30%	
4-Bromophenyl phenyl ether	1.28	0.0766	0.153	mg/kg dry	10	1.23	ND	105	46-124%	2	30%	
4-Chlorophenyl phenyl ether	1.25	0.0766	0.153	mg/kg dry	10	1.23	ND	102	45-121%	2	30%	
Aniline	0.813	0.690	0.690	mg/kg dry	10	1.23	ND	66	7-120%	25	30%	Q-31
4-Chloroaniline	0.377	0.0766	0.153	mg/kg dry	10	1.23	ND	31	16-120%	15	30%	Q-31
2-Nitroaniline	1.50	0.614	1.23	mg/kg dry	10	1.23	ND	123	44-127%	3	30%	
3-Nitroaniline	0.655	0.614	1.23	mg/kg dry	10	1.23	ND	53	33-120%	200	30%	Q-01, J
4-Nitroaniline	1.27	0.614	1.23	mg/kg dry	10	1.23	ND	104	35-120%	3	30%	Q-41
Nitrobenzene	1.04	0.306	0.614	mg/kg dry	10	1.23	ND	85	34-122%	6	30%	
2,4-Dinitrotoluene	1.26	0.306	0.614	mg/kg dry	10	1.23	ND	103	48-126%	2	30%	
2,6-Dinitrotoluene	1.32	0.306	0.614	mg/kg dry	10	1.23	ND	107	46-124%	4	30%	
Benzoic acid	ND	3.84	7.66	mg/kg dry	10	2.45	ND		5-140%		30%	Q-11, Q-41
Benzyl alcohol	1.17	0.153	0.306	mg/kg dry	10	1.23	ND	95	29-122%	4	30%	

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tideland Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A910893 - 01 09 20 1624
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QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100490 - EPA 3546												
Sediment												
Matrix Spike Dup (9100490-MSD1)			Prepared: 10/01/19 10:34 Analyzed: 10/02/19 15:27									
QC Source Sample: Non-SDG (A910822-02RE1)												
Isophorone	1.13	0.0766	0.153	mg/kg dry	10	1.23	ND	93	30-122%	0.8	30%	
Azobenzene (1,2-DPH)	1.17	0.0766	0.153	mg/kg dry	10	1.23	ND	96	39-125%	2	30%	
Bis(2-Ethylhexyl) adipate	5.77	0.766	1.53	mg/kg dry	10	1.23	2.18	293	60-121%	85	30%	Q-03
3,3'-Dichlorobenzidine	0.738	0.614	1.23	mg/kg dry	10	2.45	ND	30	22-121%	200	30%	Q-01, Q-31, J
1,2-Dinitrobenzene	1.03	0.766	1.53	mg/kg dry	10	1.23	ND	84	44-120%	0.1	30%	J
1,3-Dinitrobenzene	1.33	0.766	1.53	mg/kg dry	10	1.23	ND	108	42-127%	5	30%	J
1,4-Dinitrobenzene	1.09	0.766	1.53	mg/kg dry	10	1.23	ND	89	37-132%	11	30%	J
Pyridine	0.588	0.153	0.306	mg/kg dry	10	1.23	ND	48	5-120%	4	30%	
<i>Surr: Nitrobenzene-d5 (Surr) Recovery: 82 % Limits: 37-122 % Dilution: 10x</i>												
<i>2-Fluorobiphenyl (Surr) 85 % 44-115 % "</i>												
<i>Phenol-d6 (Surr) 87 % 33-122 % "</i>												
<i>p-Terphenyl-d14 (Surr) 95 % 54-127 % "</i>												
<i>2-Fluorophenol (Surr) 84 % 35-115 % "</i>												
<i>2,4,6-Tribromophenol (Surr) 113 % 39-132 % "</i>												

Matrix Spike Dup (9100490-MSD2)			Prepared: 10/01/19 10:35 Analyzed: 10/02/19 13:04									
QC Source Sample: SE-10-2.0-3.7 (A910893-13RE1)												
EPA 8270D												
Acenaphthene	1.41	0.0676	0.136	mg/kg dry	20	1.35	ND	104	40-122%	1	30%	
Acenaphthylene	1.46	0.0676	0.136	mg/kg dry	20	1.35	ND	107	32-132%	0.3	30%	
Anthracene	1.49	0.0676	0.136	mg/kg dry	20	1.35	ND	110	47-123%	0.1	30%	
Benz(a)anthracene	1.46	0.0676	0.136	mg/kg dry	20	1.35	ND	107	49-126%	2	30%	
Benzo(a)pyrene	1.64	0.102	0.203	mg/kg dry	20	1.35	0.167	109	45-129%	2	30%	
Benzo(b)fluoranthene	1.54	0.102	0.203	mg/kg dry	20	1.35	0.121	105	45-132%	4	30%	
Benzo(k)fluoranthene	1.43	0.102	0.203	mg/kg dry	20	1.35	ND	105	47-132%	2	30%	
Benzo(g,h,i)perylene	1.58	0.0676	0.136	mg/kg dry	20	1.35	0.0734	111	43-134%	3	30%	
Chrysene	1.50	0.0676	0.136	mg/kg dry	20	1.35	ND	111	50-124%	5	30%	
Dibenz(a,h)anthracene	1.48	0.0676	0.136	mg/kg dry	20	1.35	ND	109	45-134%	9	30%	
Fluoranthene	1.56	0.0676	0.136	mg/kg dry	20	1.35	0.0761	110	50-127%	2	30%	
Fluorene	1.43	0.0676	0.136	mg/kg dry	20	1.35	ND	106	43-125%	2	30%	
Indeno(1,2,3-cd)pyrene	1.37	0.0676	0.136	mg/kg dry	20	1.35	ND	101	45-133%	0.1	30%	
1-Methylnaphthalene	1.39	0.136	0.271	mg/kg dry	20	1.35	ND	103	40-120%	1	30%	
2-Methylnaphthalene	1.40	0.136	0.271	mg/kg dry	20	1.35	ND	103	38-122%	1	30%	

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tideland Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A910893 - 01 09 20 1624
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QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100490 - EPA 3546												
Sediment												
Matrix Spike Dup (9100490-MSD2)												
Prepared: 10/01/19 10:35 Analyzed: 10/02/19 13:04												
QC Source Sample: SE-10-2.0-3.7 (A910893-13RE1)												
Naphthalene	1.46	0.136	0.271	mg/kg dry	20	1.35	ND	108	35-123%	3	30%	
Phenanthrene	1.49	0.0676	0.136	mg/kg dry	20	1.35	ND	110	50-121%	2	30%	
Pyrene	1.63	0.0676	0.136	mg/kg dry	20	1.35	0.152	109	47-127%	1	30%	
Carbazole	1.40	0.102	0.203	mg/kg dry	20	1.35	ND	104	50-122%	3	30%	
Dibenzofuran	1.38	0.0676	0.136	mg/kg dry	20	1.35	ND	102	44-120%	3	30%	
4-Chloro-3-methylphenol	1.41	0.676	1.36	mg/kg dry	20	1.35	ND	104	45-122%	3	30%	
2-Chlorophenol	1.32	0.339	0.676	mg/kg dry	20	1.35	ND	98	34-121%	8	30%	
2,4-Dichlorophenol	1.47	0.339	0.676	mg/kg dry	20	1.35	ND	109	40-122%	1	30%	
2,4-Dimethylphenol	1.58	0.339	0.676	mg/kg dry	20	1.35	ND	117	30-127%	3	30%	
2,4-Dinitrophenol	ND	1.69	3.39	mg/kg dry	20	1.35	ND		5-137%		30%	Q-11, Q-41
4,6-Dinitro-2-methylphenol	1.80	1.69	3.39	mg/kg dry	20	1.35	ND	133	29-132%	0.8	30%	Q-11, Q-41, J
2-Methylphenol	1.39	0.169	0.339	mg/kg dry	20	1.35	ND	103	32-122%	1	30%	
3+4-Methylphenol(s)	2.11	0.169	0.339	mg/kg dry	20	1.35	0.309	133	34-120%	21	30%	Q-01
2-Nitrophenol	1.70	0.676	1.36	mg/kg dry	20	1.35	ND	126	36-123%	9	30%	Q-11
4-Nitrophenol	1.64	0.676	1.36	mg/kg dry	20	1.35	ND	121	30-132%	4	30%	
Pentachlorophenol (PCP)	1.85	0.676	1.36	mg/kg dry	20	1.35	ND	137	25-133%	9	30%	Q-01
Phenol	1.43	0.136	0.271	mg/kg dry	20	1.35	ND	106	34-120%	12	30%	
2,3,4,6-Tetrachlorophenol	1.53	0.339	0.676	mg/kg dry	20	1.35	ND	113	44-125%	9	30%	
2,3,5,6-Tetrachlorophenol	1.59	0.339	0.676	mg/kg dry	20	1.35	ND	117	40-120%	1	30%	
2,4,5-Trichlorophenol	1.60	0.339	0.676	mg/kg dry	20	1.35	ND	118	41-124%	2	30%	
2,4,6-Trichlorophenol	1.63	0.339	0.676	mg/kg dry	20	1.35	ND	120	39-126%	4	30%	
Bis(2-ethylhexyl)phthalate	1.74	1.02	2.03	mg/kg dry	20	1.35	ND	128	51-133%	11	30%	J
Butyl benzyl phthalate	1.83	0.339	0.676	mg/kg dry	20	1.35	ND	135	48-132%	7	30%	Q-01
Diethylphthalate	1.48	0.339	0.676	mg/kg dry	20	1.35	ND	109	50-124%	0.8	30%	
Dimethylphthalate	1.44	0.339	0.676	mg/kg dry	20	1.35	ND	106	48-124%	0.7	30%	
Di-n-butylphthalate	1.60	0.339	0.676	mg/kg dry	20	1.35	ND	118	51-128%	3	30%	
Di-n-octyl phthalate	2.15	0.543	0.676	mg/kg dry	20	1.35	ND	158	44-140%	6	30%	Q-01
N-Nitrosodimethylamine	0.856	0.169	0.339	mg/kg dry	20	1.35	ND	63	23-120%	0.6	30%	
N-Nitroso-di-n-propylamine	1.23	0.169	0.339	mg/kg dry	20	1.35	ND	91	36-120%	4	30%	
N-Nitrosodiphenylamine	1.50	0.169	0.339	mg/kg dry	20	1.35	ND	111	38-127%	0.8	30%	
Bis(2-Chloroethoxy) methane	1.32	0.169	0.339	mg/kg dry	20	1.35	ND	97	36-121%	0.7	30%	
Bis(2-Chloroethyl) ether	1.01	0.169	0.339	mg/kg dry	20	1.35	ND	75	31-120%	1	30%	
2,2'-Oxybis(1-Chloropropane)	1.10	0.169	0.339	mg/kg dry	20	1.35	ND	81	33-131%	5	30%	



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tideland Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A910893 - 01 09 20 1624
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QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100490 - EPA 3546												
Sediment												
Matrix Spike Dup (9100490-MSD2) Prepared: 10/01/19 10:35 Analyzed: 10/02/19 13:04												
QC Source Sample: SE-10-2.0-3.7 (A910893-13RE1)												
Hexachlorobenzene	1.47	0.0676	0.136	mg/kg dry	20	1.35	ND	108	44-122%	6	30%	
Hexachlorobutadiene	1.39	0.169	0.339	mg/kg dry	20	1.35	ND	103	32-123%	8	30%	
Hexachlorocyclopentadiene	ND	0.339	0.676	mg/kg dry	20	1.35	ND		5-140%	200	30%	Q-11, Q-41
Hexachloroethane	1.17	0.169	0.339	mg/kg dry	20	1.35	ND	86	28-120%	3	30%	
2-Chloronaphthalene	1.45	0.0676	0.136	mg/kg dry	20	1.35	ND	107	41-120%	0.8	30%	
1,2-Dichlorobenzene	1.25	0.169	0.339	mg/kg dry	20	1.35	ND	92	33-120%	4	30%	
1,3-Dichlorobenzene	1.25	0.169	0.339	mg/kg dry	20	1.35	ND	92	30-120%	3	30%	
1,4-Dichlorobenzene	1.22	0.169	0.339	mg/kg dry	20	1.35	ND	90	31-120%	5	30%	
1,2,4-Trichlorobenzene	1.35	0.169	0.339	mg/kg dry	20	1.35	ND	100	34-120%	3	30%	
4-Bromophenyl phenyl ether	1.46	0.169	0.339	mg/kg dry	20	1.35	ND	108	46-124%	0.5	30%	
4-Chlorophenyl phenyl ether	1.42	0.169	0.339	mg/kg dry	20	1.35	ND	105	45-121%	4	30%	
Aniline	0.801	0.339	0.676	mg/kg dry	20	1.35	ND	59	7-120%	4	30%	Q-31
4-Chloroaniline	0.583	0.169	0.339	mg/kg dry	20	1.35	ND	43	16-120%	14	30%	Q-31
2-Nitroaniline	1.68	1.36	2.71	mg/kg dry	20	1.35	ND	124	44-127%	5	30%	J
3-Nitroaniline	ND	1.36	2.71	mg/kg dry	20	1.35	ND		33-120%		30%	Q-11
4-Nitroaniline	1.44	1.36	2.71	mg/kg dry	20	1.35	ND	107	35-120%	200	30%	Q-11, Q-41, J
Nitrobenzene	1.23	0.676	1.36	mg/kg dry	20	1.35	ND	91	34-122%	4	30%	J
2,4-Dinitrotoluene	1.49	0.676	1.36	mg/kg dry	20	1.35	ND	110	48-126%	3	30%	
2,6-Dinitrotoluene	1.47	0.676	1.36	mg/kg dry	20	1.35	ND	109	46-124%	3	30%	
Benzoic acid	ND	8.48	16.9	mg/kg dry	20	2.71	ND		5-140%		30%	Q-11, Q-41
Benzyl alcohol	1.24	0.339	0.676	mg/kg dry	20	1.35	ND	91	29-122%	11	30%	
Isophorone	1.32	0.169	0.339	mg/kg dry	20	1.35	ND	97	30-122%	9	30%	
Azobenzene (1,2-DPH)	1.31	0.169	0.339	mg/kg dry	20	1.35	ND	97	39-125%	1	30%	
Bis(2-Ethylhexyl) adipate	2.25	1.69	3.39	mg/kg dry	20	1.35	ND	166	60-121%	4	30%	Q-11, J
3,3'-Dichlorobenzidine	ND	1.36	2.71	mg/kg dry	20	2.71	ND		22-121%	200	30%	Q-31, Q-01
1,2-Dinitrobenzene	ND	1.69	3.39	mg/kg dry	20	1.35	ND		44-120%		30%	Q-11
1,3-Dinitrobenzene	ND	1.69	3.39	mg/kg dry	20	1.35	ND		42-127%		30%	Q-11
1,4-Dinitrobenzene	ND	1.69	3.39	mg/kg dry	20	1.35	ND		37-132%		30%	Q-11
Pyridine	0.598	0.339	0.676	mg/kg dry	20	1.35	ND	44	5-120%	17	30%	J
<i>Surr: Nitrobenzene-d5 (Surr) Recovery: 82 % Limits: 37-122 % Dilution: 20x</i>												
<i>2-Fluorobiphenyl (Surr) 66 % 44-115 % "</i>												
<i>Phenol-d6 (Surr) 84 % 33-122 % "</i>												
<i>p-Terphenyl-d14 (Surr) 70 % 54-127 % "</i>												

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Philip Nerenberg, Lab Director



Apex Laboratories, LLC

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EPA ID: OR01039

AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A910893 - 01 09 20 1624
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QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100490 - EPA 3546						Sediment						
Matrix Spike Dup (9100490-MSD2)						Prepared: 10/01/19 10:35 Analyzed: 10/02/19 13:04						
QC Source Sample: SE-10-2.0-3.7 (A910893-13RE1)												
Surr: 2-Fluorophenol (Surr)		Recovery: 84 %		Limits: 35-115 %		Dilution: 20x						
2,4,6-Tribromophenol (Surr)		107 %		39-132 %		"						

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Philip Nerenberg, Lab Director

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AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A910893 - 01 09 20 1624
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QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100614 - EPA 3510C (Acid/Base Neutral)						Water						
Blank (9100614-BLK1)			Prepared: 10/03/19 11:14 Analyzed: 10/03/19 18:24									
EPA 8270D												
Acenaphthene	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
Acenaphthylene	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
Anthracene	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
Benz(a)anthracene	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
Benzo(a)pyrene	ND	0.0150	0.0300	ug/L	1	---	---	---	---	---	---	
Benzo(b)fluoranthene	ND	0.0150	0.0300	ug/L	1	---	---	---	---	---	---	
Benzo(k)fluoranthene	ND	0.0150	0.0300	ug/L	1	---	---	---	---	---	---	
Benzo(g,h,i)perylene	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
Chrysene	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
Dibenz(a,h)anthracene	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
Fluoranthene	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
Fluorene	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
Indeno(1,2,3-cd)pyrene	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
1-Methylnaphthalene	ND	0.0200	0.0400	ug/L	1	---	---	---	---	---	---	
2-Methylnaphthalene	ND	0.0200	0.0400	ug/L	1	---	---	---	---	---	---	
Naphthalene	0.0216	0.0200	0.0400	ug/L	1	---	---	---	---	---	---	B-02, J
Phenanthrene	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
Pyrene	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
Carbazole	ND	0.0150	0.0300	ug/L	1	---	---	---	---	---	---	
Dibenzofuran	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
4-Chloro-3-methylphenol	ND	0.100	0.200	ug/L	1	---	---	---	---	---	---	
2-Chlorophenol	ND	0.0500	0.100	ug/L	1	---	---	---	---	---	---	
2,4-Dichlorophenol	ND	0.0500	0.100	ug/L	1	---	---	---	---	---	---	
2,4-Dimethylphenol	ND	0.0500	0.100	ug/L	1	---	---	---	---	---	---	
2,4-Dinitrophenol	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
4,6-Dinitro-2-methylphenol	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
2-Methylphenol	ND	0.0250	0.0500	ug/L	1	---	---	---	---	---	---	
3+4-Methylphenol(s)	ND	0.0250	0.0500	ug/L	1	---	---	---	---	---	---	
2-Nitrophenol	ND	0.100	0.200	ug/L	1	---	---	---	---	---	---	
4-Nitrophenol	ND	0.100	0.200	ug/L	1	---	---	---	---	---	---	
Pentachlorophenol (PCP)	ND	0.100	0.200	ug/L	1	---	---	---	---	---	---	
Phenol	ND	0.200	0.400	ug/L	1	---	---	---	---	---	---	
2,3,4,6-Tetrachlorophenol	ND	0.0500	0.100	ug/L	1	---	---	---	---	---	---	

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A910893 - 01 09 20 1624
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QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100614 - EPA 3510C (Acid/Base Neutral)						Water						
Blank (9100614-BLK1)			Prepared: 10/03/19 11:14 Analyzed: 10/03/19 18:24									
2,3,5,6-Tetrachlorophenol	ND	0.0500	0.100	ug/L	1	---	---	---	---	---	---	
2,4,5-Trichlorophenol	ND	0.0500	0.100	ug/L	1	---	---	---	---	---	---	
2,4,6-Trichlorophenol	ND	0.0500	0.100	ug/L	1	---	---	---	---	---	---	
Bis(2-ethylhexyl)phthalate	ND	0.200	0.400	ug/L	1	---	---	---	---	---	---	
Butyl benzyl phthalate	ND	0.200	0.400	ug/L	1	---	---	---	---	---	---	
Diethylphthalate	ND	0.200	0.400	ug/L	1	---	---	---	---	---	---	
Dimethylphthalate	ND	0.200	0.400	ug/L	1	---	---	---	---	---	---	
Di-n-butylphthalate	ND	0.200	0.400	ug/L	1	---	---	---	---	---	---	
Di-n-octyl phthalate	ND	0.200	0.400	ug/L	1	---	---	---	---	---	---	
N-Nitrosodimethylamine	ND	0.0250	0.0500	ug/L	1	---	---	---	---	---	---	
N-Nitroso-di-n-propylamine	ND	0.0250	0.0500	ug/L	1	---	---	---	---	---	---	
N-Nitrosodiphenylamine	ND	0.0250	0.0500	ug/L	1	---	---	---	---	---	---	
Bis(2-Chloroethoxy) methane	ND	0.0250	0.0500	ug/L	1	---	---	---	---	---	---	
Bis(2-Chloroethyl) ether	ND	0.0250	0.0500	ug/L	1	---	---	---	---	---	---	
2,2'-Oxybis(1-Chloropropane)	ND	0.0250	0.0500	ug/L	1	---	---	---	---	---	---	
Hexachlorobenzene	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
Hexachlorobutadiene	ND	0.0250	0.0500	ug/L	1	---	---	---	---	---	---	
Hexachlorocyclopentadiene	ND	0.0500	0.100	ug/L	1	---	---	---	---	---	---	
Hexachloroethane	ND	0.0250	0.0500	ug/L	1	---	---	---	---	---	---	
2-Chloronaphthalene	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
1,2-Dichlorobenzene	ND	0.0250	0.0500	ug/L	1	---	---	---	---	---	---	
1,3-Dichlorobenzene	ND	0.0250	0.0500	ug/L	1	---	---	---	---	---	---	
1,4-Dichlorobenzene	ND	0.0250	0.0500	ug/L	1	---	---	---	---	---	---	
1,2,4-Trichlorobenzene	ND	0.0250	0.0500	ug/L	1	---	---	---	---	---	---	
4-Bromophenyl phenyl ether	ND	0.0250	0.0500	ug/L	1	---	---	---	---	---	---	
4-Chlorophenyl phenyl ether	ND	0.0250	0.0500	ug/L	1	---	---	---	---	---	---	
Aniline	ND	0.0500	0.100	ug/L	1	---	---	---	---	---	---	
4-Chloroaniline	ND	0.0250	0.0500	ug/L	1	---	---	---	---	---	---	
2-Nitroaniline	ND	0.200	0.400	ug/L	1	---	---	---	---	---	---	
3-Nitroaniline	ND	0.200	0.400	ug/L	1	---	---	---	---	---	---	
4-Nitroaniline	ND	0.200	0.400	ug/L	1	---	---	---	---	---	---	
Nitrobenzene	ND	0.100	0.200	ug/L	1	---	---	---	---	---	---	
2,4-Dinitrotoluene	ND	0.100	0.200	ug/L	1	---	---	---	---	---	---	
2,6-Dinitrotoluene	ND	0.100	0.200	ug/L	1	---	---	---	---	---	---	

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A910893 - 01 09 20 1624
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QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100614 - EPA 3510C (Acid/Base Neutral)						Water						
Blank (9100614-BLK1)			Prepared: 10/03/19 11:14 Analyzed: 10/03/19 18:24									
Benzoic acid	ND	1.25	2.50	ug/L	1	---	---	---	---	---	---	
Benzyl alcohol	ND	0.100	0.200	ug/L	1	---	---	---	---	---	---	
Isophorone	ND	0.0250	0.0500	ug/L	1	---	---	---	---	---	---	
Azobenzene (1,2-DPH)	ND	0.0250	0.0500	ug/L	1	---	---	---	---	---	---	
Bis(2-Ethylhexyl) adipate	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
3,3'-Dichlorobenzidine	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	Q-52
1,2-Dinitrobenzene	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
1,3-Dinitrobenzene	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
1,4-Dinitrobenzene	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
Pyridine	ND	0.100	0.200	ug/L	1	---	---	---	---	---	---	
<i>Surr: Nitrobenzene-d5 (Surr)</i>		<i>Recovery: 55 %</i>		<i>Limits: 44-120 %</i>		<i>Dilution: 1x</i>						
<i>2-Fluorobiphenyl (Surr)</i>		<i>49 %</i>		<i>44-120 %</i>		<i>"</i>						
<i>Phenol-d6 (Surr)</i>		<i>20 %</i>		<i>10-120 %</i>		<i>"</i>						
<i>p-Terphenyl-d14 (Surr)</i>		<i>64 %</i>		<i>50-133 %</i>		<i>"</i>						
<i>2-Fluorophenol (Surr)</i>		<i>32 %</i>		<i>19-120 %</i>		<i>"</i>						
<i>2,4,6-Tribromophenol (Surr)</i>		<i>66 %</i>		<i>43-140 %</i>		<i>"</i>						

LCS (9100614-BS1)			Prepared: 10/03/19 11:14 Analyzed: 10/03/19 19:00									
EPA 8270D												
Acenaphthene	2.50	0.0400	0.0800	ug/L	4	4.00	---	62	47-122%	---	---	
Acenaphthylene	2.65	0.0400	0.0800	ug/L	4	4.00	---	66	41-130%	---	---	
Anthracene	2.99	0.0400	0.0800	ug/L	4	4.00	---	75	57-123%	---	---	
Benz(a)anthracene	3.10	0.0400	0.0800	ug/L	4	4.00	---	78	58-125%	---	---	
Benzo(a)pyrene	3.16	0.0600	0.120	ug/L	4	4.00	---	79	54-128%	---	---	
Benzo(b)fluoranthene	3.21	0.0600	0.120	ug/L	4	4.00	---	80	53-131%	---	---	
Benzo(k)fluoranthene	3.07	0.0600	0.120	ug/L	4	4.00	---	77	57-129%	---	---	
Benzo(g,h,i)perylene	3.32	0.0400	0.0800	ug/L	4	4.00	---	83	50-134%	---	---	
Chrysene	3.04	0.0400	0.0800	ug/L	4	4.00	---	76	59-123%	---	---	
Dibenz(a,h)anthracene	3.13	0.0400	0.0800	ug/L	4	4.00	---	78	51-134%	---	---	
Fluoranthene	3.36	0.0400	0.0800	ug/L	4	4.00	---	84	57-128%	---	---	
Fluorene	2.82	0.0400	0.0800	ug/L	4	4.00	---	71	52-124%	---	---	
Indeno(1,2,3-cd)pyrene	2.99	0.0400	0.0800	ug/L	4	4.00	---	75	52-133%	---	---	
1-Methylnaphthalene	2.16	0.0800	0.160	ug/L	4	4.00	---	54	41-120%	---	---	
2-Methylnaphthalene	2.18	0.0800	0.160	ug/L	4	4.00	---	54	40-121%	---	---	

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QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100614 - EPA 3510C (Acid/Base Neutral)							Water					
LCS (9100614-BS1)			Prepared: 10/03/19 11:14 Analyzed: 10/03/19 19:00									
Naphthalene	2.13	0.0800	0.160	ug/L	4	4.00	---	53	40-121%	---	---	B-02
Phenanthrene	2.89	0.0400	0.0800	ug/L	4	4.00	---	72	59-120%	---	---	
Pyrene	3.34	0.0400	0.0800	ug/L	4	4.00	---	84	57-126%	---	---	
Carbazole	3.07	0.0600	0.120	ug/L	4	4.00	---	77	60-122%	---	---	
Dibenzofuran	2.75	0.0400	0.0800	ug/L	4	4.00	---	69	53-120%	---	---	
4-Chloro-3-methylphenol	3.01	0.400	0.800	ug/L	4	4.00	---	75	52-120%	---	---	
2-Chlorophenol	2.35	0.200	0.400	ug/L	4	4.00	---	59	38-120%	---	---	
2,4-Dichlorophenol	2.91	0.200	0.400	ug/L	4	4.00	---	73	47-121%	---	---	
2,4-Dimethylphenol	2.75	0.200	0.400	ug/L	4	4.00	---	69	31-124%	---	---	
2,4-Dinitrophenol	3.65	1.00	2.00	ug/L	4	4.00	---	91	23-143%	---	---	Q-41
4,6-Dinitro-2-methylphenol	4.01	1.00	2.00	ug/L	4	4.00	---	100	44-137%	---	---	Q-41
2-Methylphenol	2.32	0.100	0.200	ug/L	4	4.00	---	58	30-120%	---	---	
3+4-Methylphenol(s)	2.23	0.100	0.200	ug/L	4	4.00	---	56	29-120%	---	---	
2-Nitrophenol	3.37	0.400	0.800	ug/L	4	4.00	---	84	47-123%	---	---	
4-Nitrophenol	1.70	0.400	0.800	ug/L	4	4.00	---	43	5-120%	---	---	Q-41
Pentachlorophenol (PCP)	3.07	0.400	0.800	ug/L	4	4.00	---	77	35-138%	---	---	
Phenol	1.03	0.800	0.800	ug/L	4	4.00	---	26	5-120%	---	---	
2,3,4,6-Tetrachlorophenol	3.12	0.200	0.400	ug/L	4	4.00	---	78	50-128%	---	---	
2,3,5,6-Tetrachlorophenol	3.27	0.200	0.400	ug/L	4	4.00	---	82	50-121%	---	---	
2,4,5-Trichlorophenol	3.11	0.200	0.400	ug/L	4	4.00	---	78	53-123%	---	---	
2,4,6-Trichlorophenol	3.08	0.200	0.400	ug/L	4	4.00	---	77	50-125%	---	---	
Bis(2-ethylhexyl)phthalate	3.44	0.800	1.60	ug/L	4	4.00	---	86	55-135%	---	---	
Butyl benzyl phthalate	3.43	0.800	1.60	ug/L	4	4.00	---	86	53-134%	---	---	
Diethylphthalate	3.30	0.800	1.60	ug/L	4	4.00	---	82	55-125%	---	---	
Dimethylphthalate	3.13	0.800	1.60	ug/L	4	4.00	---	78	45-127%	---	---	
Di-n-butylphthalate	3.42	0.800	1.60	ug/L	4	4.00	---	86	59-127%	---	---	
Di-n-octyl phthalate	3.65	0.800	1.60	ug/L	4	4.00	---	91	51-140%	---	---	
N-Nitrosodimethylamine	1.22	0.100	0.200	ug/L	4	4.00	---	30	6-120%	---	---	
N-Nitroso-di-n-propylamine	2.46	0.100	0.200	ug/L	4	4.00	---	62	49-120%	---	---	
N-Nitrosodiphenylamine	2.97	0.100	0.200	ug/L	4	4.00	---	74	51-123%	---	---	
Bis(2-Chloroethoxy) methane	2.74	0.100	0.200	ug/L	4	4.00	---	69	48-120%	---	---	
Bis(2-Chloroethyl) ether	2.02	0.100	0.200	ug/L	4	4.00	---	51	43-120%	---	---	
2,2'-Oxybis(1-Chloropropane)	1.88	0.100	0.200	ug/L	4	4.00	---	47	37-130%	---	---	Q-31
Hexachlorobenzene	2.88	0.0400	0.0800	ug/L	4	4.00	---	72	52-125%	---	---	

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QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100614 - EPA 3510C (Acid/Base Neutral)							Water					
LCS (9100614-BS1)			Prepared: 10/03/19 11:14 Analyzed: 10/03/19 19:00									
Hexachlorobutadiene	1.50	0.100	0.200	ug/L	4	4.00	---	37	22-124%	---	---	
Hexachlorocyclopentadiene	1.49	0.200	0.400	ug/L	4	4.00	---	37	5-127%	---	---	Q-41
Hexachloroethane	1.37	0.100	0.200	ug/L	4	4.00	---	34	21-120%	---	---	
2-Chloronaphthalene	2.32	0.0400	0.0800	ug/L	4	4.00	---	58	40-120%	---	---	
1,2-Dichlorobenzene	1.49	0.100	0.200	ug/L	4	4.00	---	37	32-120%	---	---	
1,3-Dichlorobenzene	1.39	0.100	0.200	ug/L	4	4.00	---	35	28-120%	---	---	
1,4-Dichlorobenzene	1.42	0.100	0.200	ug/L	4	4.00	---	35	29-120%	---	---	
1,2,4-Trichlorobenzene	1.74	0.100	0.200	ug/L	4	4.00	---	44	29-120%	---	---	
4-Bromophenyl phenyl ether	2.90	0.100	0.200	ug/L	4	4.00	---	72	54-124%	---	---	
4-Chlorophenyl phenyl ether	2.82	0.100	0.200	ug/L	4	4.00	---	71	53-121%	---	---	
Aniline	1.57	0.200	0.400	ug/L	4	4.00	---	39	6-120%	---	---	Q-31
4-Chloroaniline	1.56	0.100	0.200	ug/L	4	4.00	---	39	33-120%	---	---	Q-31
2-Nitroaniline	3.31	0.800	1.60	ug/L	4	4.00	---	83	54-127%	---	---	
3-Nitroaniline	2.95	0.800	1.60	ug/L	4	4.00	---	74	41-128%	---	---	
4-Nitroaniline	4.43	0.800	1.60	ug/L	4	4.00	---	111	35-120%	---	---	Q-41
Nitrobenzene	2.39	0.400	0.800	ug/L	4	4.00	---	60	45-121%	---	---	
2,4-Dinitrotoluene	3.18	0.400	0.800	ug/L	4	4.00	---	80	57-128%	---	---	
2,6-Dinitrotoluene	3.02	0.400	0.800	ug/L	4	4.00	---	76	57-124%	---	---	
Benzoic acid	4.84	4.00	4.00	ug/L	4	8.00	---	60	5-120%	---	---	Q-41
Benzyl alcohol	2.37	0.400	0.800	ug/L	4	4.00	---	59	31-120%	---	---	
Isophorone	2.71	0.100	0.200	ug/L	4	4.00	---	68	42-124%	---	---	
Azobenzene (1,2-DPH)	2.58	0.100	0.200	ug/L	4	4.00	---	64	61-120%	---	---	
Bis(2-Ethylhexyl) adipate	3.42	1.00	2.00	ug/L	4	4.00	---	85	40-125%	---	---	
3,3'-Dichlorobenzidine	7.59	2.00	4.00	ug/L	4	8.00	---	95	27-129%	---	---	Q-31
1,2-Dinitrobenzene	2.97	1.00	2.00	ug/L	4	4.00	---	74	59-120%	---	---	
1,3-Dinitrobenzene	3.39	1.00	2.00	ug/L	4	4.00	---	85	49-128%	---	---	
1,4-Dinitrobenzene	3.66	1.00	2.00	ug/L	4	4.00	---	92	40-120%	---	---	Q-41
Pyridine	0.661	0.400	0.400	ug/L	4	4.00	---	17	5-120%	---	---	
<i>Surr: Nitrobenzene-d5 (Surr)</i>		<i>Recovery: 64 %</i>		<i>Limits: 44-120 %</i>		<i>Dilution: 4x</i>						
<i>2-Fluorobiphenyl (Surr)</i>		<i>62 %</i>		<i>44-120 %</i>		<i>"</i>						
<i>Phenol-d6 (Surr)</i>		<i>23 %</i>		<i>10-120 %</i>		<i>"</i>						
<i>p-Terphenyl-d14 (Surr)</i>		<i>80 %</i>		<i>50-133 %</i>		<i>"</i>						
<i>2-Fluorophenol (Surr)</i>		<i>36 %</i>		<i>19-120 %</i>		<i>"</i>						
<i>2,4,6-Tribromophenol (Surr)</i>		<i>80 %</i>		<i>43-140 %</i>		<i>"</i>						



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tideland Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A910893 - 01 09 20 1624
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QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes	
Batch 9100614 - EPA 3510C (Acid/Base Neutral)							Water						
LCS Dup (9100614-BSD1)			Prepared: 10/03/19 11:14 Analyzed: 10/03/19 19:37					Q-19					
EPA 8270D													
Acenaphthene	2.63	0.0400	0.0800	ug/L	4	4.00	---	66	47-122%	5	30%		
Acenaphthylene	2.82	0.0400	0.0800	ug/L	4	4.00	---	70	41-130%	6	30%		
Anthracene	3.06	0.0400	0.0800	ug/L	4	4.00	---	76	57-123%	2	30%		
Benz(a)anthracene	3.22	0.0400	0.0800	ug/L	4	4.00	---	81	58-125%	4	30%		
Benzo(a)pyrene	3.23	0.0600	0.120	ug/L	4	4.00	---	81	54-128%	2	30%		
Benzo(b)fluoranthene	3.26	0.0600	0.120	ug/L	4	4.00	---	82	53-131%	2	30%		
Benzo(k)fluoranthene	3.19	0.0600	0.120	ug/L	4	4.00	---	80	57-129%	4	30%		
Benzo(g,h,i)perylene	3.30	0.0400	0.0800	ug/L	4	4.00	---	83	50-134%	0.5	30%		
Chrysene	3.17	0.0400	0.0800	ug/L	4	4.00	---	79	59-123%	4	30%		
Dibenz(a,h)anthracene	3.21	0.0400	0.0800	ug/L	4	4.00	---	80	51-134%	2	30%		
Fluoranthene	3.39	0.0400	0.0800	ug/L	4	4.00	---	85	57-128%	0.9	30%		
Fluorene	2.89	0.0400	0.0800	ug/L	4	4.00	---	72	52-124%	2	30%		
Indeno(1,2,3-cd)pyrene	3.01	0.0400	0.0800	ug/L	4	4.00	---	75	52-133%	0.4	30%		
1-Methylnaphthalene	2.38	0.0800	0.160	ug/L	4	4.00	---	60	41-120%	10	30%		
2-Methylnaphthalene	2.46	0.0800	0.160	ug/L	4	4.00	---	61	40-121%	12	30%		
Naphthalene	2.39	0.0800	0.160	ug/L	4	4.00	---	60	40-121%	11	30%	B-02	
Phenanthrene	2.89	0.0400	0.0800	ug/L	4	4.00	---	72	59-120%	0.03	30%		
Pyrene	3.43	0.0400	0.0800	ug/L	4	4.00	---	86	57-126%	2	30%		
Carbazole	3.18	0.0600	0.120	ug/L	4	4.00	---	80	60-122%	3	30%		
Dibenzofuran	2.90	0.0400	0.0800	ug/L	4	4.00	---	73	53-120%	5	30%		
4-Chloro-3-methylphenol	3.05	0.400	0.800	ug/L	4	4.00	---	76	52-120%	1	30%		
2-Chlorophenol	2.47	0.200	0.400	ug/L	4	4.00	---	62	38-120%	5	30%		
2,4-Dichlorophenol	3.03	0.200	0.400	ug/L	4	4.00	---	76	47-121%	4	30%		
2,4-Dimethylphenol	2.92	0.200	0.400	ug/L	4	4.00	---	73	31-124%	6	30%		
2,4-Dinitrophenol	3.82	1.00	2.00	ug/L	4	4.00	---	96	23-143%	5	30%	Q-41	
4,6-Dinitro-2-methylphenol	4.09	1.00	2.00	ug/L	4	4.00	---	102	44-137%	2	30%	Q-41	
2-Methylphenol	2.40	0.100	0.200	ug/L	4	4.00	---	60	30-120%	3	30%		
3+4-Methylphenol(s)	2.23	0.100	0.200	ug/L	4	4.00	---	56	29-120%	0.2	30%		
2-Nitrophenol	3.59	0.400	0.800	ug/L	4	4.00	---	90	47-123%	6	30%		
4-Nitrophenol	1.63	0.400	0.800	ug/L	4	4.00	---	41	5-120%	5	30%	Q-41	
Pentachlorophenol (PCP)	3.12	0.400	0.800	ug/L	4	4.00	---	78	35-138%	1	30%		
Phenol	1.05	0.800	0.800	ug/L	4	4.00	---	26	5-120%	2	30%		
2,3,4,6-Tetrachlorophenol	3.16	0.200	0.400	ug/L	4	4.00	---	79	50-128%	1	30%		

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tideland Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A910893 - 01 09 20 1624
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QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100614 - EPA 3510C (Acid/Base Neutral)							Water					
LCS Dup (9100614-BSD1)	Prepared: 10/03/19 11:14 Analyzed: 10/03/19 19:37											Q-19
2,3,5,6-Tetrachlorophenol	3.36	0.200	0.400	ug/L	4	4.00	---	84	50-121%	3	30%	
2,4,5-Trichlorophenol	3.27	0.200	0.400	ug/L	4	4.00	---	82	53-123%	5	30%	
2,4,6-Trichlorophenol	3.22	0.200	0.400	ug/L	4	4.00	---	81	50-125%	5	30%	
Bis(2-ethylhexyl)phthalate	3.47	0.800	1.60	ug/L	4	4.00	---	87	55-135%	0.8	30%	
Butyl benzyl phthalate	3.43	0.800	1.60	ug/L	4	4.00	---	86	53-134%	0.02	30%	
Diethylphthalate	3.33	0.800	1.60	ug/L	4	4.00	---	83	55-125%	0.9	30%	
Dimethylphthalate	3.20	0.800	1.60	ug/L	4	4.00	---	80	45-127%	2	30%	
Di-n-butylphthalate	3.48	0.800	1.60	ug/L	4	4.00	---	87	59-127%	2	30%	
Di-n-octyl phthalate	3.60	0.800	1.60	ug/L	4	4.00	---	90	51-140%	1	30%	
N-Nitrosodimethylamine	1.27	0.100	0.200	ug/L	4	4.00	---	32	6-120%	4	30%	
N-Nitroso-di-n-propylamine	2.63	0.100	0.200	ug/L	4	4.00	---	66	49-120%	6	30%	
N-Nitrosodiphenylamine	3.04	0.100	0.200	ug/L	4	4.00	---	76	51-123%	2	30%	
Bis(2-Chloroethoxy) methane	2.87	0.100	0.200	ug/L	4	4.00	---	72	48-120%	5	30%	
Bis(2-Chloroethyl) ether	2.21	0.100	0.200	ug/L	4	4.00	---	55	43-120%	9	30%	
2,2'-Oxybis(1-Chloropropane)	2.00	0.100	0.200	ug/L	4	4.00	---	50	37-130%	6	30%	Q-31
Hexachlorobenzene	2.85	0.0400	0.0800	ug/L	4	4.00	---	71	52-125%	1	30%	
Hexachlorobutadiene	1.85	0.100	0.200	ug/L	4	4.00	---	46	22-124%	21	30%	
Hexachlorocyclopentadiene	2.04	0.200	0.400	ug/L	4	4.00	---	51	5-127%	31	30%	Q-24, Q-41
Hexachloroethane	1.79	0.100	0.200	ug/L	4	4.00	---	45	21-120%	26	30%	
2-Chloronaphthalene	2.61	0.0400	0.0800	ug/L	4	4.00	---	65	40-120%	12	30%	
1,2-Dichlorobenzene	1.85	0.100	0.200	ug/L	4	4.00	---	46	32-120%	21	30%	
1,3-Dichlorobenzene	1.75	0.100	0.200	ug/L	4	4.00	---	44	28-120%	23	30%	
1,4-Dichlorobenzene	1.80	0.100	0.200	ug/L	4	4.00	---	45	29-120%	24	30%	
1,2,4-Trichlorobenzene	2.08	0.100	0.200	ug/L	4	4.00	---	52	29-120%	18	30%	
4-Bromophenyl phenyl ether	2.97	0.100	0.200	ug/L	4	4.00	---	74	54-124%	3	30%	
4-Chlorophenyl phenyl ether	2.86	0.100	0.200	ug/L	4	4.00	---	72	53-121%	1	30%	
Aniline	1.85	0.200	0.400	ug/L	4	4.00	---	46	6-120%	17	30%	Q-31
4-Chloroaniline	1.50	0.100	0.200	ug/L	4	4.00	---	38	33-120%	4	30%	Q-31
2-Nitroaniline	3.49	0.800	1.60	ug/L	4	4.00	---	87	54-127%	5	30%	
3-Nitroaniline	2.96	0.800	1.60	ug/L	4	4.00	---	74	41-128%	0.5	30%	
4-Nitroaniline	4.49	0.800	1.60	ug/L	4	4.00	---	112	35-120%	1	30%	Q-41
Nitrobenzene	2.60	0.400	0.800	ug/L	4	4.00	---	65	45-121%	8	30%	
2,4-Dinitrotoluene	3.29	0.400	0.800	ug/L	4	4.00	---	82	57-128%	3	30%	
2,6-Dinitrotoluene	3.13	0.400	0.800	ug/L	4	4.00	---	78	57-124%	4	30%	



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A910893 - 01 09 20 1624
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QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100614 - EPA 3510C (Acid/Base Neutral)							Water					
LCS Dup (9100614-BSD1)							Prepared: 10/03/19 11:14 Analyzed: 10/03/19 19:37					Q-19
Benzoic acid	4.94	4.00	4.00	ug/L	4	8.00	---	62	5-120%	2	30%	Q-41
Benzyl alcohol	2.42	0.400	0.800	ug/L	4	4.00	---	61	31-120%	2	30%	
Isophorone	2.80	0.100	0.200	ug/L	4	4.00	---	70	42-124%	4	30%	
Azobenzene (1,2-DPH)	2.63	0.100	0.200	ug/L	4	4.00	---	66	61-120%	2	30%	
Bis(2-Ethylhexyl) adipate	3.36	1.00	2.00	ug/L	4	4.00	---	84	40-125%	2	30%	
3,3'-Dichlorobenzidine	7.44	2.00	4.00	ug/L	4	8.00	---	93	27-129%	2	30%	Q-31
1,2-Dinitrobenzene	3.13	1.00	2.00	ug/L	4	4.00	---	78	59-120%	5	30%	
1,3-Dinitrobenzene	3.50	1.00	2.00	ug/L	4	4.00	---	87	49-128%	3	30%	
1,4-Dinitrobenzene	3.82	1.00	2.00	ug/L	4	4.00	---	95	40-120%	4	30%	Q-41
Pyridine	0.778	0.400	0.400	ug/L	4	4.00	---	19	5-120%	16	30%	
<i>Surr: Nitrobenzene-d5 (Surr)</i>		<i>Recovery: 67 %</i>		<i>Limits: 44-120 %</i>		<i>Dilution: 4x</i>						
<i>2-Fluorobiphenyl (Surr)</i>		<i>66 %</i>		<i>44-120 %</i>		<i>"</i>						
<i>Phenol-d6 (Surr)</i>		<i>23 %</i>		<i>10-120 %</i>		<i>"</i>						
<i>p-Terphenyl-d14 (Surr)</i>		<i>79 %</i>		<i>50-133 %</i>		<i>"</i>						
<i>2-Fluorophenol (Surr)</i>		<i>34 %</i>		<i>19-120 %</i>		<i>"</i>						
<i>2,4,6-Tribromophenol (Surr)</i>		<i>77 %</i>		<i>43-140 %</i>		<i>"</i>						



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A910893 - 01 09 20 1624
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QUALITY CONTROL (QC) SAMPLE RESULTS

Total Metals by EPA 6020A (ICPMS)

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100588 - EPA 3015A												
Water												
Blank (9100588-BLK1) Prepared: 10/03/19 08:36 Analyzed: 10/03/19 18:53												
<u>EPA 6020A</u>												
Lead	ND	0.100	0.200	ug/L	1	---	---	---	---	---	---	
Blank (9100588-BLK2) Prepared: 10/03/19 08:36 Analyzed: 10/05/19 16:23												
<u>EPA 6020A</u>												
Arsenic	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	Q-16
Cadmium	ND	0.0400	0.200	ug/L	1	---	---	---	---	---	---	Q-16
Chromium	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	Q-16
Copper	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	Q-16
Nickel	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	Q-16
Selenium	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	Q-16
Silver	ND	0.100	0.200	ug/L	1	---	---	---	---	---	---	Q-16
Zinc	ND	2.00	4.00	ug/L	1	---	---	---	---	---	---	Q-16
LCS (9100588-BS1) Prepared: 10/03/19 08:36 Analyzed: 10/03/19 18:48												
<u>EPA 6020A</u>												
Lead	56.4	0.100	0.200	ug/L	1	55.6	---	101	80-120%	---	---	
LCS (9100588-BS2) Prepared: 10/03/19 08:36 Analyzed: 10/05/19 16:28												
<u>EPA 6020A</u>												
Arsenic	54.3	0.500	1.00	ug/L	1	55.6	---	98	80-120%	---	---	Q-16
Cadmium	54.5	0.0400	0.200	ug/L	1	55.6	---	98	80-120%	---	---	Q-16
Chromium	55.1	0.500	1.00	ug/L	1	55.6	---	99	80-120%	---	---	Q-16
Copper	57.9	0.500	1.00	ug/L	1	55.6	---	104	80-120%	---	---	Q-16
Nickel	59.9	0.500	1.00	ug/L	1	55.6	---	108	80-120%	---	---	Q-16
Selenium	26.7	0.500	1.00	ug/L	1	27.8	---	96	80-120%	---	---	Q-16
Silver	29.4	0.100	0.200	ug/L	1	27.8	---	106	80-120%	---	---	Q-16
Zinc	57.6	2.00	4.00	ug/L	1	55.6	---	104	80-120%	---	---	Q-16
Duplicate (9100588-DUP1) Prepared: 10/03/19 08:36 Analyzed: 10/03/19 19:16												
<u>QC Source Sample: Non-SDG (A910928-04)</u>												
Lead	1.10	0.100	0.200	ug/L	1	---	1.06	---	---	3	20%	

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Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A910893 - 01 09 20 1624
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QUALITY CONTROL (QC) SAMPLE RESULTS

Total Metals by EPA 6020A (ICPMS)

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100588 - EPA 3015A												
Water												
Duplicate (9100588-DUP2) Prepared: 10/03/19 08:36 Analyzed: 10/05/19 16:51												
<u>QC Source Sample: Non-SDG (A910928-04RE1)</u>												
Arsenic	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	20%	Q-16
Cadmium	0.291	0.0400	0.200	ug/L	1	---	0.303	---	---	4	20%	Q-16
Chromium	3.17	0.500	1.00	ug/L	1	---	3.16	---	---	0.5	20%	Q-16
Copper	2.49	0.500	1.00	ug/L	1	---	2.52	---	---	1	20%	Q-16
Nickel	3.84	0.500	1.00	ug/L	1	---	3.96	---	---	3	20%	Q-16
Silver	ND	0.100	0.200	ug/L	1	---	ND	---	---	---	20%	Q-16
Zinc	7.06	2.00	4.00	ug/L	1	---	7.02	---	---	0.6	20%	Q-16
Duplicate (9100588-DUP3) Prepared: 10/03/19 08:36 Analyzed: 10/07/19 16:37												
<u>QC Source Sample: Non-SDG (A910928-04RE2)</u>												
Selenium	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	20%	Q-16
Matrix Spike (9100588-MS1) Prepared: 10/03/19 08:36 Analyzed: 10/03/19 19:31												
<u>QC Source Sample: Non-SDG (A910928-04)</u>												
<u>EPA 6020A</u>												
Lead	58.3	0.100	0.200	ug/L	1	55.6	1.06	103	75-125%	---	---	
Matrix Spike (9100588-MS2) Prepared: 10/03/19 08:36 Analyzed: 10/03/19 20:55												
<u>QC Source Sample: Non-SDG (A9J0092-01)</u>												
<u>EPA 6020A</u>												
Lead	64.1	0.500	1.00	ug/L	5	55.6	ND	115	75-125%	---	---	
Matrix Spike (9100588-MS3) Prepared: 10/03/19 08:36 Analyzed: 10/05/19 16:56												
<u>QC Source Sample: Non-SDG (A910928-04RE1)</u>												
<u>EPA 6020A</u>												
Arsenic	53.3	0.500	1.00	ug/L	1	55.6	ND	96	75-125%	---	---	Q-16
Cadmium	55.9	0.0400	0.200	ug/L	1	55.6	0.303	100	75-125%	---	---	Q-16
Chromium	57.9	0.500	1.00	ug/L	1	55.6	3.16	99	75-125%	---	---	Q-16
Copper	59.4	0.500	1.00	ug/L	1	55.6	2.52	102	75-125%	---	---	Q-16
Nickel	61.6	0.500	1.00	ug/L	1	55.6	3.96	104	75-125%	---	---	Q-16
Silver	29.3	0.100	0.200	ug/L	1	27.8	ND	106	75-125%	---	---	Q-16

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AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A910893 - 01 09 20 1624
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QUALITY CONTROL (QC) SAMPLE RESULTS

Total Metals by EPA 6020A (ICPMS)

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100588 - EPA 3015A												
Water												
Matrix Spike (9100588-MS3) Prepared: 10/03/19 08:36 Analyzed: 10/05/19 16:56												
QC Source Sample: Non-SDG (A9I0928-04RE1)												
Zinc	63.4	2.00	4.00	ug/L	1	55.6	7.02	101	75-125%	---	---	Q-16
Matrix Spike (9100588-MS4) Prepared: 10/03/19 08:36 Analyzed: 10/05/19 17:44												
QC Source Sample: Non-SDG (A9J0092-01RE1)												
EPA 6020A												
Arsenic	77.6	2.50	5.00	ug/L	5	55.6	20.9	102	75-125%	---	---	Q-16
Cadmium	59.2	0.200	1.00	ug/L	5	55.6	ND	107	75-125%	---	---	Q-16
Chromium	56.9	2.50	5.00	ug/L	5	55.6	ND	102	75-125%	---	---	Q-16
Copper	80.5	2.50	5.00	ug/L	5	55.6	19.7	109	75-125%	---	---	Q-16
Nickel	61.5	2.50	5.00	ug/L	5	55.6	ND	111	75-125%	---	---	Q-16
Selenium	27.7	2.50	5.00	ug/L	5	27.8	ND	100	75-125%	---	---	Q-16
Silver	30.5	0.500	1.00	ug/L	5	27.8	ND	110	75-125%	---	---	Q-16
Zinc	63.6	10.0	20.0	ug/L	5	55.6	ND	115	75-125%	---	---	Q-16
Matrix Spike (9100588-MS5) Prepared: 10/03/19 08:36 Analyzed: 10/07/19 19:38												
QC Source Sample: Non-SDG (A9I0928-04RE2)												
EPA 6020A												
Selenium	26.1	0.500	1.00	ug/L	1	27.8	ND	94	75-125%	---	---	Q-16



AMENDED REPORT

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QUALITY CONTROL (QC) SAMPLE RESULTS

Total Metals by EPA 6020A (ICPMS)

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100629 - EPA 3051A												
Sediment												
Blank (9100629-BLK1) Prepared: 10/03/19 14:31 Analyzed: 10/07/19 20:11												
<u>EPA 6020A</u>												
Arsenic	ND	0.240	0.481	mg/kg wet	5	---	---	---	---	---	---	
Cadmium	ND	0.0481	0.0962	mg/kg wet	5	---	---	---	---	---	---	
Chromium	ND	0.240	0.481	mg/kg wet	5	---	---	---	---	---	---	
Copper	ND	0.240	0.481	mg/kg wet	5	---	---	---	---	---	---	
Lead	ND	0.0481	0.0962	mg/kg wet	5	---	---	---	---	---	---	
Nickel	ND	0.481	0.962	mg/kg wet	5	---	---	---	---	---	---	
Selenium	ND	0.240	0.481	mg/kg wet	5	---	---	---	---	---	---	
Silver	ND	0.0481	0.0962	mg/kg wet	5	---	---	---	---	---	---	
Zinc	ND	0.962	1.92	mg/kg wet	5	---	---	---	---	---	---	
LCS (9100629-BS1) Prepared: 10/03/19 14:31 Analyzed: 10/07/19 20:15												
<u>EPA 6020A</u>												
Arsenic	23.8	0.250	0.500	mg/kg wet	5	25.0	---	95	80-120%	---	---	
Cadmium	24.8	0.0500	0.100	mg/kg wet	5	25.0	---	99	80-120%	---	---	
Chromium	26.2	0.250	0.500	mg/kg wet	5	25.0	---	105	80-120%	---	---	
Copper	26.7	0.250	0.500	mg/kg wet	5	25.0	---	107	80-120%	---	---	
Lead	26.9	0.0500	0.100	mg/kg wet	5	25.0	---	108	80-120%	---	---	
Nickel	26.6	0.500	1.00	mg/kg wet	5	25.0	---	106	80-120%	---	---	
Selenium	11.7	0.250	0.500	mg/kg wet	5	12.5	---	94	80-120%	---	---	
Silver	13.9	0.0500	0.100	mg/kg wet	5	12.5	---	111	80-120%	---	---	
Zinc	25.3	1.00	2.00	mg/kg wet	5	25.0	---	101	80-120%	---	---	
Matrix Spike (9100629-MS1) Prepared: 10/03/19 14:31 Analyzed: 10/07/19 20:29												
<u>QC Source Sample: SE-10-2.0-3.7 (A910893-13)</u>												
<u>EPA 6020A</u>												
Arsenic	63.5	0.637	1.27	mg/kg dry	5	63.7	5.47	91	75-125%	---	---	
Cadmium	60.6	0.127	0.255	mg/kg dry	5	63.7	0.595	94	75-125%	---	---	
Chromium	92.5	0.637	1.27	mg/kg dry	5	63.7	25.2	106	75-125%	---	---	
Copper	150	0.637	1.27	mg/kg dry	5	63.7	56.1	148	75-125%	---	---	Q-04
Lead	89.2	0.127	0.255	mg/kg dry	5	63.7	24.0	102	75-125%	---	---	
Nickel	92.3	1.27	2.55	mg/kg dry	5	63.7	25.1	105	75-125%	---	---	
Selenium	29.9	0.637	1.27	mg/kg dry	5	31.8	0.667	92	75-125%	---	---	
Silver	33.1	0.127	0.255	mg/kg dry	5	31.8	0.138	104	75-125%	---	---	

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AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A910893 - 01 09 20 1624
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QUALITY CONTROL (QC) SAMPLE RESULTS

Total Metals by EPA 6020A (ICPMS)

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100629 - EPA 3051A												
Sediment												
Matrix Spike (9100629-MS1)						Prepared: 10/03/19 14:31 Analyzed: 10/07/19 20:29						
QC Source Sample: SE-10-2.0-3.7 (A910893-13)												
Zinc	135	2.55	5.09	mg/kg dry	5	63.7	71.9	99	75-125%	---	---	
Matrix Spike Dup (9100629-MSD1)						Prepared: 10/03/19 14:31 Analyzed: 10/07/19 20:33						
QC Source Sample: SE-10-2.0-3.7 (A910893-13)												
EPA 6020A												
Arsenic	68.0	0.649	1.30	mg/kg dry	5	64.9	5.47	96	75-125%	7	40%	
Cadmium	65.5	0.130	0.260	mg/kg dry	5	64.9	0.595	100	75-125%	8	40%	
Chromium	95.0	0.649	1.30	mg/kg dry	5	64.9	25.2	108	75-125%	3	40%	
Copper	124	0.649	1.30	mg/kg dry	5	64.9	56.1	105	75-125%	19	40%	
Lead	102	0.130	0.260	mg/kg dry	5	64.9	24.0	119	75-125%	13	40%	
Nickel	90.8	1.30	2.60	mg/kg dry	5	64.9	25.1	101	75-125%	2	40%	
Selenium	32.3	0.649	1.30	mg/kg dry	5	32.5	0.667	98	75-125%	8	40%	
Silver	36.2	0.130	0.260	mg/kg dry	5	32.5	0.138	111	75-125%	9	40%	
Zinc	146	2.60	5.19	mg/kg dry	5	64.9	71.9	113	75-125%	8	40%	



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QUALITY CONTROL (QC) SAMPLE RESULTS

Ammonia by Gas Diffusion and Colorimetric Detection

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100540 - Method Prep: Aq							Water					
Blank (9100540-BLK1)			Prepared: 10/02/19 09:57 Analyzed: 10/02/19 13:48									
<u>SM 4500-NH3 G</u>												
Ammonia as N	ND	0.0200	0.0200	mg/L	1	---	---	---	---	---	---	
LCS (9100540-BS1)			Prepared: 10/02/19 09:57 Analyzed: 10/02/19 13:50									
<u>SM 4500-NH3 G</u>												
Ammonia as N	2.01	0.0200	0.0200	mg/L	1	2.00	---	101	90-110%	---	---	
Matrix Spike (9100540-MS1)			Prepared: 10/02/19 09:57 Analyzed: 10/02/19 15:17									
<u>QC Source Sample: Rinsate Blank (A910893-18)</u>												
<u>SM 4500-NH3 G</u>												
Ammonia as N	2.54	0.0250	0.0250	mg/L	1	2.50	ND	101	90-110%	---	---	
Matrix Spike Dup (9100540-MSD1)			Prepared: 10/02/19 09:57 Analyzed: 10/02/19 15:18									
<u>QC Source Sample: Rinsate Blank (A910893-18)</u>												
<u>SM 4500-NH3 G</u>												
Ammonia as N	2.55	0.0250	0.0250	mg/L	1	2.50	ND	102	90-110%	0.7	10%	



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QUALITY CONTROL (QC) SAMPLE RESULTS

Ammonia by Plumb Extraction, Gas Diffusion and Colorimetric Detection

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100459 - Plumb 1981 Ammonia (Acidified KCl Leach)							Soil					
Blank (9100459-BLK1)						Prepared: 10/01/19 07:19 Analyzed: 10/02/19 13:53						
<u>Plumb/SM 4500-NH3 G</u>												
Ammonia as N	ND	0.100	0.100	mg/kg wet	1	---	---	---	---	---	---	
LCS (9100459-BS1)						Prepared: 10/01/19 07:19 Analyzed: 10/02/19 13:54						
<u>Plumb/SM 4500-NH3 G</u>												
Ammonia as N	10.5	0.100	0.100	mg/kg wet	1	10.0	---	105	80-120%	---	---	
Matrix Spike (9100459-MS1)						Prepared: 10/01/19 07:19 Analyzed: 10/02/19 14:18						
<u>QC Source Sample: SE-10-2.0-3.7 (A910893-13)</u>												
<u>Plumb/SM 4500-NH3 G</u>												
Ammonia as N	24.8	0.260	0.260	mg/kg dry	1	26.0	5.37	74	75-125%	---	---	Q-04
Matrix Spike Dup (9100459-MSD1)						Prepared: 10/01/19 07:19 Analyzed: 10/02/19 14:20						
<u>QC Source Sample: SE-10-2.0-3.7 (A910893-13)</u>												
<u>Plumb/SM 4500-NH3 G</u>												
Ammonia as N	23.5	0.256	0.256	mg/kg dry	1	25.6	5.37	71	75-125%	5	20%	Q-04



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QUALITY CONTROL (QC) SAMPLE RESULTS

Ammonia by Plumb Extraction, Gas Diffusion and Colorimetric Detection

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9101224 - Plumb 1981 Ammonia (Acidified KCl Leach)							Soil					
Blank (9101224-BLK1)						Prepared: 10/17/19 08:53 Analyzed: 10/17/19 14:07						
<u>Plumb/SM 4500-NH3 G</u>												
Ammonia as N	ND	0.100	0.100	mg/kg wet	1	---	---	---	---	---	---	
LCS (9101224-BS1)						Prepared: 10/17/19 08:53 Analyzed: 10/17/19 14:09						
<u>Plumb/SM 4500-NH3 G</u>												
Ammonia as N	10.8	0.100	0.100	mg/kg wet	1	10.0	---	108	80-120%	---	---	
Matrix Spike (9101224-MS1)						Prepared: 10/17/19 08:53 Analyzed: 10/17/19 14:24						
<u>QC Source Sample: SE-03A-0-1.0 (A910893-05)</u>												
<u>Plumb/SM 4500-NH3 G</u>												
Ammonia as N	189	2.14	2.14	mg/kg dry	10	21.4	168	95	75-125%	---	---	H-06
Matrix Spike Dup (9101224-MSD1)						Prepared: 10/17/19 08:53 Analyzed: 10/17/19 14:25						
<u>QC Source Sample: SE-03A-0-1.0 (A910893-05)</u>												
<u>Plumb/SM 4500-NH3 G</u>												
Ammonia as N	187	2.11	2.11	mg/kg dry	10	21.1	168	90	75-125%	0.7	20%	H-06

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QUALITY CONTROL (QC) SAMPLE RESULTS

Demand Parameters

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100512 - PSEP-5310B TOC						Sediment						
Blank (9100512-BLK1)			Prepared: 10/01/19 08:13 Analyzed: 10/08/19 08:35									
<u>EPA 9060Amod</u>												
Total Organic Carbon	ND	200	200	mg/kg	1	---	---	---	---	---	---	
LCS (9100512-BS1)			Prepared: 10/01/19 08:13 Analyzed: 10/08/19 08:50									
<u>EPA 9060Amod</u>												
Total Organic Carbon	10000			mg/kg	1	10000	---	104	90-110%	---	---	
Duplicate (9100512-DUP1)			Prepared: 10/01/19 08:13 Analyzed: 10/08/19 11:06									
<u>QC Source Sample: SE-10-2.0-3.7 (A910893-13)</u>												
<u>EPA 9060Amod</u>												
Total Organic Carbon	62000	200	200	mg/kg	1	---	79000	---	---	23	20%	Q-04

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QUALITY CONTROL (QC) SAMPLE RESULTS

Demand Parameters

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9101222 - PSEP-5310B TOC						Sediment						
Blank (9101222-BLK1)			Prepared: 10/17/19 08:57 Analyzed: 10/22/19 23:52									
<u>EPA 9060Amod</u>												
Total Organic Carbon	ND	200	200	mg/kg	1	---	---	---	---	---	---	
LCS (9101222-BS1)			Prepared: 10/17/19 08:57 Analyzed: 10/23/19 00:02									
<u>EPA 9060Amod</u>												
Total Organic Carbon	9900			mg/kg	1	10000	---	99	90-110%	---	---	
Duplicate (9101222-DUP2)			Prepared: 10/17/19 08:57 Analyzed: 10/23/19 01:52									
<u>QC Source Sample: Non-SDG (A9J0277-01)</u>												
Total Organic Carbon	8100	200	200	mg/kg	1	---	8800	---	---	8	20%	
Duplicate (9101222-DUP3)			Prepared: 10/17/19 08:57 Analyzed: 10/23/19 02:02									
<u>QC Source Sample: Non-SDG (A9J0277-01)</u>												
Total Organic Carbon	8800	200	200	mg/kg	1	---	8800	---	---	0.5	20%	
Duplicate (9101222-DUP4)			Prepared: 10/17/19 08:57 Analyzed: 10/23/19 12:25									
<u>QC Source Sample: SE-01A-1.0-2.0 (A9I0893-01RE1)</u>												
<u>EPA 9060Amod</u>												
Total Organic Carbon	43000	200	200	mg/kg	1	---	44000	---	---	2	20%	Q-16

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QUALITY CONTROL (QC) SAMPLE RESULTS

Total Organic Carbon (Non-Purgeable) by Persulfate Oxidation by Standard Method 5310C

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9091432 - Method Prep: Aq						Water						
Blank (9091432-BLK1)						Prepared: 09/30/19 09:22 Analyzed: 10/01/19 06:30						
<u>SM 5310 C</u>												
Total Organic Carbon	ND	1.00	1.00	mg/L	1	---	---	---	---	---	---	
LCS (9091432-BS1)						Prepared: 09/30/19 09:22 Analyzed: 10/01/19 07:00						
<u>SM 5310 C</u>												
Total Organic Carbon	9.73	1.00	1.00	mg/L	1	10.0	---	97	85-115%	---	---	
Duplicate (9091432-DUP1)						Prepared: 09/30/19 09:22 Analyzed: 10/01/19 07:59						
<u>QC Source Sample: Non-SDG (A910814-01)</u>												
Total Organic Carbon	1.72	1.00	1.00	mg/L	1	---	1.70	---	---	0.6	10%	
Matrix Spike (9091432-MS1)						Prepared: 09/30/19 09:22 Analyzed: 10/01/19 08:28						
<u>QC Source Sample: Non-SDG (A910814-01)</u>												
<u>SM 5310 C</u>												
Total Organic Carbon	11.5	1.01	1.01	mg/L	1	10.0	1.70	98	85-115%	---	---	



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QUALITY CONTROL (QC) SAMPLE RESULTS

Solid and Moisture Determinations

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9091443 - Total Solids (SM2540G/PSEP)						Sediment						
Duplicate (9091443-DUP1)			Prepared: 09/30/19 10:56 Analyzed: 10/01/19 13:08									
QC Source Sample: Non-SDG (A910822-02)												
Total Solids	48.6	1.00	1.00	%	1	---	42.9	---	---	12	20%	

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AMENDED REPORT

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QUALITY CONTROL (QC) SAMPLE RESULTS

Solid and Moisture Determinations

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9091474 - Total Volatile Solids (non-aq)							Solid					
Duplicate (9091474-DUP1)					Prepared: 09/30/19 17:28 Analyzed: 10/02/19 15:31							
QC Source Sample: Non-SDG (A910822-02)												
Total Volatile Solids	20.6	1.00	1.00	%	1	---	27.4	---	---	28	10%	Q-04

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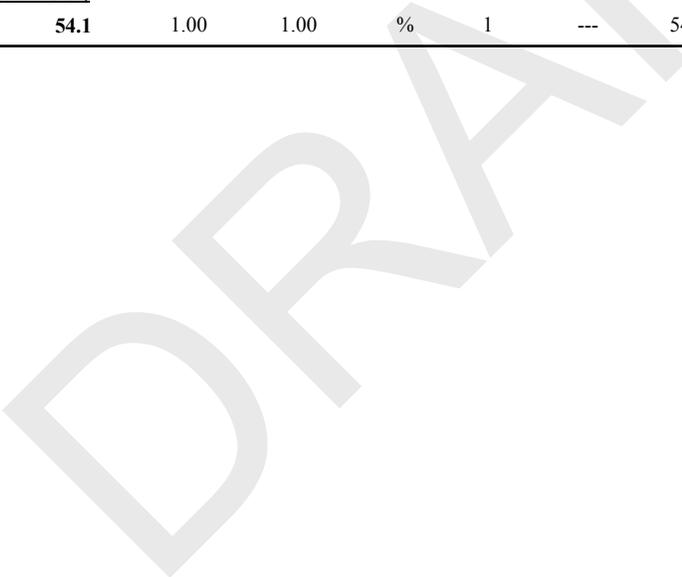
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QUALITY CONTROL (QC) SAMPLE RESULTS

Solid and Moisture Determinations

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9101195 - Total Solids (SM2540G/PSEP)						Sediment						
Duplicate (9101195-DUP1)			Prepared: 10/16/19 15:47 Analyzed: 10/17/19 03:40									
<u>QC Source Sample: SE-01A-1.0-2.0 (A910893-01)</u>												
<u>PSEP 1986</u>												
Total Solids	51.8	1.00	1.00	%	1	---	51.9	---	---	0.2	20%	
Duplicate (9101195-DUP2)			Prepared: 10/16/19 15:47 Analyzed: 10/17/19 03:40									
<u>QC Source Sample: Non-SDG (A9J0371-17)</u>												
Total Solids	54.1	1.00	1.00	%	1	---	54.0	---	---	0.2	20%	



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QUALITY CONTROL (QC) SAMPLE RESULTS

Solid and Moisture Determinations

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9101266 - Total Volatile Solids (non-aq)							Solid					
Duplicate (9101266-DUP1)					Prepared: 10/17/19 13:32 Analyzed: 10/17/19 17:08							
QC Source Sample: SE-01A-1.0-2.0 (A910893-01)												
SM 2540 G												
Total Volatile Solids	11.1	1.00	1.00	%	1	---	11.9	---	---	6	10%	

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QUALITY CONTROL (QC) SAMPLE RESULTS

Percent Dry Weight

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9091443 - Total Solids (SM2540G/PSEP)						Sediment						
Duplicate (9091443-DUP1)			Prepared: 09/30/19 10:56 Analyzed: 10/01/19 13:08									
QC Source Sample: Non-SDG (A910822-02)												
% Solids	48.6	1.00	1.00	%	1	---	42.9	---	---	12	10%	Q-04

No Client related Batch QC samples analyzed for this batch. See notes page for more information.

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QUALITY CONTROL (QC) SAMPLE RESULTS

Percent Dry Weight

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9101195 - Total Solids (SM2540G/PSEP)						Sediment						
Duplicate (9101195-DUP1)			Prepared: 10/16/19 15:47 Analyzed: 10/17/19 03:40									
<u>QC Source Sample: SE-01A-1.0-2.0 (A910893-01)</u>												
<u>EPA 8000C</u>												
% Solids	51.8	1.00	1.00	%	1	---	51.9	---	---	0.2	10%	
Duplicate (9101195-DUP2)			Prepared: 10/16/19 15:47 Analyzed: 10/17/19 03:40									
<u>QC Source Sample: Non-SDG (A9J0371-17)</u>												
% Solids	54.1	1.00	1.00	%	1	---	54.0	---	---	0.2	10%	

No Client related Batch QC samples analyzed for this batch. See notes page for more information.



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QUALITY CONTROL (QC) SAMPLE RESULTS

Percent Dry Weight

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9101585 - Total Solids (Dry Weight)							Soil					
Duplicate (9101585-DUP1)			Prepared: 10/25/19 08:44 Analyzed: 10/28/19 07:41									
<u>QC Source Sample: SE-30-2.5-4.5---Air Dried (A910893-22)</u>												
<u>EPA 8000C</u>												
% Solids	92.7	1.00	1.00	%	1	---	92.6	---	---	0.09	10%	
Duplicate (9101585-DUP2)			Prepared: 10/25/19 08:44 Analyzed: 10/28/19 07:41									
<u>QC Source Sample: Non-SDG (A9J0894-01)</u>												
% Solids	71.6	1.00	1.00	%	1	---	72.1	---	---	0.8	10%	
Duplicate (9101585-DUP3)			Prepared: 10/25/19 08:44 Analyzed: 10/28/19 07:41									
<u>QC Source Sample: Non-SDG (A9J0896-01)</u>												
% Solids	91.2	1.00	1.00	%	1	---	91.7	---	---	0.5	10%	
Duplicate (9101585-DUP4)			Prepared: 10/25/19 08:44 Analyzed: 10/28/19 07:41									
<u>QC Source Sample: Non-SDG (A9J0922-01)</u>												
% Solids	78.0	1.00	1.00	%	1	---	79.1	---	---	2	10%	
Duplicate (9101585-DUP5)			Prepared: 10/25/19 17:55 Analyzed: 10/28/19 07:41									
<u>QC Source Sample: Non-SDG (A9J0958-01)</u>												
% Solids	85.0	1.00	1.00	%	1	---	85.7	---	---	0.8	10%	
Duplicate (9101585-DUP6)			Prepared: 10/25/19 17:55 Analyzed: 10/28/19 07:41									
<u>QC Source Sample: Non-SDG (A9J0964-02)</u>												
% Solids	80.5	1.00	1.00	%	1	---	80.2	---	---	0.3	10%	

No Client related Batch QC samples analyzed for this batch. See notes page for more information.

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Analytical Resources, Inc.

QUALITY CONTROL (QC) SAMPLE RESULTS

Metals and Metallic Compounds

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch BHJ0100 - TWM EPA 7470A						Water						
Blank (BHJ0100-BLK1)						Prepared: 10/03/19 10:48 Analyzed: 10/04/19 11:17						
<u>EPA 7470A</u>												
Mercury	ND	0.000013	0.000100	mg/L	1	---	---	---	---	---	---	U
LCS (BHJ0100-BS1)						Prepared: 10/03/19 10:48 Analyzed: 10/04/19 11:19						
<u>EPA 7470A</u>												
Mercury	0.00216	0.000013	0.000100	mg/L	1	0.0020000	---	108	80-120%	---	---	

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AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A910893 - 01 09 20 1624
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Analytical Resources, Inc.

QUALITY CONTROL (QC) SAMPLE RESULTS

Metals and Metallic Compounds

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch BHJ0281 - SMM EPA 7471B						Solid						
Blank (BHJ0281-BLK1)			Prepared: 10/09/19 15:55 Analyzed: 10/10/19 15:36									
<u>EPA 7471B</u>												
Mercury	ND	0.00525	0.0250	mg/kg wet	1	---	---	---	---	---	---	U
LCS (BHJ0281-BS1)			Prepared: 10/09/19 15:55 Analyzed: 10/10/19 15:43									
<u>EPA 7471B</u>												
Mercury	0.468	0.00525	0.0250	mg/kg wet	1	0.50000	---	93.7	80-120%	---	---	
Duplicate (BHJ0281-DUP1)			Prepared: 10/09/19 15:55 Analyzed: 10/10/19 15:47									
<u>QC Source Sample: A910893-13 (A910893-13)</u>												
<u>EPA 7471B</u>												
Mercury	0.135	0.0110	0.0526	mg/kg dry	1	---	0.129	---	---	4.92	20%	
Matrix Spike (BHJ0281-MS1)			Prepared: 10/09/19 15:55 Analyzed: 10/10/19 15:50									
<u>QC Source Sample: A910893-13 (A910893-13)</u>												
<u>EPA 7471B</u>												
Mercury	0.852	0.0109	0.0520	mg/kg dry	1	0.52003	0.129	139	75-125%	---	---	*
Matrix Spike Dup (BHJ0281-MSD1)			Prepared: 10/09/19 15:55 Analyzed: 10/10/19 15:52									
<u>QC Source Sample: A910893-13 (A910893-13)</u>												
<u>EPA 7471B</u>												
Mercury	0.775	0.0111	0.0530	mg/kg dry	1	0.53023	0.129	122	75-125%	9.49	20%	

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AMENDED REPORT

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Analytical Resources, Inc.

QUALITY CONTROL (QC) SAMPLE RESULTS

TCLP Metals and Metallic Compounds

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch BHJ0442 - LEN Digestion of EPA 1311 Elutriate							Solid					
Blank (BHJ0442-BLK1)			Prepared: 10/15/19 08:09 Analyzed: 10/16/19 16:28									
<u>EPA 6010C</u>												
Lead	ND	0.0065	0.100	mg/L	5	---	---	---	---	---	---	U
Duplicate (BHJ0442-DUP1)			Prepared: 10/15/19 08:09 Analyzed: 10/16/19 16:50									
<u>QC Source Sample: A910893-13 (A910893-13)</u>												
<u>EPA 6010C</u>												
Lead	ND	0.0065	0.100	mg/L	5	---	ND	---	---	---	20%	U
Matrix Spike (BHJ0442-MS1)			Prepared: 10/15/19 08:09 Analyzed: 10/16/19 16:55									
<u>QC Source Sample: A910893-13 (A910893-13)</u>												
<u>EPA 6010C</u>												
Lead	3.95	0.0065	0.100	mg/L	5	4.0000	ND	98.6	75-125%	---	---	
Matrix Spike Dup (BHJ0442-MSD1)			Prepared: 10/15/19 08:09 Analyzed: 10/16/19 17:00									
<u>QC Source Sample: A910893-13 (A910893-13)</u>												
<u>EPA 6010C</u>												
Lead	3.61	0.0065	0.100	mg/L	5	4.0000	ND	90.3	75-125%	8.77	20%	



AMENDED REPORT

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Analytical Resources, Inc.

QUALITY CONTROL (QC) SAMPLE RESULTS

TCLP Metals and Metallic Compounds

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch BHJ0444 - LEM 7470A Digestion of EPA 1311 Elutriate for Hg							Solid					
Blank (BHJ0444-BLK1)			Prepared: 10/15/19 08:13 Analyzed: 10/17/19 11:58									
<u>EPA 7470A</u>												
Mercury	ND	0.000007	0.000100	mg/L	1	---	---	---	---	---	---	U
Duplicate (BHJ0444-DUP1)			Prepared: 10/15/19 08:13 Analyzed: 10/17/19 12:03									
<u>QC Source Sample: A910893-13 (A910893-13)</u>												
<u>EPA 7470A</u>												
Mercury	ND	0.000007	0.000100	mg/L	1	---	ND	---	---	---	20%	U
Matrix Spike (BHJ0444-MS1)			Prepared: 10/15/19 08:13 Analyzed: 10/17/19 12:05									
<u>QC Source Sample: A910893-13 (A910893-13)</u>												
<u>EPA 7470A</u>												
Mercury	0.00113	0.000007	0.000100	mg/L	1	0.0010000	ND	113	75-125%	---	---	
Matrix Spike Dup (BHJ0444-MSD1)			Prepared: 10/15/19 08:13 Analyzed: 10/17/19 12:07									
<u>QC Source Sample: A910893-13 (A910893-13)</u>												
<u>EPA 7470A</u>												
Mercury	0.00116	0.000007	0.000100	mg/L	1	0.0010000	ND	116	75-125%	3.07	20%	



AMENDED REPORT

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Analytical Resources, Inc.

QUALITY CONTROL (QC) SAMPLE RESULTS

Wet Chemistry

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch BHJ0036 - No Prep Wet Chem						Solid						
Blank (BHJ0036-BLK1)						Prepared: 10/01/19 21:48 Analyzed: 10/01/19 23:14						
<u>PSEP 1986</u>												
Total Solids, Sulfide	ND	0.04	0.04	%	1	---	---	---	---	---	---	U
Duplicate (BHJ0036-DUP1)						Prepared: 10/01/19 21:48 Analyzed: 10/01/19 23:14						
<u>QC Source Sample: A910893-13 (A910893-13)</u>												
<u>PSEP 1986</u>												
Total Solids, Sulfide	32.82	0.04	0.04	%	1	---	33.04	---	---	0.682	20%	



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Analytical Resources, Inc.

QUALITY CONTROL (QC) SAMPLE RESULTS

Wet Chemistry

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch BHJ0054 - EPA 9030B							Solid					
Blank (BHJ0054-BLK1)			Prepared: 10/02/19 11:07 Analyzed: 10/03/19 15:34									
<u>SM 4500-S2 D-00</u>												
Sulfide	ND	1.00	1.00	mg/kg wet	1	---	---	---	---	---	---	U
LCS (BHJ0054-BS1)			Prepared: 10/02/19 11:07 Analyzed: 10/03/19 15:49									
<u>SM 4500-S2 D-00</u>												
Sulfide	148	10.0	10.0	mg/kg wet	10	175.20	---	84.4	75-125%	---	---	D
Duplicate (BHJ0054-DUP1)			Prepared: 10/02/19 11:07 Analyzed: 10/03/19 15:55									
<u>QC Source Sample: A910893-13 (A910893-13)</u>												
<u>SM 4500-S2 D-00</u>												
Sulfide	318	57.2	57.2	mg/kg dry	20	---	228	---	---	32.8	20%	*, D
Duplicate (BHJ0054-DUP2)			Prepared: 10/02/19 11:07 Analyzed: 10/04/19 15:28									
<u>QC Source Sample: A910893-13 (A910893-13)</u>												
<u>SM 4500-S2 D-00</u>												
Sulfide	267	57.2	57.2	mg/kg dry	20	---	228	---	---	15.8	20%	D
Matrix Spike (BHJ0054-MS1)			Prepared: 10/02/19 11:07 Analyzed: 10/03/19 15:55									
<u>QC Source Sample: A910893-13 (A910893-13)</u>												
<u>SM 4500-S2 D-00</u>												
Sulfide	581	55.0	55.0	mg/kg dry	20	481.65	228	73.2	75-125%	---	---	*, D
Matrix Spike Dup (BHJ0054-MSD1)			Prepared: 10/02/19 11:07 Analyzed: 10/03/19 15:58									
<u>QC Source Sample: A910893-13 (A910893-13)</u>												
<u>SM 4500-S2 D-00</u>												
Sulfide	322	50.8	50.8	mg/kg dry	20	444.58	228	21.0	75-125%	57.4	200%	*, D

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AMENDED REPORT

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QUALITY CONTROL (QC) SAMPLE RESULTS

Wet Chemistry

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch BHJ0097 - No Prep Wet Chem						Water						
Blank (BHJ0097-BLK1)						Prepared: 10/03/19 10:17 Analyzed: 10/03/19 13:46						
<u>SM 4500-S2 D-00</u>												
Sulfide	ND	0.050	0.050	mg/L	1	---	---	---	---	---	---	U
LCS (BHJ0097-BS1)						Prepared: 10/03/19 10:17 Analyzed: 10/03/19 13:46						
<u>SM 4500-S2 D-00</u>												
Sulfide	0.521	0.050	0.050	mg/L	1	0.49756	---	105	75-125%	---	---	
Duplicate (BHJ0097-DUP1)						Prepared: 10/03/19 10:17 Analyzed: 10/03/19 13:47						
<u>QC Source Sample: A910893-18 (A910893-18)</u>												
<u>SM 4500-S2 D-00</u>												
Sulfide	ND	0.050	0.050	mg/L	1	---	ND	---	---	---	20%	U
Matrix Spike (BHJ0097-MS1)						Prepared: 10/03/19 10:17 Analyzed: 10/03/19 13:47						
<u>QC Source Sample: A910893-18 (A910893-18)</u>												
<u>SM 4500-S2 D-00</u>												
Sulfide	0.491	0.050	0.050	mg/L	1	0.49756	ND	98.7	75-125%	---	---	



AMENDED REPORT

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Analytical Resources, Inc.

QUALITY CONTROL (QC) SAMPLE RESULTS

Wet Chemistry

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch BHJ0145 - No Prep Wet Chem						Water						
Blank (BHJ0145-BLK1)						Prepared: 10/04/19 13:20 Analyzed: 10/04/19 14:49						
<u>SM 4500-S2 D-00</u>												
Sulfide	ND	0.050	0.050	mg/L	1	---	---	---	---	---	---	U
LCS (BHJ0145-BS1)						Prepared: 10/04/19 13:20 Analyzed: 10/04/19 14:49						
<u>SM 4500-S2 D-00</u>												
Sulfide	0.509	0.050	0.050	mg/L	1	0.50250	---	101	75-125%	---	---	
Matrix Spike (BHJ0145-MS7)						Prepared: 10/04/19 13:20 Analyzed: 10/04/19 14:56						
<u>QC Source Sample: A910893-19 (A910893-19)</u>												
<u>SM 4500-S2 D-00</u>												
Sulfide	0.345	0.050	0.050	mg/L	1	0.50250	0.059	56.9	75-125%	---	---	*, H

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AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A910893 - 01 09 20 1624
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SAMPLE PREPARATION INFORMATION

Diesel and/or Oil Hydrocarbons by NWTPH-Dx with Acid/Silica Gel Cleanup

Prep: EPA 3510C (Fuels/Acid Ext.) w/Silica Gel + Acid

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
<u>Batch: 9101263</u>							
A910893-18	Water	NWTPH-Dx/SG	09/26/19 18:40	10/01/19 15:39	900mL/5mL	1000mL/5mL	1.11

Prep: EPA 3546 w/SG+Acid (NWTPH)

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
<u>Batch: 9101200</u>							
A910893-08	Sediment	NWTPH-Dx/SG	09/25/19 18:15	10/03/19 13:22	10.18g/5mL	10g/5mL	0.98
A910893-13	Sediment	NWTPH-Dx/SG	09/26/19 13:50	10/03/19 13:22	10.12g/5mL	10g/5mL	0.99
A910893-14	Sediment	NWTPH-Dx/SG	09/26/19 15:40	10/03/19 13:22	10.17g/5mL	10g/5mL	0.98

Gasoline Range Hydrocarbons (Benzene through Naphthalene) by NWTPH-Gx

Prep: EPA 5030B

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
<u>Batch: 9091419</u>							
A910893-18	Water	NWTPH-Gx (MS)	09/26/19 18:40	09/28/19 20:41	5mL/5mL	5mL/5mL	1.00

Prep: EPA 5035A

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
<u>Batch: 9091416</u>							
A910893-08	Sediment	NWTPH-Gx (MS)	09/25/19 18:15	09/25/19 18:15	3.73g/5mL	5g/5mL	1.34
A910893-13	Sediment	NWTPH-Gx (MS)	09/26/19 13:50	09/26/19 13:50	4.2g/5mL	5g/5mL	1.19
A910893-14	Sediment	NWTPH-Gx (MS)	09/26/19 15:40	09/26/19 15:40	5.04g/5mL	5g/5mL	0.99

Polychlorinated Biphenyls by EPA 8082A

Prep: EPA 3510C (Neutral pH)

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
<u>Batch: 9091465</u>							
A910893-18	Water	EPA 8082A	09/26/19 18:40	09/30/19 15:11	890mL/5mL	1000mL/5mL	1.12

Prep: EPA 3546

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
<u>Batch: 9101592</u>							
A910893-20	Sediment	EPA 8082A	09/25/19 18:15	10/25/19 10:03	10.28g/2mL	10g/2mL	0.97
A910893-21	Sediment	EPA 8082A	09/26/19 13:50	10/25/19 10:03	10.2g/2mL	10g/2mL	0.98

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AMENDED REPORT

Maul Foster & Alongi, INC.
2001 NW 19th Ave, STE 200
Portland, OR 97209

Project: **Seaport Tideland**
Project Number: **1044.02.06-02**
Project Manager: **Emily Hess**

Report ID:
A910893 - 01 09 20 1624

SAMPLE PREPARATION INFORMATION

Polychlorinated Biphenyls by EPA 8082A

Prep: EPA 3546

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
A910893-22	Sediment	EPA 8082A	09/26/19 15:40	10/25/19 10:03	10.45g/2mL	10g/2mL	0.96

Semivolatile Organic Compounds by EPA 8270D

Prep: EPA 3510C (Acid/Base Neutral)

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
Batch: 9100614							
A910893-18RE1	Water	EPA 8270D	09/26/19 18:40	10/03/19 11:14	840mL/1mL	1000mL/1mL	1.19

Prep: EPA 3546

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
Batch: 9100490							
A910893-08RE1	Sediment	EPA 8270D	09/25/19 18:15	10/01/19 10:34	15.14g/2mL	15g/2mL	0.99
A910893-13RE1	Sediment	EPA 8270D	09/26/19 13:50	10/01/19 10:34	15.31g/2mL	15g/2mL	0.98
A910893-14RE1	Sediment	EPA 8270D	09/26/19 15:40	10/01/19 10:34	15.24g/2mL	15g/2mL	0.98

Total Metals by EPA 6020A (ICPMS)

Prep: EPA 3015A

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
Batch: 9100588							
A910893-18	Water	EPA 6020A	09/26/19 18:40	10/03/19 08:36	45mL/50mL	45mL/50mL	1.00
A910893-18RE1	Water	EPA 6020A	09/26/19 18:40	10/03/19 08:36	45mL/50mL	45mL/50mL	1.00

Prep: EPA 3051A

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
Batch: 9100629							
A910893-08	Sediment	EPA 6020A	09/25/19 18:15	10/03/19 14:31	0.507g/50mL	0.5g/50mL	0.99
A910893-13	Sediment	EPA 6020A	09/26/19 13:50	10/03/19 14:31	0.51g/50mL	0.5g/50mL	0.98
A910893-14	Sediment	EPA 6020A	09/26/19 15:40	10/03/19 14:31	0.488g/50mL	0.5g/50mL	1.02

Ammonia by Gas Diffusion and Colorimetric Detection

Prep: Method Prep: Aq

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
Batch: 9100540							
A910893-18	Water	SM 4500-NH3 G	09/26/19 18:40	10/02/19 09:57	10mL/10mL	10mL/10mL	1.00

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AMENDED REPORT

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SAMPLE PREPARATION INFORMATION

Ammonia by Gas Diffusion and Colorimetric Detection

Prep: Method Prep: Ag					Sample	Default	RL Prep
Lab Number	Matrix	Method	Sampled	Prepared	Initial/Final	Initial/Final	Factor

Ammonia by Plumb Extraction, Gas Diffusion and Colorimetric Detection

Prep: Plumb 1981 Ammonia (Acidified KCl Leach)					Sample	Default	RL Prep
Lab Number	Matrix	Method	Sampled	Prepared	Initial/Final	Initial/Final	Factor
<u>Batch: 9100459</u>							
A910893-08	Sediment	Plumb/SM 4500-NH3 G	09/25/19 18:15	10/01/19 07:19	10.7943g/50mL	10g/50mL	0.93
A910893-13	Sediment	Plumb/SM 4500-NH3 G	09/26/19 13:50	10/01/19 07:19	10.4754g/50mL	10g/50mL	0.96
A910893-14	Sediment	Plumb/SM 4500-NH3 G	09/26/19 15:40	10/01/19 07:19	10.5133g/50mL	10g/50mL	0.95
<u>Batch: 9101224</u>							
A910893-01	Sediment	Plumb/SM 4500-NH3 G	09/25/19 08:10	10/17/19 08:53	10.0937g/50mL	10g/50mL	0.99
A910893-05	Sediment	Plumb/SM 4500-NH3 G	09/25/19 11:20	10/17/19 08:53	10.3432g/50mL	10g/50mL	0.97
A910893-07	Sediment	Plumb/SM 4500-NH3 G	09/25/19 14:15	10/17/19 08:53	10.4776g/50mL	10g/50mL	0.95
A910893-09RE1	Sediment	Plumb/SM 4500-NH3 G	09/26/19 08:15	10/17/19 08:53	10.445g/50mL	10g/50mL	0.96
A910893-11	Sediment	Plumb/SM 4500-NH3 G	09/26/19 11:50	10/17/19 08:53	10.3005g/50mL	10g/50mL	0.97

Demand Parameters

Prep: PSEP-5310B TOC					Sample	Default	RL Prep
Lab Number	Matrix	Method	Sampled	Prepared	Initial/Final	Initial/Final	Factor
<u>Batch: 9100512</u>							
A910893-08	Sediment	EPA 9060Amod	09/25/19 18:15	10/01/19 08:13			NA
A910893-13	Sediment	EPA 9060Amod	09/26/19 13:50	10/01/19 08:13			NA
A910893-14	Sediment	EPA 9060Amod	09/26/19 15:40	10/01/19 08:13			NA
<u>Batch: 9101222</u>							
A910893-01RE1	Sediment	EPA 9060Amod	09/25/19 08:10	10/17/19 08:03			NA
A910893-05	Sediment	EPA 9060Amod	09/25/19 11:20	10/17/19 08:57			NA
A910893-07	Sediment	EPA 9060Amod	09/25/19 14:15	10/17/19 08:57			NA
A910893-09	Sediment	EPA 9060Amod	09/26/19 08:15	10/17/19 08:57			NA
A910893-11	Sediment	EPA 9060Amod	09/26/19 11:50	10/17/19 08:57			NA

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AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A910893 - 01 09 20 1624
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SAMPLE PREPARATION INFORMATION

Demand Parameters

Total Organic Carbon (Non-Purgeable) by Persulfate Oxidation by Standard Method 5310C

Prep: Method Prep: Ag

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
Batch: 9091432							
A910893-18	Water	SM 5310 C	09/26/19 18:40	09/30/19 09:22	40mL/40mL	40mL/40mL	1.00

Solid and Moisture Determinations

Prep: Total Solids (SM2540G/PSEP)

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
Batch: 9091443							
A910893-08	Sediment	PSEP 1986	09/25/19 18:15	09/30/19 10:56			NA
A910893-13	Sediment	PSEP 1986	09/26/19 13:50	09/30/19 10:56			NA
A910893-14	Sediment	PSEP 1986	09/26/19 15:40	09/30/19 10:56			NA
Batch: 9101195							
A910893-01	Sediment	PSEP 1986	09/25/19 08:10	10/16/19 15:47			NA
A910893-05	Sediment	PSEP 1986	09/25/19 11:20	10/16/19 15:47			NA
A910893-07	Sediment	PSEP 1986	09/25/19 14:15	10/16/19 15:47			NA
A910893-09	Sediment	PSEP 1986	09/26/19 08:15	10/16/19 15:47			NA
A910893-11	Sediment	PSEP 1986	09/26/19 11:50	10/16/19 15:47			NA

Prep: Total Volatile Solids (non-aq)

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
Batch: 9091474							
A910893-08	Sediment	SM 2540 G	09/25/19 18:15	09/30/19 17:28			NA
A910893-13	Sediment	SM 2540 G	09/26/19 13:50	09/30/19 17:28			NA
A910893-14	Sediment	SM 2540 G	09/26/19 15:40	09/30/19 17:28			NA
Batch: 9101266							
A910893-01	Sediment	SM 2540 G	09/25/19 08:10	10/16/19 10:12			NA
A910893-05	Sediment	SM 2540 G	09/25/19 11:20	10/16/19 10:12			NA
A910893-07	Sediment	SM 2540 G	09/25/19 14:15	10/16/19 10:12			NA
A910893-09	Sediment	SM 2540 G	09/26/19 08:15	10/16/19 10:12			NA
A910893-11	Sediment	SM 2540 G	09/26/19 11:50	10/16/19 10:12			NA

Grain Size by ASTM D 422m/PSET Parameters

Apex Laboratories

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Philip Nerenberg, Lab Director



AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
 Tigard, OR 97223
 503-718-2323
 EPA ID: OR01039

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A910893 - 01 09 20 1624
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SAMPLE PREPARATION INFORMATION

Grain Size by ASTM D 422m/PSET Parameters

<u>Prep: ASTM D 421</u>					Sample	Default	RL Prep
Lab Number	Matrix	Method	Sampled	Prepared	Initial/Final	Initial/Final	Factor
<u>Batch: 9100739</u>							
A910893-08	Sediment	D422mod	09/25/19 18:15	10/09/19 10:31			NA
A910893-13	Sediment	D422mod	09/26/19 13:50	10/07/19 11:26			NA
A910893-14	Sediment	D422mod	09/26/19 15:40	10/07/19 11:48			NA

Percent Dry Weight

<u>Prep: Total Solids (Dry Weight)</u>					Sample	Default	RL Prep
Lab Number	Matrix	Method	Sampled	Prepared	Initial/Final	Initial/Final	Factor
<u>Batch: 9101585</u>							
A910893-20	Sediment	EPA 8000C	09/25/19 18:15	10/25/19 08:44			NA
A910893-21	Sediment	EPA 8000C	09/26/19 13:50	10/25/19 08:44			NA
A910893-22	Sediment	EPA 8000C	09/26/19 15:40	10/25/19 08:44			NA

<u>Prep: Total Solids (SM2540G/PSEP)</u>					Sample	Default	RL Prep
Lab Number	Matrix	Method	Sampled	Prepared	Initial/Final	Initial/Final	Factor
<u>Batch: 9091443</u>							
A910893-08	Sediment	EPA 8000C	09/25/19 18:15	09/30/19 10:56			NA
A910893-13	Sediment	EPA 8000C	09/26/19 13:50	09/30/19 10:56			NA
A910893-14	Sediment	EPA 8000C	09/26/19 15:40	09/30/19 10:56			NA
<u>Batch: 9101195</u>							
A910893-01	Sediment	EPA 8000C	09/25/19 08:10	10/16/19 15:47			NA
A910893-05	Sediment	EPA 8000C	09/25/19 11:20	10/16/19 15:47			NA
A910893-07	Sediment	EPA 8000C	09/25/19 14:15	10/16/19 15:47			NA
A910893-09	Sediment	EPA 8000C	09/26/19 08:15	10/16/19 15:47			NA
A910893-11	Sediment	EPA 8000C	09/26/19 11:50	10/16/19 15:47			NA

Apex Laboratories

Philip Nerenberg, Lab Director

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AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A910893 - 01 09 20 1624
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Analytical Resources, Inc.

SAMPLE PREPARATION INFORMATION

Metals and Metallic Compounds

Prep: SMM EPA 7471B

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
Batch: BHJ0281							
A910893-08	Sediment	EPA 7471B	09/25/19 18:15	10/09/19 15:55	0.206g/50mL	0.2g/50mL	0.97
A910893-09	Sediment	EPA 7471B	09/26/19 08:15	10/09/19 15:55	0.232g/50mL	0.2g/50mL	0.86
A910893-11	Sediment	EPA 7471B	09/26/19 11:50	10/09/19 15:55	0.213g/50mL	0.2g/50mL	0.94
A910893-13	Sediment	EPA 7471B	09/26/19 13:50	10/09/19 15:55	0.258g/50mL	0.2g/50mL	0.78
A910893-14	Sediment	EPA 7471B	09/26/19 15:40	10/09/19 15:55	0.269g/50mL	0.2g/50mL	0.74

Prep: TWM EPA 7470A

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
Batch: BHJ0100							
A910893-18	Water	EPA 7470A	09/26/19 18:40	10/03/19 10:48	20mL/20mL	20mL/20mL	1.00

TCLP Metals and Metallic Compounds

Prep: LEM 7470A Digestion of EPA 1311 Elutriate for Hg

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
Batch: BHJ0444							
A910893-13	Sediment	EPA 7470A	09/26/19 13:50	10/15/19 08:13	20mL/20mL	20mL/20mL	1.00
A910893-14	Sediment	EPA 7470A	09/26/19 15:40	10/15/19 08:13	20mL/20mL	20mL/20mL	1.00

Prep: LEN Digestion of EPA 1311 Elutriate

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
Batch: BHJ0442							
A910893-13	Sediment	EPA 6010C	09/26/19 13:50	10/15/19 08:09	25mL/25mL	25mL/25mL	1.00
A910893-14	Sediment	EPA 6010C	09/26/19 15:40	10/15/19 08:09	25mL/25mL	25mL/25mL	1.00

Wet Chemistry

Prep: EPA 9030B

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
Batch: BHJ0054							
A910893-01	Sediment	SM 4500-S2 D-00	09/25/19 08:10	10/02/19 11:07	5.038g/100mL	5g/100mL	0.99
A910893-05	Sediment	SM 4500-S2 D-00	09/25/19 11:20	10/02/19 11:07	5.04g/100mL	5g/100mL	0.99
A910893-08	Sediment	SM 4500-S2 D-00	09/25/19 18:15	10/02/19 11:07	5.368g/100mL	5g/100mL	0.93
A910893-09	Sediment	SM 4500-S2 D-00	09/26/19 08:15	10/02/19 11:07	5.279g/100mL	5g/100mL	0.95

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tideland Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A910893 - 01 09 20 1624
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Analytical Resources, Inc.

SAMPLE PREPARATION INFORMATION

Wet Chemistry

Prep: EPA 9030B

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
A910893-11	Sediment	SM 4500-S2 D-00	09/26/19 11:50	10/02/19 11:07	5.319g/100mL	5g/100mL	0.94
A910893-13	Sediment	SM 4500-S2 D-00	09/26/19 13:50	10/02/19 11:07	5.091g/100mL	5g/100mL	0.98
A910893-14	Sediment	SM 4500-S2 D-00	09/26/19 15:40	10/02/19 11:07	5.352g/100mL	5g/100mL	0.93

Prep: No Prep Wet Chem

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
Batch: BHJ0036							
A910893-01	Sediment	PSEP 1986	09/25/19 08:10	10/01/19 21:48	5g/5g	5g/5g	1.00
A910893-05	Sediment	PSEP 1986	09/25/19 11:20	10/01/19 21:48	5g/5g	5g/5g	1.00
A910893-08	Sediment	PSEP 1986	09/25/19 18:15	10/01/19 21:48	5g/5g	5g/5g	1.00
A910893-09	Sediment	PSEP 1986	09/26/19 08:15	10/01/19 21:48	5g/5g	5g/5g	1.00
A910893-11	Sediment	PSEP 1986	09/26/19 11:50	10/01/19 21:48	5g/5g	5g/5g	1.00
A910893-13	Sediment	PSEP 1986	09/26/19 13:50	10/01/19 21:48	5g/5g	5g/5g	1.00
A910893-14	Sediment	PSEP 1986	09/26/19 15:40	10/01/19 21:48	5g/5g	5g/5g	1.00
Batch: BHJ0097							
A910893-18	Water	SM 4500-S2 D-00	09/26/19 18:40	10/03/19 09:18	5mL/5mL	5mL/5mL	1.00
Batch: BHJ0145							
A910893-19	Water	SM 4500-S2 D-00	09/25/19 18:15	10/04/19 13:20	5mL/5mL	5mL/5mL	1.00



AMENDED REPORT

Maul Foster & Alongi, INC.

2001 NW 19th Ave, STE 200
Portland, OR 97209

Project: **Seaport Tidelands**

Project Number: **1044.02.06-02**

Project Manager: **Emily Hess**

Report ID:

A910893 - 01 09 20 1624

QUALIFIER DEFINITIONS

Client Sample and Quality Control (QC) Sample Qualifier Definitions:

Apex Laboratories

- A-01** Due to coelution of isomers, 2,3,4,6- and 2,3,4,5-Tetrachlorophenol (TCP) are reported as a sum and are Estimated Values. Results are calculated using the response factor of 2,3,4,6-TCP. Batch results accepted based on spike recovery of 2,3,4,6-TCP.
- B** Analyte detected in an associated blank at a level above the MRL. (See Notes and Conventions below.)
- B-02** Analyte detected in an associated blank at a level between one-half the MRL and the MRL. (See Notes and Conventions below.)
- C-07** Extract has undergone Sulfuric Acid Cleanup by EPA 3665A, Sulfur Cleanup by EPA 3660B, and Florisil Cleanup by EPA 3620B in order to minimize matrix interference.
- GS-01** See detailed Particle Size Analysis results, accumulation curves, and Case Narratives at the end of this report.
- H-06** This sample was received, or the analysis requested, outside the recommended holding time.
- J** Estimated Result. Result detected below the lowest point of the calibration curve, but above the specified MDL.
- M-04** Due to matrix interference, this analyte cannot be accurately quantified. The reported result may contain a high bias.
- P-10** Result estimated due to the presence of multiple PCB Aroclors and/or matrix interference.
- Q-01** Spike recovery and/or RPD is outside acceptance limits.
- Q-03** Spike recovery and/or RPD is outside control limits due to the high concentration of analyte present in the sample.
- Q-04** Spike recovery and/or RPD is outside control limits due to a non-homogeneous sample matrix.
- Q-05** Analyses are not controlled on RPD values from sample and duplicate concentrations that are below 5 times the reporting level.
- Q-11** Spike recovery cannot be accurately quantified due to sample dilution required for high analyte concentration and/or matrix interference.
- Q-16** Reanalysis of an original Batch QC sample.
- Q-19** Blank Spike Duplicate (BSD) sample analyzed in place of Matrix Spike/Duplicate samples due to limited sample amount available for analysis.
- Q-24** The RPD for this spike and spike duplicate is above established control limits. Recoveries for both the spike and spike duplicate are within control limits.
- Q-29** Recovery for Lab Control Spike (LCS) is above the upper control limit. Data may be biased high.
- Q-31** Estimated Results. Recovery of Continuing Calibration Verification sample below lower control limit for this analyte. Results are likely biased low.
- Q-41** Estimated Results. Recovery of Continuing Calibration Verification sample above upper control limit for this analyte. Results are likely biased high.
- Q-52** Due to erratic or low blank spike recoveries, results for this analyte are considered Estimated Values.
- R-02** The Reporting Limit for this analyte has been raised to account for interference from coeluting organic compounds present in the sample.
- R-04** Reporting levels elevated due to preparation and/or analytical dilution necessary for analysis.
- S-06** Surrogate recovery is outside of established control limits.

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Philip Nerenberg, Lab Director



Apex Laboratories, LLC

6700 S.W. Sandburg Street

Tigard, OR 97223

503-718-2323

EPA ID: OR01039

AMENDED REPORT

Maul Foster & Alongi, INC.

2001 NW 19th Ave, STE 200

Portland, OR 97209

Project: **Seaport Tidelands**

Project Number: **1044.02.06-02**

Project Manager: **Emily Hess**

Report ID:

A910893 - 01 09 20 1624

Analytical Resources, Inc.

- * Flagged value is not within established control limits.
- D The reported value is from a dilution
- H Hold time violation - Hold time was exceeded.
- U This analyte is not detected above the reporting limit (RL) or if noted, not detected above the limit of detection (LOD).

DRAFT

Apex Laboratories

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A910893 - 01 09 20 1624
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REPORTING NOTES AND CONVENTIONS:

Abbreviations:

- DET Analyte DETECTED at or above the detection or reporting limit.
- ND Analyte NOT DETECTED at or above the detection or reporting limit.
- NR Result Not Reported
- RPD Relative Percent Difference. RPDs for Matrix Spikes and Matrix Spike Duplicates are based on concentration, not recovery.

Detection Limits: Limit of Detection (LOD)

Limits of Detection (LODs) are normally set at a level of one half the validated Limit of Quantitation (LOQ).
If no value is listed ('-----'), then the data has not been evaluated below the Reporting Limit.

Reporting Limits: Limit of Quantitation (LOQ)

Validated Limits of Quantitation (LOQs) are reported as the Reporting Limits for all analyses where the LOQ, MRL, PQL or CRL are requested. The LOQ represents a level at or above the low point of the calibration curve, that has been validated according to Apex Laboratories' comprehensive LOQ policies and procedures.

Reporting Conventions:

- Basis: Results for soil samples are generally reported on a 100% dry weight basis.
The Result Basis is listed following the units as " dry", " wet", or " " (blank) designation.
- " dry" Sample results and Reporting Limits are reported on a dry weight basis. (i.e. "ug/kg dry")
See Percent Solids section for details of dry weight analysis.
- " wet" Sample results and Reporting Limits for this analysis are normally dry weight corrected, but have not been modified in this case.
- " " Results without 'wet' or 'dry' designation are not normally dry weight corrected. These results are considered 'As Received'.

QC Source:

In cases where there is insufficient sample provided for Sample Duplicates and/or Matrix Spikes, a Lab Control Sample Duplicate (LCS Dup) may be analyzed to demonstrate accuracy and precision of the extraction batch.

Non-Client Batch QC Samples (Duplicates and Matrix Spike/Duplicates) may not be included in this report. Please request a Full QC report if this data is required.

Miscellaneous Notes:

- " --- " QC results are not applicable. For example, % Recoveries for Blanks and Duplicates, % RPD for Blanks, Blank Spikes and Matrix Spikes, etc.
- " *** " Used to indicate a possible discrepancy with the Sample and Sample Duplicate results when the %RPD is not available. In this case, either the Sample or the Sample Duplicate has a reportable result for this analyte, while the other is Non Detect (ND).

Blanks:

Standard practice is to evaluate the results from Blank QC Samples down to a level equal to 1/2 the Reporting Limit (RL).
-For Blank hits falling between 1/2 the RL and the RL (J flagged hits), the associated sample and QC data will receive a 'B-02' qualifier.
-For Blank hits above the RL, the associated sample and QC data will receive a 'B' qualifier, per Apex Laboratories' Blank Policy.
For further details, please request a copy of this document.



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A910893 - 01 09 20 1624
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REPORTING NOTES AND CONVENTIONS (Cont.):

Blanks (Cont.):

Sample results flagged with a 'B' or 'B-02' qualifier are potentially biased high if the sample results are less than ten times the level found in the blank for inorganic analyses, or less than five times the level found in the blank for organic analyses.

'B' and 'B-02' qualifications are only applied to sample results detected above the Reporting Level.

Preparation Notes:

Mixed Matrix Samples:

Water Samples:

Water samples containing significant amounts of sediment are decanted or separated prior to extraction, and only the water portion analyzed, unless otherwise directed by the client.

Soil and Sediment Samples:

Soil and Sediment samples containing significant amounts of water are decanted prior to extraction, and only the solid portion analyzed, unless otherwise directed by the client.

Sampling and Preservation Notes:

Certain regulatory programs, such as National Pollutant Discharge Elimination System (NPDES), require that activities such as sample filtration (for dissolved metals, orthophosphate, hexavalent chromium, etc.) and testing of short hold analytes (pH, Dissolved Oxygen, etc.) be performed in the field (on-site) within a short time window. In addition, sample matrix spikes are required for some analyses, and sufficient volume must be provided, and billable site specific QC requested, if this is required. All regulatory permits should be reviewed to ensure that these requirements are being met.

Data users should be aware of which regulations pertain to the samples they submit for testing. If related sample collection activities are not approved for a particular regulatory program, results should be considered estimates. Apex Laboratories will qualify these analytes according to the most stringent requirements, however results for samples that are for non-regulatory purposes may be acceptable.

Samples that have been filtered and preserved at Apex Laboratories per client request are listed in the preparation section of the report with the date and time of filtration listed.

Apex Laboratories maintains detailed records on sample receipt, including client label verification, cooler temperature, sample preservation, hold time compliance and field filtration. Data is qualified as necessary, and the lack of qualification indicates compliance with required parameters.



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A910893 - 01 09 20 1624
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LABORATORY ACCREDITATION INFORMATION

TNI Certification ID: OR100062 (Primary Accreditation) - EPA ID: OR01039

All methods and analytes reported from work performed at Apex Laboratories are included on Apex Laboratories' ORELAP Scope of Certification, with the exception of any analyte(s) listed below:

Apex Laboratories

Matrix	Analysis	TNI_ID	Analyte	TNI_ID	Accreditation
<u>All reported analytes are included in Apex Laboratories' current ORELAP scope.</u>					

Secondary Accreditations

Apex Laboratories also maintains reciprocal accreditation with non-TNI states (Washington DOE), as well as other state specific accreditations not listed here.

Subcontract Laboratory Accreditations

Subcontracted data falls outside of Apex Laboratories' Scope of Accreditation. Please see the Subcontract Laboratory report for full details, or contact your Project Manager for more information.

Field Testing Parameters

Results for Field Tested data are provided by the client or sampler, and fall outside of Apex Laboratories' Scope of Accreditation.

Apex Laboratories

Philip Nerenberg, Lab Director

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AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tideland Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A910893 - 01 09 20 1624
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1/2

APEX LABS COOLER RECEIPT FORM

Client: Maul Foster & Alongi - Vancouver Element WO#: A9 I0893

Project/Project #: Seaport In-Water RI #1044.02.06-02

Delivery Info:
Date/time received: 9/27/19 @ 1210 By: AKK
Delivered by: Apex ___ Client ___ ESS FedEx ___ UPS ___ Swift ___ Senvoy ___ SDS ___ Other ___

Cooler Inspection Date/time inspected: 9/27/19 @ 1225 By: AKK
Chain of Custody included? Yes No ___ Custody seals? Yes ___ No
Signed/dated by client? Yes No ___
Signed/dated by Apex? Yes No ___

	Cooler #1	Cooler #2	Cooler #3	Cooler #4	Cooler #5	Cooler #6	Cooler #7
Temperature (°C)	<u>1.3</u>	<u>1.7</u>	<u>1.1</u>	<u>0.5</u>			
Received on ice? (Y/N)	<u>Y</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>			
Temp. blanks? (Y/N)	<u>N</u>	<u>N</u>	<u>N</u>	<u>Y</u>			
Ice type: (Gel/Real/Other)	<u>Real</u>	<u>Real</u>	<u>Real</u>	<u>Real</u>			
Condition:	<u>Good</u>	<u>Good</u>	<u>Good</u>	<u>Good</u>			

Cooler out of temp? (Y/N) Possible reason why: _____
If some coolers are in temp and some out, were green dots applied to out of temperature samples? Yes/No/NA
Out of temperature samples form initiated? Yes/No/NA

Samples Inspection: Date/time inspected: 9/27/19 @ 1715 By: (80)
All samples intact? Yes No ___ Comments: _____
Bottle labels/COCs agree? Yes ___ No Comments: See form
COC/container discrepancies form initiated? Yes No ___ NA ___
Containers/volumes received appropriate for analysis? Yes No ___ Comments: _____
Do VOA vials have visible headspace? Yes ___ No NA ___
Comments: _____
Water samples: pH checked: Yes No ___ NA ___ pH appropriate? Yes No ___ NA ___
Comments: _____

Additional information: _____

Labeled by: (80) Witness: AKK Cooler Inspected by: (80) Sub-sampler: (80)
See Project Contact Form: Y Witness: AKK

Philip Nerenberg

Apex Laboratories, LLC

Particle Size Analysis of Soil by ASTM D 422

Sample ID:	A9I0893-08	Client Sample ID:	SE-20-0-0.33	Batch Number:	9100739
Data Entered by:	SJL	Date:	10/14/19	Data Reviewed by:	JW
Date:				Date:	10/16/19
Sample Description:	Clayey SILT with some Sand and Gravel		Max Particle Size:	Gravel	
Particle Shape:	Angular		Hardness	Hard and Durable	

Whole Sample	Tare	Air Dry + Tare	Air Dry	Moisture	Dry Wt.
	6.063	173.269	167.21	8.87	153.6

Sieve Number	Opening (mm)	Tare	Dry + Tare	Weight Retained	Cumulative Wt. Retained	% Retained	% Passing
4	4.75	6.386	13.438	7.05	7.05	4.6	95.4
10	2.00	1.318	2.219	0.90	7.95	0.6	94.8
Pan		6.066	165.008	158.94	166.90	94.3	

Hygroscopic Moisture Correction

Hygroscopic Correction Factor	Oven Sample	Pan No.	Tare	Air Dry + Tare	Oven Dry + Tare	Moisture
	0.9185	1893-08	1.328	21.252	19.629	8.87

Hydrometer Analysis

Start Date/Time	10/9/2019	10:31	Dispersing Agent	NaPO ₃
Air Dry Sample Wt. for Hydrometer Test (g)	53.536		G _s Correction Factor (α)	1.000
Percent Passing No.10 Sieve	94.8		Specific Gravity (G _s)	2.65
Dry Weight of Soil Tested (g)	49.17		Corrected Dry Weight of Soil Tested (g) (W)	51.86

Elapsed Time (min)	Hydrometer Reading	Temperature (°C)	Corrected Hydrometer Reading [R]	% Finer of Hydrometer Sample	L	K	Particle Diameter (mm)	Percent Passing
1	46	19.2	39.51	76.2	8.6	0.01382	0.041	72.25
2	44	19.2	37.51	72.3	8.9	0.01382	0.029	68.59
4	41	19.3	34.55	66.6	9.4	0.01382	0.021	63.16
8	37	19.4	30.58	59.0	10.1	0.01382	0.016	55.91
15	32.5	19.4	26.08	50.3	10.7	0.01382	0.012	47.68
30	27.5	19.4	21.08	40.6	11.5	0.01382	0.009	38.54
60	23	19.3	16.55	31.9	12.4	0.01382	0.006	30.25
90	21	19.3	14.55	28.0	12.7	0.01382	0.005	26.60
120	19.5	19.2	13.01	25.1	12.9	0.01382	0.005	23.79
240	17.5	19.4	11.08	21.4	13.2	0.01382	0.003	20.26
360	15.5	19.6	9.15	17.6	13.5	0.01365	0.003	16.72
1440	13	18.5	6.28	12.1	14	0.01382	0.001	11.48

Sieve Analysis of Portion Finer Than No. 10 Sieve

Sieve Number	Opening (mm)	Tare	Dry + Tare	Weight Retained	Cumulative Retained	% Retained	% Passing
20	0.850	1.328	1.519	0.19	8.52	0.4	94.5
40	0.425	1.336	2.241	0.91	11.21	1.7	92.7
60	0.250	1.328	2.326	1.00	14.17	1.9	90.8
100	0.150	1.337	2.472	1.14	17.54	2.2	88.6
140	0.105	1.313	2.019	0.71	19.64	1.4	87.2
200	0.075	1.314	2.106	0.79	21.99	1.5	85.7
230	0.063	1.327	1.651	0.32	22.95	0.6	85.1
			Sum	5.05	230 Minus	44.12	

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

Sample ID: SE-20-0-0.33 (A9I0893-08)

Grain Size Analysis Summary from Sieving and Hydrometer Testing	Particle Size (mm)	Percent Finer	Total Percent of Sample
Gravel			5.18
Retained on No. 4 sieve	4.75	95.41	4.59
Gravel, passing No. 4 sieve and retained on No. 10 sieve	2.00	94.82	0.59
Sand			9.74
Coarse sand, passing No.10 sieve and retained on No. 20 sieve	0.8500	94.45	0.37
Medium sand, passing No.20 sieve and retained on No. 40 sieve	0.4250	92.71	1.75
Medium sand, passing No.40 sieve and retained on No. 60 sieve	0.2500	90.78	1.92
Medium sand, passing No. 60 sieve and retained on No.100 sieve	0.1500	88.6	2.19
Fine sand, passing No. 100 sieve and retained on No.140 sieve	0.1060	87.23	1.36
Fine sand passing No. 140 sieve and retained on No. 200 sieve	0.0750	85.71	1.53
Fine sand, passing No. 200 sieve and retained on No. 230 sieve	0.0630	85.08	0.62
Silt and Clay (Measurements in the Clay fraction are noted)			85.08
Hydrometer Test	0.0405	72.25	12.84
Hydrometer Test	0.0292	68.59	3.66
Hydrometer Test	0.0212	63.16	5.42
Hydrometer Test	0.0155	55.91	7.25
Hydrometer Test	0.0117	47.68	8.23
Hydrometer Test	0.0086	38.54	9.14
Hydrometer Test	0.0063	30.25	8.29
Hydrometer Test	0.0052	26.6	3.66
Hydrometer Test Clay	0.0045	23.79	2.8
Hydrometer Test Clay	0.0032	20.26	3.53
Hydrometer Test Clay	0.0026	16.72	3.53
Hydrometer Test Clay	0.0014	11.48	5.24

Grain Size Summary	Percent of Total Sample
Gravel	5.2
Sand	9.7
Coarse sand	0.4
Medium sand	5.9
Fine sand	3.5
Silt	58.5
Clay	26.6

Case Narrative for Sample ID: SE-20-0-0.33 (A9I0893-08)

This data is not to be used for engineering purposes.

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

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

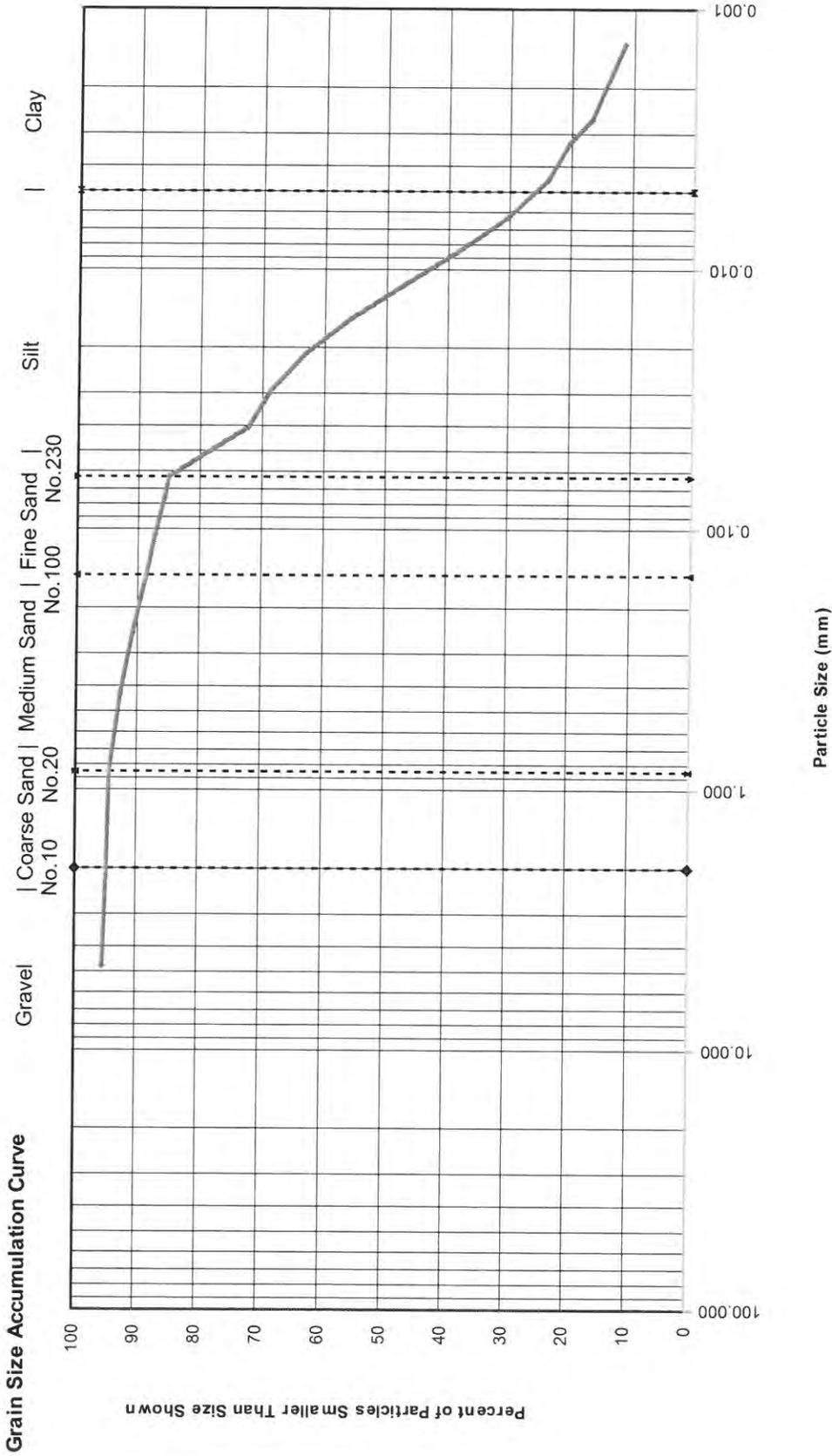
The assumed specific gravity used in the calculations was 2.65.

Organic material present in +10 through +100 fractions.



Express 12/21/19

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



Sample ID: SE-20-0-0.33 (A910893-08)				
Specific Gravity	2.65	GRAVEL & SAND		SOIL DESCRIPTION
		PARTICLE SHAPE	HARDNESS	
	Gravel	Angular	Hard and Durable	Clayey SILT with some Sand and Gravel

Apex Laboratories, LLC

Particle Size Analysis of Soil by ASTM D 422

Sample ID:	A9I0893-13	Client Sample ID:	SE-10-2.0-3.7	Batch Number:	9100739
Data Entered by:	SJL	Date:	10/14/19	Data Reviewed by:	JW
Date:				Date:	10/16/19
Sample Description:	Clayey SILT with some Sand and Gravel		Max Particle Size:	Gravel	
Particle Shape:	N/A		Hardness	N/A	

Whole Sample	Tare	Air Dry + Tare	Air Dry	Moisture	Dry Wt.
	5.881	160.481	154.60	11.72	138.4

Sieve Number	Opening (mm)	Tare	Dry + Tare	Weight Retained	Cumulative Wt. Retained	% Retained	% Passing
4	4.75	6.071	20.914	14.84	14.84	10.7	89.3
10	2.00	6.048	12.623	6.58	21.42	4.8	84.5
Pan		5.882	132.781	126.90	148.32	81.0	

Hygroscopic Moisture Correction

Hygroscopic Correction Factor	Oven Sample	Pan No.	Tare	Air Dry + Tare	Oven Dry + Tare	Moisture
		I893-13	1.309	20.044	18.079	11.72

Hydrometer Analysis

Start Date/Time	10/7/2019	11:26	Dispersing Agent	NaPO ₃
Air Dry Sample Wt. for Hydrometer Test (g)	52.105		G _s Correction Factor (α)	1.000
Percent Passing No.10 Sieve	84.5		Specific Gravity (G _s)	2.65
Dry Weight of Soil Tested (g)	46.64		Corrected Dry Weight of Soil Tested (g) (W)	55.18

Elapsed Time (min)	Hydrometer Reading	Temperature (°C)	Corrected Hydrometer Reading [R]	% Finer of Hydrometer Sample	L	K	Particle Diameter (mm)	Percent Passing
1	36	20.2	29.85	54.1	10.2	0.01365	0.044	45.72
2	33.5	20.2	27.35	49.6	10.5	0.01365	0.031	41.89
4	30.5	20.1	24.31	44.1	11.1	0.01365	0.023	37.24
8	28.5	20.3	22.38	40.6	11.4	0.01365	0.016	34.28
15	24	20.3	17.88	32.4	12.2	0.01365	0.012	27.39
30	20.5	20.3	14.38	26.1	12.7	0.01365	0.009	22.03
60	17.5	20.1	11.31	20.5	13.2	0.01365	0.006	17.33
90	16.5	19.9	10.25	18.6	13.3	0.01365	0.005	15.70
120	15.5	19.9	9.25	16.8	13.5	0.01365	0.005	14.16
240	14.5	19.7	8.18	14.8	13.7	0.01365	0.003	12.53
360	13	19.5	6.61	12.0	14	0.01365	0.003	10.13
1440	11	19.2	4.51	8.2	14.3	0.01382	0.001	6.91

Sieve Analysis of Portion Finer Than No. 10 Sieve

Sieve Number	Opening (mm)	Tare	Dry + Tare	Weight Retained	Cumulative Retained	% Retained	% Passing
20	0.850	1.314	4.435	3.12	29.02	5.7	78.9
40	0.425	1.317	5.527	4.21	39.27	7.6	71.2
60	0.250	1.330	4.885	3.56	47.93	6.4	64.8
100	0.150	1.310	3.191	1.88	52.51	3.4	61.4
140	0.105	1.329	2.545	1.22	55.47	2.2	59.2
200	0.075	1.316	2.718	1.40	58.89	2.5	56.6
230	0.063	1.307	2.121	0.81	60.87	1.5	55.2
			Sum	16.20	230 Minus	30.44	

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

Sample ID: SE-10-2.0-3.7 (A9I0893-13)

Grain Size Analysis Summary from Sieving and Hydrometer Testing	Particle Size (mm)	Percent Finer	Total Percent of Sample	
Gravel			15.48	
Retained on No. 4 sieve	4.75	89.27	10.73	
Gravel, passing No. 4 sieve and retained on No. 10 sieve	2.00	84.52	4.75	
Sand			29.36	
Coarse sand, passing No.10 sieve and retained on No. 20 sieve	0.8500	78.87	5.66	
Medium sand, passing No.20 sieve and retained on No. 40 sieve	0.4250	71.24	7.63	
Medium sand, passing No.40 sieve and retained on No. 60 sieve	0.2500	64.79	6.44	
Medium sand, passing No. 60 sieve and retained on No.100 sieve	0.1500	61.39	3.41	
Fine sand, passing No. 100 sieve and retained on No.140 sieve	0.1060	59.18	2.2	
Fine sand passing No. 140 sieve and retained on No. 200 sieve	0.0750	56.64	2.54	
Fine sand, passing No. 200 sieve and retained on No. 230 sieve	0.0630	55.17	1.48	
Silt and Clay (Measurements in the Clay fraction are noted)			55.17	
Hydrometer Test	0.0436	45.72	9.45	
Hydrometer Test	0.0313	41.89	3.83	
Hydrometer Test	0.0227	37.24	4.65	
Hydrometer Test	0.0163	34.28	2.96	
Hydrometer Test	0.0123	27.39	6.89	
Hydrometer Test	0.0089	22.03	5.36	
Hydrometer Test	0.0064	17.33	4.7	
Hydrometer Test	0.0052	15.7	1.63	
Hydrometer Test	Clay	0.0046	14.16	1.53
Hydrometer Test	Clay	0.0033	12.53	1.63
Hydrometer Test	Clay	0.0027	10.13	2.4
Hydrometer Test	Clay	0.0014	6.91	3.22

Grain Size Summary	Percent of Total Sample
Gravel	15.5
Sand	29.4
Coarse sand	5.7
Medium sand	17.5
Fine sand	6.2
Silt	39.5
Clay	15.7

Case Narrative for Sample ID: SE-10-2.0-3.7 (A9I0893-13)

This data is not to be used for engineering purposes.

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

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

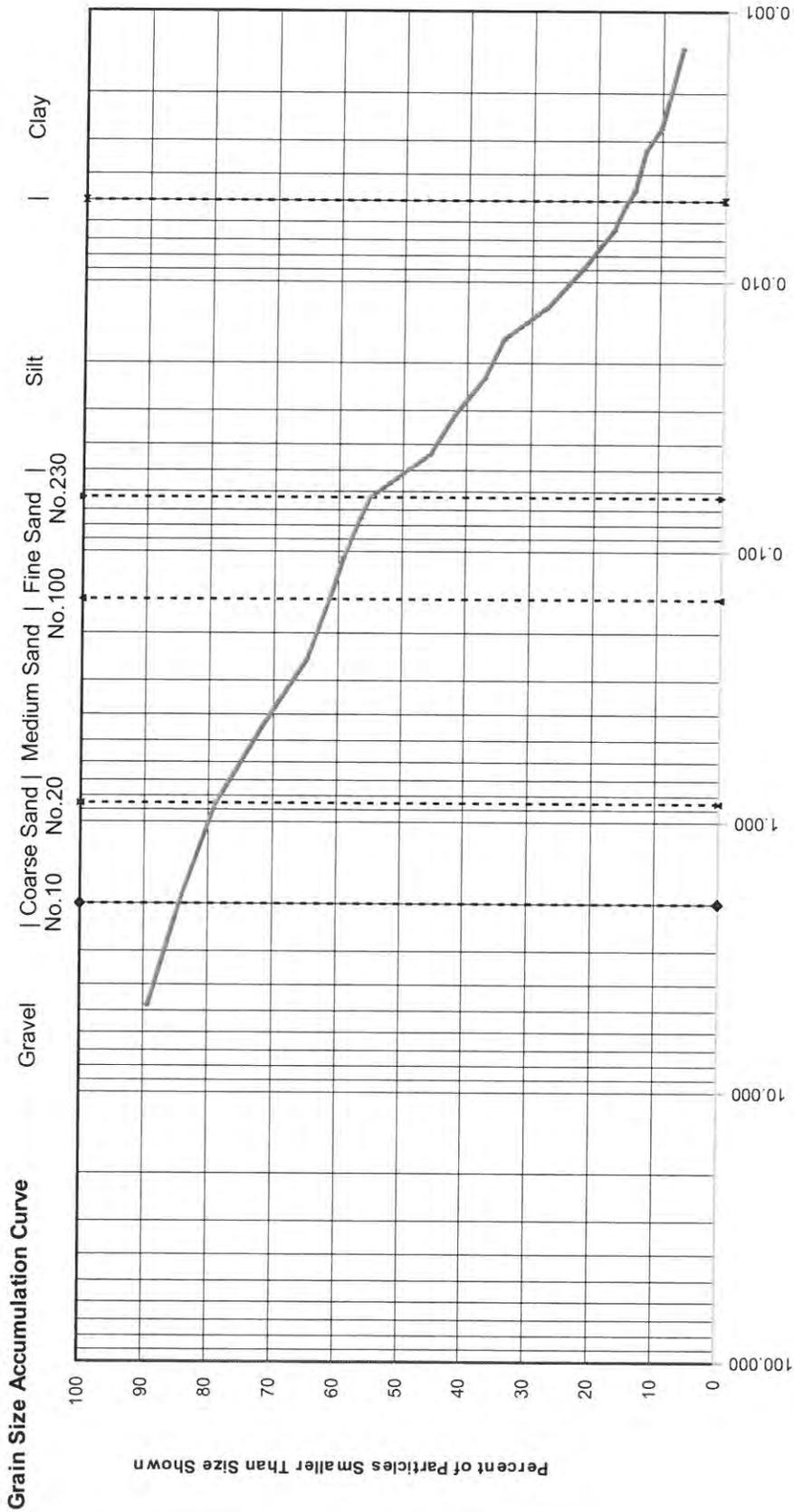
The assumed specific gravity used in the calculations was 2.65.

+4 through +100 fractions consist almost entirely of organic material.



Express 12/31/19

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



Particle Size (mm)

Sample ID:	SE-10-2.0-3.7 (A9I0893-13)		
Specific Gravity	2.65	GRAVEL & SAND	
		PARTICLE SHAPE	HARDNESS
	Gravel	N/A	N/A
		SOIL DESCRIPTION	
		Clayey SILT with some Sand and Gravel	

Apex Laboratories, LLC

Particle Size Analysis of Soil by ASTM D 422

Sample ID:	A910893-14	Client Sample ID:	SE-30-2.5-4.5	Batch Number:	9100739
Data Entered by:	SJL	Date:	10/14/19	Data Reviewed by:	JW
Date:				Date:	10/16/19
Sample Description:	Clayey SILT with trace Sand and Gravel		Max Particle Size:	Gravel	
Particle Shape:	Sub-angular to Sub-rounded		Hardness	Weathered to Friable	

Whole Sample	Tare	Air Dry + Tare	Air Dry	Moisture	Dry Wt.
	6.284	270.067	263.78	9.40	241.1

Sieve Number	Opening (mm)	Tare	Dry + Tare	Weight Retained	Cumulative Wt. Retained	% Retained	% Passing
4	4.75	6.384	16.322	9.94	9.94	4.1	95.9
10	2.00	6.395	10.418	4.02	13.96	1.7	94.2
Pan		6.285	254.029	247.74	261.71	93.1	

Hygroscopic Moisture Correction

	Hygroscopic Correction Factor	Oven Sample	Pan No.	Tare	Air Dry + Tare	Oven Dry + Tare	Moisture
	0.9141		I893-14	1.342	21.171	19.467	9.40

Hydrometer Analysis

Start Date/Time	10/7/2019	11:48	Dispersing Agent	NaPO ₃
Air Dry Sample Wt. for Hydrometer Test (g)	53.785		G _s Correction Factor (α)	1.000
Percent Passing No.10 Sieve	94.2		Specific Gravity (G _s)	2.65
Dry Weight of Soil Tested (g)	49.16		Corrected Dry Weight of Soil Tested (g) (W)	52.18

Elapsed Time (min)	Hydrometer Reading	Temperature (°C)	Corrected Hydrometer Reading [R]	% Finer of Hydrometer Sample	L	K	Particle Diameter (mm)	Percent Passing
1	46	20	39.78	76.2	8.6	0.01365	0.040	71.82
2	42.5	20	36.28	69.5	9.1	0.01365	0.029	65.50
4	38.5	20.1	32.31	61.9	9.7	0.01365	0.021	58.34
8	33.5	20.2	27.35	52.4	10.5	0.01365	0.016	49.37
15	29.5	20.2	23.35	44.7	11.2	0.01365	0.012	42.15
30	25.5	20.1	19.31	37.0	11.9	0.01365	0.009	34.87
60	23	19.9	16.75	32.1	12.4	0.01365	0.006	30.23
90	21	19.8	14.71	28.2	12.7	0.01365	0.005	26.56
120	19.5	19.8	13.21	25.3	12.9	0.01365	0.004	23.85
240	17.5	19.7	11.18	21.4	13.2	0.01365	0.003	20.18
360	16.5	19.5	10.11	19.4	13.3	0.01365	0.003	18.26
1440	13	19.3	6.55	12.5	14	0.01382	0.001	11.82

Sieve Analysis of Portion Finer Than No. 10 Sieve

Sieve Number	Opening (mm)	Tare	Dry + Tare	Weight Retained	Cumulative Retained	% Retained	% Passing
20	0.850	1.313	2.010	0.70	17.17	1.3	92.9
40	0.425	1.341	2.404	1.06	22.07	2.0	90.8
60	0.250	1.318	2.091	0.77	25.63	1.5	89.4
100	0.150	1.325	2.132	0.81	29.35	1.5	87.8
140	0.105	1.333	1.991	0.66	32.38	1.3	86.5
200	0.075	1.307	2.450	1.14	37.64	2.2	84.4
230	0.063	1.333	2.140	0.81	41.36	1.5	82.8
			Sum	5.95	230 Minus	43.21	

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

Sample ID: SE-30-2.5-4.5 (A910893-14)

Grain Size Analysis Summary from Sieving and Hydrometer Testing	Particle Size (mm)	Percent Finer	Total Percent of Sample	
Gravel			5.79	
Retained on No. 4 sieve	4.75	95.88	4.12	
Gravel, passing No. 4 sieve and retained on No. 10 sieve	2.00	94.21	1.67	
Sand			11.4	
Coarse sand, passing No.10 sieve and retained on No. 20 sieve	0.8500	92.87	1.34	
Medium sand, passing No.20 sieve and retained on No. 40 sieve	0.4250	90.84	2.04	
Medium sand, passing No.40 sieve and retained on No. 60 sieve	0.2500	89.36	1.48	
Medium sand, passing No. 60 sieve and retained on No.100 sieve	0.1500	87.81	1.55	
Fine sand, passing No. 100 sieve and retained on No.140 sieve	0.1060	86.55	1.26	
Fine sand passing No. 140 sieve and retained on No. 200 sieve	0.0750	84.36	2.19	
Fine sand, passing No. 200 sieve and retained on No. 230 sieve	0.0630	82.81	1.55	
Silt and Clay (Measurements in the Clay fraction are noted)			82.81	
Hydrometer Test	0.0400	71.82	11	
Hydrometer Test	0.0291	65.5	6.32	
Hydrometer Test	0.0213	58.34	7.16	
Hydrometer Test	0.0156	49.37	8.97	
Hydrometer Test	0.0118	42.15	7.22	
Hydrometer Test	0.0086	34.87	7.28	
Hydrometer Test	0.0062	30.23	4.63	
Hydrometer Test	0.0051	26.56	3.67	
Hydrometer Test	Clay	0.0045	23.85	2.71
Hydrometer Test	Clay	0.0032	20.18	3.67
Hydrometer Test	Clay	0.0026	18.26	1.93
Hydrometer Test	Clay	0.0014	11.82	6.44

Grain Size Summary	Percent of Total Sample
Gravel	5.8
Sand	11.4
Coarse sand	1.3
Medium sand	5.1
Fine sand	5.0
Silt	56.2
Clay	26.6

Case Narrative for Sample ID: SE-30-2.5-4.5 (A910893-14)

This data is not to be used for engineering purposes.

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

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

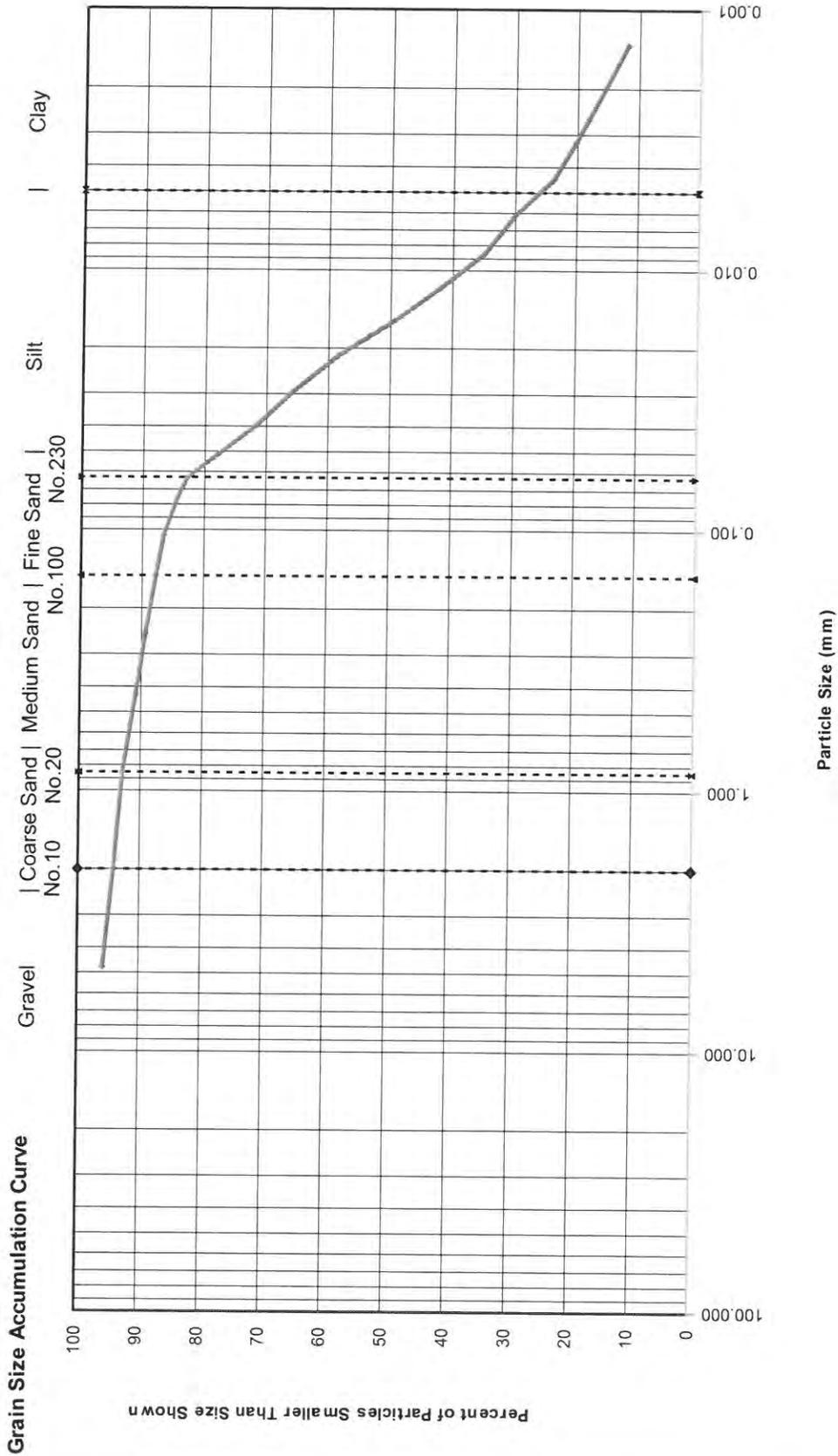
The assumed specific gravity used in the calculations was 2.65.

+4 through +100 fractions consist of abundant organic material.



Expires 12/31/19

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



October 22, 2019

Mr. Philip Nerenberg
Apex Laboratories
6700 SW Sandburg Street
Portland, Oregon 97223

Re: DXN & PCB Subcontract
Work Order: 15579
SDG: A9I0893

Dear Mr. Nerenberg:

Cape Fear Analytical LLC (CFA) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on October 01, 2019. This original data report has been prepared and reviewed in accordance with CFA's standard operating procedures.

Our policy is to provide high quality, personalized analytical services to enable you to meet your analytical needs on time every time. We trust that you will find everything in order and to your satisfaction. If you have any questions, please do not hesitate to call me at 910-795-0421.

Sincerely,



Cynde Larkins
Project Manager

Enclosures

SUBCONTRACT ORDER

Apex Laboratories

A9I0893

9/30/19
H4

SENDING LABORATORY:

Apex Laboratories
6700 S.W. Sandburg Street
Tigard, OR 97223
Phone: (503) 718-2323
Fax: (503) 336-0745
Project Manager: Philip Nerenberg

RECEIVING LABORATORY:

Cape Fear Analytical, LLC
3306 Kitty Hawk Rd Suite 120
Wilmington, NC 28405
Phone : (910) 795-0421
Fax: -

CFA WO #15579

Sample Name: Rinsate Blank

Water

Sampled: 09/26/19 18:40

(A9I0893-18)

Analysis	Due	Expires	Comments
1613B Dioxins and Furans (SUB) <i>Containers Supplied:</i> (L)1 L Amber Glass - Non Preserved (M)1 L Amber Glass - Non Preserved	10/10/19 17:00	03/24/20 18:40	Cape Fear

Standard TAT

temp = 3.8°C

Released By [Signature] Date 9/30/19 Fed Ex (Shipper)

Received By [Signature] Date 10/1/19 @ 1008

Released By _____ Date _____ Received By _____ Date _____

High Resolution Dioxins and Furans Analysis

DRAFT

Case Narrative

DRAFT

**HDOX Case Narrative
Apex Laboratories (APEX)
SDG A9I0893
Work Order 15579**

Method/Analysis Information

Product: Dioxins/Furans by EPA Method 1613B in Liquids
Analytical Method: EPA Method 1613B
Extraction Method: SW846 3520C
Analytical Batch Number: 42013
Clean Up Batch Number: 42009
Extraction Batch Number: 42008

Sample Analysis

Sample 15579001 was received at 3.8°C. The following samples were analyzed using the analytical protocol as established in EPA Method 1613B:

Sample ID	Client ID
12025039	Method Blank (MB)
12025040	Laboratory Control Sample (LCS)
12025041	Laboratory Control Sample Duplicate (LCSD)
15579001	Rinsate Blank

The samples in this SDG were analyzed on an "as received" basis.

SOP Reference

Procedure for preparation, analysis and reporting of analytical data are controlled by Cape Fear Analytical LLC (CFA) as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with CF-OA-E-002 REV# 15.

Raw data reports are processed and reviewed by the analyst using the TargetLynx software package.

Calibration Information

Initial Calibration

All initial calibration requirements have been met for this sample delivery group (SDG).

Continuing Calibration Verification (CCV) Requirements

All associated calibration verification standard(s) (CCV) met the acceptance criteria.

Quality Control (QC) Information

Certification Statement

The test results presented in this document are certified to meet all requirements of the 2009 TNI Standard.

Method Blank (MB) Statement

The MB(s) analyzed with this SDG met the acceptance criteria.

Surrogate Recoveries

All surrogate recoveries were within the established acceptance criteria for this SDG.

Laboratory Control Sample (LCS) Recovery

The LCS spike recoveries met the acceptance limits.

Laboratory Control Sample Duplicate (LCSD) Recovery

The LCSD spike recoveries met the acceptance limits.

LCS/LCSD Relative Percent Difference (RPD) Statement

The RPD(s) between the LCS and LCSD met the acceptance limits.

QC Sample Designation

A matrix spike and matrix spike duplicate analysis was not required for this SDG.

Technical Information

Holding Time Specifications

CFA assigns holding times based on the associated methodology, which assigns the date and time from sample collection. Those holding times expressed in hours are calculated in the AlphaLIMS system. Those holding times expressed as days expire at midnight on the day of expiration. All samples in this SDG met the specified holding time.

Preparation/Analytical Method Verification

All procedures were performed as stated in the SOP.

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-extraction/Re-analysis

Re-extractions or re-analyses were not required in this SDG.

Miscellaneous Information

Nonconformance (NCR) Documentation

A NCR was not required for this SDG.

Manual Integrations

Certain standards and QC samples required manual integrations to correctly position the baseline as set in the calibration standard injections. Where manual integrations were performed, copies of all manual integration peak profiles are included in the raw data section of this fraction. Manual integrations were required for data files in this SDG.

System Configuration

This analysis was performed on the following instrument configuration:

Instrument ID	Instrument	System Configuration	Column ID	Column Description
HRP763_1	Primary Dioxin Analysis	Dioxin Analysis	DB-5MS	60m x 0.25mm, 0.25um

Electronic Packaging Comment

This data package was generated using an electronic data processing program referred to as virtual packaging. In an effort to increase quality and efficiency, the laboratory has developed systems to generate all data packages electronically. The following change from traditional packages should be noted: Analyst/peer reviewer initials and dates are not present on the electronic data files. Presently, all initials and dates are present on the original raw data. These hard copies are temporarily stored in the laboratory. An electronic signature page inserted after the case narrative will include the data validator's signature and title. The signature page also includes the data qualifiers used in the fractional package. Data that are not generated electronically, such as hand written pages, will be scanned and inserted into the electronic package.

Sample Data Summary

DRAFT

Cape Fear Analytical, LLC

3306 Kitty Hawk Road Suite 120, Wilmington, NC 28405 - (910) 795-0421 - www.capefearanalytical.com

Qualifier Definition Report for

APEX001 Apex Laboratories

Client SDG: A9I0893 CFA Work Order: 15579

The Qualifiers in this report are defined as follows:

- * A quality control analyte recovery is outside of specified acceptance criteria
- ** Analyte is a surrogate compound
- B The target analyte was detected in the associated blank.
- J Value is estimated
- K Estimated Maximum Possible Concentration
- U Analyte was analyzed for, but not detected above the specified detection limit.
- DL Indicates that sample is diluted.
- RA Indicates that sample is re-analyzed without re-extraction.
- RE Indicates that sample is re-extracted.

Review/Validation

Cape Fear Analytical requires all analytical data to be verified by a qualified data reviewer.

The following data validator verified the information presented in this case narrative:

Signature: 

Name: Heather Patterson

Date: 22 OCT 2019

Title: Group Leader

DRAFT

**Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary**

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SDG Number: A9I0893
Lab Sample ID: 15579001
Client Sample: 1613B Water
Client ID: Rinsate Blank
Batch ID: 42013
Run Date: 10/16/2019 18:34
Data File: b15oct19b_3-7
Prep Batch: 42008
Prep Date: 09-OCT-19

Client: APEX001
Date Collected: 09/26/2019 18:40
Date Received: 10/01/2019 10:08
Method: EPA Method 1613B
Analyst: MLS
Prep Method: SW846 3520C
Prep Aliquot: 899 mL

Project: APEX00319
Matrix: WATER
Prep Basis: As Received
Instrument: HRP763
Dilution: 1

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
1746-01-6	2,3,7,8-TCDD	U	2.29	pg/L	2.29	11.1
40321-76-4	1,2,3,7,8-PeCDD	U	1.33	pg/L	1.33	55.6
39227-28-6	1,2,3,4,7,8-HxCDD	U	1.82	pg/L	1.82	55.6
57653-85-7	1,2,3,6,7,8-HxCDD	U	1.66	pg/L	1.66	55.6
19408-74-3	1,2,3,7,8,9-HxCDD	U	1.79	pg/L	1.79	55.6
35822-46-9	1,2,3,4,6,7,8-HpCDD	BJK	3.78	pg/L	3.29	55.6
3268-87-9	1,2,3,4,6,7,8,9-OCDD	BJ	82.6	pg/L	8.90	111
51207-31-9	2,3,7,8-TCDF	U	1.81	pg/L	1.81	11.1
57117-41-6	1,2,3,7,8-PeCDF	U	1.17	pg/L	1.17	55.6
57117-31-4	2,3,4,7,8-PeCDF	U	1.01	pg/L	1.01	55.6
70648-26-9	1,2,3,4,7,8-HxCDF	U	0.977	pg/L	0.977	55.6
57117-44-9	1,2,3,6,7,8-HxCDF	U	0.937	pg/L	0.937	55.6
60851-34-5	2,3,4,6,7,8-HxCDF	U	0.963	pg/L	0.963	55.6
72918-21-9	1,2,3,7,8,9-HxCDF	U	1.45	pg/L	1.45	55.6
67562-39-4	1,2,3,4,6,7,8-HpCDF	BJ	1.40	pg/L	1.36	55.6
55673-89-7	1,2,3,4,7,8,9-HpCDF	U	2.08	pg/L	2.08	55.6
39001-02-0	1,2,3,4,6,7,8,9-OCDF	BJ	7.32	pg/L	6.18	111
41903-57-5	Total TeCDD	U	2.29	pg/L	2.29	11.1
36088-22-9	Total PeCDD	U	1.33	pg/L	1.33	55.6
34465-46-8	Total HxCDD	U	1.66	pg/L	1.66	55.6
37871-00-4	Total HpCDD	BJK	3.78	pg/L	3.29	55.6
30402-14-3	Total TeCDF	U	1.81	pg/L	1.81	11.1
30402-15-4	Total PeCDF	U	1.01	pg/L	1.01	55.6
55684-94-1	Total HxCDF	U	0.937	pg/L	0.937	55.6
38998-75-3	Total HpCDF	BJ	3.09	pg/L	1.36	55.6
3333-30-2	TEQ WHO2005 ND=0 with EMPCs		0.0788	pg/L		
3333-30-3	TEQ WHO2005 ND=0.5 with EMPCs		2.64	pg/L		

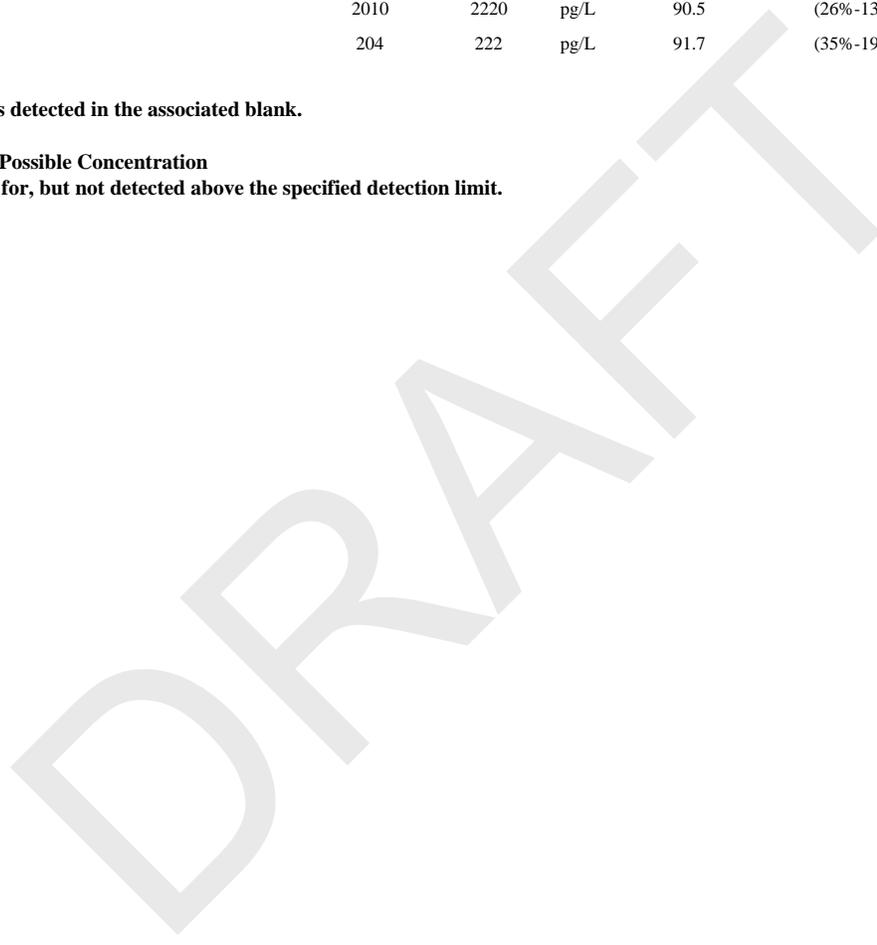
Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-2,3,7,8-TCDD		1820	2220	pg/L	81.7	(25%-164%)
13C-1,2,3,7,8-PeCDD		2060	2220	pg/L	92.7	(25%-181%)
13C-1,2,3,4,7,8-HxCDD		1710	2220	pg/L	76.9	(32%-141%)
13C-1,2,3,6,7,8-HxCDD		1900	2220	pg/L	85.4	(28%-130%)
13C-1,2,3,4,6,7,8-HpCDD		2080	2220	pg/L	93.7	(23%-140%)
13C-OCDD		3800	4450	pg/L	85.5	(17%-157%)
13C-2,3,7,8-TCDF		1710	2220	pg/L	77.0	(24%-169%)
13C-1,2,3,7,8-PeCDF		1980	2220	pg/L	89.1	(24%-185%)
13C-2,3,4,7,8-PeCDF		2020	2220	pg/L	90.9	(21%-178%)
13C-1,2,3,4,7,8-HxCDF		1670	2220	pg/L	75.2	(26%-152%)
13C-1,2,3,6,7,8-HxCDF		1780	2220	pg/L	79.8	(26%-123%)
13C-2,3,4,6,7,8-HxCDF		1770	2220	pg/L	79.8	(28%-136%)
13C-1,2,3,7,8,9-HxCDF		1760	2220	pg/L	79.0	(29%-147%)

**Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary**

SDG Number: A9I0893	Client: APEX001	Project: APEX00319
Lab Sample ID: 15579001	Date Collected: 09/26/2019 18:40	Matrix: WATER
Client Sample: 1613B Water	Date Received: 10/01/2019 10:08	
Client ID: Rinsate Blank		Prep Basis: As Received
Batch ID: 42013	Method: EPA Method 1613B	
Run Date: 10/16/2019 18:34	Analyst: MLS	Instrument: HRP763
Data File: b15oct19b_3-7		Dilution: 1
Prep Batch: 42008	Prep Method: SW846 3520C	
Prep Date: 09-OCT-19	Prep Aliquot: 899 mL	

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
Surrogate/Tracer recovery						
		Qual	Result	Nominal	Units	Recovery% Acceptable Limits
13C-1,2,3,4,6,7,8-HpCDF			1890	2220	pg/L	85.1 (28%-143%)
13C-1,2,3,4,7,8,9-HpCDF			2010	2220	pg/L	90.5 (26%-138%)
37Cl-2,3,7,8-TCDD			204	222	pg/L	91.7 (35%-197%)

- Comments:**
- B** The target analyte was detected in the associated blank.
 - J** Value is estimated
 - K** Estimated Maximum Possible Concentration
 - U** Analyte was analyzed for, but not detected above the specified detection limit.



Quality Control Summary

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Hi-Res Dioxins/Furans
Surrogate Recovery Report

SDG Number: A9I0893

Matrix Type: LIQUID

Sample ID	Client ID	Surrogate	QUAL	Recovery (%)	Acceptance Limits
12025040	LCS for batch 42008	13C-2,3,7,8-TCDD		82.1	(20%-175%)
		13C-1,2,3,7,8-PeCDD		93.7	(21%-227%)
		13C-1,2,3,4,7,8-HxCDD		74.9	(21%-193%)
		13C-1,2,3,6,7,8-HxCDD		84.0	(25%-163%)
		13C-1,2,3,4,6,7,8-HpCDD		88.1	(22%-166%)
		13C-OCDD		69.9	(13%-199%)
		13C-2,3,7,8-TCDF		76.9	(22%-152%)
		13C-1,2,3,7,8-PeCDF		94.5	(21%-192%)
		13C-2,3,4,7,8-PeCDF		93.1	(13%-328%)
		13C-1,2,3,4,7,8-HxCDF		80.2	(19%-202%)
		13C-1,2,3,6,7,8-HxCDF		87.4	(21%-159%)
		13C-2,3,4,6,7,8-HxCDF		85.3	(22%-176%)
		13C-1,2,3,7,8,9-HxCDF		84.4	(17%-205%)
		13C-1,2,3,4,6,7,8-HpCDF		90.0	(21%-158%)
		13C-1,2,3,4,7,8,9-HpCDF		91.8	(20%-186%)
		37Cl-2,3,7,8-TCDD		86.9	(31%-191%)
12025041	LCSD for batch 42008	13C-2,3,7,8-TCDD		82.0	(20%-175%)
		13C-1,2,3,7,8-PeCDD		93.1	(21%-227%)
		13C-1,2,3,4,7,8-HxCDD		77.0	(21%-193%)
		13C-1,2,3,6,7,8-HxCDD		89.1	(25%-163%)
		13C-1,2,3,4,6,7,8-HpCDD		88.1	(22%-166%)
		13C-OCDD		69.2	(13%-199%)
		13C-2,3,7,8-TCDF		79.5	(22%-152%)
		13C-1,2,3,7,8-PeCDF		96.0	(21%-192%)
		13C-2,3,4,7,8-PeCDF		95.7	(13%-328%)
		13C-1,2,3,4,7,8-HxCDF		82.7	(19%-202%)
		13C-1,2,3,6,7,8-HxCDF		91.5	(21%-159%)
		13C-2,3,4,6,7,8-HxCDF		89.7	(22%-176%)
		13C-1,2,3,7,8,9-HxCDF		84.8	(17%-205%)
		13C-1,2,3,4,6,7,8-HpCDF		91.9	(21%-158%)
		13C-1,2,3,4,7,8,9-HpCDF		89.8	(20%-186%)
		37Cl-2,3,7,8-TCDD		85.5	(31%-191%)
12025039	MB for batch 42008	13C-2,3,7,8-TCDD		79.3	(25%-164%)
		13C-1,2,3,7,8-PeCDD		93.0	(25%-181%)
		13C-1,2,3,4,7,8-HxCDD		75.5	(32%-141%)
		13C-1,2,3,6,7,8-HxCDD		79.1	(28%-130%)
		13C-1,2,3,4,6,7,8-HpCDD		84.8	(23%-140%)
		13C-OCDD		68.2	(17%-157%)
		13C-2,3,7,8-TCDF		76.5	(24%-169%)
		13C-1,2,3,7,8-PeCDF		93.7	(24%-185%)
		13C-2,3,4,7,8-PeCDF		92.6	(21%-178%)
		13C-1,2,3,4,7,8-HxCDF		76.8	(26%-152%)
		13C-1,2,3,6,7,8-HxCDF		81.8	(26%-123%)
		13C-2,3,4,6,7,8-HxCDF		82.9	(28%-136%)
		13C-1,2,3,7,8,9-HxCDF		82.9	(29%-147%)
		13C-1,2,3,4,6,7,8-HpCDF		84.7	(28%-143%)
		13C-1,2,3,4,7,8,9-HpCDF		88.2	(26%-138%)
		37Cl-2,3,7,8-TCDD		91.3	(35%-197%)
15579001	Rinsate Blank	13C-2,3,7,8-TCDD		81.7	(25%-164%)

**Hi-Res Dioxins/Furans
Surrogate Recovery Report**

SDG Number: A9I0893

Matrix Type: LIQUID

Sample ID	Client ID	Surrogate	QUAL	Recovery (%)	Acceptance Limits
15579001	Rinsate Blank	13C-1,2,3,7,8-PeCDD		92.7	(25%-181%)
		13C-1,2,3,4,7,8-HxCDD		76.9	(32%-141%)
		13C-1,2,3,6,7,8-HxCDD		85.4	(28%-130%)
		13C-1,2,3,4,6,7,8-HpCDD		93.7	(23%-140%)
		13C-OCDD		85.5	(17%-157%)
		13C-2,3,7,8-TCDF		77.0	(24%-169%)
		13C-1,2,3,7,8-PeCDF		89.1	(24%-185%)
		13C-2,3,4,7,8-PeCDF		90.9	(21%-178%)
		13C-1,2,3,4,7,8-HxCDF		75.2	(26%-152%)
		13C-1,2,3,6,7,8-HxCDF		79.8	(26%-123%)
		13C-2,3,4,6,7,8-HxCDF		79.8	(28%-136%)
		13C-1,2,3,7,8,9-HxCDF		79.0	(29%-147%)
		13C-1,2,3,4,6,7,8-HpCDF		85.1	(28%-143%)
		13C-1,2,3,4,7,8,9-HpCDF		90.5	(26%-138%)
		37Cl-2,3,7,8-TCDD		91.7	(35%-197%)

* Recovery outside Acceptance Limits

Column to be used to flag recovery values

D Sample Diluted

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Hi-Res Dioxins/Furans
Quality Control Summary
Spike Recovery Report

SDG Number: A9I0893
Client ID: LCS for batch 42008
Lab Sample ID: 12025040
Instrument: HRP763
Analyst: MLS

Sample Type: Laboratory Control Sample
Matrix: WATER
Analysis Date: 10/13/2019 02:52
Prep Batch ID: 42008
Batch ID: 42013

Dilution: 1

CAS No.	Parmname	Amount Added pg/L	Spike Conc. pg/L	Recovery %	Acceptance Limits
1746-01-6	LCS 2,3,7,8-TCDD	200	193	96.4	67-158
40321-76-4	LCS 1,2,3,7,8-PeCDD	1000	1140	114	70-142
39227-28-6	LCS 1,2,3,4,7,8-HxCDD	1000	1180	118	70-164
57653-85-7	LCS 1,2,3,6,7,8-HxCDD	1000	1180	118	74-134
19408-74-3	LCS 1,2,3,7,8,9-HxCDD	1000	1250	125	64-162
35822-46-9	LCS 1,2,3,4,6,7,8-HpCDD	1000	1160	116	70-140
3268-87-9	LCS 1,2,3,4,6,7,8,9-OCDD	2000	2320	116	78-144
51207-31-9	LCS 2,3,7,8-TCDF	200	236	118	75-158
57117-41-6	LCS 1,2,3,7,8-PeCDF	1000	1180	118	80-134
57117-31-4	LCS 2,3,4,7,8-PeCDF	1000	1210	121	68-160
70648-26-9	LCS 1,2,3,4,7,8-HxCDF	1000	1150	115	72-134
57117-44-9	LCS 1,2,3,6,7,8-HxCDF	1000	1220	122	84-130
60851-34-5	LCS 2,3,4,6,7,8-HxCDF	1000	1190	119	70-156
72918-21-9	LCS 1,2,3,7,8,9-HxCDF	1000	1160	116	78-130
67562-39-4	LCS 1,2,3,4,6,7,8-HpCDF	1000	1190	119	82-122
55673-89-7	LCS 1,2,3,4,7,8,9-HpCDF	1000	1200	120	78-138
39001-02-0	LCS 1,2,3,4,6,7,8,9-OCDF	2000	2520	126	63-170

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Hi-Res Dioxins/Furans
Quality Control Summary
Spike Recovery Report

SDG Number: A9I0893
Client ID: LCSD for batch 42008
Lab Sample ID: 12025041
Instrument: HRP763
Analyst: MLS

Sample Type: Laboratory Control Sample Duplicate
Matrix: WATER
Analysis Date: 10/13/2019 03:39
Prep Batch ID: 42008
Batch ID: 42013
Dilution: 1

CAS No.	Parmname	Amount Added pg/L	Spike Conc. pg/L	Recovery %	Acceptance Limits	RPD %	Acceptance Limits
1746-01-6	LCSD 2,3,7,8-TCDD	200	191	95.5	67-158	0.949	0-20
40321-76-4	LCSD 1,2,3,7,8-PeCDD	1000	1160	116	70-142	1.20	0-20
39227-28-6	LCSD 1,2,3,4,7,8-HxCDD	1000	1150	115	70-164	2.81	0-20
57653-85-7	LCSD 1,2,3,6,7,8-HxCDD	1000	1140	114	74-134	3.09	0-20
19408-74-3	LCSD 1,2,3,7,8,9-HxCDD	1000	1220	122	64-162	2.10	0-20
35822-46-9	LCSD 1,2,3,4,6,7,8-HpCDD	1000	1080	108	70-140	6.92	0-20
3268-87-9	LCSD 1,2,3,4,6,7,8,9-OCDD	2000	2380	119	78-144	2.38	0-20
51207-31-9	LCSD 2,3,7,8-TCDF	200	230	115	75-158	2.68	0-20
57117-41-6	LCSD 1,2,3,7,8-PeCDF	1000	1160	116	80-134	2.00	0-20
57117-31-4	LCSD 2,3,4,7,8-PeCDF	1000	1170	117	68-160	3.51	0-20
70648-26-9	LCSD 1,2,3,4,7,8-HxCDF	1000	1150	115	72-134	0.191	0-20
57117-44-9	LCSD 1,2,3,6,7,8-HxCDF	1000	1190	119	84-130	2.50	0-20
60851-34-5	LCSD 2,3,4,6,7,8-HxCDF	1000	1150	115	70-156	3.44	0-20
72918-21-9	LCSD 1,2,3,7,8,9-HxCDF	1000	1220	122	78-130	4.69	0-20
67562-39-4	LCSD 1,2,3,4,6,7,8-HpCDF	1000	1200	120	82-122	0.488	0-20
55673-89-7	LCSD 1,2,3,4,7,8,9-HpCDF	1000	1190	119	78-138	0.586	0-20
39001-02-0	LCSD 1,2,3,4,6,7,8,9-OCDF	2000	2530	126	63-170	0.229	0-20

DRY

Method Blank Summary

Page 1 of 1

SDG Number: A9I0893
Client ID: MB for batch 42008
Lab Sample ID: 12025039
Column:

Client: APEX001
Instrument ID: HRP763
Prep Date: 09-OCT-19

Matrix: WATER
Data File: b10oct19a_8-3
Analyzed: 10/13/19 04:27

This method blank applies to the following samples and quality control samples:

Client Sample ID	Lab Sample ID	File ID	Date Analyzed	Time Analyzed
01 LCS for batch 42008	12025040	b10oct19a_8-1	10/13/19	0252
02 LCSD for batch 42008	12025041	b10oct19a_8-2	10/13/19	0339
03 Rinsate Blank	15579001	b15oct19b_3-7	10/16/19	1834

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**Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary**

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SDG Number: A9I0893
Lab Sample ID: 12025039
Client Sample: QC for batch 42008
Client ID: MB for batch 42008
Batch ID: 42013
Run Date: 10/13/2019 04:27
Data File: b10oct19a_8-3
Prep Batch: 42008
Prep Date: 09-OCT-19

Client: APEX001
Method: EPA Method 1613B
Analyst: MLS
Prep Method: SW846 3520C
Prep Aliquot: 1000 mL

Project: APEX00319
Matrix: WATER
Prep Basis: As Received
Instrument: HRP763
Dilution: 1

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
1746-01-6	2,3,7,8-TCDD	U	0.754	pg/L	0.754	10.0
40321-76-4	1,2,3,7,8-PeCDD	J	1.18	pg/L	0.906	50.0
39227-28-6	1,2,3,4,7,8-HxCDD	J	1.90	pg/L	1.02	50.0
57653-85-7	1,2,3,6,7,8-HxCDD	JK	1.34	pg/L	0.892	50.0
19408-74-3	1,2,3,7,8,9-HxCDD	J	1.76	pg/L	0.978	50.0
35822-46-9	1,2,3,4,6,7,8-HpCDD	J	2.44	pg/L	1.32	50.0
3268-87-9	1,2,3,4,6,7,8,9-OCDD	JK	8.42	pg/L	2.80	100
51207-31-9	2,3,7,8-TCDF	U	0.628	pg/L	0.628	10.0
57117-41-6	1,2,3,7,8-PeCDF	JK	1.88	pg/L	0.828	50.0
57117-31-4	2,3,4,7,8-PeCDF	U	0.706	pg/L	0.706	50.0
70648-26-9	1,2,3,4,7,8-HxCDF	J	1.56	pg/L	0.798	50.0
57117-44-9	1,2,3,6,7,8-HxCDF	JK	1.42	pg/L	0.738	50.0
60851-34-5	2,3,4,6,7,8-HxCDF	J	1.78	pg/L	0.800	50.0
72918-21-9	1,2,3,7,8,9-HxCDF	J	1.96	pg/L	1.21	50.0
67562-39-4	1,2,3,4,6,7,8-HpCDF	J	1.98	pg/L	0.796	50.0
55673-89-7	1,2,3,4,7,8,9-HpCDF	J	2.02	pg/L	1.26	50.0
39001-02-0	1,2,3,4,6,7,8,9-OCDF	J	4.28	pg/L	2.44	100
41903-57-5	Total TeCDD	U	0.754	pg/L	0.754	10.0
36088-22-9	Total PeCDD	J	1.18	pg/L	0.906	50.0
34465-46-8	Total HxCDD	JK	5.00	pg/L	0.892	50.0
37871-00-4	Total HpCDD	J	2.44	pg/L	1.32	50.0
30402-14-3	Total TeCDF	U	0.628	pg/L	0.628	10.0
30402-15-4	Total PeCDF	JK	1.88	pg/L	0.506	50.0
55684-94-1	Total HxCDF	JK	6.72	pg/L	0.738	50.0
38998-75-3	Total HpCDF	J	4.00	pg/L	0.796	50.0
3333-30-2	TEQ WHO2005 ND=0 with EMPCs		2.48	pg/L		
3333-30-3	TEQ WHO2005 ND=0.5 with EMPCs		2.99	pg/L		

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-2,3,7,8-TCDD		1590	2000	pg/L	79.3	(25%-164%)
13C-1,2,3,7,8-PeCDD		1860	2000	pg/L	93.0	(25%-181%)
13C-1,2,3,4,7,8-HxCDD		1510	2000	pg/L	75.5	(32%-141%)
13C-1,2,3,6,7,8-HxCDD		1580	2000	pg/L	79.1	(28%-130%)
13C-1,2,3,4,6,7,8-HpCDD		1700	2000	pg/L	84.8	(23%-140%)
13C-OCDD		2730	4000	pg/L	68.2	(17%-157%)
13C-2,3,7,8-TCDF		1530	2000	pg/L	76.5	(24%-169%)
13C-1,2,3,7,8-PeCDF		1870	2000	pg/L	93.7	(24%-185%)
13C-2,3,4,7,8-PeCDF		1850	2000	pg/L	92.6	(21%-178%)
13C-1,2,3,4,7,8-HxCDF		1540	2000	pg/L	76.8	(26%-152%)
13C-1,2,3,6,7,8-HxCDF		1640	2000	pg/L	81.8	(26%-123%)
13C-2,3,4,6,7,8-HxCDF		1660	2000	pg/L	82.9	(28%-136%)
13C-1,2,3,7,8,9-HxCDF		1660	2000	pg/L	82.9	(29%-147%)

**Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary**

SDG Number: A9I0893	Client: APEX001	Project: APEX00319
Lab Sample ID: 12025039		Matrix: WATER
Client Sample: QC for batch 42008		
Client ID: MB for batch 42008		Prep Basis: As Received
Batch ID: 42013	Method: EPA Method 1613B	
Run Date: 10/13/2019 04:27	Analyst: MLS	Instrument: HRP763
Data File: b10oct19a_8-3		Dilution: 1
Prep Batch: 42008	Prep Method: SW846 3520C	
Prep Date: 09-OCT-19	Prep Aliquot: 1000 mL	

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
Surrogate/Tracer recovery						
		Qual	Result	Nominal	Units	Recovery% Acceptable Limits
13C-1,2,3,4,6,7,8-HpCDF			1690	2000	pg/L	84.7 (28%-143%)
13C-1,2,3,4,7,8,9-HpCDF			1760	2000	pg/L	88.2 (26%-138%)
37Cl-2,3,7,8-TCDD			183	200	pg/L	91.3 (35%-197%)

Comments:
J Value is estimated
K Estimated Maximum Possible Concentration
U Analyte was analyzed for, but not detected above the specified detection limit.



**Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary**

Page 1 of 1

SDG Number: A9I0893	Client: APEX001	Project: APEX00319
Lab Sample ID: 12025040		Matrix: WATER
Client Sample: QC for batch 42008		
Client ID: LCS for batch 42008		Prep Basis: As Received
Batch ID: 42013	Method: EPA Method 1613B	
Run Date: 10/13/2019 02:52	Analyst: MLS	Instrument: HRP763
Data File: b10oct19a_8-1		Dilution: 1
Prep Batch: 42008	Prep Method: SW846 3520C	
Prep Date: 09-OCT-19	Prep Aliquot: 1000 mL	

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
1746-01-6	2,3,7,8-TCDD		193	pg/L	1.60	10.0
40321-76-4	1,2,3,7,8-PeCDD		1140	pg/L	2.88	50.0
39227-28-6	1,2,3,4,7,8-HxCDD		1180	pg/L	7.36	50.0
57653-85-7	1,2,3,6,7,8-HxCDD		1180	pg/L	6.76	50.0
19408-74-3	1,2,3,7,8,9-HxCDD		1250	pg/L	7.26	50.0
35822-46-9	1,2,3,4,6,7,8-HpCDD		1160	pg/L	13.4	50.0
3268-87-9	1,2,3,4,6,7,8,9-OCDD		2320	pg/L	33.0	100
51207-31-9	2,3,7,8-TCDF		236	pg/L	1.57	10.0
57117-41-6	1,2,3,7,8-PeCDF		1180	pg/L	3.74	50.0
57117-31-4	2,3,4,7,8-PeCDF		1210	pg/L	3.10	50.0
70648-26-9	1,2,3,4,7,8-HxCDF		1150	pg/L	6.72	50.0
57117-44-9	1,2,3,6,7,8-HxCDF		1220	pg/L	6.84	50.0
60851-34-5	2,3,4,6,7,8-HxCDF		1190	pg/L	7.20	50.0
72918-21-9	1,2,3,7,8,9-HxCDF		1160	pg/L	11.2	50.0
67562-39-4	1,2,3,4,6,7,8-HpCDF		1190	pg/L	7.66	50.0
55673-89-7	1,2,3,4,7,8,9-HpCDF		1200	pg/L	11.2	50.0
39001-02-0	1,2,3,4,6,7,8,9-OCDF		2520	pg/L	22.4	100

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-2,3,7,8-TCDD		1640	2000	pg/L	82.1	(20%-175%)
13C-1,2,3,7,8-PeCDD		1870	2000	pg/L	93.7	(21%-227%)
13C-1,2,3,4,7,8-HxCDD		1500	2000	pg/L	74.9	(21%-193%)
13C-1,2,3,6,7,8-HxCDD		1680	2000	pg/L	84.0	(25%-163%)
13C-1,2,3,4,6,7,8-HpCDD		1760	2000	pg/L	88.1	(22%-166%)
13C-OCDD		2800	4000	pg/L	69.9	(13%-199%)
13C-2,3,7,8-TCDF		1540	2000	pg/L	76.9	(22%-152%)
13C-1,2,3,7,8-PeCDF		1890	2000	pg/L	94.5	(21%-192%)
13C-2,3,4,7,8-PeCDF		1860	2000	pg/L	93.1	(13%-328%)
13C-1,2,3,4,7,8-HxCDF		1600	2000	pg/L	80.2	(19%-202%)
13C-1,2,3,6,7,8-HxCDF		1750	2000	pg/L	87.4	(21%-159%)
13C-2,3,4,6,7,8-HxCDF		1710	2000	pg/L	85.3	(22%-176%)
13C-1,2,3,7,8,9-HxCDF		1690	2000	pg/L	84.4	(17%-205%)
13C-1,2,3,4,6,7,8-HpCDF		1800	2000	pg/L	90.0	(21%-158%)
13C-1,2,3,4,7,8,9-HpCDF		1840	2000	pg/L	91.8	(20%-186%)
37Cl-2,3,7,8-TCDD		174	200	pg/L	86.9	(31%-191%)

Comments:

U Analyte was analyzed for, but not detected above the specified detection limit.

**Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary**

Page 1 of 1

SDG Number: A9I0893	Client: APEX001	Project: APEX00319
Lab Sample ID: 12025041		Matrix: WATER
Client Sample: QC for batch 42008		
Client ID: LCSD for batch 42008		Prep Basis: As Received
Batch ID: 42013	Method: EPA Method 1613B	
Run Date: 10/13/2019 03:39	Analyst: MLS	Instrument: HRP763
Data File: b10oct19a_8-2		Dilution: 1
Prep Batch: 42008	Prep Method: SW846 3520C	
Prep Date: 09-OCT-19	Prep Aliquot: 1000 mL	

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
1746-01-6	2,3,7,8-TCDD		191	pg/L	1.68	10.0
40321-76-4	1,2,3,7,8-PeCDD		1160	pg/L	3.66	50.0
39227-28-6	1,2,3,4,7,8-HxCDD		1150	pg/L	8.62	50.0
57653-85-7	1,2,3,6,7,8-HxCDD		1140	pg/L	8.12	50.0
19408-74-3	1,2,3,7,8,9-HxCDD		1220	pg/L	8.62	50.0
35822-46-9	1,2,3,4,6,7,8-HpCDD		1080	pg/L	15.8	50.0
3268-87-9	1,2,3,4,6,7,8,9-OCDD		2380	pg/L	33.8	100
51207-31-9	2,3,7,8-TCDF		230	pg/L	1.64	10.0
57117-41-6	1,2,3,7,8-PeCDF		1160	pg/L	5.08	50.0
57117-31-4	2,3,4,7,8-PeCDF		1170	pg/L	4.40	50.0
70648-26-9	1,2,3,4,7,8-HxCDF		1150	pg/L	7.44	50.0
57117-44-9	1,2,3,6,7,8-HxCDF		1190	pg/L	7.32	50.0
60851-34-5	2,3,4,6,7,8-HxCDF		1150	pg/L	7.64	50.0
72918-21-9	1,2,3,7,8,9-HxCDF		1220	pg/L	12.5	50.0
67562-39-4	1,2,3,4,6,7,8-HpCDF		1200	pg/L	8.36	50.0
55673-89-7	1,2,3,4,7,8,9-HpCDF		1190	pg/L	13.2	50.0
39001-02-0	1,2,3,4,6,7,8,9-OCDF		2530	pg/L	21.4	100

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-2,3,7,8-TCDD		1640	2000	pg/L	82.0	(20%-175%)
13C-1,2,3,7,8-PeCDD		1860	2000	pg/L	93.1	(21%-227%)
13C-1,2,3,4,7,8-HxCDD		1540	2000	pg/L	77.0	(21%-193%)
13C-1,2,3,6,7,8-HxCDD		1780	2000	pg/L	89.1	(25%-163%)
13C-1,2,3,4,6,7,8-HpCDD		1760	2000	pg/L	88.1	(22%-166%)
13C-OCDD		2770	4000	pg/L	69.2	(13%-199%)
13C-2,3,7,8-TCDF		1590	2000	pg/L	79.5	(22%-152%)
13C-1,2,3,7,8-PeCDF		1920	2000	pg/L	96.0	(21%-192%)
13C-2,3,4,7,8-PeCDF		1910	2000	pg/L	95.7	(13%-328%)
13C-1,2,3,4,7,8-HxCDF		1650	2000	pg/L	82.7	(19%-202%)
13C-1,2,3,6,7,8-HxCDF		1830	2000	pg/L	91.5	(21%-159%)
13C-2,3,4,6,7,8-HxCDF		1790	2000	pg/L	89.7	(22%-176%)
13C-1,2,3,7,8,9-HxCDF		1700	2000	pg/L	84.8	(17%-205%)
13C-1,2,3,4,6,7,8-HpCDF		1840	2000	pg/L	91.9	(21%-158%)
13C-1,2,3,4,7,8,9-HpCDF		1800	2000	pg/L	89.8	(20%-186%)
37Cl-2,3,7,8-TCDD		171	200	pg/L	85.5	(31%-191%)

Comments:

U Analyte was analyzed for, but not detected above the specified detection limit.



AMENDED REPORT

Thursday, January 9, 2020

Emily Hess
Maul Foster & Alongi, INC.
2001 NW 19th Ave, STE 200
Portland, OR 97209

RE: A9J0006 - Seaport Tidelands - 1044.02.06-02

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

Enclosed are the results of analyses for work order A9J0006, which was received by the laboratory on 9/30/2019 at 12:10:00PM.

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

Please note: All samples will be disposed of within 30 days of sample receipt, unless prior arrangements have been made.

Cooler Receipt Information

(See Cooler Receipt Form for details)

Cooler #1	2.3 degC	Cooler #2	3.0 degC
Cooler #3	1.6 degC	Cooler #4	4.8 degC
Cooler #5	1.9 degC	Cooler #6	5.5 degC
Cooler #7	1.3 degC	Cooler #8	1.8 degC

This Final Report is the official version of the data results for this sample submission, unless superseded by a subsequent, labeled amended report.

All other deliverables derived from this data, including Electronic Data Deliverables (EDDs), CLP-like forms, client requested summary sheets, and all other products are considered secondary to this report.



Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
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ANALYTICAL REPORT FOR SAMPLES

SAMPLE INFORMATION

Client Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
SE-24-0-0.33	A9J0006-01	Sediment	09/27/19 13:13	09/30/19 12:10
SE-24-0-0.33 (Porewater)	A9J0006-02	Water	09/27/19 13:13	09/30/19 12:10
SE-14-0-0.33	A9J0006-03	Sediment	09/27/19 14:02	09/30/19 12:10
SE-14-0-0.33 (Porewater)	A9J0006-04	Water	09/27/19 13:13	09/30/19 12:10
SE-23-0-0.33	A9J0006-05	Sediment	09/27/19 10:23	09/30/19 12:10
SE-17-0-0.33	A9J0006-06	Sediment	09/27/19 09:47	09/30/19 12:10
SE-15-0-0.33	A9J0006-07	Sediment	09/27/19 11:44	09/30/19 12:10
SE-21-0-0.33	A9J0006-08	Sediment	09/27/19 15:07	09/30/19 12:10
SE-25-0-0.33	A9J0006-13	Sediment	09/27/19 18:15	09/30/19 12:10
SE-28-0-0.33	A9J0006-14	Sediment	09/27/19 18:40	09/30/19 12:10
SE-28-0-0.33 (Porewater)	A9J0006-15	Water	09/27/19 18:40	09/30/19 12:10
SE-26-0-0.33	A9J0006-16	Sediment	09/27/19 17:25	09/30/19 12:10
SE-26-0-0.33 (Porewater)	A9J0006-17	Water	09/27/19 17:25	09/30/19 12:10
SE-18-0-0.33	A9J0006-18	Sediment	09/27/19 11:54	09/30/19 12:10
SE-18-0-0.33 (Porewater)	A9J0006-19	Water	09/27/19 11:54	09/30/19 12:10
SE-31-0-0.33	A9J0006-20	Sediment	09/27/19 12:10	09/30/19 12:10
SE-16-0-0.33	A9J0006-21	Sediment	09/27/19 09:00	09/30/19 12:10
SE-19-0-0.33	A9J0006-22	Sediment	09/27/19 08:30	09/30/19 12:10
SE-22-0-0.33	A9J0006-23	Sediment	09/27/19 19:30	09/30/19 12:10
SE-27-0-0.33	A9J0006-24	Sediment	09/27/19 14:35	09/30/19 12:10
SE-27-0-0.33-Dup	A9J0006-25	Sediment	09/27/19 14:35	09/30/19 12:10
SE-16-0-0.33 (Porewater)	A9J0006-26	Water	09/27/19 09:00	09/30/19 12:10
SE-17-0-0.33---Air Dried	A9J0006-27	Sediment	09/27/19 09:47	09/30/19 12:10
SE-18-0-0.33---Air Dried	A9J0006-28	Sediment	09/27/19 11:54	09/30/19 12:10
SE-16-0-0.33---Air Dried	A9J0006-29	Sediment	09/27/19 09:00	09/30/19 12:10
SE-22-0-0.33---Air Dried	A9J0006-30	Sediment	09/27/19 19:30	09/30/19 12:10
SE-27-0-0.33---Air Dried	A9J0006-31	Sediment	09/27/19 14:35	09/30/19 12:10
SE-27-0-0.33-Dup---Air Dried	A9J0006-32	Sediment	09/27/19 14:35	09/30/19 12:10



Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
EPA ID: OR01039

AMENDED REPORT

<u>Maul Foster & Alongi, INC.</u> 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: <u>Seaport Tidelands</u> Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
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ANALYTICAL CASE NARRATIVE

Work Order: A9J0006

Amended Report Revision 1:

This report supersedes all previous reports.

Due to client request, 1-methylnaphthalene was added to the SVOC analyte list after the previous report version had been completed.

Philip Nerenberg
Lab Director
1/9/20

DRAFT

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
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ANALYTICAL SAMPLE RESULTS

Diesel and/or Oil Hydrocarbons by NWTPH-Dx with Acid/Silica Gel Cleanup

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
SE-24-0-0.33 (A9J0006-01)				Matrix: Sediment		Batch: 9101200		
Diesel	ND	28.1	56.2	mg/kg dry	1	10/17/19 01:51	NWTPH-Dx/SG	
Oil	559	56.2	112	mg/kg dry	1	10/17/19 01:51	NWTPH-Dx/SG	
<i>Surrogate: o-Terphenyl (Surr)</i>		<i>Recovery: 91 %</i>		<i>Limits: 50-150 %</i>		<i>1</i>	<i>10/17/19 01:51</i>	<i>NWTPH-Dx/SG</i>
SE-14-0-0.33 (A9J0006-03)				Matrix: Sediment		Batch: 9101200		
Diesel	ND	27.3	54.7	mg/kg dry	1	10/17/19 02:15	NWTPH-Dx/SG	
Oil	384	54.7	109	mg/kg dry	1	10/17/19 02:15	NWTPH-Dx/SG	
<i>Surrogate: o-Terphenyl (Surr)</i>		<i>Recovery: 93 %</i>		<i>Limits: 50-150 %</i>		<i>1</i>	<i>10/17/19 02:15</i>	<i>NWTPH-Dx/SG</i>
SE-23-0-0.33 (A9J0006-05)				Matrix: Sediment		Batch: 9101200		
Diesel	ND	21.2	42.5	mg/kg dry	1	10/17/19 04:15	NWTPH-Dx/SG	
Oil	73.8	42.5	85.0	mg/kg dry	1	10/17/19 04:15	NWTPH-Dx/SG	Ja
<i>Surrogate: o-Terphenyl (Surr)</i>		<i>Recovery: 93 %</i>		<i>Limits: 50-150 %</i>		<i>1</i>	<i>10/17/19 04:15</i>	<i>NWTPH-Dx/SG</i>
SE-17-0-0.33 (A9J0006-06)				Matrix: Sediment		Batch: 9101200		
Diesel	ND	22.4	44.9	mg/kg dry	1	10/17/19 04:39	NWTPH-Dx/SG	
Oil	ND	44.9	89.8	mg/kg dry	1	10/17/19 04:39	NWTPH-Dx/SG	
<i>Surrogate: o-Terphenyl (Surr)</i>		<i>Recovery: 89 %</i>		<i>Limits: 50-150 %</i>		<i>1</i>	<i>10/17/19 04:39</i>	<i>NWTPH-Dx/SG</i>
SE-15-0-0.33 (A9J0006-07)				Matrix: Sediment		Batch: 9101200		
Diesel	ND	22.5	45.1	mg/kg dry	1	10/17/19 05:02	NWTPH-Dx/SG	
Oil	374	45.1	90.2	mg/kg dry	1	10/17/19 05:02	NWTPH-Dx/SG	
<i>Surrogate: o-Terphenyl (Surr)</i>		<i>Recovery: 95 %</i>		<i>Limits: 50-150 %</i>		<i>1</i>	<i>10/17/19 05:02</i>	<i>NWTPH-Dx/SG</i>
SE-21-0-0.33 (A9J0006-08)				Matrix: Sediment		Batch: 9101200		
Diesel	23.2	16.5	33.1	mg/kg dry	1	10/17/19 05:26	NWTPH-Dx/SG	Ja
Oil	ND	33.1	66.1	mg/kg dry	1	10/17/19 05:26	NWTPH-Dx/SG	
<i>Surrogate: o-Terphenyl (Surr)</i>		<i>Recovery: 93 %</i>		<i>Limits: 50-150 %</i>		<i>1</i>	<i>10/17/19 05:26</i>	<i>NWTPH-Dx/SG</i>
SE-25-0-0.33 (A9J0006-13)				Matrix: Sediment		Batch: 9101200		
Diesel	ND	24.1	48.3	mg/kg dry	1	10/17/19 05:49	NWTPH-Dx/SG	
Oil	2080	48.3	96.5	mg/kg dry	1	10/17/19 05:49	NWTPH-Dx/SG	
<i>Surrogate: o-Terphenyl (Surr)</i>		<i>Recovery: 91 %</i>		<i>Limits: 50-150 %</i>		<i>1</i>	<i>10/17/19 05:49</i>	<i>NWTPH-Dx/SG</i>

Apex Laboratories

Philip Nerenberg, Lab Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
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ANALYTICAL SAMPLE RESULTS

Diesel and/or Oil Hydrocarbons by NWTPH-Dx with Acid/Silica Gel Cleanup

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
SE-26-0-0.33 (A9J0006-16)				Matrix: Sediment		Batch: 9101200		
Diesel	ND	23.4	46.8	mg/kg dry	1	10/17/19 06:12	NWTPH-Dx/SG	
Oil	842	46.8	93.6	mg/kg dry	1	10/17/19 06:12	NWTPH-Dx/SG	
<i>Surrogate: o-Terphenyl (Surr)</i>		<i>Recovery: 89 %</i>		<i>Limits: 50-150 %</i>		<i>1</i>	<i>10/17/19 06:12</i>	<i>NWTPH-Dx/SG</i>
SE-18-0-0.33 (A9J0006-18)				Matrix: Sediment		Batch: 9101200		
Diesel	ND	21.5	43.0	mg/kg dry	1	10/17/19 06:35	NWTPH-Dx/SG	
Oil	ND	43.0	86.0	mg/kg dry	1	10/17/19 06:35	NWTPH-Dx/SG	
<i>Surrogate: o-Terphenyl (Surr)</i>		<i>Recovery: 91 %</i>		<i>Limits: 50-150 %</i>		<i>1</i>	<i>10/17/19 06:35</i>	<i>NWTPH-Dx/SG</i>
SE-31-0-0.33 (A9J0006-20)				Matrix: Sediment		Batch: 9101200		
Diesel	ND	20.4	40.8	mg/kg dry	1	10/17/19 06:59	NWTPH-Dx/SG	
Oil	58.5	40.8	81.5	mg/kg dry	1	10/17/19 06:59	NWTPH-Dx/SG	Ja
<i>Surrogate: o-Terphenyl (Surr)</i>		<i>Recovery: 92 %</i>		<i>Limits: 50-150 %</i>		<i>1</i>	<i>10/17/19 06:59</i>	<i>NWTPH-Dx/SG</i>
SE-16-0-0.33 (A9J0006-21)				Matrix: Sediment		Batch: 9101200		
Diesel	18.5	18.4	36.8	mg/kg dry	1	10/17/19 07:23	NWTPH-Dx/SG	Ja
Oil	ND	36.8	73.6	mg/kg dry	1	10/17/19 07:23	NWTPH-Dx/SG	
<i>Surrogate: o-Terphenyl (Surr)</i>		<i>Recovery: 94 %</i>		<i>Limits: 50-150 %</i>		<i>1</i>	<i>10/17/19 07:23</i>	<i>NWTPH-Dx/SG</i>
SE-22-0-0.33 (A9J0006-23)				Matrix: Sediment		Batch: 9101200		
Diesel	ND	29.9	59.8	mg/kg dry	1	10/17/19 07:47	NWTPH-Dx/SG	
Oil	130	59.8	120	mg/kg dry	1	10/17/19 07:47	NWTPH-Dx/SG	
<i>Surrogate: o-Terphenyl (Surr)</i>		<i>Recovery: 94 %</i>		<i>Limits: 50-150 %</i>		<i>1</i>	<i>10/17/19 07:47</i>	<i>NWTPH-Dx/SG</i>
SE-27-0-0.33 (A9J0006-24)				Matrix: Sediment		Batch: 9101200		
Diesel	ND	24.2	48.3	mg/kg dry	1	10/17/19 08:11	NWTPH-Dx/SG	
Oil	89.6	48.3	96.7	mg/kg dry	1	10/17/19 08:11	NWTPH-Dx/SG	Ja
<i>Surrogate: o-Terphenyl (Surr)</i>		<i>Recovery: 88 %</i>		<i>Limits: 50-150 %</i>		<i>1</i>	<i>10/17/19 08:11</i>	<i>NWTPH-Dx/SG</i>
SE-27-0-0.33-Dup (A9J0006-25)				Matrix: Sediment		Batch: 9101200		
Diesel	ND	25.9	51.8	mg/kg dry	1	10/17/19 08:35	NWTPH-Dx/SG	
Oil	72.2	51.8	104	mg/kg dry	1	10/17/19 08:35	NWTPH-Dx/SG	Ja
<i>Surrogate: o-Terphenyl (Surr)</i>		<i>Recovery: 92 %</i>		<i>Limits: 50-150 %</i>		<i>1</i>	<i>10/17/19 08:35</i>	<i>NWTPH-Dx/SG</i>

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Philip Nerenberg, Lab Director

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AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tideland Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
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ANALYTICAL SAMPLE RESULTS

Gasoline Range Hydrocarbons (Benzene through Naphthalene) by NWTPH-Gx

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
SE-24-0-0.33 (A9J0006-01)				Matrix: Sediment		Batch: 9100478		
Gasoline Range Organics	ND	27.9	27.9	mg/kg dry	50	10/01/19 17:04	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		Recovery: 102 %		Limits: 50-150 %	1	10/01/19 17:04	NWTPH-Gx (MS)	
1,4-Difluorobenzene (Sur)		89 %		50-150 %	1	10/01/19 17:04	NWTPH-Gx (MS)	
SE-14-0-0.33 (A9J0006-03)				Matrix: Sediment		Batch: 9100546		
Gasoline Range Organics	ND	12.8	25.6	mg/kg dry	50	10/02/19 15:41	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		Recovery: 108 %		Limits: 50-150 %	1	10/02/19 15:41	NWTPH-Gx (MS)	
1,4-Difluorobenzene (Sur)		101 %		50-150 %	1	10/02/19 15:41	NWTPH-Gx (MS)	
SE-23-0-0.33 (A9J0006-05)				Matrix: Sediment		Batch: 9100546		
Gasoline Range Organics	ND	9.01	18.0	mg/kg dry	50	10/02/19 16:08	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		Recovery: 110 %		Limits: 50-150 %	1	10/02/19 16:08	NWTPH-Gx (MS)	
1,4-Difluorobenzene (Sur)		101 %		50-150 %	1	10/02/19 16:08	NWTPH-Gx (MS)	
SE-17-0-0.33 (A9J0006-06)				Matrix: Sediment		Batch: 9100546		
Gasoline Range Organics	ND	13.3	26.7	mg/kg dry	50	10/02/19 16:35	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		Recovery: 114 %		Limits: 50-150 %	1	10/02/19 16:35	NWTPH-Gx (MS)	
1,4-Difluorobenzene (Sur)		104 %		50-150 %	1	10/02/19 16:35	NWTPH-Gx (MS)	
SE-15-0-0.33 (A9J0006-07)				Matrix: Sediment		Batch: 9100478		
Gasoline Range Organics	ND	10.0	20.1	mg/kg dry	50	10/01/19 18:53	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		Recovery: 90 %		Limits: 50-150 %	1	10/01/19 18:53	NWTPH-Gx (MS)	
1,4-Difluorobenzene (Sur)		87 %		50-150 %	1	10/01/19 18:53	NWTPH-Gx (MS)	
SE-21-0-0.33 (A9J0006-08)				Matrix: Sediment		Batch: 9100478		
Gasoline Range Organics	ND	6.71	13.4	mg/kg dry	50	10/01/19 19:20	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		Recovery: 92 %		Limits: 50-150 %	1	10/01/19 19:20	NWTPH-Gx (MS)	
1,4-Difluorobenzene (Sur)		88 %		50-150 %	1	10/01/19 19:20	NWTPH-Gx (MS)	
SE-25-0-0.33 (A9J0006-13)				Matrix: Sediment		Batch: 9100478		
Gasoline Range Organics	ND	10.1	20.2	mg/kg dry	50	10/01/19 19:47	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		Recovery: 88 %		Limits: 50-150 %	1	10/01/19 19:47	NWTPH-Gx (MS)	
1,4-Difluorobenzene (Sur)		89 %		50-150 %	1	10/01/19 19:47	NWTPH-Gx (MS)	
SE-26-0-0.33 (A9J0006-16)				Matrix: Sediment		Batch: 9100478		

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AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
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ANALYTICAL SAMPLE RESULTS

Gasoline Range Hydrocarbons (Benzene through Naphthalene) by NWTPH-Gx

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
SE-26-0-0.33 (A9J0006-16)				Matrix: Sediment		Batch: 9100478		
Gasoline Range Organics	ND	9.64	19.3	mg/kg dry	50	10/01/19 21:09	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		Recovery: 92 %	Limits: 50-150 %	1		10/01/19 21:09	NWTPH-Gx (MS)	
1,4-Difluorobenzene (Sur)		89 %	50-150 %	1		10/01/19 21:09	NWTPH-Gx (MS)	
SE-18-0-0.33 (A9J0006-18)				Matrix: Sediment		Batch: 9100478		
Gasoline Range Organics	ND	9.11	18.2	mg/kg dry	50	10/01/19 21:36	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		Recovery: 94 %	Limits: 50-150 %	1		10/01/19 21:36	NWTPH-Gx (MS)	
1,4-Difluorobenzene (Sur)		91 %	50-150 %	1		10/01/19 21:36	NWTPH-Gx (MS)	
SE-31-0-0.33 (A9J0006-20)				Matrix: Sediment		Batch: 9100509		
Gasoline Range Organics	ND	7.73	15.5	mg/kg dry	50	10/01/19 17:28	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		Recovery: 111 %	Limits: 50-150 %	1		10/01/19 17:28	NWTPH-Gx (MS)	
1,4-Difluorobenzene (Sur)		94 %	50-150 %	1		10/01/19 17:28	NWTPH-Gx (MS)	
SE-16-0-0.33 (A9J0006-21)				Matrix: Sediment		Batch: 9100509		
Gasoline Range Organics	ND	8.42	16.8	mg/kg dry	50	10/01/19 17:55	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		Recovery: 106 %	Limits: 50-150 %	1		10/01/19 17:55	NWTPH-Gx (MS)	
1,4-Difluorobenzene (Sur)		94 %	50-150 %	1		10/01/19 17:55	NWTPH-Gx (MS)	
SE-22-0-0.33 (A9J0006-23)				Matrix: Sediment		Batch: 9100509		
Gasoline Range Organics	ND	16.0	32.0	mg/kg dry	50	10/01/19 18:22	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		Recovery: 110 %	Limits: 50-150 %	1		10/01/19 18:22	NWTPH-Gx (MS)	
1,4-Difluorobenzene (Sur)		94 %	50-150 %	1		10/01/19 18:22	NWTPH-Gx (MS)	
SE-27-0-0.33 (A9J0006-24)				Matrix: Sediment		Batch: 9100509		
Gasoline Range Organics	ND	11.5	22.9	mg/kg dry	50	10/01/19 19:17	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		Recovery: 114 %	Limits: 50-150 %	1		10/01/19 19:17	NWTPH-Gx (MS)	
1,4-Difluorobenzene (Sur)		95 %	50-150 %	1		10/01/19 19:17	NWTPH-Gx (MS)	
SE-27-0-0.33-Dup (A9J0006-25)				Matrix: Sediment		Batch: 9100509		
Gasoline Range Organics	ND	13.0	26.0	mg/kg dry	50	10/01/19 19:44	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		Recovery: 113 %	Limits: 50-150 %	1		10/01/19 19:44	NWTPH-Gx (MS)	
1,4-Difluorobenzene (Sur)		95 %	50-150 %	1		10/01/19 19:44	NWTPH-Gx (MS)	

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AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
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ANALYTICAL SAMPLE RESULTS

Polychlorinated Biphenyls by EPA 8082A

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
SE-24-0-0.33 (A9J0006-01)			Matrix: Sediment			Batch: 9100667		C-07
Aroclor 1016	ND	5.60	11.2	ug/kg dry	1	10/07/19 12:32	EPA 8082A	
Aroclor 1221	ND	5.60	11.2	ug/kg dry	1	10/07/19 12:32	EPA 8082A	
Aroclor 1232	ND	5.60	11.2	ug/kg dry	1	10/07/19 12:32	EPA 8082A	
Aroclor 1242	ND	5.60	11.2	ug/kg dry	1	10/07/19 12:32	EPA 8082A	
Aroclor 1248	ND	5.60	11.2	ug/kg dry	1	10/07/19 12:32	EPA 8082A	
Aroclor 1254	ND	5.60	11.2	ug/kg dry	1	10/07/19 12:32	EPA 8082A	
Aroclor 1260	42.4	5.60	11.2	ug/kg dry	1	10/07/19 12:32	EPA 8082A	
<i>Surrogate: Decachlorobiphenyl (Surr)</i>		<i>Recovery: 65 %</i>		<i>Limits: 60-125 %</i>		<i>1</i>	<i>10/07/19 12:32</i>	<i>EPA 8082A</i>

SE-14-0-0.33 (A9J0006-03)			Matrix: Sediment			Batch: 9100667		C-07
Aroclor 1016	ND	5.75	11.5	ug/kg dry	1	10/07/19 13:52	EPA 8082A	
Aroclor 1221	ND	5.75	11.5	ug/kg dry	1	10/07/19 13:52	EPA 8082A	
Aroclor 1232	ND	5.75	11.5	ug/kg dry	1	10/07/19 13:52	EPA 8082A	
Aroclor 1242	ND	5.75	11.5	ug/kg dry	1	10/07/19 13:52	EPA 8082A	
Aroclor 1248	ND	5.75	11.5	ug/kg dry	1	10/07/19 13:52	EPA 8082A	
Aroclor 1254	ND	5.75	11.5	ug/kg dry	1	10/07/19 13:52	EPA 8082A	
Aroclor 1260	8.41	5.75	11.5	ug/kg dry	1	10/07/19 13:52	EPA 8082A	Ja
<i>Surrogate: Decachlorobiphenyl (Surr)</i>		<i>Recovery: 59 %</i>		<i>Limits: 60-125 %</i>		<i>1</i>	<i>10/07/19 13:52</i>	<i>EPA 8082A</i>

SE-23-0-0.33 (A9J0006-05)			Matrix: Sediment			Batch: 9100667		C-07
Aroclor 1016	ND	4.39	8.79	ug/kg dry	1	10/07/19 14:28	EPA 8082A	
Aroclor 1221	ND	4.39	8.79	ug/kg dry	1	10/07/19 14:28	EPA 8082A	
Aroclor 1232	ND	4.39	8.79	ug/kg dry	1	10/07/19 14:28	EPA 8082A	
Aroclor 1242	ND	4.39	8.79	ug/kg dry	1	10/07/19 14:28	EPA 8082A	
Aroclor 1248	ND	4.39	8.79	ug/kg dry	1	10/07/19 14:28	EPA 8082A	
Aroclor 1254	8.09	4.39	8.79	ug/kg dry	1	10/07/19 14:28	EPA 8082A	Ja
Aroclor 1260	ND	4.39	8.79	ug/kg dry	1	10/07/19 14:28	EPA 8082A	
<i>Surrogate: Decachlorobiphenyl (Surr)</i>		<i>Recovery: 79 %</i>		<i>Limits: 60-125 %</i>		<i>1</i>	<i>10/07/19 14:28</i>	<i>EPA 8082A</i>

SE-15-0-0.33 (A9J0006-07)			Matrix: Sediment			Batch: 9100667		C-07
Aroclor 1016	ND	4.57	9.14	ug/kg dry	1	10/07/19 15:39	EPA 8082A	
Aroclor 1221	ND	4.57	9.14	ug/kg dry	1	10/07/19 15:39	EPA 8082A	
Aroclor 1232	ND	4.57	9.14	ug/kg dry	1	10/07/19 15:39	EPA 8082A	

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
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ANALYTICAL SAMPLE RESULTS

Polychlorinated Biphenyls by EPA 8082A

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
SE-15-0-0.33 (A9J0006-07)				Matrix: Sediment		Batch: 9100667		C-07
Aroclor 1242	ND	4.57	9.14	ug/kg dry	1	10/07/19 15:39	EPA 8082A	
Aroclor 1248	ND	4.57	9.14	ug/kg dry	1	10/07/19 15:39	EPA 8082A	
Aroclor 1254	ND	4.57	9.14	ug/kg dry	1	10/07/19 15:39	EPA 8082A	
Aroclor 1260	ND	4.57	9.14	ug/kg dry	1	10/07/19 15:39	EPA 8082A	
<i>Surrogate: Decachlorobiphenyl (Surr)</i>		<i>Recovery: 64 %</i>		<i>Limits: 60-125 %</i>		<i>1</i>	<i>10/07/19 15:39</i>	<i>EPA 8082A</i>
SE-21-0-0.33 (A9J0006-08)				Matrix: Sediment		Batch: 9100667		C-07
Aroclor 1016	ND	3.36	6.73	ug/kg dry	1	10/07/19 16:14	EPA 8082A	
Aroclor 1221	ND	3.36	6.73	ug/kg dry	1	10/07/19 16:14	EPA 8082A	
Aroclor 1232	ND	3.36	6.73	ug/kg dry	1	10/07/19 16:14	EPA 8082A	
Aroclor 1242	ND	3.36	6.73	ug/kg dry	1	10/07/19 16:14	EPA 8082A	
Aroclor 1248	ND	3.36	6.73	ug/kg dry	1	10/07/19 16:14	EPA 8082A	
Aroclor 1254	ND	3.36	6.73	ug/kg dry	1	10/07/19 16:14	EPA 8082A	
Aroclor 1260	4.16	3.36	6.73	ug/kg dry	1	10/07/19 16:14	EPA 8082A	Ja
<i>Surrogate: Decachlorobiphenyl (Surr)</i>		<i>Recovery: 68 %</i>		<i>Limits: 60-125 %</i>		<i>1</i>	<i>10/07/19 16:14</i>	<i>EPA 8082A</i>
SE-25-0-0.33 (A9J0006-13)				Matrix: Sediment		Batch: 9100667		C-07
Aroclor 1016	ND	4.56	9.12	ug/kg dry	1	10/07/19 16:50	EPA 8082A	
Aroclor 1221	ND	4.56	9.12	ug/kg dry	1	10/07/19 16:50	EPA 8082A	
Aroclor 1232	ND	4.56	9.12	ug/kg dry	1	10/07/19 16:50	EPA 8082A	
Aroclor 1242	ND	4.56	9.12	ug/kg dry	1	10/07/19 16:50	EPA 8082A	
Aroclor 1248	ND	4.56	9.12	ug/kg dry	1	10/07/19 16:50	EPA 8082A	
Aroclor 1254	ND	4.56	9.12	ug/kg dry	1	10/07/19 16:50	EPA 8082A	
Aroclor 1260	17.6	4.56	9.12	ug/kg dry	1	10/07/19 16:50	EPA 8082A	
<i>Surrogate: Decachlorobiphenyl (Surr)</i>		<i>Recovery: 84 %</i>		<i>Limits: 60-125 %</i>		<i>1</i>	<i>10/07/19 16:50</i>	<i>EPA 8082A</i>
SE-26-0-0.33 (A9J0006-16)				Matrix: Sediment		Batch: 9100667		C-07
Aroclor 1016	ND	4.42	8.85	ug/kg dry	1	10/07/19 12:50	EPA 8082A	
Aroclor 1221	ND	4.42	8.85	ug/kg dry	1	10/07/19 12:50	EPA 8082A	
Aroclor 1232	ND	4.42	8.85	ug/kg dry	1	10/07/19 12:50	EPA 8082A	
Aroclor 1242	ND	4.42	8.85	ug/kg dry	1	10/07/19 12:50	EPA 8082A	
Aroclor 1248	ND	4.42	8.85	ug/kg dry	1	10/07/19 12:50	EPA 8082A	
Aroclor 1254	ND	4.42	8.85	ug/kg dry	1	10/07/19 12:50	EPA 8082A	

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
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ANALYTICAL SAMPLE RESULTS

Polychlorinated Biphenyls by EPA 8082A

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
SE-26-0-0.33 (A9J0006-16)				Matrix: Sediment		Batch: 9100667		C-07
Aroclor 1260	15.5	4.42	8.85	ug/kg dry	1	10/07/19 12:50	EPA 8082A	
<i>Surrogate: Decachlorobiphenyl (Surr)</i>		<i>Recovery: 84 %</i>		<i>Limits: 60-125 %</i>		<i>1</i>	<i>10/07/19 12:50</i>	<i>EPA 8082A</i>
SE-31-0-0.33 (A9J0006-20)				Matrix: Sediment		Batch: 9100667		C-07
Aroclor 1016	ND	3.96	7.93	ug/kg dry	1	10/07/19 14:10	EPA 8082A	
Aroclor 1221	ND	3.96	7.93	ug/kg dry	1	10/07/19 14:10	EPA 8082A	
Aroclor 1232	ND	3.96	7.93	ug/kg dry	1	10/07/19 14:10	EPA 8082A	
Aroclor 1242	ND	3.96	7.93	ug/kg dry	1	10/07/19 14:10	EPA 8082A	
Aroclor 1248	ND	3.96	7.93	ug/kg dry	1	10/07/19 14:10	EPA 8082A	
Aroclor 1254	ND	3.96	7.93	ug/kg dry	1	10/07/19 14:10	EPA 8082A	
Aroclor 1260	ND	3.96	7.93	ug/kg dry	1	10/07/19 14:10	EPA 8082A	
<i>Surrogate: Decachlorobiphenyl (Surr)</i>		<i>Recovery: 61 %</i>		<i>Limits: 60-125 %</i>		<i>1</i>	<i>10/07/19 14:10</i>	<i>EPA 8082A</i>
SE-17-0-0.33---Air Dried (A9J0006-27)				Matrix: Sediment		Batch: 9101592		C-07
Aroclor 1016	ND	2.07	4.14	ug/kg dry	1	10/28/19 09:24	EPA 8082A	
Aroclor 1221	ND	2.07	4.14	ug/kg dry	1	10/28/19 09:24	EPA 8082A	
Aroclor 1232	ND	2.07	4.14	ug/kg dry	1	10/28/19 09:24	EPA 8082A	
Aroclor 1242	ND	2.07	4.14	ug/kg dry	1	10/28/19 09:24	EPA 8082A	
Aroclor 1248	ND	2.07	4.14	ug/kg dry	1	10/28/19 09:24	EPA 8082A	
Aroclor 1254	ND	4.14	4.14	ug/kg dry	1	10/28/19 09:24	EPA 8082A	
Aroclor 1260	ND	4.14	4.14	ug/kg dry	1	10/28/19 09:24	EPA 8082A	
<i>Surrogate: Decachlorobiphenyl (Surr)</i>		<i>Recovery: 103 %</i>		<i>Limits: 60-125 %</i>		<i>1</i>	<i>10/28/19 09:24</i>	<i>EPA 8082A</i>
SE-18-0-0.33---Air Dried (A9J0006-28)				Matrix: Sediment		Batch: 9101592		C-07
Aroclor 1016	ND	2.03	4.06	ug/kg dry	1	10/28/19 09:59	EPA 8082A	
Aroclor 1221	ND	2.03	4.06	ug/kg dry	1	10/28/19 09:59	EPA 8082A	
Aroclor 1232	ND	2.03	4.06	ug/kg dry	1	10/28/19 09:59	EPA 8082A	
Aroclor 1242	ND	2.03	4.06	ug/kg dry	1	10/28/19 09:59	EPA 8082A	
Aroclor 1248	ND	2.03	4.06	ug/kg dry	1	10/28/19 09:59	EPA 8082A	
Aroclor 1254	ND	2.03	4.06	ug/kg dry	1	10/28/19 09:59	EPA 8082A	
Aroclor 1260	ND	2.03	4.06	ug/kg dry	1	10/28/19 09:59	EPA 8082A	
<i>Surrogate: Decachlorobiphenyl (Surr)</i>		<i>Recovery: 95 %</i>		<i>Limits: 60-125 %</i>		<i>1</i>	<i>10/28/19 09:59</i>	<i>EPA 8082A</i>

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Philip Nerenberg, Lab Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
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ANALYTICAL SAMPLE RESULTS

Polychlorinated Biphenyls by EPA 8082A

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
SE-16-0-0.33---Air Dried (A9J0006-29)				Matrix: Sediment		Batch: 9101592		C-07
Aroclor 1016	ND	2.02	4.05	ug/kg dry	1	10/28/19 10:35	EPA 8082A	
Aroclor 1221	ND	2.02	4.05	ug/kg dry	1	10/28/19 10:35	EPA 8082A	
Aroclor 1232	ND	2.02	4.05	ug/kg dry	1	10/28/19 10:35	EPA 8082A	
Aroclor 1242	ND	2.02	4.05	ug/kg dry	1	10/28/19 10:35	EPA 8082A	
Aroclor 1248	ND	2.02	4.05	ug/kg dry	1	10/28/19 10:35	EPA 8082A	
Aroclor 1254	ND	2.02	4.05	ug/kg dry	1	10/28/19 10:35	EPA 8082A	
Aroclor 1260	ND	2.02	4.05	ug/kg dry	1	10/28/19 10:35	EPA 8082A	
<i>Surrogate: Decachlorobiphenyl (Surr)</i>		<i>Recovery: 103 %</i>		<i>Limits: 60-125 %</i>		<i>1</i>	<i>10/28/19 10:35</i>	<i>EPA 8082A</i>
SE-22-0-0.33---Air Dried (A9J0006-30)				Matrix: Sediment		Batch: 9101592		C-07
Aroclor 1016	ND	2.04	4.09	ug/kg dry	1	10/28/19 11:10	EPA 8082A	
Aroclor 1221	ND	2.04	4.09	ug/kg dry	1	10/28/19 11:10	EPA 8082A	
Aroclor 1232	ND	2.04	4.09	ug/kg dry	1	10/28/19 11:10	EPA 8082A	
Aroclor 1242	ND	2.04	4.09	ug/kg dry	1	10/28/19 11:10	EPA 8082A	
Aroclor 1248	ND	2.04	4.09	ug/kg dry	1	10/28/19 11:10	EPA 8082A	
Aroclor 1254	3.74	2.04	4.09	ug/kg dry	1	10/28/19 11:10	EPA 8082A	Ja
Aroclor 1260	4.43	2.04	4.09	ug/kg dry	1	10/28/19 11:10	EPA 8082A	P-10
<i>Surrogate: Decachlorobiphenyl (Surr)</i>		<i>Recovery: 90 %</i>		<i>Limits: 60-125 %</i>		<i>1</i>	<i>10/28/19 11:10</i>	<i>EPA 8082A</i>
SE-27-0-0.33---Air Dried (A9J0006-31)				Matrix: Sediment		Batch: 9101592		C-07
Aroclor 1016	ND	2.07	4.15	ug/kg dry	1	10/28/19 11:45	EPA 8082A	
Aroclor 1221	ND	2.07	4.15	ug/kg dry	1	10/28/19 11:45	EPA 8082A	
Aroclor 1232	ND	2.07	4.15	ug/kg dry	1	10/28/19 11:45	EPA 8082A	
Aroclor 1242	ND	2.07	4.15	ug/kg dry	1	10/28/19 11:45	EPA 8082A	
Aroclor 1248	ND	2.07	4.15	ug/kg dry	1	10/28/19 11:45	EPA 8082A	
Aroclor 1254	ND	2.07	4.15	ug/kg dry	1	10/28/19 11:45	EPA 8082A	
Aroclor 1260	9.53	2.07	4.15	ug/kg dry	1	10/28/19 11:45	EPA 8082A	
<i>Surrogate: Decachlorobiphenyl (Surr)</i>		<i>Recovery: 101 %</i>		<i>Limits: 60-125 %</i>		<i>1</i>	<i>10/28/19 11:45</i>	<i>EPA 8082A</i>
SE-27-0-0.33-Dup---Air Dried (A9J0006-32)				Matrix: Sediment		Batch: 9101592		C-07
Aroclor 1016	ND	1.92	3.85	ug/kg dry	1	10/28/19 12:20	EPA 8082A	
Aroclor 1221	ND	1.92	3.85	ug/kg dry	1	10/28/19 12:20	EPA 8082A	
Aroclor 1232	ND	1.92	3.85	ug/kg dry	1	10/28/19 12:20	EPA 8082A	

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Philip Nerenberg, Lab Director



AMENDED REPORT

<u>Maul Foster & Alongi, INC.</u> 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: <u>Seaport Tidelands</u> Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
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ANALYTICAL SAMPLE RESULTS

Polychlorinated Biphenyls by EPA 8082A

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
SE-27-0-0.33-Dup---Air Dried (A9J0006-32)				Matrix: Sediment		Batch: 9101592		C-07
Aroclor 1242	ND	1.92	3.85	ug/kg dry	1	10/28/19 12:20	EPA 8082A	
Aroclor 1248	ND	1.92	3.85	ug/kg dry	1	10/28/19 12:20	EPA 8082A	
Aroclor 1254	ND	1.92	3.85	ug/kg dry	1	10/28/19 12:20	EPA 8082A	
Aroclor 1260	9.05	1.92	3.85	ug/kg dry	1	10/28/19 12:20	EPA 8082A	
<i>Surrogate: Decachlorobiphenyl (Surr)</i>		<i>Recovery: 94 %</i>		<i>Limits: 60-125 %</i>		<i>1</i>	<i>10/28/19 12:20</i>	<i>EPA 8082A</i>

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Philip Nerenberg



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
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ANALYTICAL SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
SE-24-0-0.33 (A9J0006-01RE1)				Matrix: Sediment		Batch: 9100490		
Acenaphthene	0.0293	0.0148	0.0296	mg/kg dry	4	10/02/19 13:16	EPA 8270D	Ja
Acenaphthylene	ND	0.0148	0.0296	mg/kg dry	4	10/02/19 13:16	EPA 8270D	
Anthracene	0.0226	0.0148	0.0296	mg/kg dry	4	10/02/19 13:16	EPA 8270D	Ja
Benz(a)anthracene	0.0412	0.0148	0.0296	mg/kg dry	4	10/02/19 13:16	EPA 8270D	
Benzo(a)pyrene	0.0318	0.0222	0.0444	mg/kg dry	4	10/02/19 13:16	EPA 8270D	Ja
Benzo(b)fluoranthene	0.0286	0.0222	0.0444	mg/kg dry	4	10/02/19 13:16	EPA 8270D	Ja
Benzo(k)fluoranthene	ND	0.0222	0.0444	mg/kg dry	4	10/02/19 13:16	EPA 8270D	
Benzo(g,h,i)perylene	ND	0.0148	0.0296	mg/kg dry	4	10/02/19 13:16	EPA 8270D	
Chrysene	0.0334	0.0148	0.0296	mg/kg dry	4	10/02/19 13:16	EPA 8270D	
Dibenz(a,h)anthracene	ND	0.0148	0.0296	mg/kg dry	4	10/02/19 13:16	EPA 8270D	
Fluoranthene	0.123	0.0148	0.0296	mg/kg dry	4	10/02/19 13:16	EPA 8270D	
Fluorene	0.0242	0.0148	0.0296	mg/kg dry	4	10/02/19 13:16	EPA 8270D	Ja
Indeno(1,2,3-cd)pyrene	ND	0.0148	0.0296	mg/kg dry	4	10/02/19 13:16	EPA 8270D	
1-Methylnaphthalene	ND	0.0296	0.0592	mg/kg dry	4	10/02/19 13:16	EPA 8270D	
2-Methylnaphthalene	ND	0.0296	0.0592	mg/kg dry	4	10/02/19 13:16	EPA 8270D	
Naphthalene	0.0698	0.0296	0.0592	mg/kg dry	4	10/02/19 13:16	EPA 8270D	
Phenanthrene	0.0768	0.0148	0.0296	mg/kg dry	4	10/02/19 13:16	EPA 8270D	
Pyrene	0.113	0.0148	0.0296	mg/kg dry	4	10/02/19 13:16	EPA 8270D	
Dibenzofuran	0.0211	0.0148	0.0296	mg/kg dry	4	10/02/19 13:16	EPA 8270D	Ja
2,4-Dimethylphenol	ND	0.0740	0.148	mg/kg dry	4	10/02/19 13:16	EPA 8270D	
2-Methylphenol	ND	0.0370	0.0740	mg/kg dry	4	10/02/19 13:16	EPA 8270D	
3+4-Methylphenol(s)	0.137	0.0370	0.0740	mg/kg dry	4	10/02/19 13:16	EPA 8270D	
Pentachlorophenol (PCP)	ND	0.148	0.296	mg/kg dry	4	10/02/19 13:16	EPA 8270D	
Phenol	0.0889	0.0296	0.0592	mg/kg dry	4	10/02/19 13:16	EPA 8270D	
Bis(2-ethylhexyl)phthalate	ND	0.222	0.444	mg/kg dry	4	10/02/19 13:16	EPA 8270D	
Butyl benzyl phthalate	ND	0.0740	0.148	mg/kg dry	4	10/02/19 13:16	EPA 8270D	
Diethylphthalate	ND	0.0740	0.148	mg/kg dry	4	10/02/19 13:16	EPA 8270D	
Dimethylphthalate	ND	0.0740	0.148	mg/kg dry	4	10/02/19 13:16	EPA 8270D	
Di-n-butylphthalate	ND	0.0740	0.148	mg/kg dry	4	10/02/19 13:16	EPA 8270D	
Di-n-octyl phthalate	ND	0.119	0.148	mg/kg dry	4	10/02/19 13:16	EPA 8270D	
N-Nitrosodiphenylamine	ND	0.0370	0.0740	mg/kg dry	4	10/02/19 13:16	EPA 8270D	
Hexachlorobenzene	ND	0.0148	0.0296	mg/kg dry	4	10/02/19 13:16	EPA 8270D	
Hexachlorobutadiene	ND	0.0370	0.0740	mg/kg dry	4	10/02/19 13:16	EPA 8270D	

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
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ANALYTICAL SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
SE-24-0-0.33 (A9J0006-01RE1)			Matrix: Sediment			Batch: 9100490		
Hexachlorocyclopentadiene	ND	0.0740	0.148	mg/kg dry	4	10/02/19 13:16	EPA 8270D	
1,2-Dichlorobenzene	ND	0.0370	0.0740	mg/kg dry	4	10/02/19 13:16	EPA 8270D	
1,4-Dichlorobenzene	ND	0.0370	0.0740	mg/kg dry	4	10/02/19 13:16	EPA 8270D	
1,2,4-Trichlorobenzene	ND	0.0370	0.0740	mg/kg dry	4	10/02/19 13:16	EPA 8270D	
Benzoic acid	ND	1.85	3.70	mg/kg dry	4	10/02/19 13:16	EPA 8270D	
Benzyl alcohol	ND	0.0740	0.148	mg/kg dry	4	10/02/19 13:16	EPA 8270D	
<i>Surrogate: Nitrobenzene-d5 (Surr)</i>		<i>Recovery: 60 %</i>		<i>Limits: 37-122 %</i>		<i>4</i>	<i>10/02/19 13:16</i>	<i>EPA 8270D</i>
<i>2-Fluorobiphenyl (Surr)</i>		<i>64 %</i>		<i>44-115 %</i>		<i>4</i>	<i>10/02/19 13:16</i>	<i>EPA 8270D</i>
<i>Phenol-d6 (Surr)</i>		<i>56 %</i>		<i>33-122 %</i>		<i>4</i>	<i>10/02/19 13:16</i>	<i>EPA 8270D</i>
<i>p-Terphenyl-d14 (Surr)</i>		<i>63 %</i>		<i>54-127 %</i>		<i>4</i>	<i>10/02/19 13:16</i>	<i>EPA 8270D</i>
<i>2-Fluorophenol (Surr)</i>		<i>53 %</i>		<i>35-115 %</i>		<i>4</i>	<i>10/02/19 13:16</i>	<i>EPA 8270D</i>
<i>2,4,6-Tribromophenol (Surr)</i>		<i>104 %</i>		<i>39-132 %</i>		<i>4</i>	<i>10/02/19 13:16</i>	<i>EPA 8270D</i>

SE-14-0-0.33 (A9J0006-03RE1)			Matrix: Sediment			Batch: 9100490		
Acenaphthene	0.0154	0.0151	0.0303	mg/kg dry	4	10/02/19 14:25	EPA 8270D	Ja
Acenaphthylene	ND	0.0151	0.0303	mg/kg dry	4	10/02/19 14:25	EPA 8270D	
Anthracene	ND	0.0151	0.0303	mg/kg dry	4	10/02/19 14:25	EPA 8270D	
Benz(a)anthracene	ND	0.0303	0.0303	mg/kg dry	4	10/02/19 14:25	EPA 8270D	
Benzo(a)pyrene	ND	0.0227	0.0454	mg/kg dry	4	10/02/19 14:25	EPA 8270D	
Benzo(b)fluoranthene	ND	0.0227	0.0454	mg/kg dry	4	10/02/19 14:25	EPA 8270D	
Benzo(k)fluoranthene	ND	0.0227	0.0454	mg/kg dry	4	10/02/19 14:25	EPA 8270D	
Benzo(g,h,i)perylene	ND	0.0151	0.0303	mg/kg dry	4	10/02/19 14:25	EPA 8270D	
Chrysene	0.0166	0.0151	0.0303	mg/kg dry	4	10/02/19 14:25	EPA 8270D	Ja
Dibenz(a,h)anthracene	ND	0.0151	0.0303	mg/kg dry	4	10/02/19 14:25	EPA 8270D	
Fluoranthene	0.0211	0.0151	0.0303	mg/kg dry	4	10/02/19 14:25	EPA 8270D	Ja
Fluorene	ND	0.0151	0.0303	mg/kg dry	4	10/02/19 14:25	EPA 8270D	
Indeno(1,2,3-cd)pyrene	ND	0.0151	0.0303	mg/kg dry	4	10/02/19 14:25	EPA 8270D	
1-Methylnaphthalene	ND	0.0303	0.0605	mg/kg dry	4	10/02/19 14:25	EPA 8270D	
2-Methylnaphthalene	ND	0.0303	0.0605	mg/kg dry	4	10/02/19 14:25	EPA 8270D	
Naphthalene	ND	0.0303	0.0605	mg/kg dry	4	10/02/19 14:25	EPA 8270D	
Phenanthrene	0.0398	0.0151	0.0303	mg/kg dry	4	10/02/19 14:25	EPA 8270D	
Pyrene	0.0158	0.0151	0.0303	mg/kg dry	4	10/02/19 14:25	EPA 8270D	Ja
Dibenzofuran	ND	0.0151	0.0303	mg/kg dry	4	10/02/19 14:25	EPA 8270D	
2,4-Dimethylphenol	ND	0.0757	0.151	mg/kg dry	4	10/02/19 14:25	EPA 8270D	

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
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ANALYTICAL SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
SE-14-0-0.33 (A9J0006-03RE1)				Matrix: Sediment		Batch: 9100490		
2-Methylphenol	ND	0.0378	0.0757	mg/kg dry	4	10/02/19 14:25	EPA 8270D	
3+4-Methylphenol(s)	ND	0.0378	0.0757	mg/kg dry	4	10/02/19 14:25	EPA 8270D	
Pentachlorophenol (PCP)	ND	0.151	0.303	mg/kg dry	4	10/02/19 14:25	EPA 8270D	
Phenol	0.0715	0.0303	0.0605	mg/kg dry	4	10/02/19 14:25	EPA 8270D	
Bis(2-ethylhexyl)phthalate	ND	0.227	0.454	mg/kg dry	4	10/02/19 14:25	EPA 8270D	
Butyl benzyl phthalate	ND	0.0757	0.151	mg/kg dry	4	10/02/19 14:25	EPA 8270D	
Diethylphthalate	ND	0.0757	0.151	mg/kg dry	4	10/02/19 14:25	EPA 8270D	
Dimethylphthalate	ND	0.0757	0.151	mg/kg dry	4	10/02/19 14:25	EPA 8270D	
Di-n-butylphthalate	ND	0.0757	0.151	mg/kg dry	4	10/02/19 14:25	EPA 8270D	
Di-n-octyl phthalate	ND	0.121	0.151	mg/kg dry	4	10/02/19 14:25	EPA 8270D	
N-Nitrosodiphenylamine	ND	0.0378	0.0757	mg/kg dry	4	10/02/19 14:25	EPA 8270D	
Hexachlorobenzene	ND	0.0151	0.0303	mg/kg dry	4	10/02/19 14:25	EPA 8270D	
Hexachlorobutadiene	ND	0.0378	0.0757	mg/kg dry	4	10/02/19 14:25	EPA 8270D	
Hexachlorocyclopentadiene	ND	0.0757	0.151	mg/kg dry	4	10/02/19 14:25	EPA 8270D	
1,2-Dichlorobenzene	ND	0.0378	0.0757	mg/kg dry	4	10/02/19 14:25	EPA 8270D	
1,4-Dichlorobenzene	ND	0.0378	0.0757	mg/kg dry	4	10/02/19 14:25	EPA 8270D	
1,2,4-Trichlorobenzene	ND	0.0378	0.0757	mg/kg dry	4	10/02/19 14:25	EPA 8270D	
Benzoic acid	ND	1.90	3.78	mg/kg dry	4	10/02/19 14:25	EPA 8270D	
Benzyl alcohol	ND	0.0757	0.151	mg/kg dry	4	10/02/19 14:25	EPA 8270D	
<i>Surrogate: Nitrobenzene-d5 (Surr)</i>		<i>Recovery: 77 %</i>		<i>Limits: 37-122 %</i>		<i>4</i>	<i>10/02/19 14:25</i>	<i>EPA 8270D</i>
<i>2-Fluorobiphenyl (Surr)</i>		<i>80 %</i>		<i>44-115 %</i>		<i>4</i>	<i>10/02/19 14:25</i>	<i>EPA 8270D</i>
<i>Phenol-d6 (Surr)</i>		<i>74 %</i>		<i>33-122 %</i>		<i>4</i>	<i>10/02/19 14:25</i>	<i>EPA 8270D</i>
<i>p-Terphenyl-d14 (Surr)</i>		<i>74 %</i>		<i>54-127 %</i>		<i>4</i>	<i>10/02/19 14:25</i>	<i>EPA 8270D</i>
<i>2-Fluorophenol (Surr)</i>		<i>69 %</i>		<i>35-115 %</i>		<i>4</i>	<i>10/02/19 14:25</i>	<i>EPA 8270D</i>
<i>2,4,6-Tribromophenol (Surr)</i>		<i>107 %</i>		<i>39-132 %</i>		<i>4</i>	<i>10/02/19 14:25</i>	<i>EPA 8270D</i>

SE-23-0-0.33 (A9J0006-05RE1)				Matrix: Sediment		Batch: 9100490		
Acenaphthene	ND	0.0284	0.0570	mg/kg dry	10	10/02/19 17:50	EPA 8270D	
Acenaphthylene	0.0376	0.0284	0.0570	mg/kg dry	10	10/02/19 17:50	EPA 8270D	Ja
Anthracene	0.0458	0.0284	0.0570	mg/kg dry	10	10/02/19 17:50	EPA 8270D	Ja
Benz(a)anthracene	0.164	0.0284	0.0570	mg/kg dry	10	10/02/19 17:50	EPA 8270D	
Benzo(a)pyrene	0.163	0.0427	0.0854	mg/kg dry	10	10/02/19 17:50	EPA 8270D	
Benzo(b)fluoranthene	0.153	0.0427	0.0854	mg/kg dry	10	10/02/19 17:50	EPA 8270D	
Benzo(k)fluoranthene	0.0681	0.0427	0.0854	mg/kg dry	10	10/02/19 17:50	EPA 8270D	Ja

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
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ANALYTICAL SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
SE-23-0-0.33 (A9J0006-05RE1)				Matrix: Sediment		Batch: 9100490		
Benzo(g,h,i)perylene	0.0778	0.0284	0.0570	mg/kg dry	10	10/02/19 17:50	EPA 8270D	
Chrysene	0.153	0.0284	0.0570	mg/kg dry	10	10/02/19 17:50	EPA 8270D	
Dibenz(a,h)anthracene	ND	0.0284	0.0570	mg/kg dry	10	10/02/19 17:50	EPA 8270D	
Fluoranthene	0.285	0.0284	0.0570	mg/kg dry	10	10/02/19 17:50	EPA 8270D	
Fluorene	ND	0.0284	0.0570	mg/kg dry	10	10/02/19 17:50	EPA 8270D	
Indeno(1,2,3-cd)pyrene	0.0807	0.0284	0.0570	mg/kg dry	10	10/02/19 17:50	EPA 8270D	
1-Methylnaphthalene	ND	0.0570	0.114	mg/kg dry	10	10/02/19 17:50	EPA 8270D	
2-Methylnaphthalene	ND	0.0570	0.114	mg/kg dry	10	10/02/19 17:50	EPA 8270D	
Naphthalene	ND	0.0570	0.114	mg/kg dry	10	10/02/19 17:50	EPA 8270D	
Phenanthrene	0.213	0.0284	0.0570	mg/kg dry	10	10/02/19 17:50	EPA 8270D	
Pyrene	0.305	0.0284	0.0570	mg/kg dry	10	10/02/19 17:50	EPA 8270D	
Dibenzofuran	ND	0.0284	0.0570	mg/kg dry	10	10/02/19 17:50	EPA 8270D	
2,4-Dimethylphenol	ND	0.142	0.284	mg/kg dry	10	10/02/19 17:50	EPA 8270D	
2-Methylphenol	ND	0.0711	0.142	mg/kg dry	10	10/02/19 17:50	EPA 8270D	
3+4-Methylphenol(s)	ND	0.0711	0.142	mg/kg dry	10	10/02/19 17:50	EPA 8270D	
Pentachlorophenol (PCP)	ND	0.284	0.570	mg/kg dry	10	10/02/19 17:50	EPA 8270D	
Phenol	ND	0.0570	0.114	mg/kg dry	10	10/02/19 17:50	EPA 8270D	
Bis(2-ethylhexyl)phthalate	ND	0.427	0.854	mg/kg dry	10	10/02/19 17:50	EPA 8270D	
Butyl benzyl phthalate	ND	0.142	0.284	mg/kg dry	10	10/02/19 17:50	EPA 8270D	
Diethylphthalate	ND	0.142	0.284	mg/kg dry	10	10/02/19 17:50	EPA 8270D	
Dimethylphthalate	ND	0.142	0.284	mg/kg dry	10	10/02/19 17:50	EPA 8270D	
Di-n-butylphthalate	ND	0.142	0.284	mg/kg dry	10	10/02/19 17:50	EPA 8270D	
Di-n-octyl phthalate	ND	0.228	0.284	mg/kg dry	10	10/02/19 17:50	EPA 8270D	
N-Nitrosodiphenylamine	ND	0.0711	0.142	mg/kg dry	10	10/02/19 17:50	EPA 8270D	
Hexachlorobenzene	ND	0.0284	0.0570	mg/kg dry	10	10/02/19 17:50	EPA 8270D	
Hexachlorobutadiene	ND	0.0711	0.142	mg/kg dry	10	10/02/19 17:50	EPA 8270D	
Hexachlorocyclopentadiene	ND	0.142	0.284	mg/kg dry	10	10/02/19 17:50	EPA 8270D	
1,2-Dichlorobenzene	ND	0.0711	0.142	mg/kg dry	10	10/02/19 17:50	EPA 8270D	
1,4-Dichlorobenzene	ND	0.0711	0.142	mg/kg dry	10	10/02/19 17:50	EPA 8270D	
1,2,4-Trichlorobenzene	ND	0.0711	0.142	mg/kg dry	10	10/02/19 17:50	EPA 8270D	
Benzoic acid	ND	3.56	7.11	mg/kg dry	10	10/02/19 17:50	EPA 8270D	
Benzyl alcohol	ND	0.142	0.284	mg/kg dry	10	10/02/19 17:50	EPA 8270D	

Surrogate: Nitrobenzene-d5 (Surr) Recovery: 50 % Limits: 37-122 % 10 10/02/19 17:50 EPA 8270D

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The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
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ANALYTICAL SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
SE-23-0-0.33 (A9J0006-05RE1)				Matrix: Sediment		Batch: 9100490		
<i>Surrogate: 2-Fluorobiphenyl (Surr)</i>		<i>Recovery: 59 %</i>		<i>Limits: 44-115 %</i>	<i>10</i>	<i>10/02/19 17:50</i>	<i>EPA 8270D</i>	
<i>Phenol-d6 (Surr)</i>			<i>47 %</i>	<i>33-122 %</i>	<i>10</i>	<i>10/02/19 17:50</i>	<i>EPA 8270D</i>	
<i>p-Terphenyl-d14 (Surr)</i>			<i>68 %</i>	<i>54-127 %</i>	<i>10</i>	<i>10/02/19 17:50</i>	<i>EPA 8270D</i>	
<i>2-Fluorophenol (Surr)</i>			<i>48 %</i>	<i>35-115 %</i>	<i>10</i>	<i>10/02/19 17:50</i>	<i>EPA 8270D</i>	
<i>2,4,6-Tribromophenol (Surr)</i>			<i>106 %</i>	<i>39-132 %</i>	<i>10</i>	<i>10/02/19 17:50</i>	<i>EPA 8270D</i>	

SE-17-0-0.33 (A9J0006-06RE1)				Matrix: Sediment		Batch: 9100490		
Acenaphthene	0.126	0.0118	0.0236	mg/kg dry	4	10/02/19 17:16	EPA 8270D	
Acenaphthylene	0.0229	0.0118	0.0236	mg/kg dry	4	10/02/19 17:16	EPA 8270D	Ja
Anthracene	0.121	0.0118	0.0236	mg/kg dry	4	10/02/19 17:16	EPA 8270D	
Benz(a)anthracene	0.0665	0.0118	0.0236	mg/kg dry	4	10/02/19 17:16	EPA 8270D	
Benzo(a)pyrene	0.0387	0.0177	0.0354	mg/kg dry	4	10/02/19 17:16	EPA 8270D	
Benzo(b)fluoranthene	0.0339	0.0177	0.0354	mg/kg dry	4	10/02/19 17:16	EPA 8270D	Ja
Benzo(k)fluoranthene	ND	0.0177	0.0354	mg/kg dry	4	10/02/19 17:16	EPA 8270D	
Benzo(g,h,i)perylene	ND	0.0118	0.0236	mg/kg dry	4	10/02/19 17:16	EPA 8270D	
Chrysene	0.0703	0.0118	0.0236	mg/kg dry	4	10/02/19 17:16	EPA 8270D	
Dibenz(a,h)anthracene	ND	0.0118	0.0236	mg/kg dry	4	10/02/19 17:16	EPA 8270D	
Fluoranthene	0.335	0.0118	0.0236	mg/kg dry	4	10/02/19 17:16	EPA 8270D	
Fluorene	0.0875	0.0118	0.0236	mg/kg dry	4	10/02/19 17:16	EPA 8270D	
Indeno(1,2,3-cd)pyrene	ND	0.0118	0.0236	mg/kg dry	4	10/02/19 17:16	EPA 8270D	
1-Methylnaphthalene	0.0706	0.0236	0.0471	mg/kg dry	4	10/02/19 17:16	EPA 8270D	
2-Methylnaphthalene	0.0337	0.0236	0.0471	mg/kg dry	4	10/02/19 17:16	EPA 8270D	Ja
Naphthalene	0.0770	0.0236	0.0471	mg/kg dry	4	10/02/19 17:16	EPA 8270D	
Phenanthrene	0.575	0.0118	0.0236	mg/kg dry	4	10/02/19 17:16	EPA 8270D	
Pyrene	0.401	0.0118	0.0236	mg/kg dry	4	10/02/19 17:16	EPA 8270D	
Dibenzofuran	0.0187	0.0118	0.0236	mg/kg dry	4	10/02/19 17:16	EPA 8270D	Ja
2,4-Dimethylphenol	ND	0.0590	0.118	mg/kg dry	4	10/02/19 17:16	EPA 8270D	
2-Methylphenol	ND	0.0295	0.0590	mg/kg dry	4	10/02/19 17:16	EPA 8270D	
3+4-Methylphenol(s)	ND	0.0295	0.0590	mg/kg dry	4	10/02/19 17:16	EPA 8270D	
Pentachlorophenol (PCP)	ND	0.118	0.236	mg/kg dry	4	10/02/19 17:16	EPA 8270D	
Phenol	ND	0.0236	0.0471	mg/kg dry	4	10/02/19 17:16	EPA 8270D	
Bis(2-ethylhexyl)phthalate	ND	0.177	0.354	mg/kg dry	4	10/02/19 17:16	EPA 8270D	
Butyl benzyl phthalate	ND	0.0590	0.118	mg/kg dry	4	10/02/19 17:16	EPA 8270D	
Diethylphthalate	ND	0.0590	0.118	mg/kg dry	4	10/02/19 17:16	EPA 8270D	

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
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ANALYTICAL SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
SE-17-0-0.33 (A9J0006-06RE1)				Matrix: Sediment		Batch: 9100490		
Dimethylphthalate	ND	0.0590	0.118	mg/kg dry	4	10/02/19 17:16	EPA 8270D	
Di-n-butylphthalate	ND	0.0590	0.118	mg/kg dry	4	10/02/19 17:16	EPA 8270D	
Di-n-octyl phthalate	ND	0.0946	0.118	mg/kg dry	4	10/02/19 17:16	EPA 8270D	
N-Nitrosodiphenylamine	ND	0.0295	0.0590	mg/kg dry	4	10/02/19 17:16	EPA 8270D	
Hexachlorobenzene	ND	0.0118	0.0236	mg/kg dry	4	10/02/19 17:16	EPA 8270D	
Hexachlorobutadiene	ND	0.0295	0.0590	mg/kg dry	4	10/02/19 17:16	EPA 8270D	
Hexachlorocyclopentadiene	ND	0.0590	0.118	mg/kg dry	4	10/02/19 17:16	EPA 8270D	
1,2-Dichlorobenzene	ND	0.0295	0.0590	mg/kg dry	4	10/02/19 17:16	EPA 8270D	
1,4-Dichlorobenzene	ND	0.0295	0.0590	mg/kg dry	4	10/02/19 17:16	EPA 8270D	
1,2,4-Trichlorobenzene	ND	0.0295	0.0590	mg/kg dry	4	10/02/19 17:16	EPA 8270D	
Benzoic acid	ND	1.48	2.95	mg/kg dry	4	10/02/19 17:16	EPA 8270D	
Benzyl alcohol	ND	0.0590	0.118	mg/kg dry	4	10/02/19 17:16	EPA 8270D	
<i>Surrogate: Nitrobenzene-d5 (Surr)</i>		<i>Recovery: 62 %</i>		<i>Limits: 37-122 %</i>		<i>4</i>	<i>10/02/19 17:16</i>	<i>EPA 8270D</i>
<i>2-Fluorobiphenyl (Surr)</i>		<i>71 %</i>		<i>44-115 %</i>		<i>4</i>	<i>10/02/19 17:16</i>	<i>EPA 8270D</i>
<i>Phenol-d6 (Surr)</i>		<i>61 %</i>		<i>33-122 %</i>		<i>4</i>	<i>10/02/19 17:16</i>	<i>EPA 8270D</i>
<i>p-Terphenyl-d14 (Surr)</i>		<i>75 %</i>		<i>54-127 %</i>		<i>4</i>	<i>10/02/19 17:16</i>	<i>EPA 8270D</i>
<i>2-Fluorophenol (Surr)</i>		<i>57 %</i>		<i>35-115 %</i>		<i>4</i>	<i>10/02/19 17:16</i>	<i>EPA 8270D</i>
<i>2,4,6-Tribromophenol (Surr)</i>		<i>96 %</i>		<i>39-132 %</i>		<i>4</i>	<i>10/02/19 17:16</i>	<i>EPA 8270D</i>

SE-15-0-0.33 (A9J0006-07RE1)				Matrix: Sediment		Batch: 9100490		
Acenaphthene	0.0487	0.0120	0.0242	mg/kg dry	4	10/02/19 20:49	EPA 8270D	
Acenaphthylene	ND	0.0120	0.0242	mg/kg dry	4	10/02/19 20:49	EPA 8270D	
Anthracene	0.0208	0.0120	0.0242	mg/kg dry	4	10/02/19 20:49	EPA 8270D	Ja
Benz(a)anthracene	0.0612	0.0120	0.0242	mg/kg dry	4	10/02/19 20:49	EPA 8270D	
Benzo(a)pyrene	0.0458	0.0181	0.0362	mg/kg dry	4	10/02/19 20:49	EPA 8270D	
Benzo(b)fluoranthene	0.0907	0.0181	0.0362	mg/kg dry	4	10/02/19 20:49	EPA 8270D	
Benzo(k)fluoranthene	0.0365	0.0181	0.0362	mg/kg dry	4	10/02/19 20:49	EPA 8270D	M-05
Benzo(g,h,i)perylene	0.0183	0.0120	0.0242	mg/kg dry	4	10/02/19 20:49	EPA 8270D	Ja
Chrysene	0.0719	0.0120	0.0242	mg/kg dry	4	10/02/19 20:49	EPA 8270D	
Dibenz(a,h)anthracene	ND	0.0120	0.0242	mg/kg dry	4	10/02/19 20:49	EPA 8270D	
Fluoranthene	0.250	0.0120	0.0242	mg/kg dry	4	10/02/19 20:49	EPA 8270D	
Fluorene	ND	0.0120	0.0242	mg/kg dry	4	10/02/19 20:49	EPA 8270D	
Indeno(1,2,3-cd)pyrene	0.0207	0.0120	0.0242	mg/kg dry	4	10/02/19 20:49	EPA 8270D	Ja
1-Methylnaphthalene	ND	0.0242	0.0483	mg/kg dry	4	10/02/19 20:49	EPA 8270D	

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
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ANALYTICAL SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
SE-15-0-0.33 (A9J0006-07RE1)			Matrix: Sediment			Batch: 9100490		
2-Methylnaphthalene	ND	0.0242	0.0483	mg/kg dry	4	10/02/19 20:49	EPA 8270D	
Naphthalene	ND	0.0242	0.0483	mg/kg dry	4	10/02/19 20:49	EPA 8270D	
Phenanthrene	0.0243	0.0120	0.0242	mg/kg dry	4	10/02/19 20:49	EPA 8270D	
Pyrene	0.210	0.0120	0.0242	mg/kg dry	4	10/02/19 20:49	EPA 8270D	
Dibenzofuran	0.0145	0.0120	0.0242	mg/kg dry	4	10/02/19 20:49	EPA 8270D	Ja
2,4-Dimethylphenol	ND	0.0604	0.120	mg/kg dry	4	10/02/19 20:49	EPA 8270D	
2-Methylphenol	ND	0.0302	0.0604	mg/kg dry	4	10/02/19 20:49	EPA 8270D	
3+4-Methylphenol(s)	0.157	0.0302	0.0604	mg/kg dry	4	10/02/19 20:49	EPA 8270D	
Pentachlorophenol (PCP)	ND	0.120	0.242	mg/kg dry	4	10/02/19 20:49	EPA 8270D	
Phenol	0.0583	0.0242	0.0483	mg/kg dry	4	10/02/19 20:49	EPA 8270D	M-04
Bis(2-ethylhexyl)phthalate	ND	0.181	0.362	mg/kg dry	4	10/02/19 20:49	EPA 8270D	
Butyl benzyl phthalate	ND	0.0604	0.120	mg/kg dry	4	10/02/19 20:49	EPA 8270D	
Diethylphthalate	ND	0.0604	0.120	mg/kg dry	4	10/02/19 20:49	EPA 8270D	
Dimethylphthalate	ND	0.0604	0.120	mg/kg dry	4	10/02/19 20:49	EPA 8270D	
Di-n-butylphthalate	ND	0.0604	0.120	mg/kg dry	4	10/02/19 20:49	EPA 8270D	
Di-n-octyl phthalate	ND	0.0969	0.120	mg/kg dry	4	10/02/19 20:49	EPA 8270D	
N-Nitrosodiphenylamine	ND	0.0302	0.0604	mg/kg dry	4	10/02/19 20:49	EPA 8270D	
Hexachlorobenzene	ND	0.0120	0.0242	mg/kg dry	4	10/02/19 20:49	EPA 8270D	
Hexachlorobutadiene	ND	0.0302	0.0604	mg/kg dry	4	10/02/19 20:49	EPA 8270D	
Hexachlorocyclopentadiene	ND	0.0604	0.120	mg/kg dry	4	10/02/19 20:49	EPA 8270D	
1,2-Dichlorobenzene	ND	0.0302	0.0604	mg/kg dry	4	10/02/19 20:49	EPA 8270D	
1,4-Dichlorobenzene	ND	0.0302	0.0604	mg/kg dry	4	10/02/19 20:49	EPA 8270D	
1,2,4-Trichlorobenzene	ND	0.0302	0.0604	mg/kg dry	4	10/02/19 20:49	EPA 8270D	
Benzoic acid	ND	1.51	3.02	mg/kg dry	4	10/02/19 20:49	EPA 8270D	
Benzyl alcohol	ND	0.0604	0.120	mg/kg dry	4	10/02/19 20:49	EPA 8270D	
<i>Surrogate: Nitrobenzene-d5 (Surr)</i>		<i>Recovery: 69 %</i>		<i>Limits: 37-122 %</i>	<i>4</i>	<i>10/02/19 20:49</i>	<i>EPA 8270D</i>	
<i>2-Fluorobiphenyl (Surr)</i>		<i>77 %</i>		<i>44-115 %</i>	<i>4</i>	<i>10/02/19 20:49</i>	<i>EPA 8270D</i>	
<i>Phenol-d6 (Surr)</i>		<i>73 %</i>		<i>33-122 %</i>	<i>4</i>	<i>10/02/19 20:49</i>	<i>EPA 8270D</i>	
<i>p-Terphenyl-d14 (Surr)</i>		<i>87 %</i>		<i>54-127 %</i>	<i>4</i>	<i>10/02/19 20:49</i>	<i>EPA 8270D</i>	
<i>2-Fluorophenol (Surr)</i>		<i>75 %</i>		<i>35-115 %</i>	<i>4</i>	<i>10/02/19 20:49</i>	<i>EPA 8270D</i>	
<i>2,4,6-Tribromophenol (Surr)</i>		<i>95 %</i>		<i>39-132 %</i>	<i>4</i>	<i>10/02/19 20:49</i>	<i>EPA 8270D</i>	

SE-21-0-0.33 (A9J0006-08RE1) **Matrix: Sediment** **Batch: 9100490**

Acenaphthene	ND	0.00885	0.0178	mg/kg dry	4	10/02/19 18:25	EPA 8270D	
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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
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ANALYTICAL SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
SE-21-0-0.33 (A9J0006-08RE1)				Matrix: Sediment		Batch: 9100490		
Acenaphthylene	0.0145	0.00885	0.0178	mg/kg dry	4	10/02/19 18:25	EPA 8270D	Ja
Anthracene	ND	0.00885	0.0178	mg/kg dry	4	10/02/19 18:25	EPA 8270D	
Benz(a)anthracene	ND	0.00885	0.0178	mg/kg dry	4	10/02/19 18:25	EPA 8270D	
Benzo(a)pyrene	ND	0.0133	0.0266	mg/kg dry	4	10/02/19 18:25	EPA 8270D	
Benzo(b)fluoranthene	ND	0.0133	0.0266	mg/kg dry	4	10/02/19 18:25	EPA 8270D	
Benzo(k)fluoranthene	ND	0.0133	0.0266	mg/kg dry	4	10/02/19 18:25	EPA 8270D	
Benzo(g,h,i)perylene	ND	0.00885	0.0178	mg/kg dry	4	10/02/19 18:25	EPA 8270D	
Chrysene	ND	0.00885	0.0178	mg/kg dry	4	10/02/19 18:25	EPA 8270D	
Dibenz(a,h)anthracene	ND	0.00885	0.0178	mg/kg dry	4	10/02/19 18:25	EPA 8270D	
Fluoranthene	0.0181	0.00885	0.0178	mg/kg dry	4	10/02/19 18:25	EPA 8270D	
Fluorene	ND	0.00885	0.0178	mg/kg dry	4	10/02/19 18:25	EPA 8270D	
Indeno(1,2,3-cd)pyrene	ND	0.00885	0.0178	mg/kg dry	4	10/02/19 18:25	EPA 8270D	
1-Methylnaphthalene	ND	0.0178	0.0355	mg/kg dry	4	10/02/19 18:25	EPA 8270D	
2-Methylnaphthalene	ND	0.0178	0.0355	mg/kg dry	4	10/02/19 18:25	EPA 8270D	
Naphthalene	0.0492	0.0178	0.0355	mg/kg dry	4	10/02/19 18:25	EPA 8270D	
Phenanthrene	0.0195	0.00885	0.0178	mg/kg dry	4	10/02/19 18:25	EPA 8270D	
Pyrene	0.0177	0.00885	0.0178	mg/kg dry	4	10/02/19 18:25	EPA 8270D	Ja
Dibenzofuran	ND	0.00885	0.0178	mg/kg dry	4	10/02/19 18:25	EPA 8270D	
2,4-Dimethylphenol	ND	0.0444	0.0885	mg/kg dry	4	10/02/19 18:25	EPA 8270D	
2-Methylphenol	ND	0.0222	0.0444	mg/kg dry	4	10/02/19 18:25	EPA 8270D	
3+4-Methylphenol(s)	0.100	0.0222	0.0444	mg/kg dry	4	10/02/19 18:25	EPA 8270D	
Pentachlorophenol (PCP)	ND	0.0885	0.178	mg/kg dry	4	10/02/19 18:25	EPA 8270D	
Phenol	0.0281	0.0178	0.0355	mg/kg dry	4	10/02/19 18:25	EPA 8270D	Ja
Bis(2-ethylhexyl)phthalate	ND	0.133	0.266	mg/kg dry	4	10/02/19 18:25	EPA 8270D	
Butyl benzyl phthalate	ND	0.0444	0.0885	mg/kg dry	4	10/02/19 18:25	EPA 8270D	
Diethylphthalate	ND	0.0444	0.0885	mg/kg dry	4	10/02/19 18:25	EPA 8270D	
Dimethylphthalate	ND	0.0444	0.0885	mg/kg dry	4	10/02/19 18:25	EPA 8270D	
Di-n-butylphthalate	ND	0.0444	0.0885	mg/kg dry	4	10/02/19 18:25	EPA 8270D	
Di-n-octyl phthalate	ND	0.0712	0.0885	mg/kg dry	4	10/02/19 18:25	EPA 8270D	
N-Nitrosodiphenylamine	ND	0.0222	0.0444	mg/kg dry	4	10/02/19 18:25	EPA 8270D	
Hexachlorobenzene	ND	0.00885	0.0178	mg/kg dry	4	10/02/19 18:25	EPA 8270D	
Hexachlorobutadiene	ND	0.0222	0.0444	mg/kg dry	4	10/02/19 18:25	EPA 8270D	
Hexachlorocyclopentadiene	ND	0.0444	0.0885	mg/kg dry	4	10/02/19 18:25	EPA 8270D	

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
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ANALYTICAL SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
SE-21-0-0.33 (A9J0006-08RE1)			Matrix: Sediment			Batch: 9100490		
1,2-Dichlorobenzene	ND	0.0222	0.0444	mg/kg dry	4	10/02/19 18:25	EPA 8270D	
1,4-Dichlorobenzene	ND	0.0222	0.0444	mg/kg dry	4	10/02/19 18:25	EPA 8270D	
1,2,4-Trichlorobenzene	ND	0.0222	0.0444	mg/kg dry	4	10/02/19 18:25	EPA 8270D	
Benzoic acid	ND	1.11	2.22	mg/kg dry	4	10/02/19 18:25	EPA 8270D	
Benzyl alcohol	ND	0.0444	0.0885	mg/kg dry	4	10/02/19 18:25	EPA 8270D	
<i>Surrogate: Nitrobenzene-d5 (Surr)</i>		<i>Recovery: 65 %</i>		<i>Limits: 37-122 %</i>		<i>4</i>	<i>10/02/19 18:25</i>	<i>EPA 8270D</i>
<i>2-Fluorobiphenyl (Surr)</i>		<i>70 %</i>		<i>44-115 %</i>		<i>4</i>	<i>10/02/19 18:25</i>	<i>EPA 8270D</i>
<i>Phenol-d6 (Surr)</i>		<i>66 %</i>		<i>33-122 %</i>		<i>4</i>	<i>10/02/19 18:25</i>	<i>EPA 8270D</i>
<i>p-Terphenyl-d14 (Surr)</i>		<i>52 %</i>		<i>54-127 %</i>		<i>4</i>	<i>10/02/19 18:25</i>	<i>EPA 8270D</i>
<i>2-Fluorophenol (Surr)</i>		<i>63 %</i>		<i>35-115 %</i>		<i>4</i>	<i>10/02/19 18:25</i>	<i>EPA 8270D</i>
<i>2,4,6-Tribromophenol (Surr)</i>		<i>100 %</i>		<i>39-132 %</i>		<i>4</i>	<i>10/02/19 18:25</i>	<i>EPA 8270D</i>
SE-25-0-0.33 (A9J0006-13RE1)			Matrix: Sediment			Batch: 9100490		
Acenaphthene	ND	0.0647	0.130	mg/kg dry	20	10/02/19 21:25	EPA 8270D	
Acenaphthylene	ND	0.0647	0.130	mg/kg dry	20	10/02/19 21:25	EPA 8270D	
Anthracene	ND	0.0647	0.130	mg/kg dry	20	10/02/19 21:25	EPA 8270D	
Benz(a)anthracene	0.0890	0.0647	0.130	mg/kg dry	20	10/02/19 21:25	EPA 8270D	Ja
Benzo(a)pyrene	0.111	0.0974	0.195	mg/kg dry	20	10/02/19 21:25	EPA 8270D	Ja
Benzo(b)fluoranthene	0.137	0.0974	0.195	mg/kg dry	20	10/02/19 21:25	EPA 8270D	Ja
Benzo(k)fluoranthene	ND	0.0974	0.195	mg/kg dry	20	10/02/19 21:25	EPA 8270D	
Benzo(g,h,i)perylene	ND	0.0647	0.130	mg/kg dry	20	10/02/19 21:25	EPA 8270D	
Chrysene	ND	0.0647	0.130	mg/kg dry	20	10/02/19 21:25	EPA 8270D	
Dibenz(a,h)anthracene	ND	0.0647	0.130	mg/kg dry	20	10/02/19 21:25	EPA 8270D	
Fluoranthene	0.204	0.0647	0.130	mg/kg dry	20	10/02/19 21:25	EPA 8270D	
Fluorene	ND	0.0647	0.130	mg/kg dry	20	10/02/19 21:25	EPA 8270D	
Indeno(1,2,3-cd)pyrene	ND	0.0647	0.130	mg/kg dry	20	10/02/19 21:25	EPA 8270D	
1-Methylnaphthalene	ND	0.130	0.259	mg/kg dry	20	10/02/19 21:25	EPA 8270D	
2-Methylnaphthalene	ND	0.130	0.259	mg/kg dry	20	10/02/19 21:25	EPA 8270D	
Naphthalene	ND	0.130	0.259	mg/kg dry	20	10/02/19 21:25	EPA 8270D	
Phenanthrene	0.0648	0.0647	0.130	mg/kg dry	20	10/02/19 21:25	EPA 8270D	Ja
Pyrene	0.184	0.0647	0.130	mg/kg dry	20	10/02/19 21:25	EPA 8270D	
Dibenzofuran	ND	0.0647	0.130	mg/kg dry	20	10/02/19 21:25	EPA 8270D	
2,4-Dimethylphenol	ND	0.325	0.647	mg/kg dry	20	10/02/19 21:25	EPA 8270D	
2-Methylphenol	ND	0.162	0.325	mg/kg dry	20	10/02/19 21:25	EPA 8270D	

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
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ANALYTICAL SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
SE-25-0-0.33 (A9J0006-13RE1)			Matrix: Sediment			Batch: 9100490		
3+4-Methylphenol(s)	ND	0.162	0.325	mg/kg dry	20	10/02/19 21:25	EPA 8270D	
Pentachlorophenol (PCP)	ND	0.647	1.30	mg/kg dry	20	10/02/19 21:25	EPA 8270D	
Phenol	ND	0.130	0.259	mg/kg dry	20	10/02/19 21:25	EPA 8270D	
Bis(2-ethylhexyl)phthalate	ND	0.974	1.95	mg/kg dry	20	10/02/19 21:25	EPA 8270D	
Butyl benzyl phthalate	ND	0.325	0.647	mg/kg dry	20	10/02/19 21:25	EPA 8270D	
Diethylphthalate	ND	0.325	0.647	mg/kg dry	20	10/02/19 21:25	EPA 8270D	
Dimethylphthalate	ND	0.325	0.647	mg/kg dry	20	10/02/19 21:25	EPA 8270D	
Di-n-butylphthalate	ND	0.325	0.647	mg/kg dry	20	10/02/19 21:25	EPA 8270D	
Di-n-octyl phthalate	ND	0.521	0.647	mg/kg dry	20	10/02/19 21:25	EPA 8270D	
N-Nitrosodiphenylamine	ND	0.162	0.325	mg/kg dry	20	10/02/19 21:25	EPA 8270D	
Hexachlorobenzene	ND	0.0647	0.130	mg/kg dry	20	10/02/19 21:25	EPA 8270D	
Hexachlorobutadiene	ND	0.162	0.325	mg/kg dry	20	10/02/19 21:25	EPA 8270D	
Hexachlorocyclopentadiene	ND	0.325	0.647	mg/kg dry	20	10/02/19 21:25	EPA 8270D	
1,2-Dichlorobenzene	ND	0.162	0.325	mg/kg dry	20	10/02/19 21:25	EPA 8270D	
1,4-Dichlorobenzene	ND	0.162	0.325	mg/kg dry	20	10/02/19 21:25	EPA 8270D	
1,2,4-Trichlorobenzene	ND	0.162	0.325	mg/kg dry	20	10/02/19 21:25	EPA 8270D	
Benzoic acid	ND	8.13	16.2	mg/kg dry	20	10/02/19 21:25	EPA 8270D	
Benzyl alcohol	ND	0.325	0.647	mg/kg dry	20	10/02/19 21:25	EPA 8270D	
<i>Surrogate: Nitrobenzene-d5 (Surr)</i>		<i>Recovery: 74 %</i>		<i>Limits: 37-122 %</i>		<i>20</i>	<i>10/02/19 21:25</i>	<i>EPA 8270D</i>
<i>2-Fluorobiphenyl (Surr)</i>		<i>81 %</i>		<i>44-115 %</i>		<i>20</i>	<i>10/02/19 21:25</i>	<i>EPA 8270D</i>
<i>Phenol-d6 (Surr)</i>		<i>68 %</i>		<i>33-122 %</i>		<i>20</i>	<i>10/02/19 21:25</i>	<i>EPA 8270D</i>
<i>p-Terphenyl-d14 (Surr)</i>		<i>99 %</i>		<i>54-127 %</i>		<i>20</i>	<i>10/02/19 21:25</i>	<i>EPA 8270D</i>
<i>2-Fluorophenol (Surr)</i>		<i>67 %</i>		<i>35-115 %</i>		<i>20</i>	<i>10/02/19 21:25</i>	<i>EPA 8270D</i>
<i>2,4,6-Tribromophenol (Surr)</i>		<i>105 %</i>		<i>39-132 %</i>		<i>20</i>	<i>10/02/19 21:25</i>	<i>EPA 8270D</i>

SE-26-0-0.33 (A9J0006-16RE1)			Matrix: Sediment			Batch: 9100490		
Acenaphthene	0.0408	0.0306	0.0614	mg/kg dry	10	10/02/19 22:01	EPA 8270D	Ja
Acenaphthylene	ND	0.0306	0.0614	mg/kg dry	10	10/02/19 22:01	EPA 8270D	
Anthracene	ND	0.0306	0.0614	mg/kg dry	10	10/02/19 22:01	EPA 8270D	
Benz(a)anthracene	0.0458	0.0306	0.0614	mg/kg dry	10	10/02/19 22:01	EPA 8270D	Ja
Benzo(a)pyrene	0.0665	0.0460	0.0920	mg/kg dry	10	10/02/19 22:01	EPA 8270D	Ja
Benzo(b)fluoranthene	0.0754	0.0460	0.0920	mg/kg dry	10	10/02/19 22:01	EPA 8270D	Ja
Benzo(k)fluoranthene	ND	0.0460	0.0920	mg/kg dry	10	10/02/19 22:01	EPA 8270D	
Benzo(g,h,i)perylene	ND	0.0306	0.0614	mg/kg dry	10	10/02/19 22:01	EPA 8270D	

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
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ANALYTICAL SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
SE-26-0-0.33 (A9J0006-16RE1)				Matrix: Sediment		Batch: 9100490		
Chrysene	0.0424	0.0306	0.0614	mg/kg dry	10	10/02/19 22:01	EPA 8270D	Ja
Dibenz(a,h)anthracene	ND	0.0306	0.0614	mg/kg dry	10	10/02/19 22:01	EPA 8270D	
Fluoranthene	0.109	0.0306	0.0614	mg/kg dry	10	10/02/19 22:01	EPA 8270D	
Fluorene	0.0386	0.0306	0.0614	mg/kg dry	10	10/02/19 22:01	EPA 8270D	Ja
Indeno(1,2,3-cd)pyrene	0.0340	0.0306	0.0614	mg/kg dry	10	10/02/19 22:01	EPA 8270D	Ja
1-Methylnaphthalene	ND	0.0614	0.123	mg/kg dry	10	10/02/19 22:01	EPA 8270D	
2-Methylnaphthalene	ND	0.0614	0.123	mg/kg dry	10	10/02/19 22:01	EPA 8270D	
Naphthalene	0.0752	0.0614	0.123	mg/kg dry	10	10/02/19 22:01	EPA 8270D	Ja
Phenanthrene	0.112	0.0306	0.0614	mg/kg dry	10	10/02/19 22:01	EPA 8270D	
Pyrene	0.102	0.0306	0.0614	mg/kg dry	10	10/02/19 22:01	EPA 8270D	
Dibenzofuran	0.0339	0.0306	0.0614	mg/kg dry	10	10/02/19 22:01	EPA 8270D	Ja
2,4-Dimethylphenol	ND	0.153	0.306	mg/kg dry	10	10/02/19 22:01	EPA 8270D	
2-Methylphenol	ND	0.0766	0.153	mg/kg dry	10	10/02/19 22:01	EPA 8270D	
3+4-Methylphenol(s)	0.0934	0.0766	0.153	mg/kg dry	10	10/02/19 22:01	EPA 8270D	Ja
Pentachlorophenol (PCP)	ND	0.306	0.614	mg/kg dry	10	10/02/19 22:01	EPA 8270D	
Phenol	0.0941	0.0614	0.123	mg/kg dry	10	10/02/19 22:01	EPA 8270D	Ja
Bis(2-ethylhexyl)phthalate	ND	0.460	0.920	mg/kg dry	10	10/02/19 22:01	EPA 8270D	
Butyl benzyl phthalate	ND	0.153	0.306	mg/kg dry	10	10/02/19 22:01	EPA 8270D	
Diethylphthalate	ND	0.153	0.306	mg/kg dry	10	10/02/19 22:01	EPA 8270D	
Dimethylphthalate	ND	0.153	0.306	mg/kg dry	10	10/02/19 22:01	EPA 8270D	
Di-n-butylphthalate	ND	0.153	0.306	mg/kg dry	10	10/02/19 22:01	EPA 8270D	
Di-n-octyl phthalate	ND	0.246	0.306	mg/kg dry	10	10/02/19 22:01	EPA 8270D	
N-Nitrosodiphenylamine	ND	0.0766	0.153	mg/kg dry	10	10/02/19 22:01	EPA 8270D	
Hexachlorobenzene	ND	0.0306	0.0614	mg/kg dry	10	10/02/19 22:01	EPA 8270D	
Hexachlorobutadiene	ND	0.0766	0.153	mg/kg dry	10	10/02/19 22:01	EPA 8270D	
Hexachlorocyclopentadiene	ND	0.153	0.306	mg/kg dry	10	10/02/19 22:01	EPA 8270D	
1,2-Dichlorobenzene	ND	0.0766	0.153	mg/kg dry	10	10/02/19 22:01	EPA 8270D	
1,4-Dichlorobenzene	ND	0.0766	0.153	mg/kg dry	10	10/02/19 22:01	EPA 8270D	
1,2,4-Trichlorobenzene	ND	0.0766	0.153	mg/kg dry	10	10/02/19 22:01	EPA 8270D	
Benzoic acid	ND	3.84	7.66	mg/kg dry	10	10/02/19 22:01	EPA 8270D	
Benzyl alcohol	ND	0.153	0.306	mg/kg dry	10	10/02/19 22:01	EPA 8270D	
Surrogate: Nitrobenzene-d5 (Surr)		Recovery: 73 %		Limits: 37-122 %	10	10/02/19 22:01	EPA 8270D	
2-Fluorobiphenyl (Surr)		78 %		44-115 %	10	10/02/19 22:01	EPA 8270D	

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
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ANALYTICAL SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
SE-26-0-0.33 (A9J0006-16RE1)				Matrix: Sediment		Batch: 9100490		
<i>Surrogate: Phenol-d6 (Surr)</i>		<i>Recovery: 69 %</i>		<i>Limits: 33-122 %</i>	<i>10</i>	<i>10/02/19 22:01</i>	<i>EPA 8270D</i>	
<i>p-Terphenyl-d14 (Surr)</i>		<i>92 %</i>		<i>54-127 %</i>	<i>10</i>	<i>10/02/19 22:01</i>	<i>EPA 8270D</i>	
<i>2-Fluorophenol (Surr)</i>		<i>70 %</i>		<i>35-115 %</i>	<i>10</i>	<i>10/02/19 22:01</i>	<i>EPA 8270D</i>	
<i>2,4,6-Tribromophenol (Surr)</i>		<i>99 %</i>		<i>39-132 %</i>	<i>10</i>	<i>10/02/19 22:01</i>	<i>EPA 8270D</i>	

SE-18-0-0.33 (A9J0006-18RE1)				Matrix: Sediment		Batch: 9100490		R-04
Acenaphthene	ND	0.0114	0.0228	mg/kg dry	4	10/02/19 18:59	EPA 8270D	
Acenaphthylene	ND	0.0114	0.0228	mg/kg dry	4	10/02/19 18:59	EPA 8270D	
Anthracene	ND	0.0114	0.0228	mg/kg dry	4	10/02/19 18:59	EPA 8270D	
Benz(a)anthracene	ND	0.0114	0.0228	mg/kg dry	4	10/02/19 18:59	EPA 8270D	
Benzo(a)pyrene	ND	0.0171	0.0342	mg/kg dry	4	10/02/19 18:59	EPA 8270D	
Benzo(b)fluoranthene	ND	0.0171	0.0342	mg/kg dry	4	10/02/19 18:59	EPA 8270D	
Benzo(k)fluoranthene	ND	0.0171	0.0342	mg/kg dry	4	10/02/19 18:59	EPA 8270D	
Benzo(g,h,i)perylene	ND	0.0114	0.0228	mg/kg dry	4	10/02/19 18:59	EPA 8270D	
Chrysene	ND	0.0114	0.0228	mg/kg dry	4	10/02/19 18:59	EPA 8270D	
Dibenz(a,h)anthracene	ND	0.0114	0.0228	mg/kg dry	4	10/02/19 18:59	EPA 8270D	
Fluoranthene	ND	0.0114	0.0228	mg/kg dry	4	10/02/19 18:59	EPA 8270D	
Fluorene	ND	0.0114	0.0228	mg/kg dry	4	10/02/19 18:59	EPA 8270D	
Indeno(1,2,3-cd)pyrene	ND	0.0114	0.0228	mg/kg dry	4	10/02/19 18:59	EPA 8270D	
1-Methylnaphthalene	ND	0.0228	0.0455	mg/kg dry	4	10/02/19 18:59	EPA 8270D	
2-Methylnaphthalene	ND	0.0228	0.0455	mg/kg dry	4	10/02/19 18:59	EPA 8270D	
Naphthalene	ND	0.0228	0.0455	mg/kg dry	4	10/02/19 18:59	EPA 8270D	
Phenanthrene	ND	0.0114	0.0228	mg/kg dry	4	10/02/19 18:59	EPA 8270D	
Pyrene	ND	0.0114	0.0228	mg/kg dry	4	10/02/19 18:59	EPA 8270D	
Dibenzofuran	ND	0.0114	0.0228	mg/kg dry	4	10/02/19 18:59	EPA 8270D	
2,4-Dimethylphenol	ND	0.0570	0.114	mg/kg dry	4	10/02/19 18:59	EPA 8270D	
2-Methylphenol	ND	0.0284	0.0570	mg/kg dry	4	10/02/19 18:59	EPA 8270D	
3+4-Methylphenol(s)	ND	0.0284	0.0570	mg/kg dry	4	10/02/19 18:59	EPA 8270D	
Pentachlorophenol (PCP)	ND	0.114	0.228	mg/kg dry	4	10/02/19 18:59	EPA 8270D	
Phenol	ND	0.0228	0.0455	mg/kg dry	4	10/02/19 18:59	EPA 8270D	
Bis(2-ethylhexyl)phthalate	ND	0.171	0.342	mg/kg dry	4	10/02/19 18:59	EPA 8270D	
Butyl benzyl phthalate	ND	0.0570	0.114	mg/kg dry	4	10/02/19 18:59	EPA 8270D	
Diethylphthalate	ND	0.0570	0.114	mg/kg dry	4	10/02/19 18:59	EPA 8270D	
Dimethylphthalate	ND	0.0570	0.114	mg/kg dry	4	10/02/19 18:59	EPA 8270D	

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
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ANALYTICAL SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
SE-18-0-0.33 (A9J0006-18RE1)			Matrix: Sediment			Batch: 9100490		R-04
Di-n-butylphthalate	ND	0.0570	0.114	mg/kg dry	4	10/02/19 18:59	EPA 8270D	
Di-n-octyl phthalate	ND	0.0914	0.114	mg/kg dry	4	10/02/19 18:59	EPA 8270D	
N-Nitrosodiphenylamine	ND	0.0284	0.0570	mg/kg dry	4	10/02/19 18:59	EPA 8270D	
Hexachlorobenzene	ND	0.0114	0.0228	mg/kg dry	4	10/02/19 18:59	EPA 8270D	
Hexachlorobutadiene	ND	0.0284	0.0570	mg/kg dry	4	10/02/19 18:59	EPA 8270D	
Hexachlorocyclopentadiene	ND	0.0570	0.114	mg/kg dry	4	10/02/19 18:59	EPA 8270D	
1,2-Dichlorobenzene	ND	0.0284	0.0570	mg/kg dry	4	10/02/19 18:59	EPA 8270D	
1,4-Dichlorobenzene	ND	0.0284	0.0570	mg/kg dry	4	10/02/19 18:59	EPA 8270D	
1,2,4-Trichlorobenzene	ND	0.0284	0.0570	mg/kg dry	4	10/02/19 18:59	EPA 8270D	
Benzoic acid	ND	1.43	2.84	mg/kg dry	4	10/02/19 18:59	EPA 8270D	
Benzyl alcohol	ND	0.0570	0.114	mg/kg dry	4	10/02/19 18:59	EPA 8270D	
<i>Surrogate: Nitrobenzene-d5 (Surr)</i>		<i>Recovery: 61 %</i>		<i>Limits: 37-122 %</i>		<i>4</i>	<i>10/02/19 18:59</i>	<i>EPA 8270D</i>
<i>2-Fluorobiphenyl (Surr)</i>		<i>65 %</i>		<i>44-115 %</i>		<i>4</i>	<i>10/02/19 18:59</i>	<i>EPA 8270D</i>
<i>Phenol-d6 (Surr)</i>		<i>60 %</i>		<i>33-122 %</i>		<i>4</i>	<i>10/02/19 18:59</i>	<i>EPA 8270D</i>
<i>p-Terphenyl-d14 (Surr)</i>		<i>72 %</i>		<i>54-127 %</i>		<i>4</i>	<i>10/02/19 18:59</i>	<i>EPA 8270D</i>
<i>2-Fluorophenol (Surr)</i>		<i>59 %</i>		<i>35-115 %</i>		<i>4</i>	<i>10/02/19 18:59</i>	<i>EPA 8270D</i>
<i>2,4,6-Tribromophenol (Surr)</i>		<i>91 %</i>		<i>39-132 %</i>		<i>4</i>	<i>10/02/19 18:59</i>	<i>EPA 8270D</i>

SE-31-0-0.33 (A9J0006-20RE1)			Matrix: Sediment			Batch: 9100490		
Acenaphthene	0.0372	0.0107	0.0215	mg/kg dry	4	10/02/19 19:34	EPA 8270D	
Acenaphthylene	0.0196	0.0107	0.0215	mg/kg dry	4	10/02/19 19:34	EPA 8270D	Ja
Anthracene	ND	0.0107	0.0215	mg/kg dry	4	10/02/19 19:34	EPA 8270D	
Benz(a)anthracene	0.0125	0.0107	0.0215	mg/kg dry	4	10/02/19 19:34	EPA 8270D	Ja
Benzo(a)pyrene	0.0173	0.0161	0.0323	mg/kg dry	4	10/02/19 19:34	EPA 8270D	Ja
Benzo(b)fluoranthene	ND	0.0161	0.0323	mg/kg dry	4	10/02/19 19:34	EPA 8270D	
Benzo(k)fluoranthene	ND	0.0161	0.0323	mg/kg dry	4	10/02/19 19:34	EPA 8270D	
Benzo(g,h,i)perylene	ND	0.0107	0.0215	mg/kg dry	4	10/02/19 19:34	EPA 8270D	
Chrysene	ND	0.0107	0.0215	mg/kg dry	4	10/02/19 19:34	EPA 8270D	
Dibenz(a,h)anthracene	ND	0.0107	0.0215	mg/kg dry	4	10/02/19 19:34	EPA 8270D	
Fluoranthene	0.0280	0.0107	0.0215	mg/kg dry	4	10/02/19 19:34	EPA 8270D	
Fluorene	ND	0.0107	0.0215	mg/kg dry	4	10/02/19 19:34	EPA 8270D	
Indeno(1,2,3-cd)pyrene	ND	0.0107	0.0215	mg/kg dry	4	10/02/19 19:34	EPA 8270D	
1-Methylnaphthalene	ND	0.0215	0.0430	mg/kg dry	4	10/02/19 19:34	EPA 8270D	
2-Methylnaphthalene	ND	0.0215	0.0430	mg/kg dry	4	10/02/19 19:34	EPA 8270D	

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
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ANALYTICAL SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
SE-31-0-0.33 (A9J0006-20RE1)				Matrix: Sediment		Batch: 9100490		
Naphthalene	0.0742	0.0215	0.0430	mg/kg dry	4	10/02/19 19:34	EPA 8270D	
Phenanthrene	0.0289	0.0107	0.0215	mg/kg dry	4	10/02/19 19:34	EPA 8270D	
Pyrene	0.0296	0.0107	0.0215	mg/kg dry	4	10/02/19 19:34	EPA 8270D	
Dibenzofuran	ND	0.0107	0.0215	mg/kg dry	4	10/02/19 19:34	EPA 8270D	
2,4-Dimethylphenol	ND	0.0538	0.107	mg/kg dry	4	10/02/19 19:34	EPA 8270D	
2-Methylphenol	ND	0.0269	0.0538	mg/kg dry	4	10/02/19 19:34	EPA 8270D	
3+4-Methylphenol(s)	0.267	0.0269	0.0538	mg/kg dry	4	10/02/19 19:34	EPA 8270D	
Pentachlorophenol (PCP)	ND	0.107	0.215	mg/kg dry	4	10/02/19 19:34	EPA 8270D	
Phenol	0.0739	0.0215	0.0430	mg/kg dry	4	10/02/19 19:34	EPA 8270D	
Bis(2-ethylhexyl)phthalate	ND	0.161	0.323	mg/kg dry	4	10/02/19 19:34	EPA 8270D	
Butyl benzyl phthalate	ND	0.0538	0.107	mg/kg dry	4	10/02/19 19:34	EPA 8270D	
Diethylphthalate	ND	0.0538	0.107	mg/kg dry	4	10/02/19 19:34	EPA 8270D	
Dimethylphthalate	ND	0.0538	0.107	mg/kg dry	4	10/02/19 19:34	EPA 8270D	
Di-n-butylphthalate	ND	0.0538	0.107	mg/kg dry	4	10/02/19 19:34	EPA 8270D	
Di-n-octyl phthalate	ND	0.0863	0.107	mg/kg dry	4	10/02/19 19:34	EPA 8270D	
N-Nitrosodiphenylamine	ND	0.0269	0.0538	mg/kg dry	4	10/02/19 19:34	EPA 8270D	
Hexachlorobenzene	ND	0.0107	0.0215	mg/kg dry	4	10/02/19 19:34	EPA 8270D	
Hexachlorobutadiene	ND	0.0269	0.0538	mg/kg dry	4	10/02/19 19:34	EPA 8270D	
Hexachlorocyclopentadiene	ND	0.0538	0.107	mg/kg dry	4	10/02/19 19:34	EPA 8270D	
1,2-Dichlorobenzene	ND	0.0269	0.0538	mg/kg dry	4	10/02/19 19:34	EPA 8270D	
1,4-Dichlorobenzene	ND	0.0269	0.0538	mg/kg dry	4	10/02/19 19:34	EPA 8270D	
1,2,4-Trichlorobenzene	ND	0.0269	0.0538	mg/kg dry	4	10/02/19 19:34	EPA 8270D	
Benzoic acid	ND	1.35	2.69	mg/kg dry	4	10/02/19 19:34	EPA 8270D	
Benzyl alcohol	ND	0.0538	0.107	mg/kg dry	4	10/02/19 19:34	EPA 8270D	
<i>Surrogate: Nitrobenzene-d5 (Surr)</i>		<i>Recovery: 64 %</i>		<i>Limits: 37-122 %</i>	4	10/02/19 19:34	EPA 8270D	
<i>2-Fluorobiphenyl (Surr)</i>		<i>77 %</i>		<i>44-115 %</i>	4	10/02/19 19:34	EPA 8270D	
<i>Phenol-d6 (Surr)</i>		<i>65 %</i>		<i>33-122 %</i>	4	10/02/19 19:34	EPA 8270D	
<i>p-Terphenyl-d14 (Surr)</i>		<i>73 %</i>		<i>54-127 %</i>	4	10/02/19 19:34	EPA 8270D	
<i>2-Fluorophenol (Surr)</i>		<i>63 %</i>		<i>35-115 %</i>	4	10/02/19 19:34	EPA 8270D	
<i>2,4,6-Tribromophenol (Surr)</i>		<i>103 %</i>		<i>39-132 %</i>	4	10/02/19 19:34	EPA 8270D	

SE-16-0-0.33 (A9J0006-21RE1)				Matrix: Sediment		Batch: 9100490		
Acenaphthene	ND	0.00974	0.0195	mg/kg dry	4	10/02/19 20:09	EPA 8270D	
Acenaphthylene	ND	0.00974	0.0195	mg/kg dry	4	10/02/19 20:09	EPA 8270D	

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
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ANALYTICAL SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
SE-16-0-0.33 (A9J0006-21RE1)				Matrix: Sediment		Batch: 9100490		
Anthracene	ND	0.00974	0.0195	mg/kg dry	4	10/02/19 20:09	EPA 8270D	
Benz(a)anthracene	ND	0.00974	0.0195	mg/kg dry	4	10/02/19 20:09	EPA 8270D	
Benzo(a)pyrene	ND	0.0146	0.0293	mg/kg dry	4	10/02/19 20:09	EPA 8270D	
Benzo(b)fluoranthene	ND	0.0146	0.0293	mg/kg dry	4	10/02/19 20:09	EPA 8270D	
Benzo(k)fluoranthene	ND	0.0146	0.0293	mg/kg dry	4	10/02/19 20:09	EPA 8270D	
Benzo(g,h,i)perylene	ND	0.00974	0.0195	mg/kg dry	4	10/02/19 20:09	EPA 8270D	
Chrysene	ND	0.00974	0.0195	mg/kg dry	4	10/02/19 20:09	EPA 8270D	
Dibenz(a,h)anthracene	ND	0.00974	0.0195	mg/kg dry	4	10/02/19 20:09	EPA 8270D	
Fluoranthene	0.0138	0.00974	0.0195	mg/kg dry	4	10/02/19 20:09	EPA 8270D	Ja
Fluorene	ND	0.00974	0.0195	mg/kg dry	4	10/02/19 20:09	EPA 8270D	
Indeno(1,2,3-cd)pyrene	ND	0.00974	0.0195	mg/kg dry	4	10/02/19 20:09	EPA 8270D	
1-Methylnaphthalene	ND	0.0195	0.0390	mg/kg dry	4	10/02/19 20:09	EPA 8270D	
2-Methylnaphthalene	ND	0.0195	0.0390	mg/kg dry	4	10/02/19 20:09	EPA 8270D	
Naphthalene	ND	0.0195	0.0390	mg/kg dry	4	10/02/19 20:09	EPA 8270D	
Phenanthrene	0.0136	0.00974	0.0195	mg/kg dry	4	10/02/19 20:09	EPA 8270D	Ja
Pyrene	0.0130	0.00974	0.0195	mg/kg dry	4	10/02/19 20:09	EPA 8270D	Ja
Dibenzofuran	ND	0.00974	0.0195	mg/kg dry	4	10/02/19 20:09	EPA 8270D	
2,4-Dimethylphenol	ND	0.0488	0.0974	mg/kg dry	4	10/02/19 20:09	EPA 8270D	
2-Methylphenol	ND	0.0244	0.0488	mg/kg dry	4	10/02/19 20:09	EPA 8270D	
3+4-Methylphenol(s)	0.0284	0.0244	0.0488	mg/kg dry	4	10/02/19 20:09	EPA 8270D	Ja
Pentachlorophenol (PCP)	ND	0.0974	0.195	mg/kg dry	4	10/02/19 20:09	EPA 8270D	
Phenol	ND	0.0195	0.0390	mg/kg dry	4	10/02/19 20:09	EPA 8270D	
Bis(2-ethylhexyl)phthalate	ND	0.146	0.293	mg/kg dry	4	10/02/19 20:09	EPA 8270D	
Butyl benzyl phthalate	ND	0.0488	0.0974	mg/kg dry	4	10/02/19 20:09	EPA 8270D	
Diethylphthalate	ND	0.0488	0.0974	mg/kg dry	4	10/02/19 20:09	EPA 8270D	
Dimethylphthalate	ND	0.0488	0.0974	mg/kg dry	4	10/02/19 20:09	EPA 8270D	
Di-n-butylphthalate	ND	0.0488	0.0974	mg/kg dry	4	10/02/19 20:09	EPA 8270D	
Di-n-octyl phthalate	ND	0.0783	0.0974	mg/kg dry	4	10/02/19 20:09	EPA 8270D	
N-Nitrosodiphenylamine	ND	0.0244	0.0488	mg/kg dry	4	10/02/19 20:09	EPA 8270D	
Hexachlorobenzene	ND	0.00974	0.0195	mg/kg dry	4	10/02/19 20:09	EPA 8270D	
Hexachlorobutadiene	ND	0.0244	0.0488	mg/kg dry	4	10/02/19 20:09	EPA 8270D	
Hexachlorocyclopentadiene	ND	0.0488	0.0974	mg/kg dry	4	10/02/19 20:09	EPA 8270D	
1,2-Dichlorobenzene	ND	0.0244	0.0488	mg/kg dry	4	10/02/19 20:09	EPA 8270D	

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
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ANALYTICAL SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
SE-16-0-0.33 (A9J0006-21RE1)			Matrix: Sediment			Batch: 9100490		
1,4-Dichlorobenzene	ND	0.0244	0.0488	mg/kg dry	4	10/02/19 20:09	EPA 8270D	
1,2,4-Trichlorobenzene	ND	0.0244	0.0488	mg/kg dry	4	10/02/19 20:09	EPA 8270D	
Benzoic acid	ND	1.22	2.44	mg/kg dry	4	10/02/19 20:09	EPA 8270D	
Benzyl alcohol	ND	0.0488	0.0974	mg/kg dry	4	10/02/19 20:09	EPA 8270D	
<i>Surrogate: Nitrobenzene-d5 (Surr)</i>		<i>Recovery: 60 %</i>		<i>Limits: 37-122 %</i>		<i>4</i>	<i>10/02/19 20:09</i>	<i>EPA 8270D</i>
<i>2-Fluorobiphenyl (Surr)</i>		<i>73 %</i>		<i>44-115 %</i>		<i>4</i>	<i>10/02/19 20:09</i>	<i>EPA 8270D</i>
<i>Phenol-d6 (Surr)</i>		<i>60 %</i>		<i>33-122 %</i>		<i>4</i>	<i>10/02/19 20:09</i>	<i>EPA 8270D</i>
<i>p-Terphenyl-d14 (Surr)</i>		<i>76 %</i>		<i>54-127 %</i>		<i>4</i>	<i>10/02/19 20:09</i>	<i>EPA 8270D</i>
<i>2-Fluorophenol (Surr)</i>		<i>59 %</i>		<i>35-115 %</i>		<i>4</i>	<i>10/02/19 20:09</i>	<i>EPA 8270D</i>
<i>2,4,6-Tribromophenol (Surr)</i>		<i>94 %</i>		<i>39-132 %</i>		<i>4</i>	<i>10/02/19 20:09</i>	<i>EPA 8270D</i>
SE-22-0-0.33 (A9J0006-23RE1)			Matrix: Sediment			Batch: 9100490		
Acenaphthene	ND	0.0158	0.0317	mg/kg dry	4	10/02/19 22:37	EPA 8270D	
Acenaphthylene	ND	0.0158	0.0317	mg/kg dry	4	10/02/19 22:37	EPA 8270D	
Anthracene	ND	0.0158	0.0317	mg/kg dry	4	10/02/19 22:37	EPA 8270D	
Benz(a)anthracene	ND	0.0158	0.0317	mg/kg dry	4	10/02/19 22:37	EPA 8270D	
Benzo(a)pyrene	ND	0.0238	0.0475	mg/kg dry	4	10/02/19 22:37	EPA 8270D	
Benzo(b)fluoranthene	ND	0.0238	0.0475	mg/kg dry	4	10/02/19 22:37	EPA 8270D	
Benzo(k)fluoranthene	ND	0.0238	0.0475	mg/kg dry	4	10/02/19 22:37	EPA 8270D	
Benzo(g,h,i)perylene	ND	0.0158	0.0317	mg/kg dry	4	10/02/19 22:37	EPA 8270D	
Chrysene	ND	0.0158	0.0317	mg/kg dry	4	10/02/19 22:37	EPA 8270D	
Dibenz(a,h)anthracene	ND	0.0158	0.0317	mg/kg dry	4	10/02/19 22:37	EPA 8270D	
Fluoranthene	0.0318	0.0158	0.0317	mg/kg dry	4	10/02/19 22:37	EPA 8270D	
Fluorene	ND	0.0158	0.0317	mg/kg dry	4	10/02/19 22:37	EPA 8270D	
Indeno(1,2,3-cd)pyrene	ND	0.0158	0.0317	mg/kg dry	4	10/02/19 22:37	EPA 8270D	
1-Methylnaphthalene	ND	0.0317	0.0634	mg/kg dry	4	10/02/19 22:37	EPA 8270D	
2-Methylnaphthalene	ND	0.0317	0.0634	mg/kg dry	4	10/02/19 22:37	EPA 8270D	
Naphthalene	ND	0.0317	0.0634	mg/kg dry	4	10/02/19 22:37	EPA 8270D	
Phenanthrene	ND	0.0158	0.0317	mg/kg dry	4	10/02/19 22:37	EPA 8270D	
Pyrene	0.0264	0.0158	0.0317	mg/kg dry	4	10/02/19 22:37	EPA 8270D	Ja
Dibenzofuran	ND	0.0158	0.0317	mg/kg dry	4	10/02/19 22:37	EPA 8270D	
2,4-Dimethylphenol	ND	0.0793	0.158	mg/kg dry	4	10/02/19 22:37	EPA 8270D	
2-Methylphenol	ND	0.0396	0.0793	mg/kg dry	4	10/02/19 22:37	EPA 8270D	
3+4-Methylphenol(s)	ND	0.0396	0.0793	mg/kg dry	4	10/02/19 22:37	EPA 8270D	

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
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ANALYTICAL SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
SE-22-0-0.33 (A9J0006-23RE1)			Matrix: Sediment			Batch: 9100490		
Pentachlorophenol (PCP)	ND	0.158	0.317	mg/kg dry	4	10/02/19 22:37	EPA 8270D	
Phenol	ND	0.0317	0.0634	mg/kg dry	4	10/02/19 22:37	EPA 8270D	
Bis(2-ethylhexyl)phthalate	ND	0.238	0.475	mg/kg dry	4	10/02/19 22:37	EPA 8270D	
Butyl benzyl phthalate	ND	0.0793	0.158	mg/kg dry	4	10/02/19 22:37	EPA 8270D	
Diethylphthalate	ND	0.0793	0.158	mg/kg dry	4	10/02/19 22:37	EPA 8270D	
Dimethylphthalate	ND	0.0793	0.158	mg/kg dry	4	10/02/19 22:37	EPA 8270D	
Di-n-butylphthalate	ND	0.0793	0.158	mg/kg dry	4	10/02/19 22:37	EPA 8270D	
Di-n-octyl phthalate	ND	0.127	0.158	mg/kg dry	4	10/02/19 22:37	EPA 8270D	
N-Nitrosodiphenylamine	ND	0.0396	0.0793	mg/kg dry	4	10/02/19 22:37	EPA 8270D	
Hexachlorobenzene	ND	0.0158	0.0317	mg/kg dry	4	10/02/19 22:37	EPA 8270D	
Hexachlorobutadiene	ND	0.0396	0.0793	mg/kg dry	4	10/02/19 22:37	EPA 8270D	
Hexachlorocyclopentadiene	ND	0.0793	0.158	mg/kg dry	4	10/02/19 22:37	EPA 8270D	
1,2-Dichlorobenzene	ND	0.0396	0.0793	mg/kg dry	4	10/02/19 22:37	EPA 8270D	
1,4-Dichlorobenzene	ND	0.0396	0.0793	mg/kg dry	4	10/02/19 22:37	EPA 8270D	
1,2,4-Trichlorobenzene	ND	0.0396	0.0793	mg/kg dry	4	10/02/19 22:37	EPA 8270D	
Benzoic acid	ND	1.99	3.96	mg/kg dry	4	10/02/19 22:37	EPA 8270D	
Benzyl alcohol	ND	0.0793	0.158	mg/kg dry	4	10/02/19 22:37	EPA 8270D	
<i>Surrogate: Nitrobenzene-d5 (Surr)</i>		<i>Recovery: 56 %</i>		<i>Limits: 37-122 %</i>		<i>4</i>	<i>10/02/19 22:37</i>	<i>EPA 8270D</i>
<i>2-Fluorobiphenyl (Surr)</i>		<i>63 %</i>		<i>44-115 %</i>		<i>4</i>	<i>10/02/19 22:37</i>	<i>EPA 8270D</i>
<i>Phenol-d6 (Surr)</i>		<i>63 %</i>		<i>33-122 %</i>		<i>4</i>	<i>10/02/19 22:37</i>	<i>EPA 8270D</i>
<i>p-Terphenyl-d14 (Surr)</i>		<i>84 %</i>		<i>54-127 %</i>		<i>4</i>	<i>10/02/19 22:37</i>	<i>EPA 8270D</i>
<i>2-Fluorophenol (Surr)</i>		<i>60 %</i>		<i>35-115 %</i>		<i>4</i>	<i>10/02/19 22:37</i>	<i>EPA 8270D</i>
<i>2,4,6-Tribromophenol (Surr)</i>		<i>89 %</i>		<i>39-132 %</i>		<i>4</i>	<i>10/02/19 22:37</i>	<i>EPA 8270D</i>

SE-27-0-0.33 (A9J0006-24RE2)			Matrix: Sediment			Batch: 9100740		
Acenaphthene	ND	0.0131	0.0262	mg/kg dry	4	10/07/19 18:03	EPA 8270D	
Acenaphthylene	ND	0.0131	0.0262	mg/kg dry	4	10/07/19 18:03	EPA 8270D	
Anthracene	ND	0.0131	0.0262	mg/kg dry	4	10/07/19 18:03	EPA 8270D	
Benzo(a)anthracene	0.0203	0.0131	0.0262	mg/kg dry	4	10/07/19 18:03	EPA 8270D	Ja
Benzo(a)pyrene	0.0236	0.0197	0.0393	mg/kg dry	4	10/07/19 18:03	EPA 8270D	Ja
Benzo(b)fluoranthene	0.0208	0.0197	0.0393	mg/kg dry	4	10/07/19 18:03	EPA 8270D	Ja
Benzo(k)fluoranthene	ND	0.0197	0.0393	mg/kg dry	4	10/07/19 18:03	EPA 8270D	
Benzo(g,h,i)perylene	ND	0.0131	0.0262	mg/kg dry	4	10/07/19 18:03	EPA 8270D	
Chrysene	0.0203	0.0131	0.0262	mg/kg dry	4	10/07/19 18:03	EPA 8270D	Ja

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
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ANALYTICAL SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes	
SE-27-0-0.33 (A9J0006-24RE2)				Matrix: Sediment		Batch: 9100740			
Dibenz(a,h)anthracene	ND	0.0131	0.0262	mg/kg dry	4	10/07/19 18:03	EPA 8270D		
Fluoranthene	0.0363	0.0131	0.0262	mg/kg dry	4	10/07/19 18:03	EPA 8270D	Q-42	
Fluorene	ND	0.0131	0.0262	mg/kg dry	4	10/07/19 18:03	EPA 8270D		
Indeno(1,2,3-cd)pyrene	ND	0.0131	0.0262	mg/kg dry	4	10/07/19 18:03	EPA 8270D		
1-Methylnaphthalene	ND	0.0262	0.0524	mg/kg dry	4	10/07/19 18:03	EPA 8270D		
2-Methylnaphthalene	ND	0.0262	0.0524	mg/kg dry	4	10/07/19 18:03	EPA 8270D		
Naphthalene	ND	0.0262	0.0524	mg/kg dry	4	10/07/19 18:03	EPA 8270D		
Phenanthrene	0.0181	0.0131	0.0262	mg/kg dry	4	10/07/19 18:03	EPA 8270D	Ja	
Pyrene	0.0324	0.0131	0.0262	mg/kg dry	4	10/07/19 18:03	EPA 8270D		
Dibenzofuran	ND	0.0131	0.0262	mg/kg dry	4	10/07/19 18:03	EPA 8270D		
2,4-Dimethylphenol	ND	0.0656	0.131	mg/kg dry	4	10/07/19 18:03	EPA 8270D		
2-Methylphenol	ND	0.0327	0.0656	mg/kg dry	4	10/07/19 18:03	EPA 8270D		
3+4-Methylphenol(s)	0.0427	0.0327	0.0656	mg/kg dry	4	10/07/19 18:03	EPA 8270D	Ja	
Pentachlorophenol (PCP)	ND	0.131	0.262	mg/kg dry	4	10/07/19 18:03	EPA 8270D		
Phenol	ND	0.0262	0.0524	mg/kg dry	4	10/07/19 18:03	EPA 8270D		
Bis(2-ethylhexyl)phthalate	ND	0.197	0.393	mg/kg dry	4	10/07/19 18:03	EPA 8270D		
Butyl benzyl phthalate	ND	0.0656	0.131	mg/kg dry	4	10/07/19 18:03	EPA 8270D		
Diethylphthalate	ND	0.0656	0.131	mg/kg dry	4	10/07/19 18:03	EPA 8270D		
Dimethylphthalate	ND	0.0656	0.131	mg/kg dry	4	10/07/19 18:03	EPA 8270D		
Di-n-butylphthalate	ND	0.0656	0.131	mg/kg dry	4	10/07/19 18:03	EPA 8270D		
Di-n-octyl phthalate	ND	0.105	0.131	mg/kg dry	4	10/07/19 18:03	EPA 8270D		
N-Nitrosodiphenylamine	ND	0.0327	0.0656	mg/kg dry	4	10/07/19 18:03	EPA 8270D		
Hexachlorobenzene	ND	0.0131	0.0262	mg/kg dry	4	10/07/19 18:03	EPA 8270D		
Hexachlorobutadiene	ND	0.0327	0.0656	mg/kg dry	4	10/07/19 18:03	EPA 8270D		
Hexachlorocyclopentadiene	ND	0.0656	0.131	mg/kg dry	4	10/07/19 18:03	EPA 8270D		
1,2-Dichlorobenzene	ND	0.0327	0.0656	mg/kg dry	4	10/07/19 18:03	EPA 8270D		
1,4-Dichlorobenzene	ND	0.0327	0.0656	mg/kg dry	4	10/07/19 18:03	EPA 8270D		
1,2,4-Trichlorobenzene	ND	0.0327	0.0656	mg/kg dry	4	10/07/19 18:03	EPA 8270D		
Benzoic acid	ND	1.64	3.27	mg/kg dry	4	10/07/19 18:03	EPA 8270D	Q-42	
Benzyl alcohol	ND	0.0656	0.131	mg/kg dry	4	10/07/19 18:03	EPA 8270D		
<i>Surrogate: Nitrobenzene-d5 (Surr)</i>		<i>Recovery: 67 %</i>		<i>Limits: 37-122 %</i>		<i>4</i>	<i>10/07/19 18:03</i>	<i>EPA 8270D</i>	
<i>2-Fluorobiphenyl (Surr)</i>		<i>37 %</i>		<i>44-115 %</i>		<i>4</i>	<i>10/07/19 18:03</i>	<i>EPA 8270D</i>	<i>S-03</i>
<i>Phenol-d6 (Surr)</i>		<i>69 %</i>		<i>33-122 %</i>		<i>4</i>	<i>10/07/19 18:03</i>	<i>EPA 8270D</i>	

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
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ANALYTICAL SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
SE-27-0-0.33 (A9J0006-24RE2)				Matrix: Sediment		Batch: 9100740		
<i>Surrogate: p-Terphenyl-d14 (Surr)</i>		<i>Recovery: 41 %</i>		<i>Limits: 54-127 %</i>	4	10/07/19 18:03	EPA 8270D	S-03
<i>2-Fluorophenol (Surr)</i>			65 %	35-115 %	4	10/07/19 18:03	EPA 8270D	
<i>2,4,6-Tribromophenol (Surr)</i>			90 %	39-132 %	4	10/07/19 18:03	EPA 8270D	
SE-27-0-0.33-Dup (A9J0006-25RE1)				Matrix: Sediment		Batch: 9100490		
Acenaphthene	ND	0.0136	0.0272	mg/kg dry	4	10/03/19 16:39	EPA 8270D	
Acenaphthylene	ND	0.0136	0.0272	mg/kg dry	4	10/03/19 16:39	EPA 8270D	
Anthracene	ND	0.0136	0.0272	mg/kg dry	4	10/03/19 16:39	EPA 8270D	
Benz(a)anthracene	ND	0.0136	0.0272	mg/kg dry	4	10/03/19 16:39	EPA 8270D	
Benzo(a)pyrene	ND	0.0204	0.0408	mg/kg dry	4	10/03/19 16:39	EPA 8270D	
Benzo(b)fluoranthene	ND	0.0204	0.0408	mg/kg dry	4	10/03/19 16:39	EPA 8270D	
Benzo(k)fluoranthene	ND	0.0204	0.0408	mg/kg dry	4	10/03/19 16:39	EPA 8270D	
Benzo(g,h,i)perylene	ND	0.0136	0.0272	mg/kg dry	4	10/03/19 16:39	EPA 8270D	
Chrysene	ND	0.0136	0.0272	mg/kg dry	4	10/03/19 16:39	EPA 8270D	
Dibenz(a,h)anthracene	ND	0.0136	0.0272	mg/kg dry	4	10/03/19 16:39	EPA 8270D	
Fluoranthene	ND	0.0136	0.0272	mg/kg dry	4	10/03/19 16:39	EPA 8270D	
Fluorene	ND	0.0136	0.0272	mg/kg dry	4	10/03/19 16:39	EPA 8270D	
Indeno(1,2,3-cd)pyrene	ND	0.0136	0.0272	mg/kg dry	4	10/03/19 16:39	EPA 8270D	
1-Methylnaphthalene	ND	0.0272	0.0543	mg/kg dry	4	10/03/19 16:39	EPA 8270D	
2-Methylnaphthalene	ND	0.0272	0.0543	mg/kg dry	4	10/03/19 16:39	EPA 8270D	
Naphthalene	ND	0.0272	0.0543	mg/kg dry	4	10/03/19 16:39	EPA 8270D	
Phenanthrene	ND	0.0136	0.0272	mg/kg dry	4	10/03/19 16:39	EPA 8270D	
Pyrene	0.0163	0.0136	0.0272	mg/kg dry	4	10/03/19 16:39	EPA 8270D	Ja
Dibenzofuran	ND	0.0136	0.0272	mg/kg dry	4	10/03/19 16:39	EPA 8270D	
2,4-Dimethylphenol	ND	0.0680	0.136	mg/kg dry	4	10/03/19 16:39	EPA 8270D	
2-Methylphenol	ND	0.0339	0.0680	mg/kg dry	4	10/03/19 16:39	EPA 8270D	
3+4-Methylphenol(s)	0.0504	0.0339	0.0680	mg/kg dry	4	10/03/19 16:39	EPA 8270D	Ja
Pentachlorophenol (PCP)	ND	0.136	0.272	mg/kg dry	4	10/03/19 16:39	EPA 8270D	
Phenol	0.0608	0.0272	0.0543	mg/kg dry	4	10/03/19 16:39	EPA 8270D	
Bis(2-ethylhexyl)phthalate	ND	0.204	0.408	mg/kg dry	4	10/03/19 16:39	EPA 8270D	
Butyl benzyl phthalate	ND	0.0680	0.136	mg/kg dry	4	10/03/19 16:39	EPA 8270D	
Diethylphthalate	ND	0.0680	0.136	mg/kg dry	4	10/03/19 16:39	EPA 8270D	
Dimethylphthalate	ND	0.0680	0.136	mg/kg dry	4	10/03/19 16:39	EPA 8270D	
Di-n-butylphthalate	ND	0.0680	0.136	mg/kg dry	4	10/03/19 16:39	EPA 8270D	

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
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ANALYTICAL SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
SE-27-0-0.33-Dup (A9J0006-25RE1)			Matrix: Sediment			Batch: 9100490		
Di-n-octyl phthalate	ND	0.109	0.136	mg/kg dry	4	10/03/19 16:39	EPA 8270D	
N-Nitrosodiphenylamine	ND	0.0339	0.0680	mg/kg dry	4	10/03/19 16:39	EPA 8270D	
Hexachlorobenzene	ND	0.0136	0.0272	mg/kg dry	4	10/03/19 16:39	EPA 8270D	
Hexachlorobutadiene	ND	0.0339	0.0680	mg/kg dry	4	10/03/19 16:39	EPA 8270D	
Hexachlorocyclopentadiene	ND	0.0680	0.136	mg/kg dry	4	10/03/19 16:39	EPA 8270D	
1,2-Dichlorobenzene	ND	0.0339	0.0680	mg/kg dry	4	10/03/19 16:39	EPA 8270D	
1,4-Dichlorobenzene	ND	0.0339	0.0680	mg/kg dry	4	10/03/19 16:39	EPA 8270D	
1,2,4-Trichlorobenzene	ND	0.0339	0.0680	mg/kg dry	4	10/03/19 16:39	EPA 8270D	
Benzoic acid	ND	1.70	3.39	mg/kg dry	4	10/03/19 16:39	EPA 8270D	
Benzyl alcohol	ND	0.0680	0.136	mg/kg dry	4	10/03/19 16:39	EPA 8270D	
<i>Surrogate: Nitrobenzene-d5 (Surr)</i>		<i>Recovery: 61 %</i>		<i>Limits: 37-122 %</i>		<i>4</i>	<i>10/03/19 16:39</i>	<i>EPA 8270D</i>
<i>2-Fluorobiphenyl (Surr)</i>		<i>60 %</i>		<i>44-115 %</i>		<i>4</i>	<i>10/03/19 16:39</i>	<i>EPA 8270D</i>
<i>Phenol-d6 (Surr)</i>		<i>60 %</i>		<i>33-122 %</i>		<i>4</i>	<i>10/03/19 16:39</i>	<i>EPA 8270D</i>
<i>p-Terphenyl-d14 (Surr)</i>		<i>62 %</i>		<i>54-127 %</i>		<i>4</i>	<i>10/03/19 16:39</i>	<i>EPA 8270D</i>
<i>2-Fluorophenol (Surr)</i>		<i>60 %</i>		<i>35-115 %</i>		<i>4</i>	<i>10/03/19 16:39</i>	<i>EPA 8270D</i>
<i>2,4,6-Tribromophenol (Surr)</i>		<i>94 %</i>		<i>39-132 %</i>		<i>4</i>	<i>10/03/19 16:39</i>	<i>EPA 8270D</i>

Philip Nerenberg



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
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ANALYTICAL SAMPLE RESULTS

Total Metals by EPA 6020A (ICPMS)

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
SE-24-0-0.33 (A9J0006-01) Matrix: Sediment								
Batch: 9100629								
Arsenic	8.26	0.687	1.37	mg/kg dry	5	10/07/19 20:43	EPA 6020A	
Cadmium	0.216	0.137	0.275	mg/kg dry	5	10/07/19 20:43	EPA 6020A	Ja
Chromium	40.0	0.687	1.37	mg/kg dry	5	10/07/19 20:43	EPA 6020A	
Copper	73.7	0.687	1.37	mg/kg dry	5	10/07/19 20:43	EPA 6020A	
Lead	32.9	0.137	0.275	mg/kg dry	5	10/07/19 20:43	EPA 6020A	
Nickel	40.2	1.37	2.75	mg/kg dry	5	10/07/19 20:43	EPA 6020A	
Selenium	0.797	0.687	1.37	mg/kg dry	5	10/07/19 20:43	EPA 6020A	Ja
Silver	0.146	0.137	0.275	mg/kg dry	5	10/07/19 20:43	EPA 6020A	Ja
Zinc	93.0	2.75	5.50	mg/kg dry	5	10/07/19 20:43	EPA 6020A	
SE-14-0-0.33 (A9J0006-03) Matrix: Sediment								
Batch: 9100629								
Arsenic	8.63	0.697	1.39	mg/kg dry	5	10/07/19 20:47	EPA 6020A	
Cadmium	ND	0.139	0.279	mg/kg dry	5	10/07/19 20:47	EPA 6020A	
Chromium	33.9	0.697	1.39	mg/kg dry	5	10/07/19 20:47	EPA 6020A	
Copper	85.5	0.697	1.39	mg/kg dry	5	10/07/19 20:47	EPA 6020A	
Lead	47.3	0.139	0.279	mg/kg dry	5	10/07/19 20:47	EPA 6020A	
Nickel	27.9	1.39	2.79	mg/kg dry	5	10/07/19 20:47	EPA 6020A	
Selenium	0.716	0.697	1.39	mg/kg dry	5	10/07/19 20:47	EPA 6020A	Ja
Silver	ND	0.139	0.279	mg/kg dry	5	10/07/19 20:47	EPA 6020A	
Zinc	82.2	2.79	5.57	mg/kg dry	5	10/07/19 20:47	EPA 6020A	
SE-23-0-0.33 (A9J0006-05) Matrix: Sediment								
Batch: 9100629								
Arsenic	8.51	0.542	1.08	mg/kg dry	5	10/07/19 20:52	EPA 6020A	
Cadmium	0.513	0.108	0.217	mg/kg dry	5	10/07/19 20:52	EPA 6020A	
Chromium	37.8	0.542	1.08	mg/kg dry	5	10/07/19 20:52	EPA 6020A	
Copper	117	0.542	1.08	mg/kg dry	5	10/07/19 20:52	EPA 6020A	
Lead	34.9	0.108	0.217	mg/kg dry	5	10/07/19 20:52	EPA 6020A	
Nickel	37.5	1.08	2.17	mg/kg dry	5	10/07/19 20:52	EPA 6020A	
Selenium	0.798	0.542	1.08	mg/kg dry	5	10/07/19 20:52	EPA 6020A	Ja
Silver	0.148	0.108	0.217	mg/kg dry	5	10/07/19 20:52	EPA 6020A	Ja
Zinc	136	2.17	4.33	mg/kg dry	5	10/07/19 20:52	EPA 6020A	

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
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ANALYTICAL SAMPLE RESULTS

Total Metals by EPA 6020A (ICPMS)

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
SE-17-0-0.33 (A9J0006-06) Matrix: Sediment								
Batch: 9100629								
Arsenic	7.09	0.557	1.11	mg/kg dry	5	10/07/19 21:05	EPA 6020A	
Cadmium	0.151	0.111	0.223	mg/kg dry	5	10/07/19 21:05	EPA 6020A	Ja
Chromium	36.1	0.557	1.11	mg/kg dry	5	10/07/19 21:05	EPA 6020A	
Copper	57.3	0.557	1.11	mg/kg dry	5	10/07/19 21:05	EPA 6020A	
Lead	8.21	0.111	0.223	mg/kg dry	5	10/07/19 21:05	EPA 6020A	
Nickel	27.2	1.11	2.23	mg/kg dry	5	10/07/19 21:05	EPA 6020A	
Selenium	0.867	0.557	1.11	mg/kg dry	5	10/07/19 21:05	EPA 6020A	Ja
Silver	0.119	0.111	0.223	mg/kg dry	5	10/07/19 21:05	EPA 6020A	Ja
Zinc	82.1	2.23	4.45	mg/kg dry	5	10/07/19 21:05	EPA 6020A	
SE-15-0-0.33 (A9J0006-07) Matrix: Sediment								
Batch: 9100629								
Arsenic	6.20	0.576	1.15	mg/kg dry	5	10/07/19 21:10	EPA 6020A	
Cadmium	0.175	0.115	0.230	mg/kg dry	5	10/07/19 21:10	EPA 6020A	Ja
Chromium	32.0	0.576	1.15	mg/kg dry	5	10/07/19 21:10	EPA 6020A	
Copper	49.8	0.576	1.15	mg/kg dry	5	10/07/19 21:10	EPA 6020A	
Lead	7.52	0.115	0.230	mg/kg dry	5	10/07/19 21:10	EPA 6020A	
Nickel	21.8	1.15	2.30	mg/kg dry	5	10/07/19 21:10	EPA 6020A	
Selenium	0.714	0.576	1.15	mg/kg dry	5	10/07/19 21:10	EPA 6020A	Ja
Silver	0.115	0.115	0.230	mg/kg dry	5	10/07/19 21:10	EPA 6020A	Ja
Zinc	67.3	2.30	4.60	mg/kg dry	5	10/07/19 21:10	EPA 6020A	
SE-21-0-0.33 (A9J0006-08) Matrix: Sediment								
Batch: 9100629								
Arsenic	4.49	0.421	0.842	mg/kg dry	5	10/07/19 21:15	EPA 6020A	
Cadmium	0.118	0.0842	0.168	mg/kg dry	5	10/07/19 21:15	EPA 6020A	Ja
Chromium	29.1	0.421	0.842	mg/kg dry	5	10/07/19 21:15	EPA 6020A	
Copper	49.9	0.421	0.842	mg/kg dry	5	10/07/19 21:15	EPA 6020A	
Lead	7.20	0.0842	0.168	mg/kg dry	5	10/07/19 21:15	EPA 6020A	
Nickel	25.1	0.842	1.68	mg/kg dry	5	10/07/19 21:15	EPA 6020A	
Selenium	0.630	0.421	0.842	mg/kg dry	5	10/07/19 21:15	EPA 6020A	Ja
Silver	0.0854	0.0842	0.168	mg/kg dry	5	10/07/19 21:15	EPA 6020A	Ja

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tideland Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
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ANALYTICAL SAMPLE RESULTS

Total Metals by EPA 6020A (ICPMS)

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
SE-21-0-0.33 (A9J0006-08) Matrix: Sediment								
Zinc	64.0	1.68	3.37	mg/kg dry	5	10/07/19 21:15	EPA 6020A	
SE-25-0-0.33 (A9J0006-13) Matrix: Sediment								
Batch: 9100629								
Arsenic	8.84	0.632	1.26	mg/kg dry	5	10/07/19 21:19	EPA 6020A	
Cadmium	0.725	0.126	0.253	mg/kg dry	5	10/07/19 21:19	EPA 6020A	
Chromium	19.1	0.632	1.26	mg/kg dry	5	10/07/19 21:19	EPA 6020A	
Copper	76.8	0.632	1.26	mg/kg dry	5	10/07/19 21:19	EPA 6020A	Q-42
Lead	37.9	0.126	0.253	mg/kg dry	5	10/07/19 21:19	EPA 6020A	
Nickel	25.5	1.26	2.53	mg/kg dry	5	10/07/19 21:19	EPA 6020A	
Selenium	ND	0.632	1.26	mg/kg dry	5	10/07/19 21:19	EPA 6020A	
Silver	ND	0.126	0.253	mg/kg dry	5	10/07/19 21:19	EPA 6020A	
Zinc	98.6	2.53	5.05	mg/kg dry	5	10/07/19 21:19	EPA 6020A	
SE-26-0-0.33 (A9J0006-16) Matrix: Sediment								
Batch: 9100629								
Arsenic	5.11	0.593	1.19	mg/kg dry	5	10/07/19 21:24	EPA 6020A	
Cadmium	ND	0.119	0.237	mg/kg dry	5	10/07/19 21:24	EPA 6020A	
Chromium	25.7	0.593	1.19	mg/kg dry	5	10/07/19 21:24	EPA 6020A	
Copper	81.9	0.593	1.19	mg/kg dry	5	10/07/19 21:24	EPA 6020A	
Lead	30.4	0.119	0.237	mg/kg dry	5	10/07/19 21:24	EPA 6020A	
Nickel	26.0	1.19	2.37	mg/kg dry	5	10/07/19 21:24	EPA 6020A	
Selenium	ND	0.593	1.19	mg/kg dry	5	10/07/19 21:24	EPA 6020A	
Silver	ND	0.119	0.237	mg/kg dry	5	10/07/19 21:24	EPA 6020A	
Zinc	76.0	2.37	4.74	mg/kg dry	5	10/07/19 21:24	EPA 6020A	
SE-18-0-0.33 (A9J0006-18) Matrix: Sediment								
Batch: 9100629								
Arsenic	5.93	0.556	1.11	mg/kg dry	5	10/07/19 21:28	EPA 6020A	
Cadmium	0.169	0.111	0.222	mg/kg dry	5	10/07/19 21:28	EPA 6020A	Ja
Chromium	34.5	0.556	1.11	mg/kg dry	5	10/07/19 21:28	EPA 6020A	
Copper	62.1	0.556	1.11	mg/kg dry	5	10/07/19 21:28	EPA 6020A	
Lead	7.28	0.111	0.222	mg/kg dry	5	10/07/19 21:28	EPA 6020A	
Nickel	30.1	1.11	2.22	mg/kg dry	5	10/07/19 21:28	EPA 6020A	

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AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
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ANALYTICAL SAMPLE RESULTS

Total Metals by EPA 6020A (ICPMS)

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
SE-18-0-0.33 (A9J0006-18) Matrix: Sediment								
Selenium	0.860	0.556	1.11	mg/kg dry	5	10/07/19 21:28	EPA 6020A	Ja
Silver	ND	0.111	0.222	mg/kg dry	5	10/07/19 21:28	EPA 6020A	
Zinc	80.3	2.22	4.45	mg/kg dry	5	10/07/19 21:28	EPA 6020A	
SE-31-0-0.33 (A9J0006-20) Matrix: Sediment								
Batch: 9100629								
Arsenic	6.07	0.523	1.05	mg/kg dry	5	10/07/19 21:33	EPA 6020A	
Cadmium	0.165	0.105	0.209	mg/kg dry	5	10/07/19 21:33	EPA 6020A	Ja
Chromium	34.7	0.523	1.05	mg/kg dry	5	10/07/19 21:33	EPA 6020A	
Copper	61.4	0.523	1.05	mg/kg dry	5	10/07/19 21:33	EPA 6020A	
Lead	7.94	0.105	0.209	mg/kg dry	5	10/07/19 21:33	EPA 6020A	
Nickel	30.2	1.05	2.09	mg/kg dry	5	10/07/19 21:33	EPA 6020A	
Selenium	0.845	0.523	1.05	mg/kg dry	5	10/07/19 21:33	EPA 6020A	Ja
Silver	0.111	0.105	0.209	mg/kg dry	5	10/07/19 21:33	EPA 6020A	Ja
Zinc	74.7	2.09	4.18	mg/kg dry	5	10/07/19 21:33	EPA 6020A	
SE-16-0-0.33 (A9J0006-21) Matrix: Sediment								
Batch: 9100629								
Arsenic	4.91	0.459	0.918	mg/kg dry	5	10/07/19 21:38	EPA 6020A	
Cadmium	0.143	0.0918	0.184	mg/kg dry	5	10/07/19 21:38	EPA 6020A	Ja
Chromium	32.2	0.459	0.918	mg/kg dry	5	10/07/19 21:38	EPA 6020A	
Copper	52.0	0.459	0.918	mg/kg dry	5	10/07/19 21:38	EPA 6020A	
Lead	6.35	0.0918	0.184	mg/kg dry	5	10/07/19 21:38	EPA 6020A	
Nickel	26.1	0.918	1.84	mg/kg dry	5	10/07/19 21:38	EPA 6020A	
Selenium	0.725	0.459	0.918	mg/kg dry	5	10/07/19 21:38	EPA 6020A	Ja
Silver	ND	0.0918	0.184	mg/kg dry	5	10/07/19 21:38	EPA 6020A	
Zinc	75.1	1.84	3.67	mg/kg dry	5	10/07/19 21:38	EPA 6020A	
SE-22-0-0.33 (A9J0006-23) Matrix: Sediment								
Batch: 9100629								
Arsenic	6.97	0.736	1.47	mg/kg dry	5	10/07/19 21:42	EPA 6020A	
Cadmium	0.201	0.147	0.294	mg/kg dry	5	10/07/19 21:42	EPA 6020A	Ja
Chromium	35.7	0.736	1.47	mg/kg dry	5	10/07/19 21:42	EPA 6020A	
Copper	68.6	0.736	1.47	mg/kg dry	5	10/07/19 21:42	EPA 6020A	

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AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
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ANALYTICAL SAMPLE RESULTS

Total Metals by EPA 6020A (ICPMS)

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
SE-22-0-0.33 (A9J0006-23) Matrix: Sediment								
Lead	16.9	0.147	0.294	mg/kg dry	5	10/07/19 21:42	EPA 6020A	
Nickel	26.3	1.47	2.94	mg/kg dry	5	10/07/19 21:42	EPA 6020A	
Selenium	1.01	0.736	1.47	mg/kg dry	5	10/07/19 21:42	EPA 6020A	Ja
Silver	ND	0.147	0.294	mg/kg dry	5	10/07/19 21:42	EPA 6020A	
Zinc	136	2.94	5.88	mg/kg dry	5	10/07/19 21:42	EPA 6020A	
SE-27-0-0.33 (A9J0006-24) Matrix: Sediment								
Batch: 9100629								
Arsenic	7.49	0.620	1.24	mg/kg dry	5	10/07/19 21:47	EPA 6020A	
Cadmium	0.154	0.124	0.248	mg/kg dry	5	10/07/19 21:47	EPA 6020A	Ja
Chromium	33.8	0.620	1.24	mg/kg dry	5	10/07/19 21:47	EPA 6020A	
Copper	62.6	0.620	1.24	mg/kg dry	5	10/07/19 21:47	EPA 6020A	
Lead	10.8	0.124	0.248	mg/kg dry	5	10/07/19 21:47	EPA 6020A	
Nickel	25.7	1.24	2.48	mg/kg dry	5	10/07/19 21:47	EPA 6020A	
Selenium	0.896	0.620	1.24	mg/kg dry	5	10/07/19 21:47	EPA 6020A	Ja
Silver	ND	0.124	0.248	mg/kg dry	5	10/07/19 21:47	EPA 6020A	
Zinc	80.5	2.48	4.96	mg/kg dry	5	10/07/19 21:47	EPA 6020A	
SE-27-0-0.33-Dup (A9J0006-25) Matrix: Sediment								
Batch: 9100629								
Arsenic	7.57	0.644	1.29	mg/kg dry	5	10/07/19 22:00	EPA 6020A	
Cadmium	0.188	0.129	0.258	mg/kg dry	5	10/07/19 22:00	EPA 6020A	Ja
Chromium	35.3	0.644	1.29	mg/kg dry	5	10/07/19 22:00	EPA 6020A	
Copper	63.3	0.644	1.29	mg/kg dry	5	10/07/19 22:00	EPA 6020A	
Lead	11.6	0.129	0.258	mg/kg dry	5	10/07/19 22:00	EPA 6020A	
Nickel	27.4	1.29	2.58	mg/kg dry	5	10/07/19 22:00	EPA 6020A	
Selenium	0.987	0.644	1.29	mg/kg dry	5	10/07/19 22:00	EPA 6020A	Ja
Silver	ND	0.129	0.258	mg/kg dry	5	10/07/19 22:00	EPA 6020A	
Zinc	88.1	2.58	5.15	mg/kg dry	5	10/07/19 22:00	EPA 6020A	



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Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
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ANALYTICAL SAMPLE RESULTS

Ammonia by Plumb Extraction, Gas Diffusion and Colorimetric Detection

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
SE-24-0-0.33 (A9J0006-01)				Matrix: Sediment		Batch: 9100530		
Ammonia as N	9.49	0.279	0.279	mg/kg dry	1	10/02/19 14:32	Plumb/SM 4500-NH3 G	
SE-14-0-0.33 (A9J0006-03)				Matrix: Sediment		Batch: 9100530		
Ammonia as N	15.2	0.283	0.283	mg/kg dry	1	10/02/19 14:44	Plumb/SM 4500-NH3 G	
SE-23-0-0.33 (A9J0006-05)				Matrix: Sediment		Batch: 9100530		
Ammonia as N	11.8	0.212	0.212	mg/kg dry	1	10/02/19 14:45	Plumb/SM 4500-NH3 G	
SE-17-0-0.33 (A9J0006-06)				Matrix: Sediment		Batch: 9100530		
Ammonia as N	10.7	0.223	0.223	mg/kg dry	1	10/02/19 14:47	Plumb/SM 4500-NH3 G	
SE-15-0-0.33 (A9J0006-07)				Matrix: Sediment		Batch: 9100530		
Ammonia as N	5.75	0.229	0.229	mg/kg dry	1	10/02/19 14:48	Plumb/SM 4500-NH3 G	
SE-21-0-0.33 (A9J0006-08)				Matrix: Sediment		Batch: 9100530		
Ammonia as N	7.06	0.165	0.165	mg/kg dry	1	10/02/19 14:50	Plumb/SM 4500-NH3 G	
SE-25-0-0.33 (A9J0006-13)				Matrix: Sediment		Batch: 9100530		
Ammonia as N	3.68	0.235	0.235	mg/kg dry	1	10/02/19 14:51	Plumb/SM 4500-NH3 G	
SE-28-0-0.33 (A9J0006-14)				Matrix: Sediment		Batch: 9100530		
Ammonia as N	7.36	0.264	0.264	mg/kg dry	1	10/02/19 14:53	Plumb/SM 4500-NH3 G	
SE-26-0-0.33 (A9J0006-16)				Matrix: Sediment		Batch: 9100530		
Ammonia as N	3.48	0.224	0.224	mg/kg dry	1	10/02/19 14:54	Plumb/SM 4500-NH3 G	
SE-18-0-0.33 (A9J0006-18)				Matrix: Sediment		Batch: 9100530		
Ammonia as N	12.9	0.211	0.211	mg/kg dry	1	10/02/19 14:56	Plumb/SM 4500-NH3 G	

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AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
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ANALYTICAL SAMPLE RESULTS

Ammonia by Plumb Extraction, Gas Diffusion and Colorimetric Detection

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
SE-31-0-0.33 (A9J0006-20)				Matrix: Sediment		Batch: 9100530		
Ammonia as N	7.98	0.199	0.199	mg/kg dry	1	10/02/19 15:05	Plumb/SM 4500-NH3 G	
SE-16-0-0.33 (A9J0006-21)				Matrix: Sediment		Batch: 9100530		
Ammonia as N	8.43	0.188	0.188	mg/kg dry	1	10/02/19 15:06	Plumb/SM 4500-NH3 G	
SE-19-0-0.33 (A9J0006-22)				Matrix: Sediment		Batch: 9100530		
Ammonia as N	9.43	0.232	0.232	mg/kg dry	1	10/02/19 15:08	Plumb/SM 4500-NH3 G	
SE-22-0-0.33 (A9J0006-23)				Matrix: Sediment		Batch: 9100530		
Ammonia as N	7.81	0.295	0.295	mg/kg dry	1	10/02/19 15:09	Plumb/SM 4500-NH3 G	
SE-27-0-0.33 (A9J0006-24)				Matrix: Sediment		Batch: 9100530		
Ammonia as N	8.47	0.242	0.242	mg/kg dry	1	10/02/19 15:11	Plumb/SM 4500-NH3 G	
SE-27-0-0.33-Dup (A9J0006-25)				Matrix: Sediment		Batch: 9100530		
Ammonia as N	8.18	0.253	0.253	mg/kg dry	1	10/02/19 15:12	Plumb/SM 4500-NH3 G	

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Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
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ANALYTICAL SAMPLE RESULTS

Demand Parameters

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
SE-24-0-0.33 (A9J0006-01RE1)				Matrix: Sediment				
Batch: 9100832								
Total Organic Carbon	78000	200	200	mg/kg	1	10/13/19 16:25	EPA 9060Amod	
SE-14-0-0.33 (A9J0006-03)				Matrix: Sediment				
Batch: 9100832								
Total Organic Carbon	55000	200	200	mg/kg	1	10/11/19 21:13	EPA 9060Amod	
SE-23-0-0.33 (A9J0006-05)				Matrix: Sediment				
Batch: 9100832								
Total Organic Carbon	26000	200	200	mg/kg	1	10/11/19 21:24	EPA 9060Amod	
SE-17-0-0.33 (A9J0006-06)				Matrix: Sediment				
Batch: 9100832								
Total Organic Carbon	23000	200	200	mg/kg	1	10/11/19 21:35	EPA 9060Amod	
SE-15-0-0.33 (A9J0006-07)				Matrix: Sediment				
Batch: 9100832								
Total Organic Carbon	47000	200	200	mg/kg	1	10/11/19 22:07	EPA 9060Amod	
SE-21-0-0.33 (A9J0006-08)				Matrix: Sediment				
Batch: 9100832								
Total Organic Carbon	13000	200	200	mg/kg	1	10/11/19 22:18	EPA 9060Amod	
SE-25-0-0.33 (A9J0006-13RE1)				Matrix: Sediment				
Batch: 9100832								
Total Organic Carbon	180000	200	200	mg/kg	1	10/13/19 16:36	EPA 9060Amod	
SE-28-0-0.33 (A9J0006-14)				Matrix: Sediment				
Batch: 9100832								
Total Organic Carbon	55000	200	200	mg/kg	1	10/11/19 22:40	EPA 9060Amod	
SE-26-0-0.33 (A9J0006-16)				Matrix: Sediment				
Batch: 9100833								
Total Organic Carbon	130000	200	200	mg/kg	1	10/11/19 09:55	EPA 9060Amod	
SE-18-0-0.33 (A9J0006-18)				Matrix: Sediment				
Batch: 9100833								

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AMENDED REPORT

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ANALYTICAL SAMPLE RESULTS

Demand Parameters

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
SE-18-0-0.33 (A9J0006-18)				Matrix: Sediment				
Total Organic Carbon	17000	200	200	mg/kg	1	10/11/19 10:53	EPA 9060Amod	
SE-31-0-0.33 (A9J0006-20)				Matrix: Sediment				
Batch: 9100833								
Total Organic Carbon	21000	200	200	mg/kg	1	10/11/19 11:23	EPA 9060Amod	
SE-16-0-0.33 (A9J0006-21)				Matrix: Sediment				
Batch: 9100833								
Total Organic Carbon	15000	200	200	mg/kg	1	10/11/19 12:15	EPA 9060Amod	
SE-19-0-0.33 (A9J0006-22)				Matrix: Sediment				
Batch: 9100833								
Total Organic Carbon	20000	200	200	mg/kg	1	10/11/19 13:26	EPA 9060Amod	
SE-22-0-0.33 (A9J0006-23)				Matrix: Sediment				
Batch: 9100833								
Total Organic Carbon	38000	200	200	mg/kg	1	10/11/19 14:10	EPA 9060Amod	
SE-27-0-0.33 (A9J0006-24)				Matrix: Sediment				
Batch: 9100833								
Total Organic Carbon	38000	200	200	mg/kg	1	10/11/19 14:27	EPA 9060Amod	
SE-27-0-0.33-Dup (A9J0006-25)				Matrix: Sediment				
Batch: 9100833								
Total Organic Carbon	39000	200	200	mg/kg	1	10/11/19 15:24	EPA 9060Amod	



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ANALYTICAL SAMPLE RESULTS

Solid and Moisture Determinations

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
SE-24-0-0.33 (A9J0006-01) Matrix: Sediment								
Batch: 9100520								
Total Solids	35.5	1.00	1.00	%	1	10/02/19 12:42	PSEP 1986	
Batch: 9100558								
Total Volatile Solids	18.9	1.00	1.00	%	1	10/03/19 10:09	SM 2540 G	
SE-14-0-0.33 (A9J0006-03) Matrix: Sediment								
Batch: 9100520								
Total Solids	34.8	1.00	1.00	%	1	10/02/19 12:42	PSEP 1986	
Batch: 9100558								
Total Volatile Solids	12.5	1.00	1.00	%	1	10/03/19 10:09	SM 2540 G	
SE-23-0-0.33 (A9J0006-05) Matrix: Sediment								
Batch: 9100520								
Total Solids	45.4	1.00	1.00	%	1	10/02/19 12:42	PSEP 1986	
Batch: 9100558								
Total Volatile Solids	7.18	1.00	1.00	%	1	10/03/19 10:09	SM 2540 G	
SE-17-0-0.33 (A9J0006-06) Matrix: Sediment								
Batch: 9100520								
Total Solids	43.3	1.00	1.00	%	1	10/02/19 12:42	PSEP 1986	
Batch: 9100558								
Total Volatile Solids	6.80	1.00	1.00	%	1	10/03/19 10:09	SM 2540 G	
SE-15-0-0.33 (A9J0006-07) Matrix: Sediment								
Batch: 9100520								
Total Solids	43.4	1.00	1.00	%	1	10/02/19 12:42	PSEP 1986	
Batch: 9100558								
Total Volatile Solids	14.4	1.00	1.00	%	1	10/03/19 10:09	SM 2540 G	
SE-21-0-0.33 (A9J0006-08) Matrix: Sediment								
Batch: 9100520								
Total Solids	59.4	1.00	1.00	%	1	10/02/19 12:42	PSEP 1986	
Batch: 9100558								
Total Volatile Solids	5.02	1.00	1.00	%	1	10/03/19 10:09	SM 2540 G	
SE-25-0-0.33 (A9J0006-13) Matrix: Sediment								

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AMENDED REPORT

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ANALYTICAL SAMPLE RESULTS

Solid and Moisture Determinations

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
SE-25-0-0.33 (A9J0006-13) Matrix: Sediment								
Batch: 9100571								
Total Solids	40.6	1.00	1.00	%	1	10/03/19 12:11	PSEP 1986	
Batch: 9100621								
Total Volatile Solids	19.0	1.00	1.00	%	1	10/03/19 16:24	SM 2540 G	
SE-28-0-0.33 (A9J0006-14) Matrix: Sediment								
Batch: 9100571								
Total Solids	36.0	1.00	1.00	%	1	10/03/19 12:11	PSEP 1986	
Batch: 9100621								
Total Volatile Solids	13.0	1.00	1.00	%	1	10/03/19 16:24	SM 2540 G	
SE-26-0-0.33 (A9J0006-16) Matrix: Sediment								
Batch: 9100571								
Total Solids	42.4	1.00	1.00	%	1	10/03/19 12:11	PSEP 1986	
Batch: 9100621								
Total Volatile Solids	18.4	1.00	1.00	%	1	10/03/19 16:24	SM 2540 G	
SE-18-0-0.33 (A9J0006-18) Matrix: Sediment								
Batch: 9100571								
Total Solids	46.3	1.00	1.00	%	1	10/03/19 12:11	PSEP 1986	
Batch: 9100621								
Total Volatile Solids	6.06	1.00	1.00	%	1	10/03/19 16:24	SM 2540 G	
SE-31-0-0.33 (A9J0006-20) Matrix: Sediment								
Batch: 9100571								
Total Solids	48.8	1.00	1.00	%	1	10/03/19 12:11	PSEP 1986	
Batch: 9100621								
Total Volatile Solids	8.80	1.00	1.00	%	1	10/03/19 16:24	SM 2540 G	
SE-16-0-0.33 (A9J0006-21) Matrix: Sediment								
Batch: 9100630								
Total Solids	52.9	1.00	1.00	%	1	10/07/19 11:30	PSEP 1986	
Batch: 9100742								
Total Volatile Solids	5.35	1.00	1.00	%	1	10/07/19 17:15	SM 2540 G	
SE-19-0-0.33 (A9J0006-22) Matrix: Sediment								

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AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
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ANALYTICAL SAMPLE RESULTS

Solid and Moisture Determinations

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
SE-19-0-0.33 (A9J0006-22) Matrix: Sediment								
Batch: 9100630								
Total Solids	41.5	1.00	1.00	%	1	10/07/19 11:30	PSEP 1986	
Batch: 9100742								
Total Volatile Solids	6.95	1.00	1.00	%	1	10/07/19 17:15	SM 2540 G	
SE-22-0-0.33 (A9J0006-23) Matrix: Sediment								
Batch: 9100630								
Total Solids	33.4	1.00	1.00	%	1	10/07/19 11:30	PSEP 1986	
Batch: 9100742								
Total Volatile Solids	11.6	1.00	1.00	%	1	10/07/19 17:15	SM 2540 G	
SE-27-0-0.33 (A9J0006-24) Matrix: Sediment								
Batch: 9100630								
Total Solids	39.4	1.00	1.00	%	1	10/07/19 11:30	PSEP 1986	
Batch: 9100742								
Total Volatile Solids	12.1	1.00	1.00	%	1	10/07/19 17:15	SM 2540 G	
SE-27-0-0.33-Dup (A9J0006-25) Matrix: Sediment								
Batch: 9100630								
Total Solids	38.3	1.00	1.00	%	1	10/07/19 11:30	PSEP 1986	
Batch: 9100742								
Total Volatile Solids	9.96	1.00	1.00	%	1	10/07/19 17:15	SM 2540 G	



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
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ANALYTICAL SAMPLE RESULTS

Grain Size by ASTM D 422m/PSET Parameters

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
SE-24-0-0.33 (A9J0006-01)				Matrix: Sediment		Batch: 9100866		
Gravel (>2.00mm)	38.2	0.01	0.01	% of Total	1	10/14/19 14:02	D422mod	GS-01
Percent Retained 4.75 mm sieve (#4)	33.9	0.01	0.01	% of Total	1	10/14/19 14:02	D422mod	GS-01
Percent Retained 2.00 mm sieve (#10)	4.29	0.01	0.01	% of Total	1	10/14/19 14:02	D422mod	GS-01
Sand (0.063mm - 2.00mm)	14.3	0.01	0.01	% of Total	1	10/14/19 14:02	D422mod	GS-01
Percent Retained 0.85 mm sieve (#20)	4.23	0.01	0.01	% of Total	1	10/14/19 14:02	D422mod	GS-01
Percent Retained 0.425 mm sieve (#40)	4.16	0.01	0.01	% of Total	1	10/14/19 14:02	D422mod	GS-01
Percent Retained 0.250 mm sieve (#60)	2.43	0.01	0.01	% of Total	1	10/14/19 14:02	D422mod	GS-01
Percent Retained 0.150 mm sieve (#100)	1.22	0.01	0.01	% of Total	1	10/14/19 14:02	D422mod	GS-01
Percent Retained 0.106 mm sieve (#140)	0.68	0.01	0.01	% of Total	1	10/14/19 14:02	D422mod	GS-01
Percent Retained 0.075 mm sieve (#200)	0.89	0.01	0.01	% of Total	1	10/14/19 14:02	D422mod	GS-01
Percent Retained 0.063 mm sieve (#230)	0.65	0.01	0.01	% of Total	1	10/14/19 14:02	D422mod	GS-01
Silt (0.005mm < 0.063mm)	39.2	0.01	0.01	% of Total	1	10/14/19 14:02	D422mod	GS-01
Clay (< 0.005 mm)	8.30	0.01	0.01	% of Total	1	10/14/19 14:02	D422mod	GS-01
SE-14-0-0.33 (A9J0006-03)				Matrix: Sediment		Batch: 9100866		
Gravel (>2.00mm)	22.4	0.01	0.01	% of Total	1	10/14/19 14:02	D422mod	GS-01
Percent Retained 4.75 mm sieve (#4)	12.7	0.01	0.01	% of Total	1	10/14/19 14:02	D422mod	GS-01
Percent Retained 2.00 mm sieve (#10)	9.67	0.01	0.01	% of Total	1	10/14/19 14:02	D422mod	GS-01
Sand (0.063mm - 2.00mm)	27.3	0.01	0.01	% of Total	1	10/14/19 14:02	D422mod	GS-01
Percent Retained 0.85 mm sieve (#20)	10.4	0.01	0.01	% of Total	1	10/14/19 14:02	D422mod	GS-01
Percent Retained 0.425 mm sieve (#40)	7.32	0.01	0.01	% of Total	1	10/14/19 14:02	D422mod	GS-01
Percent Retained 0.250 mm sieve (#60)	4.86	0.01	0.01	% of Total	1	10/14/19 14:02	D422mod	GS-01
Percent Retained 0.150 mm sieve (#100)	2.62	0.01	0.01	% of Total	1	10/14/19 14:02	D422mod	GS-01
Percent Retained 0.106 mm sieve (#140)	0.94	0.01	0.01	% of Total	1	10/14/19 14:02	D422mod	GS-01
Percent Retained 0.075 mm sieve (#200)	0.78	0.01	0.01	% of Total	1	10/14/19 14:02	D422mod	GS-01
Percent Retained 0.063 mm sieve (#230)	0.34	0.01	0.01	% of Total	1	10/14/19 14:02	D422mod	GS-01
Silt (0.005mm < 0.063mm)	41.2	0.01	0.01	% of Total	1	10/14/19 14:02	D422mod	GS-01

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
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ANALYTICAL SAMPLE RESULTS

Grain Size by ASTM D 422m/PSET Parameters

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
SE-14-0-0.33 (A9J0006-03)				Matrix: Sediment		Batch: 9100866		
Clay (< 0.005 mm)	9.20	0.01	0.01	% of Total	1	10/14/19 14:02	D422mod	GS-01
SE-23-0-0.33 (A9J0006-05)				Matrix: Sediment		Batch: 9100866		
Gravel (>2.00mm)	7.85	0.01	0.01	% of Total	1	10/14/19 14:02	D422mod	GS-01
Percent Retained 4.75 mm sieve (#4)	3.99	0.01	0.01	% of Total	1	10/14/19 14:02	D422mod	GS-01
Percent Retained 2.00 mm sieve (#10)	3.86	0.01	0.01	% of Total	1	10/14/19 14:02	D422mod	GS-01
Sand (0.063mm - 2.00mm)	38.4	0.01	0.01	% of Total	1	10/14/19 14:02	D422mod	GS-01
Percent Retained 0.85 mm sieve (#20)	7.19	0.01	0.01	% of Total	1	10/14/19 14:02	D422mod	GS-01
Percent Retained 0.425 mm sieve (#40)	6.00	0.01	0.01	% of Total	1	10/14/19 14:02	D422mod	GS-01
Percent Retained 0.250 mm sieve (#60)	5.20	0.01	0.01	% of Total	1	10/14/19 14:02	D422mod	GS-01
Percent Retained 0.150 mm sieve (#100)	7.44	0.01	0.01	% of Total	1	10/14/19 14:02	D422mod	GS-01
Percent Retained 0.106 mm sieve (#140)	5.18	0.01	0.01	% of Total	1	10/14/19 14:02	D422mod	GS-01
Percent Retained 0.075 mm sieve (#200)	5.18	0.01	0.01	% of Total	1	10/14/19 14:02	D422mod	GS-01
Percent Retained 0.063 mm sieve (#230)	2.19	0.01	0.01	% of Total	1	10/14/19 14:02	D422mod	GS-01
Silt (0.005mm < 0.063mm)	39.2	0.01	0.01	% of Total	1	10/14/19 14:02	D422mod	GS-01
Clay (< 0.005 mm)	14.6	0.01	0.01	% of Total	1	10/14/19 14:02	D422mod	GS-01
SE-17-0-0.33 (A9J0006-06)				Matrix: Sediment		Batch: 9100866		
Gravel (>2.00mm)	0.55	0.01	0.01	% of Total	1	10/14/19 14:02	D422mod	GS-01
Percent Retained 4.75 mm sieve (#4)	0.31	0.01	0.01	% of Total	1	10/14/19 14:02	D422mod	GS-01
Percent Retained 2.00 mm sieve (#10)	0.24	0.01	0.01	% of Total	1	10/14/19 14:02	D422mod	GS-01
Sand (0.063mm - 2.00mm)	18.5	0.01	0.01	% of Total	1	10/14/19 14:02	D422mod	GS-01
Percent Retained 0.85 mm sieve (#20)	0.23	0.01	0.01	% of Total	1	10/14/19 14:02	D422mod	GS-01
Percent Retained 0.425 mm sieve (#40)	0.74	0.01	0.01	% of Total	1	10/14/19 14:02	D422mod	GS-01
Percent Retained 0.250 mm sieve (#60)	1.04	0.01	0.01	% of Total	1	10/14/19 14:02	D422mod	GS-01
Percent Retained 0.150 mm sieve (#100)	4.47	0.01	0.01	% of Total	1	10/14/19 14:02	D422mod	GS-01
Percent Retained 0.106 mm sieve (#140)	5.24	0.01	0.01	% of Total	1	10/14/19 14:02	D422mod	GS-01
Percent Retained 0.075 mm sieve (#200)	4.91	0.01	0.01	% of Total	1	10/14/19 14:02	D422mod	GS-01

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AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
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ANALYTICAL SAMPLE RESULTS

Grain Size by ASTM D 422m/PSET Parameters

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
SE-17-0-0.33 (A9J0006-06)				Matrix: Sediment		Batch: 9100866		
Percent Retained 0.063 mm sieve (#230)	1.84	0.01	0.01	% of Total	1	10/14/19 14:02	D422mod	GS-01
Silt (0.005mm < 0.063mm)	56.9	0.01	0.01	% of Total	1	10/14/19 14:02	D422mod	GS-01
Clay (< 0.005 mm)	24.1	0.01	0.01	% of Total	1	10/14/19 14:02	D422mod	GS-01
SE-15-0-0.33 (A9J0006-07)				Matrix: Sediment		Batch: 9100866		
Gravel (>2.00mm)	25.4	0.01	0.01	% of Total	1	10/14/19 14:02	D422mod	GS-01
Percent Retained 4.75 mm sieve (#4)	18.1	0.01	0.01	% of Total	1	10/14/19 14:02	D422mod	GS-01
Percent Retained 2.00 mm sieve (#10)	7.24	0.01	0.01	% of Total	1	10/14/19 14:02	D422mod	GS-01
Sand (0.063mm - 2.00mm)	21.0	0.01	0.01	% of Total	1	10/14/19 14:02	D422mod	GS-01
Percent Retained 0.85 mm sieve (#20)	3.17	0.01	0.01	% of Total	1	10/14/19 14:02	D422mod	GS-01
Percent Retained 0.425 mm sieve (#40)	2.86	0.01	0.01	% of Total	1	10/14/19 14:02	D422mod	GS-01
Percent Retained 0.250 mm sieve (#60)	2.51	0.01	0.01	% of Total	1	10/14/19 14:02	D422mod	GS-01
Percent Retained 0.150 mm sieve (#100)	3.83	0.01	0.01	% of Total	1	10/14/19 14:02	D422mod	GS-01
Percent Retained 0.106 mm sieve (#140)	3.28	0.01	0.01	% of Total	1	10/14/19 14:02	D422mod	GS-01
Percent Retained 0.075 mm sieve (#200)	3.69	0.01	0.01	% of Total	1	10/14/19 14:02	D422mod	GS-01
Percent Retained 0.063 mm sieve (#230)	1.64	0.01	0.01	% of Total	1	10/14/19 14:02	D422mod	GS-01
Silt (0.005mm < 0.063mm)	42.4	0.01	0.01	% of Total	1	10/14/19 14:02	D422mod	GS-01
Clay (< 0.005 mm)	11.2	0.01	0.01	% of Total	1	10/14/19 14:02	D422mod	GS-01
SE-21-0-0.33 (A9J0006-08)				Matrix: Sediment		Batch: 9101058		
Gravel (>2.00mm)	6.79	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Percent Retained 4.75 mm sieve (#4)	3.48	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Percent Retained 2.00 mm sieve (#10)	3.32	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Sand (0.063mm - 2.00mm)	46.2	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Percent Retained 0.85 mm sieve (#20)	1.48	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Percent Retained 0.425 mm sieve (#40)	2.91	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Percent Retained 0.250 mm sieve (#60)	9.30	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Percent Retained 0.150 mm sieve (#100)	19.3	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01

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AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
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ANALYTICAL SAMPLE RESULTS

Grain Size by ASTM D 422m/PSET Parameters

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
SE-21-0-0.33 (A9J0006-08)				Matrix: Sediment		Batch: 9101058		
Percent Retained 0.106 mm sieve (#140)	7.44	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Percent Retained 0.075 mm sieve (#200)	4.11	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Percent Retained 0.063 mm sieve (#230)	1.60	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Silt (0.005mm < 0.063mm)	33.5	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Clay (< 0.005 mm)	13.5	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
SE-25-0-0.33 (A9J0006-13)				Matrix: Sediment		Batch: 9101058		
Gravel (>2.00mm)	51.0	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Percent Retained 4.75 mm sieve (#4)	32.5	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Percent Retained 2.00 mm sieve (#10)	18.4	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Sand (0.063mm - 2.00mm)	33.2	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Percent Retained 0.85 mm sieve (#20)	10.2	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Percent Retained 0.425 mm sieve (#40)	11.6	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Percent Retained 0.250 mm sieve (#60)	7.11	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Percent Retained 0.150 mm sieve (#100)	2.67	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Percent Retained 0.106 mm sieve (#140)	0.83	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Percent Retained 0.075 mm sieve (#200)	0.58	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Percent Retained 0.063 mm sieve (#230)	0.23	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Silt (0.005mm < 0.063mm)	12.8	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Clay (< 0.005 mm)	3.00	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
SE-26-0-0.33 (A9J0006-16)				Matrix: Sediment		Batch: 9101058		
Gravel (>2.00mm)	35.0	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Percent Retained 4.75 mm sieve (#4)	15.6	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Percent Retained 2.00 mm sieve (#10)	19.4	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Sand (0.063mm - 2.00mm)	37.2	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Percent Retained 0.85 mm sieve (#20)	12.8	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Percent Retained 0.425 mm sieve (#40)	12.7	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01

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AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
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ANALYTICAL SAMPLE RESULTS

Grain Size by ASTM D 422m/PSET Parameters

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
SE-26-0-0.33 (A9J0006-16)				Matrix: Sediment		Batch: 9101058		
Percent Retained 0.250 mm sieve (#60)	6.73	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Percent Retained 0.150 mm sieve (#100)	2.96	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Percent Retained 0.106 mm sieve (#140)	0.94	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Percent Retained 0.075 mm sieve (#200)	0.76	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Percent Retained 0.063 mm sieve (#230)	0.31	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Silt (0.005mm < 0.063mm)	20.7	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Clay (< 0.005 mm)	7.10	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
SE-18-0-0.33 (A9J0006-18)				Matrix: Sediment		Batch: 9101058		
Gravel (>2.00mm)	0.02	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Percent Retained 4.75 mm sieve (#4)	ND	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Percent Retained 2.00 mm sieve (#10)	0.02	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Sand (0.063mm - 2.00mm)	38.8	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Percent Retained 0.85 mm sieve (#20)	0.10	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Percent Retained 0.425 mm sieve (#40)	0.81	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Percent Retained 0.250 mm sieve (#60)	4.50	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Percent Retained 0.150 mm sieve (#100)	19.3	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Percent Retained 0.106 mm sieve (#140)	7.84	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Percent Retained 0.075 mm sieve (#200)	4.25	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Percent Retained 0.063 mm sieve (#230)	1.93	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Silt (0.005mm < 0.063mm)	43.8	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Clay (< 0.005 mm)	17.4	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
SE-31-0-0.33 (A9J0006-20)				Matrix: Sediment		Batch: 9101058		
Gravel (>2.00mm)	2.99	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Percent Retained 4.75 mm sieve (#4)	1.41	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Percent Retained 2.00 mm sieve (#10)	1.57	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Sand (0.063mm - 2.00mm)	44.4	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01

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AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
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ANALYTICAL SAMPLE RESULTS

Grain Size by ASTM D 422m/PSET Parameters

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
SE-31-0-0.33 (A9J0006-20)				Matrix: Sediment		Batch: 9101058		
Percent Retained 0.85 mm sieve (#20)	1.24	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Percent Retained 0.425 mm sieve (#40)	1.72	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Percent Retained 0.250 mm sieve (#60)	4.53	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Percent Retained 0.150 mm sieve (#100)	21.4	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Percent Retained 0.106 mm sieve (#140)	8.77	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Percent Retained 0.075 mm sieve (#200)	5.05	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Percent Retained 0.063 mm sieve (#230)	1.76	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Silt (0.005mm < 0.063mm)	36.6	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Clay (< 0.005 mm)	15.9	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
SE-16-0-0.33 (A9J0006-21)				Matrix: Sediment		Batch: 9101058		
Gravel (>2.00mm)	0.39	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Percent Retained 4.75 mm sieve (#4)	0.34	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Percent Retained 2.00 mm sieve (#10)	0.04	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Sand (0.063mm - 2.00mm)	41.8	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Percent Retained 0.85 mm sieve (#20)	0.08	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Percent Retained 0.425 mm sieve (#40)	0.59	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Percent Retained 0.250 mm sieve (#60)	1.47	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Percent Retained 0.150 mm sieve (#100)	13.6	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Percent Retained 0.106 mm sieve (#140)	13.2	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Percent Retained 0.075 mm sieve (#200)	9.08	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Percent Retained 0.063 mm sieve (#230)	3.70	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Silt (0.005mm < 0.063mm)	42.4	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Clay (< 0.005 mm)	15.4	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
SE-22-0-0.33 (A9J0006-23)				Matrix: Sediment		Batch: 9101058		
Gravel (>2.00mm)	16.8	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Percent Retained 4.75 mm sieve (#4)	13.6	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
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ANALYTICAL SAMPLE RESULTS

Grain Size by ASTM D 422m/PSET Parameters

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
SE-22-0-0.33 (A9J0006-23)				Matrix: Sediment		Batch: 9101058		
Percent Retained 2.00 mm sieve (#10)	3.19	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Sand (0.063mm - 2.00mm)	13.6	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Percent Retained 0.85 mm sieve (#20)	2.18	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Percent Retained 0.425 mm sieve (#40)	4.25	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Percent Retained 0.250 mm sieve (#60)	2.58	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Percent Retained 0.150 mm sieve (#100)	2.04	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Percent Retained 0.106 mm sieve (#140)	1.00	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Percent Retained 0.075 mm sieve (#200)	1.08	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Percent Retained 0.063 mm sieve (#230)	0.49	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Silt (0.005mm < 0.063mm)	49.2	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Clay (< 0.005 mm)	20.4	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
SE-27-0-0.33 (A9J0006-24)				Matrix: Sediment		Batch: 9101058		
Gravel (>2.00mm)	17.7	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Percent Retained 4.75 mm sieve (#4)	16.5	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Percent Retained 2.00 mm sieve (#10)	1.20	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Sand (0.063mm - 2.00mm)	15.8	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Percent Retained 0.85 mm sieve (#20)	0.54	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Percent Retained 0.425 mm sieve (#40)	1.97	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Percent Retained 0.250 mm sieve (#60)	2.16	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Percent Retained 0.150 mm sieve (#100)	2.79	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Percent Retained 0.106 mm sieve (#140)	2.82	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Percent Retained 0.075 mm sieve (#200)	3.52	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Percent Retained 0.063 mm sieve (#230)	1.98	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Silt (0.005mm < 0.063mm)	51.8	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Clay (< 0.005 mm)	14.7	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
SE-27-0-0.33-Dup (A9J0006-25)				Matrix: Sediment		Batch: 9101058		

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
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ANALYTICAL SAMPLE RESULTS

Grain Size by ASTM D 422m/PSET Parameters

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
SE-27-0-0.33-Dup (A9J0006-25)				Matrix: Sediment		Batch: 9101058		
Gravel (>2.00mm)	8.57	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Percent Retained 4.75 mm sieve (#4)	7.58	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Percent Retained 2.00 mm sieve (#10)	0.99	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Sand (0.063mm - 2.00mm)	17.3	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Percent Retained 0.85 mm sieve (#20)	0.60	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Percent Retained 0.425 mm sieve (#40)	2.19	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Percent Retained 0.250 mm sieve (#60)	2.31	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Percent Retained 0.150 mm sieve (#100)	3.03	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Percent Retained 0.106 mm sieve (#140)	3.14	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Percent Retained 0.075 mm sieve (#200)	3.93	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Percent Retained 0.063 mm sieve (#230)	2.08	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Silt (0.005mm < 0.063mm)	53.0	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01
Clay (< 0.005 mm)	21.2	0.01	0.01	% of Total	1	10/21/19 13:59	D422mod	GS-01



AMENDED REPORT

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ANALYTICAL SAMPLE RESULTS

Percent Dry Weight									
Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes	
SE-24-0-0.33 (A9J0006-01)				Matrix: Sediment		Batch: 9100520			
% Solids	35.5	1.00	1.00	%	1	10/02/19 12:42	EPA 8000C		
SE-14-0-0.33 (A9J0006-03)				Matrix: Sediment		Batch: 9100520			
% Solids	34.8	1.00	1.00	%	1	10/02/19 12:42	EPA 8000C		
SE-23-0-0.33 (A9J0006-05)				Matrix: Sediment		Batch: 9100520			
% Solids	45.4	1.00	1.00	%	1	10/02/19 12:42	EPA 8000C		
SE-17-0-0.33 (A9J0006-06)				Matrix: Sediment		Batch: 9100520			
% Solids	43.3	1.00	1.00	%	1	10/02/19 12:42	EPA 8000C		
SE-15-0-0.33 (A9J0006-07)				Matrix: Sediment		Batch: 9100520			
% Solids	43.4	1.00	1.00	%	1	10/02/19 12:42	EPA 8000C		
SE-21-0-0.33 (A9J0006-08)				Matrix: Sediment		Batch: 9100520			
% Solids	59.4	1.00	1.00	%	1	10/02/19 12:42	EPA 8000C		
SE-25-0-0.33 (A9J0006-13)				Matrix: Sediment		Batch: 9100571			
% Solids	40.6	1.00	1.00	%	1	10/03/19 12:11	EPA 8000C		
SE-28-0-0.33 (A9J0006-14)				Matrix: Sediment		Batch: 9100571			
% Solids	36.0	1.00	1.00	%	1	10/03/19 12:11	EPA 8000C		
SE-26-0-0.33 (A9J0006-16)				Matrix: Sediment		Batch: 9100571			
% Solids	42.4	1.00	1.00	%	1	10/03/19 12:11	EPA 8000C		
SE-18-0-0.33 (A9J0006-18)				Matrix: Sediment		Batch: 9100571			
% Solids	46.3	1.00	1.00	%	1	10/03/19 12:11	EPA 8000C		
SE-31-0-0.33 (A9J0006-20)				Matrix: Sediment		Batch: 9100571			
% Solids	48.8	1.00	1.00	%	1	10/03/19 12:11	EPA 8000C		
SE-16-0-0.33 (A9J0006-21)				Matrix: Sediment		Batch: 9100630			
% Solids	52.9	1.00	1.00	%	1	10/07/19 11:30	EPA 8000C		
SE-19-0-0.33 (A9J0006-22)				Matrix: Sediment		Batch: 9100630			

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AMENDED REPORT

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ANALYTICAL SAMPLE RESULTS

Percent Dry Weight									
Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes	
SE-19-0-0.33 (A9J0006-22)				Matrix: Sediment		Batch: 9100630			
% Solids	41.5	1.00	1.00	%	1	10/07/19 11:30	EPA 8000C		
SE-22-0-0.33 (A9J0006-23)				Matrix: Sediment		Batch: 9100630			
% Solids	33.4	1.00	1.00	%	1	10/07/19 11:30	EPA 8000C		
SE-27-0-0.33 (A9J0006-24)				Matrix: Sediment		Batch: 9100630			
% Solids	39.4	1.00	1.00	%	1	10/07/19 11:30	EPA 8000C		
SE-27-0-0.33-Dup (A9J0006-25)				Matrix: Sediment		Batch: 9100630			
% Solids	38.3	1.00	1.00	%	1	10/07/19 11:30	EPA 8000C		
SE-17-0-0.33---Air Dried (A9J0006-27)				Matrix: Sediment		Batch: 9101585			
% Solids	94.5	1.00	1.00	%	1	10/28/19 07:41	EPA 8000C		
SE-18-0-0.33---Air Dried (A9J0006-28)				Matrix: Sediment		Batch: 9101585			
% Solids	95.7	1.00	1.00	%	1	10/28/19 07:41	EPA 8000C		
SE-16-0-0.33---Air Dried (A9J0006-29)				Matrix: Sediment		Batch: 9101585			
% Solids	96.3	1.00	1.00	%	1	10/28/19 07:41	EPA 8000C		
SE-22-0-0.33---Air Dried (A9J0006-30)				Matrix: Sediment		Batch: 9101585			
% Solids	94.1	1.00	1.00	%	1	10/28/19 07:41	EPA 8000C		
SE-27-0-0.33---Air Dried (A9J0006-31)				Matrix: Sediment		Batch: 9101585			
% Solids	95.1	1.00	1.00	%	1	10/28/19 07:41	EPA 8000C		
SE-27-0-0.33-Dup---Air Dried (A9J0006-32)				Matrix: Sediment		Batch: 9101585			
% Solids	95.1	1.00	1.00	%	1	10/28/19 07:41	EPA 8000C		



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
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Analytical Resources, Inc.

ANALYTICAL SAMPLE RESULTS (Subcontracted)

Metals and Metallic Compounds

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
SE-24-0-0.33 (A9J0006-01)				Matrix: Sediment		Batch: BHJ0445		
Batch: BHJ0445								
Mercury	0.111	0.0123	0.0587	mg/kg dry	1	10/15/19 16:27	EPA 7471B	
SE-14-0-0.33 (A9J0006-03)				Matrix: Sediment		Batch: BHJ0445		
Batch: BHJ0445								
Mercury	0.0882	0.0157	0.0747	mg/kg dry	1	10/15/19 16:29	EPA 7471B	
SE-23-0-0.33 (A9J0006-05)				Matrix: Sediment		Batch: BHJ0445		
Batch: BHJ0445								
Mercury	0.0928	0.0101	0.0482	mg/kg dry	1	10/15/19 16:32	EPA 7471B	
SE-17-0-0.33 (A9J0006-06)				Matrix: Sediment		Batch: BHJ0445		
Batch: BHJ0445								
Mercury	0.0450	0.0114	0.0542	mg/kg dry	1	10/15/19 16:34	EPA 7471B	J
SE-15-0-0.33 (A9J0006-07)				Matrix: Sediment		Batch: BHJ0445		
Batch: BHJ0445								
Mercury	0.0402	0.00865	0.0412	mg/kg dry	1	10/15/19 16:41	EPA 7471B	J
SE-21-0-0.33 (A9J0006-08)				Matrix: Sediment		Batch: BHJ0445		
Batch: BHJ0445								
Mercury	0.0385	0.00970	0.0462	mg/kg dry	1	10/15/19 16:43	EPA 7471B	J
SE-25-0-0.33 (A9J0006-13)				Matrix: Sediment		Batch: BHJ0445		
Batch: BHJ0445								
Mercury	0.103	0.0122	0.0583	mg/kg dry	1	10/15/19 16:46	EPA 7471B	
SE-28-0-0.33 (A9J0006-14)				Matrix: Sediment		Batch: BHJ0445		
Batch: BHJ0445								
Mercury	0.0827	0.0112	0.0534	mg/kg dry	1	10/15/19 16:48	EPA 7471B	
SE-26-0-0.33 (A9J0006-16)				Matrix: Sediment		Batch: BHJ0445		
Batch: BHJ0445								
Mercury	0.104	0.00840	0.0400	mg/kg dry	1	10/15/19 16:50	EPA 7471B	

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AMENDED REPORT

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Analytical Resources, Inc.

ANALYTICAL SAMPLE RESULTS (Subcontracted)

Metals and Metallic Compounds

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
SE-18-0-0.33 (A9J0006-18)			Matrix: Sediment		Batch: BHJ0445			
Batch: BHJ0445								
Mercury	0.0386	0.00958	0.0456	mg/kg dry	1	10/15/19 16:52	EPA 7471B	J
SE-31-0-0.33 (A9J0006-20)			Matrix: Sediment		Batch: BHJ0445			
Batch: BHJ0445								
Mercury	0.0443	0.00953	0.0454	mg/kg dry	1	10/15/19 16:55	EPA 7471B	J
SE-16-0-0.33 (A9J0006-21)			Matrix: Sediment		Batch: BHJ0445			
Batch: BHJ0445								
Mercury	0.0244	0.00901	0.0429	mg/kg dry	1	10/15/19 16:57	EPA 7471B	J
SE-19-0-0.33 (A9J0006-22)			Matrix: Sediment		Batch: BHJ0445			
Batch: BHJ0445								
Mercury	0.0379	0.0119	0.0569	mg/kg dry	1	10/15/19 16:59	EPA 7471B	J
SE-22-0-0.33 (A9J0006-23)			Matrix: Sediment		Batch: BHJ0445			
Batch: BHJ0445								
Mercury	0.0528	0.0150	0.0713	mg/kg dry	1	10/15/19 17:02	EPA 7471B	J
SE-27-0-0.33 (A9J0006-24)			Matrix: Sediment		Batch: BHJ0445			
Batch: BHJ0445								
Mercury	0.0366	0.0129	0.0617	mg/kg dry	1	10/15/19 17:09	EPA 7471B	J
SE-27-0-0.33-Dup (A9J0006-25)			Matrix: Sediment		Batch: BHJ0445			
Batch: BHJ0445								
Mercury	0.0593	0.00941	0.0448	mg/kg dry	1	10/15/19 17:11	EPA 7471B	

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AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
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Analytical Resources, Inc.

ANALYTICAL SAMPLE RESULTS (Subcontracted)

Wet Chemistry

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
SE-24-0-0.33 (A9J0006-01)				Matrix: Sediment		Batch: BHJ0088		
Batch: BHJ0088								
Total Solids, Sulfide	32.53	0.04	0.04	%	1	10/02/19 23:02	PSEP 1986	
Batch: BHJ0091								
Sulfide	281	30.2	30.2	mg/kg dry	10	10/04/19 15:29	SM 4500-S2 D-00	D
SE-14-0-0.33 (A9J0006-03)				Matrix: Sediment		Batch: BHJ0088		
Batch: BHJ0088								
Total Solids, Sulfide	40.73	0.04	0.04	%	1	10/02/19 23:02	PSEP 1986	
Batch: BHJ0091								
Sulfide	409	23.5	23.5	mg/kg dry	10	10/04/19 15:31	SM 4500-S2 D-00	D
SE-23-0-0.33 (A9J0006-05)				Matrix: Sediment		Batch: BHJ0088		
Batch: BHJ0088								
Total Solids, Sulfide	43.73	0.04	0.04	%	1	10/02/19 23:02	PSEP 1986	
Batch: BHJ0091								
Sulfide	856	42.9	42.9	mg/kg dry	20	10/04/19 15:32	SM 4500-S2 D-00	D
SE-17-0-0.33 (A9J0006-06)				Matrix: Sediment		Batch: BHJ0088		
Batch: BHJ0088								
Total Solids, Sulfide	41.21	0.04	0.04	%	1	10/02/19 23:02	PSEP 1986	
Batch: BHJ0091								
Sulfide	20.0	2.40	2.40	mg/kg dry	1	10/04/19 15:32	SM 4500-S2 D-00	
SE-15-0-0.33 (A9J0006-07)				Matrix: Sediment		Batch: BHJ0088		
Batch: BHJ0088								
Total Solids, Sulfide	42.19	0.04	0.04	%	1	10/02/19 23:02	PSEP 1986	
Batch: BHJ0091								
Sulfide	191	21.3	21.3	mg/kg dry	10	10/04/19 15:33	SM 4500-S2 D-00	D
SE-21-0-0.33 (A9J0006-08)				Matrix: Sediment		Batch: BHJ0088		
Batch: BHJ0088								
Total Solids, Sulfide	49.94	0.04	0.04	%	1	10/02/19 23:02	PSEP 1986	
Batch: BHJ0091								
Sulfide	359	19.5	19.5	mg/kg dry	10	10/04/19 15:34	SM 4500-S2 D-00	D

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
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Analytical Resources, Inc.

ANALYTICAL SAMPLE RESULTS (Subcontracted)

Wet Chemistry

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
SE-25-0-0.33 (A9J0006-13)			Matrix: Sediment		Batch: BHJ0088			
Batch: BHJ0088								
Total Solids, Sulfide	38.25	0.04	0.04	%	1	10/02/19 23:02	PSEP 1986	
Batch: BHJ0091								
Sulfide	267	48.6	48.6	mg/kg dry	20	10/04/19 15:34	SM 4500-S2 D-00	D
SE-28-0-0.33 (A9J0006-14)			Matrix: Sediment		Batch: BHJ0088			
Batch: BHJ0088								
Total Solids, Sulfide	32.33	0.04	0.04	%	1	10/02/19 23:02	PSEP 1986	
Batch: BHJ0091								
Sulfide	22.7	2.91	2.91	mg/kg dry	1	10/04/19 15:34	SM 4500-S2 D-00	
SE-26-0-0.33 (A9J0006-16)			Matrix: Sediment		Batch: BHJ0088			
Batch: BHJ0088								
Total Solids, Sulfide	27.04	0.04	0.04	%	1	10/02/19 23:02	PSEP 1986	
Batch: BHJ0091								
Sulfide	ND	3.21	3.21	mg/kg dry	1	10/04/19 15:35	SM 4500-S2 D-00	U
SE-18-0-0.33 (A9J0006-18)			Matrix: Sediment		Batch: BHJ0088			
Batch: BHJ0088								
Total Solids, Sulfide	45.90	0.04	0.04	%	1	10/02/19 23:02	PSEP 1986	
Batch: BHJ0091								
Sulfide	691	40.5	40.5	mg/kg dry	20	10/04/19 15:35	SM 4500-S2 D-00	D
SE-31-0-0.33 (A9J0006-20)			Matrix: Sediment		Batch: BHJ0088			
Batch: BHJ0088								
Total Solids, Sulfide	44.45	0.04	0.04	%	1	10/02/19 23:02	PSEP 1986	
Batch: BHJ0124								
Sulfide	397	98.2	98.2	mg/kg dry	50	10/04/19 15:36	SM 4500-S2 D-00	D
SE-16-0-0.33 (A9J0006-21)			Matrix: Sediment		Batch: BHJ0088			
Batch: BHJ0088								
Total Solids, Sulfide	49.51	0.04	0.04	%	1	10/02/19 23:02	PSEP 1986	
Batch: BHJ0124								

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AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
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Analytical Resources, Inc.

ANALYTICAL SAMPLE RESULTS (Subcontracted)

Wet Chemistry

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
SE-16-0-0.33 (A9J0006-21)				Matrix: Sediment		Batch: BHJ0124		
Sulfide	469	94.8	94.8	mg/kg dry	50	10/04/19 15:40	SM 4500-S2 D-00	D
SE-19-0-0.33 (A9J0006-22)				Matrix: Sediment		Batch: BHJ0088		
Batch: BHJ0088								
Total Solids, Sulfide	41.41	0.04	0.04	%	1	10/02/19 23:02	PSEP 1986	
Batch: BHJ0124								
Sulfide	924	120	120	mg/kg dry	50	10/04/19 15:42	SM 4500-S2 D-00	D
SE-22-0-0.33 (A9J0006-23)				Matrix: Sediment		Batch: BHJ0088		
Batch: BHJ0088								
Total Solids, Sulfide	30.05	0.04	0.04	%	1	10/02/19 23:02	PSEP 1986	
Batch: BHJ0124								
Sulfide	937	149	149	mg/kg dry	50	10/04/19 15:42	SM 4500-S2 D-00	D
SE-27-0-0.33 (A9J0006-24)				Matrix: Sediment		Batch: BHJ0088		
Batch: BHJ0088								
Total Solids, Sulfide	38.16	0.04	0.04	%	1	10/02/19 23:02	PSEP 1986	
Batch: BHJ0124								
Sulfide	394	127	127	mg/kg dry	50	10/04/19 15:42	SM 4500-S2 D-00	D
SE-27-0-0.33-Dup (A9J0006-25)				Matrix: Sediment		Batch: BHJ0088		
Batch: BHJ0088								
Total Solids, Sulfide	39.49	0.04	0.04	%	1	10/02/19 23:02	PSEP 1986	
Batch: BHJ0124								
Sulfide	396	48.4	48.4	mg/kg dry	20	10/04/19 15:43	SM 4500-S2 D-00	D



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tideland Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
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Analytical Resources, Inc.

ANALYTICAL SAMPLE RESULTS (Subcontracted)

Wet Chemistry

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
SE-24-0-0.33 (Porewater) (A9J0006-02)				Matrix: Water		Batch: BHJ0145		
Batch: BHJ0145								
Sulfide	0.098	0.050	0.050	mg/L	1	10/04/19 14:50	SM 4500-S2 D-00	
SE-14-0-0.33 (Porewater) (A9J0006-04)				Matrix: Water		Batch: BHJ0145		
Batch: BHJ0145								
Sulfide	0.126	0.050	0.050	mg/L	1	10/04/19 14:52	SM 4500-S2 D-00	
SE-28-0-0.33 (Porewater) (A9J0006-15)				Matrix: Water		Batch: BHJ0145		
Batch: BHJ0145								
Sulfide	0.062	0.050	0.050	mg/L	1	10/04/19 14:52	SM 4500-S2 D-00	
SE-26-0-0.33 (Porewater) (A9J0006-17)				Matrix: Water		Batch: BHJ0145		
Batch: BHJ0145								
Sulfide	0.115	0.050	0.050	mg/L	1	10/04/19 14:54	SM 4500-S2 D-00	
SE-18-0-0.33 (Porewater) (A9J0006-19)				Matrix: Water		Batch: BHJ0145		
Batch: BHJ0145								
Sulfide	ND	0.050	0.050	mg/L	1	10/04/19 14:55	SM 4500-S2 D-00	U
SE-16-0-0.33 (Porewater) (A9J0006-26)				Matrix: Water		Batch: BHJ0145		
Batch: BHJ0145								
Sulfide	ND	0.050	0.050	mg/L	1	10/04/19 14:55	SM 4500-S2 D-00	U



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QUALITY CONTROL (QC) SAMPLE RESULTS

Diesel and/or Oil Hydrocarbons by NWTPH-Dx with Acid/Silica Gel Cleanup

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9101200 - EPA 3546 w/SG+Acid (NWTPH)												
Sediment												
Blank (9101200-BLK1)												
Prepared: 10/03/19 13:22						Analyzed: 10/16/19 22:42						
<u>NWTPH-Dx/SG</u>												
Diesel	ND	9.09	25.0	mg/kg wet	1	---	---	---	---	---	---	
Oil	ND	18.2	50.0	mg/kg wet	1	---	---	---	---	---	---	
Surr: o-Terphenyl (Surr)		Recovery: 93 %		Limits: 50-150 %		Dilution: 1x						
LCS (9101200-BS1)												
Prepared: 10/03/19 13:22						Analyzed: 10/16/19 23:05						
<u>NWTPH-Dx/SG</u>												
Diesel	112	10.0	25.0	mg/kg wet	1	125	---	90	76-115%	---	---	
Surr: o-Terphenyl (Surr)		Recovery: 96 %		Limits: 50-150 %		Dilution: 1x						
Duplicate (9101200-DUP1)												
Prepared: 10/03/19 13:22						Analyzed: 10/16/19 23:53						
<u>QC Source Sample: Non-SDG (A9I0893-08)</u>												
Diesel	ND	26.6	53.2	mg/kg dry	1	---	ND	---	---	---	30%	
Oil	786	53.2	106	mg/kg dry	1	---	610	---	---	25	30%	
Surr: o-Terphenyl (Surr)		Recovery: 86 %		Limits: 50-150 %		Dilution: 1x						
Duplicate (9101200-DUP2)												
Prepared: 10/03/19 13:22						Analyzed: 10/17/19 08:59						
<u>QC Source Sample: SE-27-0-0.33-Dup (A9J0006-25)</u>												
Diesel	ND	26.0	52.0	mg/kg dry	1	---	ND	---	---	---	30%	
Oil	86.0	52.0	104	mg/kg dry	1	---	72.2	---	---	17	30%	Ja
Surr: o-Terphenyl (Surr)		Recovery: 95 %		Limits: 50-150 %		Dilution: 1x						
Matrix Spike (9101200-MS1)												
Prepared: 10/03/19 13:22						Analyzed: 10/17/19 00:41						
<u>QC Source Sample: Non-SDG (A9I0893-13)</u>												
<u>NWTPH-Dx/SG</u>												
Diesel	447	25.7	51.5	mg/kg dry	1	322	ND	139	50-150%	---	---	
Surr: o-Terphenyl (Surr)		Recovery: 96 %		Limits: 50-150 %		Dilution: 1x						
Matrix Spike Dup (9101200-MSD1)												
Prepared: 10/03/19 13:22						Analyzed: 10/17/19 01:04						
<u>QC Source Sample: Non-SDG (A9I0893-13)</u>												
Diesel	376	25.8	51.5	mg/kg dry	1	322	ND	117	50-150%	17	50%	
Surr: o-Terphenyl (Surr)		Recovery: 91 %		Limits: 50-150 %		Dilution: 1x						

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Philip Nerenberg, Lab Director



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AMENDED REPORT

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QUALITY CONTROL (QC) SAMPLE RESULTS

Diesel and/or Oil Hydrocarbons by NWTPH-Dx with Acid/Silica Gel Cleanup

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9101200 - EPA 3546 w/SG+Acid (NWTPH)							Sediment					

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QUALITY CONTROL (QC) SAMPLE RESULTS

Gasoline Range Hydrocarbons (Benzene through Naphthalene) by NWTPH-Gx

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Soil												
Batch 9100478 - EPA 5035A												
Blank (9100478-BLK1) Prepared: 10/01/19 10:00 Analyzed: 10/01/19 11:59												
<u>NWTPH-Gx (MS)</u>												
Gasoline Range Organics	ND	1.67	3.33	mg/kg wet	50	---	---	---	---	---	---	
Surr: 4-Bromofluorobenzene (Sur)		Recovery: 96 %	Limits: 50-150 %			Dilution: 1x						
1,4-Difluorobenzene (Sur)		96 %	50-150 %			"						
LCS (9100478-BS2) Prepared: 10/01/19 10:00 Analyzed: 10/01/19 11:32												
<u>NWTPH-Gx (MS)</u>												
Gasoline Range Organics	25.7	2.50	5.00	mg/kg wet	50	25.0	---	103	80-120%	---	---	
Surr: 4-Bromofluorobenzene (Sur)		Recovery: 98 %	Limits: 50-150 %			Dilution: 1x						
1,4-Difluorobenzene (Sur)		98 %	50-150 %			"						
Duplicate (9100478-DUP1) Prepared: 09/30/19 11:52 Analyzed: 10/01/19 15:15												
<u>QC Source Sample: Non-SDG (A9J0015-01)</u>												
Gasoline Range Organics	ND	2.34	4.68	mg/kg dry	50	---	ND	---	---	---	30%	
Surr: 4-Bromofluorobenzene (Sur)		Recovery: 106 %	Limits: 50-150 %			Dilution: 1x						
1,4-Difluorobenzene (Sur)		101 %	50-150 %			"						
Duplicate (9100478-DUP2) Prepared: 09/27/19 11:54 Analyzed: 10/01/19 22:03												
<u>QC Source Sample: SE-18-0-0.33 (A9J0006-18)</u>												
<u>NWTPH-Gx (MS)</u>												
Gasoline Range Organics	ND	8.90	17.8	mg/kg dry	50	---	ND	---	---	---	30%	
Surr: 4-Bromofluorobenzene (Sur)		Recovery: 97 %	Limits: 50-150 %			Dilution: 1x						
1,4-Difluorobenzene (Sur)		91 %	50-150 %			"						

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AMENDED REPORT

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QUALITY CONTROL (QC) SAMPLE RESULTS

Gasoline Range Hydrocarbons (Benzene through Naphthalene) by NWTPH-Gx

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Soil												
Batch 9100509 - EPA 5035A												
Blank (9100509-BLK1) Prepared: 10/01/19 15:40 Analyzed: 10/01/19 17:01												
<u>NWTPH-Gx (MS)</u>												
Gasoline Range Organics	ND	1.67	3.33	mg/kg wet	50	---	---	---	---	---	---	
Surr: 4-Bromofluorobenzene (Sur)		Recovery: 104 %	Limits: 50-150 %			Dilution: 1x						
1,4-Difluorobenzene (Sur)		92 %	50-150 %			"						
LCS (9100509-BS2) Prepared: 10/01/19 15:40 Analyzed: 10/01/19 16:34												
<u>NWTPH-Gx (MS)</u>												
Gasoline Range Organics	23.0	2.50	5.00	mg/kg wet	50	25.0	---	92	80-120%	---	---	
Surr: 4-Bromofluorobenzene (Sur)		Recovery: 105 %	Limits: 50-150 %			Dilution: 1x						
1,4-Difluorobenzene (Sur)		96 %	50-150 %			"						
Duplicate (9100509-DUP1) Prepared: 09/27/19 19:30 Analyzed: 10/01/19 18:49												
<u>QC Source Sample: SE-22-0-0.33 (A9J0006-23)</u>												
<u>NWTPH-Gx (MS)</u>												
Gasoline Range Organics	ND	14.8	29.7	mg/kg dry	50	---	ND	---	---	---	30%	
Surr: 4-Bromofluorobenzene (Sur)		Recovery: 110 %	Limits: 50-150 %			Dilution: 1x						
1,4-Difluorobenzene (Sur)		94 %	50-150 %			"						
Duplicate (9100509-DUP2) Prepared: 09/27/19 07:55 Analyzed: 10/02/19 02:30												
<u>QC Source Sample: Non-SDG (A9J0020-07)</u>												
Gasoline Range Organics	119	3.65	7.31	mg/kg dry	50	---	166	---	---	33	30%	Q-04
Surr: 4-Bromofluorobenzene (Sur)		Recovery: 122 %	Limits: 50-150 %			Dilution: 1x						
1,4-Difluorobenzene (Sur)		98 %	50-150 %			"						

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AMENDED REPORT

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QUALITY CONTROL (QC) SAMPLE RESULTS

Gasoline Range Hydrocarbons (Benzene through Naphthalene) by NWTPH-Gx

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100546 - EPA 5035A												
Soil												
Blank (9100546-BLK1) Prepared: 10/02/19 10:42 Analyzed: 10/02/19 12:58												
<u>NWTPH-Gx (MS)</u>												
Gasoline Range Organics	ND	1.67	3.33	mg/kg wet	50	---	---	---	---	---	---	
Surr: 4-Bromofluorobenzene (Sur)		Recovery: 97 %	Limits: 50-150 %			Dilution: 1x						
1,4-Difluorobenzene (Sur)		97 %	50-150 %			"						
LCS (9100546-BS2) Prepared: 10/02/19 10:42 Analyzed: 10/02/19 12:30												
<u>NWTPH-Gx (MS)</u>												
Gasoline Range Organics	24.2	2.50	5.00	mg/kg wet	50	25.0	---	97	80-120%	---	---	
Surr: 4-Bromofluorobenzene (Sur)		Recovery: 98 %	Limits: 50-150 %			Dilution: 1x						
1,4-Difluorobenzene (Sur)		98 %	50-150 %			"						
Duplicate (9100546-DUP1) Prepared: 09/26/19 14:40 Analyzed: 10/02/19 14:46												
<u>QC Source Sample: Non-SDG (A9J0042-03)</u>												
Gasoline Range Organics	ND	3.32	6.65	mg/kg dry	50	---	ND	---	---	---	30%	
Surr: 4-Bromofluorobenzene (Sur)		Recovery: 110 %	Limits: 50-150 %			Dilution: 1x						
1,4-Difluorobenzene (Sur)		101 %	50-150 %			"						



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QUALITY CONTROL (QC) SAMPLE RESULTS

Polychlorinated Biphenyls by EPA 8082A

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100667 - EPA 3546												
Sediment												
Blank (9100667-BLK1)												
Prepared: 10/04/19 10:52 Analyzed: 10/07/19 12:14 C-07												
<u>EPA 8082A</u>												
Aroclor 1016	ND	1.82	3.64	ug/kg wet	1	---	---	---	---	---	---	
Aroclor 1221	ND	1.82	3.64	ug/kg wet	1	---	---	---	---	---	---	
Aroclor 1232	ND	1.82	3.64	ug/kg wet	1	---	---	---	---	---	---	
Aroclor 1242	ND	1.82	3.64	ug/kg wet	1	---	---	---	---	---	---	
Aroclor 1248	ND	1.82	3.64	ug/kg wet	1	---	---	---	---	---	---	
Aroclor 1254	ND	1.82	3.64	ug/kg wet	1	---	---	---	---	---	---	
Aroclor 1260	ND	1.82	3.64	ug/kg wet	1	---	---	---	---	---	---	
Surr: Decachlorobiphenyl (Surr) Recovery: 94 % Limits: 60-125 % Dilution: 1x												
LCS (9100667-BS1)												
Prepared: 10/04/19 10:52 Analyzed: 10/07/19 12:32 C-07												
<u>EPA 8082A</u>												
Aroclor 1016	154	2.00	4.00	ug/kg wet	1	250	---	62	47-134%	---	---	
Aroclor 1260	203	2.00	4.00	ug/kg wet	1	250	---	81	53-140%	---	---	
Surr: Decachlorobiphenyl (Surr) Recovery: 97 % Limits: 60-125 % Dilution: 1x												
Duplicate (9100667-DUP1)												
Prepared: 10/04/19 10:52 Analyzed: 10/07/19 13:07 C-07												
<u>QC Source Sample: SE-24-0-0.33 (A9J0006-01)</u>												
<u>EPA 8082A</u>												
Aroclor 1016	ND	5.62	11.2	ug/kg dry	1	---	ND	---	---	---	30%	
Aroclor 1221	ND	5.62	11.2	ug/kg dry	1	---	ND	---	---	---	30%	
Aroclor 1232	ND	5.62	11.2	ug/kg dry	1	---	ND	---	---	---	30%	
Aroclor 1242	ND	5.62	11.2	ug/kg dry	1	---	ND	---	---	---	30%	
Aroclor 1248	ND	5.62	11.2	ug/kg dry	1	---	ND	---	---	---	30%	
Aroclor 1254	ND	5.62	11.2	ug/kg dry	1	---	ND	---	---	---	30%	
Aroclor 1260	35.0	5.62	11.2	ug/kg dry	1	---	42.4	---	---	19	30%	
Surr: Decachlorobiphenyl (Surr) Recovery: 84 % Limits: 60-125 % Dilution: 1x												
Matrix Spike (9100667-MS1)												
Prepared: 10/04/19 10:52 Analyzed: 10/07/19 17:08 C-07												
<u>QC Source Sample: SE-27-0-0.33-Dup (A9J0006-25)</u>												
Aroclor 1016	294	5.07	10.1	ug/kg dry	1	634	ND	46	47-134%	---	---	Q-01
Aroclor 1260	374	5.07	10.1	ug/kg dry	1	634	ND	59	53-140%	---	---	
Surr: Decachlorobiphenyl (Surr) Recovery: 65 % Limits: 60-125 % Dilution: 1x												

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AMENDED REPORT

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QUALITY CONTROL (QC) SAMPLE RESULTS

Polychlorinated Biphenyls by EPA 8082A

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100667 - EPA 3546							Sediment					

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QUALITY CONTROL (QC) SAMPLE RESULTS

Polychlorinated Biphenyls by EPA 8082A

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9101592 - EPA 3546												
Sediment												
Blank (9101592-BLK1) Prepared: 10/25/19 10:03 Analyzed: 10/28/19 09:24 C-07												
<u>EPA 8082A</u>												
Aroclor 1016	ND	1.82	3.64	ug/kg wet	1	---	---	---	---	---	---	
Aroclor 1221	ND	1.82	3.64	ug/kg wet	1	---	---	---	---	---	---	
Aroclor 1232	ND	1.82	3.64	ug/kg wet	1	---	---	---	---	---	---	
Aroclor 1242	ND	1.82	3.64	ug/kg wet	1	---	---	---	---	---	---	
Aroclor 1248	ND	1.82	3.64	ug/kg wet	1	---	---	---	---	---	---	
Aroclor 1254	ND	1.82	3.64	ug/kg wet	1	---	---	---	---	---	---	
Aroclor 1260	ND	1.82	3.64	ug/kg wet	1	---	---	---	---	---	---	
<i>Surr: Decachlorobiphenyl (Surr) Recovery: 90% Limits: 60-125% Dilution: 1x</i>												
LCS (9101592-BS1) Prepared: 10/25/19 10:03 Analyzed: 10/28/19 09:42 C-07												
<u>EPA 8082A</u>												
Aroclor 1016	166	2.00	4.00	ug/kg wet	1	250	---	66	47-134%	---	---	
Aroclor 1260	203	2.00	4.00	ug/kg wet	1	250	---	81	53-140%	---	---	
<i>Surr: Decachlorobiphenyl (Surr) Recovery: 97% Limits: 60-125% Dilution: 1x</i>												
Duplicate (9101592-DUP1) Prepared: 10/25/19 10:03 Analyzed: 10/28/19 10:35 C-07												
<u>QC Source Sample: Non-SDG (A910893-20)</u>												
Aroclor 1016	ND	2.10	4.21	ug/kg dry	1	---	ND	---	---	---	30%	
Aroclor 1221	ND	2.10	4.21	ug/kg dry	1	---	ND	---	---	---	30%	
Aroclor 1232	ND	2.10	4.21	ug/kg dry	1	---	ND	---	---	---	30%	
Aroclor 1242	ND	2.10	4.21	ug/kg dry	1	---	ND	---	---	---	30%	
Aroclor 1248	ND	2.10	4.21	ug/kg dry	1	---	ND	---	---	---	30%	
Aroclor 1254	2.25	2.10	4.21	ug/kg dry	1	---	2.38	---	---	6	30%	Ja
Aroclor 1260	2.12	2.10	4.21	ug/kg dry	1	---	2.31	---	---	9	30%	Ja
<i>Surr: Decachlorobiphenyl (Surr) Recovery: 77% Limits: 60-125% Dilution: 1x</i>												
Duplicate (9101592-DUP2) Prepared: 10/25/19 14:47 Analyzed: 10/28/19 10:34 C-07												
<u>QC Source Sample: Non-SDG (A9J0670-02)</u>												
Aroclor 1016	ND	4.78	9.56	ug/kg dry	1	---	ND	---	---	---	30%	
Aroclor 1221	ND	4.78	9.56	ug/kg dry	1	---	ND	---	---	---	30%	
Aroclor 1232	ND	4.78	9.56	ug/kg dry	1	---	ND	---	---	---	30%	
Aroclor 1242	26.1	4.78	9.56	ug/kg dry	1	---	28.0	---	---	7	30%	P-10

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
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QUALITY CONTROL (QC) SAMPLE RESULTS

Polychlorinated Biphenyls by EPA 8082A

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9101592 - EPA 3546												
Sediment												
Duplicate (9101592-DUP2) Prepared: 10/25/19 14:47 Analyzed: 10/28/19 10:34 C-07												
QC Source Sample: Non-SDG (A9J0670-02)												
Aroclor 1248	ND	4.78	9.56	ug/kg dry	1	---	ND	---	---	---	30%	
Aroclor 1254	33.4	4.78	9.56	ug/kg dry	1	---	36.5	---	---	9	30%	P-10
Aroclor 1260	18.8	4.78	9.56	ug/kg dry	1	---	20.0	---	---	6	30%	P-10
<i>Surr: Decachlorobiphenyl (Surr)</i>		<i>Recovery: 78 %</i>		<i>Limits: 60-125 %</i>		<i>Dilution: 1x</i>						
Matrix Spike (9101592-MS1) Prepared: 10/25/19 10:03 Analyzed: 10/28/19 11:45 C-07												
QC Source Sample: Non-SDG (A9I0893-21)												
EPA 8082A												
Aroclor 1016	150	2.12	4.24	ug/kg dry	1	265	ND	56	47-134%	---	---	
Aroclor 1260	178	2.12	4.24	ug/kg dry	1	265	7.17	64	53-140%	---	---	
<i>Surr: Decachlorobiphenyl (Surr)</i>		<i>Recovery: 66 %</i>		<i>Limits: 60-125 %</i>		<i>Dilution: 1x</i>						
Matrix Spike Dup (9101592-MSD1) Prepared: 10/25/19 10:03 Analyzed: 10/28/19 12:20 C-07												
QC Source Sample: Non-SDG (A9I0893-21)												
Aroclor 1016	133	2.15	4.30	ug/kg dry	1	269	ND	50	47-134%	12	30%	
Aroclor 1260	165	2.15	4.30	ug/kg dry	1	269	7.17	59	53-140%	8	30%	
<i>Surr: Decachlorobiphenyl (Surr)</i>		<i>Recovery: 64 %</i>		<i>Limits: 60-125 %</i>		<i>Dilution: 1x</i>						



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
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QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100490 - EPA 3546												
Sediment												
Blank (9100490-BLK1)												
Prepared: 10/01/19 10:34 Analyzed: 10/01/19 21:24												
<u>EPA 8270D</u>												
Acenaphthene	ND	0.00125	0.00250	mg/kg wet	1	---	---	---	---	---	---	
Acenaphthylene	ND	0.00125	0.00250	mg/kg wet	1	---	---	---	---	---	---	
Anthracene	ND	0.00125	0.00250	mg/kg wet	1	---	---	---	---	---	---	
Benz(a)anthracene	ND	0.00125	0.00250	mg/kg wet	1	---	---	---	---	---	---	
Benzo(a)pyrene	ND	0.00188	0.00375	mg/kg wet	1	---	---	---	---	---	---	
Benzo(b)fluoranthene	ND	0.00188	0.00375	mg/kg wet	1	---	---	---	---	---	---	
Benzo(k)fluoranthene	ND	0.00188	0.00375	mg/kg wet	1	---	---	---	---	---	---	
Benzo(g,h,i)perylene	ND	0.00125	0.00250	mg/kg wet	1	---	---	---	---	---	---	
Chrysene	ND	0.00125	0.00250	mg/kg wet	1	---	---	---	---	---	---	
Dibenz(a,h)anthracene	ND	0.00125	0.00250	mg/kg wet	1	---	---	---	---	---	---	
Fluoranthene	ND	0.00125	0.00250	mg/kg wet	1	---	---	---	---	---	---	
Fluorene	ND	0.00125	0.00250	mg/kg wet	1	---	---	---	---	---	---	
Indeno(1,2,3-cd)pyrene	ND	0.00125	0.00250	mg/kg wet	1	---	---	---	---	---	---	
1-Methylnaphthalene	ND	0.00250	0.00500	mg/kg wet	1	---	---	---	---	---	---	
2-Methylnaphthalene	ND	0.00250	0.00500	mg/kg wet	1	---	---	---	---	---	---	
Naphthalene	ND	0.00250	0.00500	mg/kg wet	1	---	---	---	---	---	---	
Phenanthrene	ND	0.00125	0.00250	mg/kg wet	1	---	---	---	---	---	---	
Pyrene	ND	0.00125	0.00250	mg/kg wet	1	---	---	---	---	---	---	
Carbazole	ND	0.00188	0.00375	mg/kg wet	1	---	---	---	---	---	---	
Dibenzofuran	ND	0.00125	0.00250	mg/kg wet	1	---	---	---	---	---	---	
4-Chloro-3-methylphenol	ND	0.0125	0.0250	mg/kg wet	1	---	---	---	---	---	---	
2-Chlorophenol	ND	0.00625	0.0125	mg/kg wet	1	---	---	---	---	---	---	
2,4-Dichlorophenol	ND	0.00625	0.0125	mg/kg wet	1	---	---	---	---	---	---	
2,4-Dimethylphenol	ND	0.00625	0.0125	mg/kg wet	1	---	---	---	---	---	---	
2,4-Dinitrophenol	ND	0.0312	0.0625	mg/kg wet	1	---	---	---	---	---	---	
4,6-Dinitro-2-methylphenol	ND	0.0312	0.0625	mg/kg wet	1	---	---	---	---	---	---	
2-Methylphenol	ND	0.00312	0.00625	mg/kg wet	1	---	---	---	---	---	---	
3+4-Methylphenol(s)	ND	0.00312	0.00625	mg/kg wet	1	---	---	---	---	---	---	
2-Nitrophenol	ND	0.0125	0.0250	mg/kg wet	1	---	---	---	---	---	---	
4-Nitrophenol	ND	0.0125	0.0250	mg/kg wet	1	---	---	---	---	---	---	
Pentachlorophenol (PCP)	ND	0.0125	0.0250	mg/kg wet	1	---	---	---	---	---	---	
Phenol	ND	0.00250	0.00500	mg/kg wet	1	---	---	---	---	---	---	
2,3,4,6-Tetrachlorophenol	ND	0.00625	0.0125	mg/kg wet	1	---	---	---	---	---	---	

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
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QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100490 - EPA 3546						Sediment						
Blank (9100490-BLK1)			Prepared: 10/01/19 10:34 Analyzed: 10/01/19 21:24									
2,3,5,6-Tetrachlorophenol	ND	0.00625	0.0125	mg/kg wet	1	---	---	---	---	---	---	
2,4,5-Trichlorophenol	ND	0.00625	0.0125	mg/kg wet	1	---	---	---	---	---	---	
2,4,6-Trichlorophenol	ND	0.00625	0.0125	mg/kg wet	1	---	---	---	---	---	---	
Bis(2-ethylhexyl)phthalate	ND	0.0188	0.0375	mg/kg wet	1	---	---	---	---	---	---	
Butyl benzyl phthalate	ND	0.00625	0.0125	mg/kg wet	1	---	---	---	---	---	---	
Diethylphthalate	ND	0.00625	0.0125	mg/kg wet	1	---	---	---	---	---	---	
Dimethylphthalate	ND	0.00625	0.0125	mg/kg wet	1	---	---	---	---	---	---	
Di-n-butylphthalate	ND	0.00625	0.0125	mg/kg wet	1	---	---	---	---	---	---	
Di-n-octyl phthalate	ND	0.0100	0.0125	mg/kg wet	1	---	---	---	---	---	---	
N-Nitrosodimethylamine	ND	0.00312	0.00625	mg/kg wet	1	---	---	---	---	---	---	
N-Nitroso-di-n-propylamine	ND	0.00312	0.00625	mg/kg wet	1	---	---	---	---	---	---	
N-Nitrosodiphenylamine	ND	0.00312	0.00625	mg/kg wet	1	---	---	---	---	---	---	
Bis(2-Chloroethoxy) methane	ND	0.00312	0.00625	mg/kg wet	1	---	---	---	---	---	---	
Bis(2-Chloroethyl) ether	ND	0.00312	0.00625	mg/kg wet	1	---	---	---	---	---	---	
2,2'-Oxybis(1-Chloropropane)	ND	0.00312	0.00625	mg/kg wet	1	---	---	---	---	---	---	
Hexachlorobenzene	ND	0.00125	0.00250	mg/kg wet	1	---	---	---	---	---	---	
Hexachlorobutadiene	ND	0.00312	0.00625	mg/kg wet	1	---	---	---	---	---	---	
Hexachlorocyclopentadiene	ND	0.00625	0.0125	mg/kg wet	1	---	---	---	---	---	---	
Hexachloroethane	ND	0.00312	0.00625	mg/kg wet	1	---	---	---	---	---	---	
2-Chloronaphthalene	ND	0.00125	0.00250	mg/kg wet	1	---	---	---	---	---	---	
1,2-Dichlorobenzene	ND	0.00312	0.00625	mg/kg wet	1	---	---	---	---	---	---	
1,3-Dichlorobenzene	ND	0.00312	0.00625	mg/kg wet	1	---	---	---	---	---	---	
1,4-Dichlorobenzene	ND	0.00312	0.00625	mg/kg wet	1	---	---	---	---	---	---	
1,2,4-Trichlorobenzene	ND	0.00312	0.00625	mg/kg wet	1	---	---	---	---	---	---	
4-Bromophenyl phenyl ether	ND	0.00312	0.00625	mg/kg wet	1	---	---	---	---	---	---	
4-Chlorophenyl phenyl ether	ND	0.00312	0.00625	mg/kg wet	1	---	---	---	---	---	---	
Aniline	ND	0.00625	0.0125	mg/kg wet	1	---	---	---	---	---	---	
4-Chloroaniline	ND	0.00312	0.00625	mg/kg wet	1	---	---	---	---	---	---	
2-Nitroaniline	ND	0.0250	0.0500	mg/kg wet	1	---	---	---	---	---	---	
3-Nitroaniline	ND	0.0250	0.0500	mg/kg wet	1	---	---	---	---	---	---	
4-Nitroaniline	ND	0.0250	0.0500	mg/kg wet	1	---	---	---	---	---	---	
Nitrobenzene	ND	0.0125	0.0250	mg/kg wet	1	---	---	---	---	---	---	
2,4-Dinitrotoluene	ND	0.0125	0.0250	mg/kg wet	1	---	---	---	---	---	---	
2,6-Dinitrotoluene	ND	0.0125	0.0250	mg/kg wet	1	---	---	---	---	---	---	

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
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QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100490 - EPA 3546												
Sediment												
Blank (9100490-BLK1)												
Prepared: 10/01/19 10:34 Analyzed: 10/01/19 21:24												
Benzoic acid	ND	0.157	0.312	mg/kg wet	1	---	---	---	---	---	---	
Benzyl alcohol	ND	0.00625	0.0125	mg/kg wet	1	---	---	---	---	---	---	
Isophorone	ND	0.00312	0.00625	mg/kg wet	1	---	---	---	---	---	---	
Azobenzene (1,2-DPH)	ND	0.00312	0.00625	mg/kg wet	1	---	---	---	---	---	---	
Bis(2-Ethylhexyl) adipate	ND	0.0312	0.0625	mg/kg wet	1	---	---	---	---	---	---	
3,3'-Dichlorobenzidine	ND	0.0250	0.0500	mg/kg wet	1	---	---	---	---	---	---	Q-52
1,2-Dinitrobenzene	ND	0.0312	0.0625	mg/kg wet	1	---	---	---	---	---	---	
1,3-Dinitrobenzene	ND	0.0312	0.0625	mg/kg wet	1	---	---	---	---	---	---	
1,4-Dinitrobenzene	ND	0.0312	0.0625	mg/kg wet	1	---	---	---	---	---	---	
Pyridine	ND	0.00625	0.0125	mg/kg wet	1	---	---	---	---	---	---	
<i>Surr: Nitrobenzene-d5 (Surr) Recovery: 69 % Limits: 37-122 % Dilution: 1x</i>												
<i>2-Fluorobiphenyl (Surr) 57 % 44-115 % "</i>												
<i>Phenol-d6 (Surr) 70 % 33-122 % "</i>												
<i>p-Terphenyl-d14 (Surr) 76 % 54-127 % "</i>												
<i>2-Fluorophenol (Surr) 64 % 35-115 % "</i>												
<i>2,4,6-Tribromophenol (Surr) 60 % 39-132 % "</i>												

LCS (9100490-BS1)												
Prepared: 10/01/19 10:34 Analyzed: 10/01/19 21:59												
EPA 8270D												
Acenaphthene	0.366	0.00532	0.0107	mg/kg wet	4	0.533	---	69	40-122%	---	---	
Acenaphthylene	0.391	0.00532	0.0107	mg/kg wet	4	0.533	---	73	32-132%	---	---	
Anthracene	0.415	0.00532	0.0107	mg/kg wet	4	0.533	---	78	47-123%	---	---	
Benz(a)anthracene	0.424	0.00532	0.0107	mg/kg wet	4	0.533	---	79	49-126%	---	---	
Benzo(a)pyrene	0.438	0.00800	0.0160	mg/kg wet	4	0.533	---	82	45-129%	---	---	
Benzo(b)fluoranthene	0.427	0.00800	0.0160	mg/kg wet	4	0.533	---	80	45-132%	---	---	
Benzo(k)fluoranthene	0.423	0.00800	0.0160	mg/kg wet	4	0.533	---	79	47-132%	---	---	
Benzo(g,h,i)perylene	0.445	0.00532	0.0107	mg/kg wet	4	0.533	---	83	43-134%	---	---	
Chrysene	0.414	0.00532	0.0107	mg/kg wet	4	0.533	---	78	50-124%	---	---	
Dibenz(a,h)anthracene	0.424	0.00532	0.0107	mg/kg wet	4	0.533	---	80	45-134%	---	---	
Fluoranthene	0.456	0.00532	0.0107	mg/kg wet	4	0.533	---	85	50-127%	---	---	
Fluorene	0.384	0.00532	0.0107	mg/kg wet	4	0.533	---	72	43-125%	---	---	
Indeno(1,2,3-cd)pyrene	0.402	0.00532	0.0107	mg/kg wet	4	0.533	---	75	45-133%	---	---	
1-Methylnaphthalene	0.368	0.0107	0.0213	mg/kg wet	4	0.533	---	69	40-120%	---	---	
2-Methylnaphthalene	0.374	0.0107	0.0213	mg/kg wet	4	0.533	---	70	38-122%	---	---	

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
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QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100490 - EPA 3546												
Sediment												
LCS (9100490-BS1)												
Prepared: 10/01/19 10:34						Analyzed: 10/01/19 21:59						
Naphthalene	0.359	0.0107	0.0213	mg/kg wet	4	0.533	---	67	35-123%	---	---	
Phenanthrene	0.395	0.00532	0.0107	mg/kg wet	4	0.533	---	74	50-121%	---	---	
Pyrene	0.464	0.00532	0.0107	mg/kg wet	4	0.533	---	87	47-127%	---	---	
Carbazole	0.464	0.00800	0.0160	mg/kg wet	4	0.533	---	87	50-122%	---	---	
Dibenzofuran	0.384	0.00532	0.0107	mg/kg wet	4	0.533	---	72	44-120%	---	---	
4-Chloro-3-methylphenol	0.415	0.0532	0.107	mg/kg wet	4	0.533	---	78	45-122%	---	---	
2-Chlorophenol	0.367	0.0267	0.0532	mg/kg wet	4	0.533	---	69	34-121%	---	---	
2,4-Dichlorophenol	0.384	0.0267	0.0532	mg/kg wet	4	0.533	---	72	40-122%	---	---	
2,4-Dimethylphenol	0.431	0.0267	0.0532	mg/kg wet	4	0.533	---	81	30-127%	---	---	
2,4-Dinitrophenol	0.466	0.133	0.267	mg/kg wet	4	0.533	---	87	5-137%	---	---	
4,6-Dinitro-2-methylphenol	0.517	0.133	0.267	mg/kg wet	4	0.533	---	97	29-132%	---	---	
2-Methylphenol	0.427	0.0133	0.0267	mg/kg wet	4	0.533	---	80	32-122%	---	---	
3+4-Methylphenol(s)	0.434	0.0133	0.0267	mg/kg wet	4	0.533	---	81	34-120%	---	---	
2-Nitrophenol	0.417	0.0532	0.107	mg/kg wet	4	0.533	---	78	36-123%	---	---	
4-Nitrophenol	0.495	0.0532	0.107	mg/kg wet	4	0.533	---	93	30-132%	---	---	
Pentachlorophenol (PCP)	0.434	0.0532	0.107	mg/kg wet	4	0.533	---	81	25-133%	---	---	
Phenol	0.393	0.0107	0.0213	mg/kg wet	4	0.533	---	74	34-120%	---	---	
2,3,4,6-Tetrachlorophenol	0.414	0.0267	0.0532	mg/kg wet	4	0.533	---	78	44-125%	---	---	
2,3,5,6-Tetrachlorophenol	0.429	0.0267	0.0532	mg/kg wet	4	0.533	---	80	40-120%	---	---	
2,4,5-Trichlorophenol	0.416	0.0267	0.0532	mg/kg wet	4	0.533	---	78	41-124%	---	---	
2,4,6-Trichlorophenol	0.405	0.0267	0.0532	mg/kg wet	4	0.533	---	76	39-126%	---	---	
Bis(2-ethylhexyl)phthalate	0.441	0.0800	0.160	mg/kg wet	4	0.533	---	83	51-133%	---	---	
Butyl benzyl phthalate	0.444	0.0267	0.0532	mg/kg wet	4	0.533	---	83	48-132%	---	---	
Diethylphthalate	0.436	0.0267	0.0532	mg/kg wet	4	0.533	---	82	50-124%	---	---	
Dimethylphthalate	0.409	0.0267	0.0532	mg/kg wet	4	0.533	---	77	48-124%	---	---	
Di-n-butylphthalate	0.448	0.0267	0.0532	mg/kg wet	4	0.533	---	84	51-128%	---	---	
Di-n-octyl phthalate	0.457	0.0428	0.0532	mg/kg wet	4	0.533	---	86	44-140%	---	---	
N-Nitrosodimethylamine	0.289	0.0133	0.0267	mg/kg wet	4	0.533	---	54	23-120%	---	---	
N-Nitroso-di-n-propylamine	0.382	0.0133	0.0267	mg/kg wet	4	0.533	---	72	36-120%	---	---	
N-Nitrosodiphenylamine	0.407	0.0133	0.0267	mg/kg wet	4	0.533	---	76	38-127%	---	---	
Bis(2-Chloroethoxy) methane	0.367	0.0133	0.0267	mg/kg wet	4	0.533	---	69	36-121%	---	---	
Bis(2-Chloroethyl) ether	0.316	0.0133	0.0267	mg/kg wet	4	0.533	---	59	31-120%	---	---	Q-41
2,2'-Oxybis(1-Chloropropane)	0.318	0.0133	0.0267	mg/kg wet	4	0.533	---	60	33-131%	---	---	
Hexachlorobenzene	0.403	0.00532	0.0107	mg/kg wet	4	0.533	---	76	44-122%	---	---	



AMENDED REPORT

Maul Foster & Alongi, INC.
2001 NW 19th Ave, STE 200
Portland, OR 97209

Project: **Seaport Tideland**
Project Number: **1044.02.06-02**
Project Manager: **Emily Hess**

Report ID:
A9J0006 - 01 09 20 1630

QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100490 - EPA 3546												
Sediment												
LCS (9100490-BS1)			Prepared: 10/01/19 10:34 Analyzed: 10/01/19 21:59									
Hexachlorobutadiene	0.337	0.0133	0.0267	mg/kg wet	4	0.533	---	63	32-123%	---	---	
Hexachlorocyclopentadiene	0.420	0.0267	0.0532	mg/kg wet	4	0.533	---	79	5-140%	---	---	Q-41
Hexachloroethane	0.323	0.0133	0.0267	mg/kg wet	4	0.533	---	61	28-120%	---	---	
2-Chloronaphthalene	0.379	0.00532	0.0107	mg/kg wet	4	0.533	---	71	41-120%	---	---	
1,2-Dichlorobenzene	0.332	0.0133	0.0267	mg/kg wet	4	0.533	---	62	33-120%	---	---	
1,3-Dichlorobenzene	0.316	0.0133	0.0267	mg/kg wet	4	0.533	---	59	30-120%	---	---	
1,4-Dichlorobenzene	0.321	0.0133	0.0267	mg/kg wet	4	0.533	---	60	31-120%	---	---	
1,2,4-Trichlorobenzene	0.336	0.0133	0.0267	mg/kg wet	4	0.533	---	63	34-120%	---	---	
4-Bromophenyl phenyl ether	0.396	0.0133	0.0267	mg/kg wet	4	0.533	---	74	46-124%	---	---	
4-Chlorophenyl phenyl ether	0.378	0.0133	0.0267	mg/kg wet	4	0.533	---	71	45-121%	---	---	
Aniline	0.327	0.0267	0.0532	mg/kg wet	4	0.533	---	61	7-120%	---	---	
4-Chloroaniline	0.217	0.0133	0.0267	mg/kg wet	4	0.533	---	41	16-120%	---	---	Q-31
2-Nitroaniline	0.414	0.107	0.213	mg/kg wet	4	0.533	---	78	44-127%	---	---	
3-Nitroaniline	0.393	0.107	0.213	mg/kg wet	4	0.533	---	74	33-120%	---	---	
4-Nitroaniline	0.588	0.107	0.213	mg/kg wet	4	0.533	---	110	35-120%	---	---	Q-41
Nitrobenzene	0.375	0.0532	0.107	mg/kg wet	4	0.533	---	70	34-122%	---	---	
2,4-Dinitrotoluene	0.418	0.0532	0.107	mg/kg wet	4	0.533	---	78	48-126%	---	---	
2,6-Dinitrotoluene	0.412	0.0532	0.107	mg/kg wet	4	0.533	---	77	46-124%	---	---	
Benzoic acid	0.659	0.400	0.400	mg/kg wet	4	1.07	---	62	5-140%	---	---	
Benzyl alcohol	0.381	0.0267	0.0532	mg/kg wet	4	0.533	---	71	29-122%	---	---	
Isophorone	0.363	0.0133	0.0267	mg/kg wet	4	0.533	---	68	30-122%	---	---	
Azobenzene (1,2-DPH)	0.359	0.0133	0.0267	mg/kg wet	4	0.533	---	67	39-125%	---	---	
Bis(2-Ethylhexyl) adipate	0.440	0.133	0.267	mg/kg wet	4	0.533	---	83	60-121%	---	---	
3,3'-Dichlorobenzidine	1.32	0.107	0.213	mg/kg wet	4	1.07	---	124	22-121%	---	---	Q-29, Q-31
1,2-Dinitrobenzene	0.397	0.133	0.267	mg/kg wet	4	0.533	---	75	44-120%	---	---	
1,3-Dinitrobenzene	0.434	0.133	0.267	mg/kg wet	4	0.533	---	81	42-127%	---	---	
1,4-Dinitrobenzene	0.464	0.133	0.267	mg/kg wet	4	0.533	---	87	37-132%	---	---	
Pyridine	0.203	0.0267	0.0532	mg/kg wet	4	0.533	---	38	5-120%	---	---	
<i>Surr: Nitrobenzene-d5 (Surr)</i>		<i>Recovery: 70 %</i>		<i>Limits: 37-122 %</i>		<i>Dilution: 4x</i>						
<i>2-Fluorobiphenyl (Surr)</i>		<i>68 %</i>		<i>44-115 %</i>		<i>"</i>						
<i>Phenol-d6 (Surr)</i>		<i>73 %</i>		<i>33-122 %</i>		<i>"</i>						
<i>p-Terphenyl-d14 (Surr)</i>		<i>82 %</i>		<i>54-127 %</i>		<i>"</i>						
<i>2-Fluorophenol (Surr)</i>		<i>62 %</i>		<i>35-115 %</i>		<i>"</i>						
<i>2,4,6-Tribromophenol (Surr)</i>		<i>74 %</i>		<i>39-132 %</i>		<i>"</i>						

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
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QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100490 - EPA 3546												
Sediment												
Duplicate (9100490-DUP2)												
Prepared: 10/01/19 10:34 Analyzed: 10/02/19 14:15												
QC Source Sample: Non-SDG (A910822-02RE1)												
Acenaphthene	0.0710	0.0306	0.0615	mg/kg dry	10	---	0.135	---	---	62	30%	Q-04
Acenaphthylene	ND	0.0306	0.0615	mg/kg dry	10	---	ND	---	---	---	30%	
Anthracene	0.103	0.0306	0.0615	mg/kg dry	10	---	0.204	---	---	66	30%	Q-04
Benz(a)anthracene	0.103	0.0306	0.0615	mg/kg dry	10	---	0.218	---	---	71	30%	Q-04
Benzo(a)pyrene	0.0937	0.0461	0.0922	mg/kg dry	10	---	0.154	---	---	48	30%	Q-04
Benzo(b)fluoranthene	0.100	0.0461	0.0922	mg/kg dry	10	---	0.180	---	---	57	30%	Q-04
Benzo(k)fluoranthene	0.0492	0.0461	0.0922	mg/kg dry	10	---	0.0758	---	---	42	30%	Q-04, Ja
Benzo(g,h,i)perylene	0.0400	0.0306	0.0615	mg/kg dry	10	---	0.0680	---	---	52	30%	Q-04, Ja
Chrysene	0.0879	0.0306	0.0615	mg/kg dry	10	---	0.199	---	---	78	30%	Q-04
Dibenz(a,h)anthracene	ND	0.0306	0.0615	mg/kg dry	10	---	ND	---	---	---	30%	
Fluoranthene	0.503	0.0306	0.0615	mg/kg dry	10	---	1.15	---	---	78	30%	Q-04
Fluorene	0.0660	0.0306	0.0615	mg/kg dry	10	---	0.136	---	---	69	30%	Q-04
Indeno(1,2,3-cd)pyrene	0.0339	0.0306	0.0615	mg/kg dry	10	---	0.0695	---	---	69	30%	Q-04, Ja
1-Methylnaphthalene	ND	0.0615	0.123	mg/kg dry	10	---	0.0767	---	---	***	30%	Q-04
2-Methylnaphthalene	0.0696	0.0615	0.123	mg/kg dry	10	---	0.149	---	---	72	30%	Q-04, Ja
Naphthalene	0.186	0.0615	0.123	mg/kg dry	10	---	0.491	---	---	90	30%	Q-04
Phenanthrene	0.255	0.0306	0.0615	mg/kg dry	10	---	0.491	---	---	63	30%	Q-04
Pyrene	0.347	0.0306	0.0615	mg/kg dry	10	---	0.823	---	---	81	30%	Q-04
Carbazole	ND	0.0461	0.0922	mg/kg dry	10	---	0.0536	---	---	***	30%	Q-04
Dibenzofuran	0.0566	0.0306	0.0615	mg/kg dry	10	---	0.145	---	---	88	30%	Q-04, Ja
4-Chloro-3-methylphenol	ND	0.306	0.615	mg/kg dry	10	---	ND	---	---	---	30%	
2-Chlorophenol	ND	0.154	0.306	mg/kg dry	10	---	ND	---	---	---	30%	
2,4-Dichlorophenol	ND	0.154	0.306	mg/kg dry	10	---	ND	---	---	---	30%	
2,4-Dimethylphenol	ND	0.154	0.306	mg/kg dry	10	---	ND	---	---	---	30%	
2,4-Dinitrophenol	ND	0.767	1.54	mg/kg dry	10	---	ND	---	---	---	30%	
4,6-Dinitro-2-methylphenol	ND	0.767	1.54	mg/kg dry	10	---	ND	---	---	---	30%	
2-Methylphenol	ND	0.0767	0.154	mg/kg dry	10	---	ND	---	---	---	30%	
3+4-Methylphenol(s)	1.59	0.0767	0.154	mg/kg dry	10	---	1.60	---	---	0.5	30%	
2-Nitrophenol	ND	0.306	0.615	mg/kg dry	10	---	ND	---	---	---	30%	
4-Nitrophenol	ND	0.306	0.615	mg/kg dry	10	---	ND	---	---	---	30%	
Pentachlorophenol (PCP)	ND	0.306	0.615	mg/kg dry	10	---	ND	---	---	---	30%	
Phenol	0.199	0.0615	0.123	mg/kg dry	10	---	0.571	---	---	97	30%	M-04, Q-04

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
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QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100490 - EPA 3546												
Sediment												
Duplicate (9100490-DUP2)												
						Prepared: 10/01/19 10:34 Analyzed: 10/02/19 14:15						
QC Source Sample: Non-SDG (A9I0822-02RE1)												
2,3,4,6-Tetrachlorophenol	ND	0.154	0.306	mg/kg dry	10	---	ND	---	---	---	30%	
2,3,5,6-Tetrachlorophenol	ND	0.154	0.306	mg/kg dry	10	---	ND	---	---	---	30%	
2,4,5-Trichlorophenol	ND	0.154	0.306	mg/kg dry	10	---	ND	---	---	---	30%	
2,4,6-Trichlorophenol	ND	0.154	0.306	mg/kg dry	10	---	ND	---	---	---	30%	
Bis(2-ethylhexyl)phthalate	ND	0.461	0.922	mg/kg dry	10	---	ND	---	---	---	30%	
Butyl benzyl phthalate	ND	0.154	0.306	mg/kg dry	10	---	ND	---	---	---	30%	
Diethylphthalate	ND	0.154	0.306	mg/kg dry	10	---	ND	---	---	---	30%	
Dimethylphthalate	ND	0.154	0.306	mg/kg dry	10	---	ND	---	---	---	30%	
Di-n-butylphthalate	ND	0.154	0.306	mg/kg dry	10	---	0.213	---	---	***	30%	Q-04
Di-n-octyl phthalate	ND	0.247	0.306	mg/kg dry	10	---	ND	---	---	---	30%	
N-Nitrosodimethylamine	ND	0.0767	0.154	mg/kg dry	10	---	ND	---	---	---	30%	
N-Nitroso-di-n-propylamine	ND	0.0767	0.154	mg/kg dry	10	---	ND	---	---	---	30%	
N-Nitrosodiphenylamine	ND	0.0767	0.154	mg/kg dry	10	---	ND	---	---	---	30%	
Bis(2-Chloroethoxy) methane	ND	0.0767	0.154	mg/kg dry	10	---	ND	---	---	---	30%	
Bis(2-Chloroethyl) ether	ND	0.0767	0.154	mg/kg dry	10	---	ND	---	---	---	30%	
2,2'-Oxybis(1-Chloropropane)	ND	0.0767	0.154	mg/kg dry	10	---	ND	---	---	---	30%	
Hexachlorobenzene	ND	0.0306	0.0615	mg/kg dry	10	---	ND	---	---	---	30%	
Hexachlorobutadiene	ND	0.0767	0.154	mg/kg dry	10	---	ND	---	---	---	30%	
Hexachlorocyclopentadiene	ND	0.154	0.306	mg/kg dry	10	---	ND	---	---	---	30%	
Hexachloroethane	ND	0.0767	0.154	mg/kg dry	10	---	ND	---	---	---	30%	
2-Chloronaphthalene	ND	0.0306	0.0615	mg/kg dry	10	---	ND	---	---	---	30%	
1,2-Dichlorobenzene	ND	0.0767	0.154	mg/kg dry	10	---	ND	---	---	---	30%	
1,3-Dichlorobenzene	ND	0.0767	0.154	mg/kg dry	10	---	ND	---	---	---	30%	
1,4-Dichlorobenzene	ND	0.0767	0.154	mg/kg dry	10	---	ND	---	---	---	30%	
1,2,4-Trichlorobenzene	ND	0.0767	0.154	mg/kg dry	10	---	ND	---	---	---	30%	
4-Bromophenyl phenyl ether	ND	0.0767	0.154	mg/kg dry	10	---	ND	---	---	---	30%	
4-Chlorophenyl phenyl ether	ND	0.0767	0.154	mg/kg dry	10	---	ND	---	---	---	30%	
Aniline	ND	0.306	0.306	mg/kg dry	10	---	ND	---	---	---	30%	
4-Chloroaniline	ND	0.0767	0.154	mg/kg dry	10	---	ND	---	---	---	30%	
2-Nitroaniline	ND	0.615	1.23	mg/kg dry	10	---	ND	---	---	---	30%	
3-Nitroaniline	ND	0.615	1.23	mg/kg dry	10	---	ND	---	---	---	30%	
4-Nitroaniline	ND	0.615	1.23	mg/kg dry	10	---	ND	---	---	---	30%	
Nitrobenzene	ND	0.306	0.615	mg/kg dry	10	---	ND	---	---	---	30%	

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tideland Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
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QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100490 - EPA 3546												
Sediment												
Duplicate (9100490-DUP2)												
Prepared: 10/01/19 10:34 Analyzed: 10/02/19 14:15												
QC Source Sample: Non-SDG (A910822-02RE1)												
2,4-Dinitrotoluene	ND	0.306	0.615	mg/kg dry	10	---	ND	---	---	---	30%	
2,6-Dinitrotoluene	ND	0.306	0.615	mg/kg dry	10	---	ND	---	---	---	30%	
Benzoic acid	ND	3.85	7.67	mg/kg dry	10	---	ND	---	---	---	30%	
Benzyl alcohol	ND	0.154	0.306	mg/kg dry	10	---	ND	---	---	---	30%	
Isophorone	ND	0.0767	0.154	mg/kg dry	10	---	ND	---	---	---	30%	
Azobenzene (1,2-DPH)	ND	0.0767	0.154	mg/kg dry	10	---	ND	---	---	---	30%	
Bis(2-Ethylhexyl) adipate	2.82	0.767	1.54	mg/kg dry	10	---	2.18	---	---	26	30%	
3,3'-Dichlorobenzidine	ND	0.615	1.23	mg/kg dry	10	---	ND	---	---	---	30%	Q-52
1,2-Dinitrobenzene	ND	0.767	1.54	mg/kg dry	10	---	ND	---	---	---	30%	
1,3-Dinitrobenzene	ND	0.767	1.54	mg/kg dry	10	---	ND	---	---	---	30%	
1,4-Dinitrobenzene	ND	0.767	1.54	mg/kg dry	10	---	ND	---	---	---	30%	
Pyridine	ND	0.154	0.306	mg/kg dry	10	---	ND	---	---	---	30%	

<i>Surr: Nitrobenzene-d5 (Surr)</i>	<i>Recovery: 71 %</i>	<i>Limits: 37-122 %</i>	<i>Dilution: 10x</i>
<i>2-Fluorobiphenyl (Surr)</i>	<i>64 %</i>	<i>44-115 %</i>	<i>"</i>
<i>Phenol-d6 (Surr)</i>	<i>73 %</i>	<i>33-122 %</i>	<i>"</i>
<i>p-Terphenyl-d14 (Surr)</i>	<i>73 %</i>	<i>54-127 %</i>	<i>"</i>
<i>2-Fluorophenol (Surr)</i>	<i>71 %</i>	<i>35-115 %</i>	<i>"</i>
<i>2,4,6-Tribromophenol (Surr)</i>	<i>107 %</i>	<i>39-132 %</i>	<i>"</i>

Matrix Spike (9100490-MS1) Prepared: 10/01/19 10:34 Analyzed: 10/02/19 14:51

QC Source Sample: Non-SDG (A910822-02RE1)												
EPA 8270D												
Acenaphthene	1.24	0.0306	0.0614	mg/kg dry	10	1.23	0.135	90	40-122%	---	---	
Acenaphthylene	1.29	0.0306	0.0614	mg/kg dry	10	1.23	ND	105	32-132%	---	---	
Anthracene	1.33	0.0306	0.0614	mg/kg dry	10	1.23	0.204	92	47-123%	---	---	
Benz(a)anthracene	1.27	0.0306	0.0614	mg/kg dry	10	1.23	0.218	85	49-126%	---	---	
Benzo(a)pyrene	1.31	0.0460	0.0920	mg/kg dry	10	1.23	0.154	94	45-129%	---	---	
Benzo(b)fluoranthene	1.29	0.0460	0.0920	mg/kg dry	10	1.23	0.180	90	45-132%	---	---	
Benzo(k)fluoranthene	1.20	0.0460	0.0920	mg/kg dry	10	1.23	0.0758	91	47-132%	---	---	
Benzo(g,h,i)perylene	1.31	0.0306	0.0614	mg/kg dry	10	1.23	0.0680	101	43-134%	---	---	
Chrysene	1.28	0.0306	0.0614	mg/kg dry	10	1.23	0.199	88	50-124%	---	---	
Dibenz(a,h)anthracene	1.22	0.0306	0.0614	mg/kg dry	10	1.23	ND	100	45-134%	---	---	
Fluoranthene	1.58	0.0306	0.0614	mg/kg dry	10	1.23	1.15	35	50-127%	---	---	Q-01

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tideland Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
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QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100490 - EPA 3546						Sediment						
Matrix Spike (9100490-MS1)			Prepared: 10/01/19 10:34 Analyzed: 10/02/19 14:51									
QC Source Sample: Non-SDG (A910822-02RE1)												
Fluorene	1.30	0.0306	0.0614	mg/kg dry	10	1.23	0.136	95	43-125%	---	---	
Indeno(1,2,3-cd)pyrene	1.14	0.0306	0.0614	mg/kg dry	10	1.23	0.0695	87	45-133%	---	---	
1-Methylnaphthalene	1.25	0.0614	0.123	mg/kg dry	10	1.23	0.0767	96	40-120%	---	---	
2-Methylnaphthalene	1.28	0.0614	0.123	mg/kg dry	10	1.23	0.149	92	38-122%	---	---	
Naphthalene	1.37	0.0614	0.123	mg/kg dry	10	1.23	0.491	71	35-123%	---	---	
Phenanthrene	1.35	0.0306	0.0614	mg/kg dry	10	1.23	0.491	70	50-121%	---	---	
Pyrene	1.49	0.0306	0.0614	mg/kg dry	10	1.23	0.823	55	47-127%	---	---	
Carbazole	1.23	0.0460	0.0920	mg/kg dry	10	1.23	0.0536	96	50-122%	---	---	
Dibenzofuran	1.26	0.0306	0.0614	mg/kg dry	10	1.23	0.145	91	44-120%	---	---	
4-Chloro-3-methylphenol	1.32	0.306	0.614	mg/kg dry	10	1.23	ND	108	45-122%	---	---	
2-Chlorophenol	1.18	0.153	0.306	mg/kg dry	10	1.23	ND	96	34-121%	---	---	
2,4-Dichlorophenol	1.31	0.153	0.306	mg/kg dry	10	1.23	ND	107	40-122%	---	---	
2,4-Dimethylphenol	1.49	0.153	0.306	mg/kg dry	10	1.23	ND	122	30-127%	---	---	
2,4-Dinitrophenol	ND	0.766	1.53	mg/kg dry	10	1.23	ND		5-137%	---	---	Q-11, Q-41
4,6-Dinitro-2-methylphenol	0.921	0.766	1.53	mg/kg dry	10	1.23	ND	75	29-132%	---	---	Q-41, Ja
2-Methylphenol	1.21	0.0766	0.153	mg/kg dry	10	1.23	ND	98	32-122%	---	---	
3+4-Methylphenol(s)	2.87	0.0766	0.153	mg/kg dry	10	1.23	1.60	104	34-120%	---	---	
2-Nitrophenol	1.43	0.306	0.614	mg/kg dry	10	1.23	ND	116	36-123%	---	---	
4-Nitrophenol	1.30	0.306	0.614	mg/kg dry	10	1.23	ND	106	30-132%	---	---	
Pentachlorophenol (PCP)	1.48	0.306	0.614	mg/kg dry	10	1.23	ND	121	25-133%	---	---	
Phenol	1.29	0.0614	0.123	mg/kg dry	10	1.23	0.571	58	34-120%	---	---	
2,3,4,6-Tetrachlorophenol	1.30	0.153	0.306	mg/kg dry	10	1.23	ND	106	44-125%	---	---	
2,3,5,6-Tetrachlorophenol	1.41	0.153	0.306	mg/kg dry	10	1.23	ND	115	40-120%	---	---	
2,4,5-Trichlorophenol	1.36	0.153	0.306	mg/kg dry	10	1.23	ND	111	41-124%	---	---	
2,4,6-Trichlorophenol	1.37	0.153	0.306	mg/kg dry	10	1.23	ND	112	39-126%	---	---	
Bis(2-ethylhexyl)phthalate	1.57	0.460	0.920	mg/kg dry	10	1.23	ND	128	51-133%	---	---	
Butyl benzyl phthalate	1.46	0.153	0.306	mg/kg dry	10	1.23	ND	119	48-132%	---	---	
Diethylphthalate	1.33	0.153	0.306	mg/kg dry	10	1.23	ND	108	50-124%	---	---	
Dimethylphthalate	1.28	0.153	0.306	mg/kg dry	10	1.23	ND	105	48-124%	---	---	
Di-n-butylphthalate	1.41	0.153	0.306	mg/kg dry	10	1.23	0.213	97	51-128%	---	---	
Di-n-octyl phthalate	1.73	0.246	0.306	mg/kg dry	10	1.23	ND	141	44-140%	---	---	Q-01
N-Nitrosodimethylamine	0.793	0.0766	0.153	mg/kg dry	10	1.23	ND	65	23-120%	---	---	
N-Nitroso-di-n-propylamine	1.10	0.0766	0.153	mg/kg dry	10	1.23	ND	90	36-120%	---	---	

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
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QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100490 - EPA 3546												
Sediment												
Matrix Spike (9100490-MS1)												
Prepared: 10/01/19 10:34 Analyzed: 10/02/19 14:51												
QC Source Sample: Non-SDG (A9I0822-02RE1)												
N-Nitrosodiphenylamine	1.24	0.0766	0.153	mg/kg dry	10	1.23	ND	101	38-127%	---	---	
Bis(2-Chloroethoxy) methane	1.16	0.0766	0.153	mg/kg dry	10	1.23	ND	94	36-121%	---	---	
Bis(2-Chloroethyl) ether	0.923	0.0766	0.153	mg/kg dry	10	1.23	ND	75	31-120%	---	---	
2,2'-Oxybis(1-Chloropropane)	0.929	0.0766	0.153	mg/kg dry	10	1.23	ND	76	33-131%	---	---	
Hexachlorobenzene	1.24	0.0306	0.0614	mg/kg dry	10	1.23	ND	101	44-122%	---	---	
Hexachlorobutadiene	1.19	0.0766	0.153	mg/kg dry	10	1.23	ND	97	32-123%	---	---	
Hexachlorocyclopentadiene	ND	0.153	0.306	mg/kg dry	10	1.23	ND		5-140%	---	---	Q-01, Q-41
Hexachloroethane	1.03	0.0766	0.153	mg/kg dry	10	1.23	ND	84	28-120%	---	---	
2-Chloronaphthalene	1.25	0.0306	0.0614	mg/kg dry	10	1.23	ND	102	41-120%	---	---	
1,2-Dichlorobenzene	1.09	0.0766	0.153	mg/kg dry	10	1.23	ND	89	33-120%	---	---	
1,3-Dichlorobenzene	1.06	0.0766	0.153	mg/kg dry	10	1.23	ND	87	30-120%	---	---	
1,4-Dichlorobenzene	1.08	0.0766	0.153	mg/kg dry	10	1.23	ND	88	31-120%	---	---	
1,2,4-Trichlorobenzene	1.13	0.0766	0.153	mg/kg dry	10	1.23	ND	92	34-120%	---	---	
4-Bromophenyl phenyl ether	1.26	0.0766	0.153	mg/kg dry	10	1.23	ND	103	46-124%	---	---	
4-Chlorophenyl phenyl ether	1.22	0.0766	0.153	mg/kg dry	10	1.23	ND	100	45-121%	---	---	
Aniline	1.04	0.690	0.690	mg/kg dry	10	1.23	ND	85	7-120%	---	---	Q-31
4-Chloroaniline	0.438	0.0766	0.153	mg/kg dry	10	1.23	ND	36	16-120%	---	---	Q-31
2-Nitroaniline	1.45	0.614	1.23	mg/kg dry	10	1.23	ND	118	44-127%	---	---	
3-Nitroaniline	ND	0.614	1.23	mg/kg dry	10	1.23	ND		33-120%	---	---	Q-01
4-Nitroaniline	1.24	0.614	1.23	mg/kg dry	10	1.23	ND	101	35-120%	---	---	Q-41
Nitrobenzene	1.11	0.306	0.614	mg/kg dry	10	1.23	ND	91	34-122%	---	---	
2,4-Dinitrotoluene	1.24	0.306	0.614	mg/kg dry	10	1.23	ND	101	48-126%	---	---	
2,6-Dinitrotoluene	1.26	0.306	0.614	mg/kg dry	10	1.23	ND	103	46-124%	---	---	
Benzoic acid	ND	3.84	7.66	mg/kg dry	10	2.45	ND		5-140%	---	---	Q-11, Q-41
Benzyl alcohol	1.22	0.153	0.306	mg/kg dry	10	1.23	ND	99	29-122%	---	---	
Isophorone	1.14	0.0766	0.153	mg/kg dry	10	1.23	ND	93	30-122%	---	---	
Azobenzene (1,2-DPH)	1.15	0.0766	0.153	mg/kg dry	10	1.23	ND	94	39-125%	---	---	
Bis(2-Ethylhexyl) adipate	2.32	0.766	1.53	mg/kg dry	10	1.23	2.18	12	60-121%	---	---	Q-03
3,3'-Dichlorobenzidine	ND	0.614	1.23	mg/kg dry	10	2.45	ND		22-121%	---	---	Q-01, Q-31
1,2-Dinitrobenzene	1.03	0.766	1.53	mg/kg dry	10	1.23	ND	84	44-120%	---	---	Ja
1,3-Dinitrobenzene	1.26	0.766	1.53	mg/kg dry	10	1.23	ND	102	42-127%	---	---	Ja
1,4-Dinitrobenzene	0.975	0.766	1.53	mg/kg dry	10	1.23	ND	79	37-132%	---	---	Ja
Pyridine	0.610	0.153	0.306	mg/kg dry	10	1.23	ND	50	5-120%	---	---	

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tideland Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
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QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100490 - EPA 3546												
Sediment												
Matrix Spike (9100490-MS1) Prepared: 10/01/19 10:34 Analyzed: 10/02/19 14:51												
QC Source Sample: Non-SDG (A9I0822-02RE1)												
Surr: Nitrobenzene-d5 (Surr)			Recovery: 90 %	Limits: 37-122 %		Dilution: 10x						
2-Fluorobiphenyl (Surr)			93 %	44-115 %		"						
Phenol-d6 (Surr)			92 %	33-122 %		"						
p-Terphenyl-d14 (Surr)			101 %	54-127 %		"						
2-Fluorophenol (Surr)			90 %	35-115 %		"						
2,4,6-Tribromophenol (Surr)			110 %	39-132 %		"						

Matrix Spike (9100490-MS2) Prepared: 10/01/19 10:35 Analyzed: 10/02/19 12:28												
QC Source Sample: Non-SDG (A9I0893-13RE1)												
EPA 8270D												
Acenaphthene	1.39	0.0681	0.137	mg/kg dry	20	1.37	ND	102	40-122%	---	---	
Acenaphthylene	1.45	0.0681	0.137	mg/kg dry	20	1.37	ND	106	32-132%	---	---	
Anthracene	1.48	0.0681	0.137	mg/kg dry	20	1.37	ND	109	47-123%	---	---	
Benz(a)anthracene	1.42	0.0681	0.137	mg/kg dry	20	1.37	ND	104	49-126%	---	---	
Benzo(a)pyrene	1.60	0.102	0.205	mg/kg dry	20	1.37	0.167	105	45-129%	---	---	
Benzo(b)fluoranthene	1.48	0.102	0.205	mg/kg dry	20	1.37	0.121	100	45-132%	---	---	
Benzo(k)fluoranthene	1.39	0.102	0.205	mg/kg dry	20	1.37	ND	102	47-132%	---	---	
Benzo(g,h,i)perylene	1.53	0.0681	0.137	mg/kg dry	20	1.37	0.0734	107	43-134%	---	---	
Chrysene	1.43	0.0681	0.137	mg/kg dry	20	1.37	ND	104	50-124%	---	---	
Dibenz(a,h)anthracene	1.36	0.0681	0.137	mg/kg dry	20	1.37	ND	99	45-134%	---	---	
Fluoranthene	1.54	0.0681	0.137	mg/kg dry	20	1.37	0.0761	107	50-127%	---	---	
Fluorene	1.47	0.0681	0.137	mg/kg dry	20	1.37	ND	107	43-125%	---	---	
Indeno(1,2,3-cd)pyrene	1.37	0.0681	0.137	mg/kg dry	20	1.37	ND	100	45-133%	---	---	
1-Methylnaphthalene	1.38	0.137	0.273	mg/kg dry	20	1.37	ND	101	40-120%	---	---	
2-Methylnaphthalene	1.41	0.137	0.273	mg/kg dry	20	1.37	ND	104	38-122%	---	---	
Naphthalene	1.42	0.137	0.273	mg/kg dry	20	1.37	ND	104	35-123%	---	---	
Phenanthrene	1.46	0.0681	0.137	mg/kg dry	20	1.37	ND	107	50-121%	---	---	
Pyrene	1.62	0.0681	0.137	mg/kg dry	20	1.37	0.152	107	47-127%	---	---	
Carbazole	1.36	0.102	0.205	mg/kg dry	20	1.37	ND	99	50-122%	---	---	
Dibenzofuran	1.43	0.0681	0.137	mg/kg dry	20	1.37	ND	105	44-120%	---	---	
4-Chloro-3-methylphenol	1.37	0.681	1.37	mg/kg dry	20	1.37	ND	101	45-122%	---	---	
2-Chlorophenol	1.23	0.341	0.681	mg/kg dry	20	1.37	ND	90	34-121%	---	---	
2,4-Dichlorophenol	1.45	0.341	0.681	mg/kg dry	20	1.37	ND	106	40-122%	---	---	

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
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QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100490 - EPA 3546												
Sediment												
Matrix Spike (9100490-MS2)												
Prepared: 10/01/19 10:35 Analyzed: 10/02/19 12:28												
QC Source Sample: Non-SDG (A910893-13RE1)												
2,4-Dimethylphenol	1.54	0.341	0.681	mg/kg dry	20	1.37	ND	113	30-127%	---	---	
2,4-Dinitrophenol	ND	1.70	3.41	mg/kg dry	20	1.37	ND		5-137%	---	---	Q-11, Q-41
4,6-Dinitro-2-methylphenol	1.79	1.70	3.41	mg/kg dry	20	1.37	ND	131	29-132%	---	---	Q-41, Ja
2-Methylphenol	1.38	0.170	0.341	mg/kg dry	20	1.37	ND	101	32-122%	---	---	
3+4-Methylphenol(s)	1.71	0.170	0.341	mg/kg dry	20	1.37	0.309	102	34-120%	---	---	
2-Nitrophenol	1.86	0.681	1.37	mg/kg dry	20	1.37	ND	136	36-123%	---	---	Q-11
4-Nitrophenol	1.70	0.681	1.37	mg/kg dry	20	1.37	ND	125	30-132%	---	---	
Pentachlorophenol (PCP)	1.69	0.681	1.37	mg/kg dry	20	1.37	ND	124	25-133%	---	---	
Phenol	1.28	0.137	0.273	mg/kg dry	20	1.37	ND	94	34-120%	---	---	
2,3,4,6-Tetrachlorophenol	1.41	0.341	0.681	mg/kg dry	20	1.37	ND	103	44-125%	---	---	
2,3,5,6-Tetrachlorophenol	1.61	0.341	0.681	mg/kg dry	20	1.37	ND	118	40-120%	---	---	
2,4,5-Trichlorophenol	1.57	0.341	0.681	mg/kg dry	20	1.37	ND	115	41-124%	---	---	
2,4,6-Trichlorophenol	1.57	0.341	0.681	mg/kg dry	20	1.37	ND	115	39-126%	---	---	
Bis(2-ethylhexyl)phthalate	1.56	1.02	2.05	mg/kg dry	20	1.37	ND	114	51-133%	---	---	Ja
Butyl benzyl phthalate	1.71	0.341	0.681	mg/kg dry	20	1.37	ND	125	48-132%	---	---	
Diethylphthalate	1.49	0.341	0.681	mg/kg dry	20	1.37	ND	109	50-124%	---	---	
Dimethylphthalate	1.45	0.341	0.681	mg/kg dry	20	1.37	ND	106	48-124%	---	---	
Di-n-butylphthalate	1.55	0.341	0.681	mg/kg dry	20	1.37	ND	113	51-128%	---	---	
Di-n-octyl phthalate	2.02	0.548	0.681	mg/kg dry	20	1.37	ND	148	44-140%	---	---	Q-01
N-Nitrosodimethylamine	0.850	0.170	0.341	mg/kg dry	20	1.37	ND	62	23-120%	---	---	
N-Nitroso-di-n-propylamine	1.18	0.170	0.341	mg/kg dry	20	1.37	ND	86	36-120%	---	---	
N-Nitrosodiphenylamine	1.49	0.170	0.341	mg/kg dry	20	1.37	ND	109	38-127%	---	---	
Bis(2-Chloroethoxy) methane	1.31	0.170	0.341	mg/kg dry	20	1.37	ND	96	36-121%	---	---	
Bis(2-Chloroethyl) ether	0.997	0.170	0.341	mg/kg dry	20	1.37	ND	73	31-120%	---	---	
2,2'-Oxybis(1-Chloropropane)	1.05	0.170	0.341	mg/kg dry	20	1.37	ND	77	33-131%	---	---	
Hexachlorobenzene	1.38	0.0681	0.137	mg/kg dry	20	1.37	ND	101	44-122%	---	---	
Hexachlorobutadiene	1.29	0.170	0.341	mg/kg dry	20	1.37	ND	95	32-123%	---	---	
Hexachlorocyclopentadiene	0.373	0.341	0.681	mg/kg dry	20	1.37	ND	27	5-140%	---	---	Q-41, Ja
Hexachloroethane	1.13	0.170	0.341	mg/kg dry	20	1.37	ND	83	28-120%	---	---	
2-Chloronaphthalene	1.47	0.0681	0.137	mg/kg dry	20	1.37	ND	107	41-120%	---	---	
1,2-Dichlorobenzene	1.20	0.170	0.341	mg/kg dry	20	1.37	ND	88	33-120%	---	---	
1,3-Dichlorobenzene	1.21	0.170	0.341	mg/kg dry	20	1.37	ND	89	30-120%	---	---	
1,4-Dichlorobenzene	1.16	0.170	0.341	mg/kg dry	20	1.37	ND	85	31-120%	---	---	

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tideland Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
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QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100490 - EPA 3546												
Sediment												
Matrix Spike (9100490-MS2)												
Prepared: 10/01/19 10:35 Analyzed: 10/02/19 12:28												
QC Source Sample: Non-SDG (A910893-13RE1)												
1,2,4-Trichlorobenzene	1.31	0.170	0.341	mg/kg dry	20	1.37	ND	96	34-120%	---	---	
4-Bromophenyl phenyl ether	1.45	0.170	0.341	mg/kg dry	20	1.37	ND	106	46-124%	---	---	
4-Chlorophenyl phenyl ether	1.48	0.170	0.341	mg/kg dry	20	1.37	ND	108	45-121%	---	---	
Aniline	0.837	0.341	0.681	mg/kg dry	20	1.37	ND	61	7-120%	---	---	Q-31
4-Chloroaniline	0.508	0.170	0.341	mg/kg dry	20	1.37	ND	37	16-120%	---	---	Q-31
2-Nitroaniline	1.60	1.37	2.73	mg/kg dry	20	1.37	ND	117	44-127%	---	---	Ja
3-Nitroaniline	ND	1.37	2.73	mg/kg dry	20	1.37	ND		33-120%	---	---	Q-11
4-Nitroaniline	ND	1.37	2.73	mg/kg dry	20	1.37	ND		35-120%	---	---	Q-11, Q-41
Nitrobenzene	1.19	0.681	1.37	mg/kg dry	20	1.37	ND	87	34-122%	---	---	Ja
2,4-Dinitrotoluene	1.54	0.681	1.37	mg/kg dry	20	1.37	ND	113	48-126%	---	---	
2,6-Dinitrotoluene	1.51	0.681	1.37	mg/kg dry	20	1.37	ND	111	46-124%	---	---	
Benzoic acid	ND	8.55	17.0	mg/kg dry	20	2.73	ND		5-140%	---	---	Q-11, Q-41
Benzyl alcohol	1.11	0.341	0.681	mg/kg dry	20	1.37	ND	81	29-122%	---	---	
Isophorone	1.21	0.170	0.341	mg/kg dry	20	1.37	ND	89	30-122%	---	---	
Azobenzene (1,2-DPH)	1.29	0.170	0.341	mg/kg dry	20	1.37	ND	95	39-125%	---	---	
Bis(2-Ethylhexyl) adipate	2.35	1.70	3.41	mg/kg dry	20	1.37	ND	172	60-121%	---	---	Q-11, Ja
3,3'-Dichlorobenzidine	2.03	1.37	2.73	mg/kg dry	20	2.73	ND	74	22-121%	---	---	Q-31, Ja
1,2-Dinitrobenzene	ND	1.70	3.41	mg/kg dry	20	1.37	ND		44-120%	---	---	Q-11
1,3-Dinitrobenzene	ND	1.70	3.41	mg/kg dry	20	1.37	ND		42-127%	---	---	Q-11
1,4-Dinitrobenzene	ND	1.70	3.41	mg/kg dry	20	1.37	ND		37-132%	---	---	Q-11
Pyridine	0.707	0.341	0.681	mg/kg dry	20	1.37	ND	52	5-120%	---	---	
<i>Surr: Nitrobenzene-d5 (Surr) Recovery: 81 % Limits: 37-122 % Dilution: 20x</i>												
<i>2-Fluorobiphenyl (Surr) 53 % 44-115 % "</i>												
<i>Phenol-d6 (Surr) 81 % 33-122 % "</i>												
<i>p-Terphenyl-d14 (Surr) 60 % 54-127 % "</i>												
<i>2-Fluorophenol (Surr) 85 % 35-115 % "</i>												
<i>2,4,6-Tribromophenol (Surr) 99 % 39-132 % "</i>												

Matrix Spike Dup (9100490-MSD1)												
Prepared: 10/01/19 10:34 Analyzed: 10/02/19 15:27												
QC Source Sample: Non-SDG (A910822-02RE1)												
Acenaphthene	1.28	0.0306	0.0614	mg/kg dry	10	1.23	0.135	94	40-122%	4	30%	
Acenaphthylene	1.32	0.0306	0.0614	mg/kg dry	10	1.23	ND	107	32-132%	2	30%	
Anthracene	1.36	0.0306	0.0614	mg/kg dry	10	1.23	0.204	94	47-123%	2	30%	

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
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QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100490 - EPA 3546												
Sediment												
Matrix Spike Dup (9100490-MSD1)						Prepared: 10/01/19 10:34 Analyzed: 10/02/19 15:27						
QC Source Sample: Non-SDG (A910822-02RE1)												
Benz(a)anthracene	1.30	0.0306	0.0614	mg/kg dry	10	1.23	0.218	89	49-126%	3	30%	
Benzo(a)pyrene	1.38	0.0460	0.0920	mg/kg dry	10	1.23	0.154	100	45-129%	5	30%	
Benzo(b)fluoranthene	1.32	0.0460	0.0920	mg/kg dry	10	1.23	0.180	93	45-132%	3	30%	
Benzo(k)fluoranthene	1.26	0.0460	0.0920	mg/kg dry	10	1.23	0.0758	97	47-132%	6	30%	
Benzo(g,h,i)perylene	1.40	0.0306	0.0614	mg/kg dry	10	1.23	0.0680	108	43-134%	6	30%	
Chrysene	1.33	0.0306	0.0614	mg/kg dry	10	1.23	0.199	92	50-124%	4	30%	
Dibenz(a,h)anthracene	1.26	0.0306	0.0614	mg/kg dry	10	1.23	ND	103	45-134%	3	30%	
Fluoranthene	1.59	0.0306	0.0614	mg/kg dry	10	1.23	1.15	35	50-127%	0.2	30%	Q-01
Fluorene	1.34	0.0306	0.0614	mg/kg dry	10	1.23	0.136	98	43-125%	3	30%	
Indeno(1,2,3-cd)pyrene	1.21	0.0306	0.0614	mg/kg dry	10	1.23	0.0695	93	45-133%	6	30%	
1-Methylnaphthalene	1.24	0.0614	0.123	mg/kg dry	10	1.23	0.0767	95	40-120%	0.9	30%	
2-Methylnaphthalene	1.28	0.0614	0.123	mg/kg dry	10	1.23	0.149	93	38-122%	0.5	30%	
Naphthalene	1.38	0.0614	0.123	mg/kg dry	10	1.23	0.491	73	35-123%	1	30%	
Phenanthrene	1.39	0.0306	0.0614	mg/kg dry	10	1.23	0.491	73	50-121%	3	30%	
Pyrene	1.55	0.0306	0.0614	mg/kg dry	10	1.23	0.823	59	47-127%	3	30%	
Carbazole	1.25	0.0460	0.0920	mg/kg dry	10	1.23	0.0536	98	50-122%	2	30%	
Dibenzofuran	1.29	0.0306	0.0614	mg/kg dry	10	1.23	0.145	94	44-120%	2	30%	
4-Chloro-3-methylphenol	1.29	0.306	0.614	mg/kg dry	10	1.23	ND	105	45-122%	3	30%	
2-Chlorophenol	1.12	0.153	0.306	mg/kg dry	10	1.23	ND	92	34-121%	5	30%	
2,4-Dichlorophenol	1.30	0.153	0.306	mg/kg dry	10	1.23	ND	106	40-122%	0.5	30%	
2,4-Dimethylphenol	1.49	0.153	0.306	mg/kg dry	10	1.23	ND	121	30-127%	0.3	30%	
2,4-Dinitrophenol	ND	0.766	1.53	mg/kg dry	10	1.23	ND		5-137%		30%	Q-11, Q-41
4,6-Dinitro-2-methylphenol	0.870	0.766	1.53	mg/kg dry	10	1.23	ND	71	29-132%	6	30%	Q-41, Ja
2-Methylphenol	1.24	0.0766	0.153	mg/kg dry	10	1.23	ND	101	32-122%	3	30%	
3+4-Methylphenol(s)	2.84	0.0766	0.153	mg/kg dry	10	1.23	1.60	101	34-120%	1	30%	
2-Nitrophenol	1.46	0.306	0.614	mg/kg dry	10	1.23	ND	119	36-123%	3	30%	
4-Nitrophenol	1.31	0.306	0.614	mg/kg dry	10	1.23	ND	107	30-132%	0.7	30%	
Pentachlorophenol (PCP)	1.50	0.306	0.614	mg/kg dry	10	1.23	ND	123	25-133%	1	30%	
Phenol	1.25	0.0614	0.123	mg/kg dry	10	1.23	0.571	56	34-120%	3	30%	
2,3,4,6-Tetrachlorophenol	1.31	0.153	0.306	mg/kg dry	10	1.23	ND	107	44-125%	1	30%	
2,3,5,6-Tetrachlorophenol	1.39	0.153	0.306	mg/kg dry	10	1.23	ND	113	40-120%	2	30%	
2,4,5-Trichlorophenol	1.37	0.153	0.306	mg/kg dry	10	1.23	ND	112	41-124%	0.3	30%	
2,4,6-Trichlorophenol	1.39	0.153	0.306	mg/kg dry	10	1.23	ND	113	39-126%	1	30%	

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tideland Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
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QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100490 - EPA 3546												
Sediment												
Matrix Spike Dup (9100490-MSD1)												
Prepared: 10/01/19 10:34 Analyzed: 10/02/19 15:27												
QC Source Sample: Non-SDG (A910822-02RE1)												
Bis(2-ethylhexyl)phthalate	1.59	0.460	0.920	mg/kg dry	10	1.23	ND	130	51-133%	1	30%	
Butyl benzyl phthalate	1.58	0.153	0.306	mg/kg dry	10	1.23	ND	129	48-132%	8	30%	
Diethylphthalate	1.35	0.153	0.306	mg/kg dry	10	1.23	ND	110	50-124%	1	30%	
Dimethylphthalate	1.31	0.153	0.306	mg/kg dry	10	1.23	ND	107	48-124%	2	30%	
Di-n-butylphthalate	1.42	0.153	0.306	mg/kg dry	10	1.23	0.213	98	51-128%	0.9	30%	
Di-n-octyl phthalate	1.81	0.246	0.306	mg/kg dry	10	1.23	ND	148	44-140%	4	30%	Q-01
N-Nitrosodimethylamine	0.752	0.0766	0.153	mg/kg dry	10	1.23	ND	61	23-120%	5	30%	
N-Nitroso-di-n-propylamine	1.06	0.0766	0.153	mg/kg dry	10	1.23	ND	86	36-120%	4	30%	
N-Nitrosodiphenylamine	1.25	0.0766	0.153	mg/kg dry	10	1.23	ND	102	38-127%	0.8	30%	
Bis(2-Chloroethoxy) methane	1.15	0.0766	0.153	mg/kg dry	10	1.23	ND	94	36-121%	0.8	30%	
Bis(2-Chloroethyl) ether	0.886	0.0766	0.153	mg/kg dry	10	1.23	ND	72	31-120%	4	30%	
2,2'-Oxybis(1-Chloropropane)	0.915	0.0766	0.153	mg/kg dry	10	1.23	ND	75	33-131%	1	30%	
Hexachlorobenzene	1.27	0.0306	0.0614	mg/kg dry	10	1.23	ND	103	44-122%	2	30%	
Hexachlorobutadiene	1.19	0.0766	0.153	mg/kg dry	10	1.23	ND	97	32-123%	0.03	30%	
Hexachlorocyclopentadiene	0.373	0.153	0.306	mg/kg dry	10	1.23	ND	30	5-140%	200	30%	Q-01, Q-41
Hexachloroethane	1.05	0.0766	0.153	mg/kg dry	10	1.23	ND	86	28-120%	2	30%	
2-Chloronaphthalene	1.25	0.0306	0.0614	mg/kg dry	10	1.23	ND	102	41-120%	0.1	30%	
1,2-Dichlorobenzene	1.04	0.0766	0.153	mg/kg dry	10	1.23	ND	85	33-120%	5	30%	
1,3-Dichlorobenzene	1.04	0.0766	0.153	mg/kg dry	10	1.23	ND	85	30-120%	2	30%	
1,4-Dichlorobenzene	1.03	0.0766	0.153	mg/kg dry	10	1.23	ND	84	31-120%	5	30%	
1,2,4-Trichlorobenzene	1.15	0.0766	0.153	mg/kg dry	10	1.23	ND	94	34-120%	1	30%	
4-Bromophenyl phenyl ether	1.28	0.0766	0.153	mg/kg dry	10	1.23	ND	105	46-124%	2	30%	
4-Chlorophenyl phenyl ether	1.25	0.0766	0.153	mg/kg dry	10	1.23	ND	102	45-121%	2	30%	
Aniline	0.813	0.690	0.690	mg/kg dry	10	1.23	ND	66	7-120%	25	30%	Q-31
4-Chloroaniline	0.377	0.0766	0.153	mg/kg dry	10	1.23	ND	31	16-120%	15	30%	Q-31
2-Nitroaniline	1.50	0.614	1.23	mg/kg dry	10	1.23	ND	123	44-127%	3	30%	
3-Nitroaniline	0.655	0.614	1.23	mg/kg dry	10	1.23	ND	53	33-120%	200	30%	Q-01, Ja
4-Nitroaniline	1.27	0.614	1.23	mg/kg dry	10	1.23	ND	104	35-120%	3	30%	Q-41
Nitrobenzene	1.04	0.306	0.614	mg/kg dry	10	1.23	ND	85	34-122%	6	30%	
2,4-Dinitrotoluene	1.26	0.306	0.614	mg/kg dry	10	1.23	ND	103	48-126%	2	30%	
2,6-Dinitrotoluene	1.32	0.306	0.614	mg/kg dry	10	1.23	ND	107	46-124%	4	30%	
Benzoic acid	ND	3.84	7.66	mg/kg dry	10	2.45	ND		5-140%		30%	Q-11, Q-41
Benzyl alcohol	1.17	0.153	0.306	mg/kg dry	10	1.23	ND	95	29-122%	4	30%	

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tideland Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
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QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100490 - EPA 3546												
Sediment												
Matrix Spike Dup (9100490-MSD1) Prepared: 10/01/19 10:34 Analyzed: 10/02/19 15:27												
QC Source Sample: Non-SDG (A910822-02RE1)												
Isophorone	1.13	0.0766	0.153	mg/kg dry	10	1.23	ND	93	30-122%	0.8	30%	
Azobenzene (1,2-DPH)	1.17	0.0766	0.153	mg/kg dry	10	1.23	ND	96	39-125%	2	30%	
Bis(2-Ethylhexyl) adipate	5.77	0.766	1.53	mg/kg dry	10	1.23	2.18	293	60-121%	85	30%	Q-03
3,3'-Dichlorobenzidine	0.738	0.614	1.23	mg/kg dry	10	2.45	ND	30	22-121%	200	30%	Q-01, Q-31, Ja
1,2-Dinitrobenzene	1.03	0.766	1.53	mg/kg dry	10	1.23	ND	84	44-120%	0.1	30%	Ja
1,3-Dinitrobenzene	1.33	0.766	1.53	mg/kg dry	10	1.23	ND	108	42-127%	5	30%	Ja
1,4-Dinitrobenzene	1.09	0.766	1.53	mg/kg dry	10	1.23	ND	89	37-132%	11	30%	Ja
Pyridine	0.588	0.153	0.306	mg/kg dry	10	1.23	ND	48	5-120%	4	30%	
<i>Surr: Nitrobenzene-d5 (Surr) Recovery: 82 % Limits: 37-122 % Dilution: 10x</i>												
<i>2-Fluorobiphenyl (Surr) 85 % 44-115 % "</i>												
<i>Phenol-d6 (Surr) 87 % 33-122 % "</i>												
<i>p-Terphenyl-d14 (Surr) 95 % 54-127 % "</i>												
<i>2-Fluorophenol (Surr) 84 % 35-115 % "</i>												
<i>2,4,6-Tribromophenol (Surr) 113 % 39-132 % "</i>												

Matrix Spike Dup (9100490-MSD2) Prepared: 10/01/19 10:35 Analyzed: 10/02/19 13:04												
QC Source Sample: Non-SDG (A910893-13RE1)												
Acenaphthene	1.41	0.0676	0.136	mg/kg dry	20	1.35	ND	104	40-122%	1	30%	
Acenaphthylene	1.46	0.0676	0.136	mg/kg dry	20	1.35	ND	107	32-132%	0.3	30%	
Anthracene	1.49	0.0676	0.136	mg/kg dry	20	1.35	ND	110	47-123%	0.1	30%	
Benz(a)anthracene	1.46	0.0676	0.136	mg/kg dry	20	1.35	ND	107	49-126%	2	30%	
Benzo(a)pyrene	1.64	0.102	0.203	mg/kg dry	20	1.35	0.167	109	45-129%	2	30%	
Benzo(b)fluoranthene	1.54	0.102	0.203	mg/kg dry	20	1.35	0.121	105	45-132%	4	30%	
Benzo(k)fluoranthene	1.43	0.102	0.203	mg/kg dry	20	1.35	ND	105	47-132%	2	30%	
Benzo(g,h,i)perylene	1.58	0.0676	0.136	mg/kg dry	20	1.35	0.0734	111	43-134%	3	30%	
Chrysene	1.50	0.0676	0.136	mg/kg dry	20	1.35	ND	111	50-124%	5	30%	
Dibenz(a,h)anthracene	1.48	0.0676	0.136	mg/kg dry	20	1.35	ND	109	45-134%	9	30%	
Fluoranthene	1.56	0.0676	0.136	mg/kg dry	20	1.35	0.0761	110	50-127%	2	30%	
Fluorene	1.43	0.0676	0.136	mg/kg dry	20	1.35	ND	106	43-125%	2	30%	
Indeno(1,2,3-cd)pyrene	1.37	0.0676	0.136	mg/kg dry	20	1.35	ND	101	45-133%	0.1	30%	
1-Methylnaphthalene	1.39	0.136	0.271	mg/kg dry	20	1.35	ND	103	40-120%	1	30%	
2-Methylnaphthalene	1.40	0.136	0.271	mg/kg dry	20	1.35	ND	103	38-122%	1	30%	

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tideland Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
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QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100490 - EPA 3546												
Sediment												
Matrix Spike Dup (9100490-MSD2)												
Prepared: 10/01/19 10:35 Analyzed: 10/02/19 13:04												
QC Source Sample: Non-SDG (A910893-13RE1)												
Naphthalene	1.46	0.136	0.271	mg/kg dry	20	1.35	ND	108	35-123%	3	30%	
Phenanthrene	1.49	0.0676	0.136	mg/kg dry	20	1.35	ND	110	50-121%	2	30%	
Pyrene	1.63	0.0676	0.136	mg/kg dry	20	1.35	0.152	109	47-127%	1	30%	
Carbazole	1.40	0.102	0.203	mg/kg dry	20	1.35	ND	104	50-122%	3	30%	
Dibenzofuran	1.38	0.0676	0.136	mg/kg dry	20	1.35	ND	102	44-120%	3	30%	
4-Chloro-3-methylphenol	1.41	0.676	1.36	mg/kg dry	20	1.35	ND	104	45-122%	3	30%	
2-Chlorophenol	1.32	0.339	0.676	mg/kg dry	20	1.35	ND	98	34-121%	8	30%	
2,4-Dichlorophenol	1.47	0.339	0.676	mg/kg dry	20	1.35	ND	109	40-122%	1	30%	
2,4-Dimethylphenol	1.58	0.339	0.676	mg/kg dry	20	1.35	ND	117	30-127%	3	30%	
2,4-Dinitrophenol	ND	1.69	3.39	mg/kg dry	20	1.35	ND		5-137%		30%	Q-11, Q-41
4,6-Dinitro-2-methylphenol	1.80	1.69	3.39	mg/kg dry	20	1.35	ND	133	29-132%	0.8	30%	Q-11, Q-41, Ja
2-Methylphenol	1.39	0.169	0.339	mg/kg dry	20	1.35	ND	103	32-122%	1	30%	
3+4-Methylphenol(s)	2.11	0.169	0.339	mg/kg dry	20	1.35	0.309	133	34-120%	21	30%	Q-01
2-Nitrophenol	1.70	0.676	1.36	mg/kg dry	20	1.35	ND	126	36-123%	9	30%	Q-11
4-Nitrophenol	1.64	0.676	1.36	mg/kg dry	20	1.35	ND	121	30-132%	4	30%	
Pentachlorophenol (PCP)	1.85	0.676	1.36	mg/kg dry	20	1.35	ND	137	25-133%	9	30%	Q-01
Phenol	1.43	0.136	0.271	mg/kg dry	20	1.35	ND	106	34-120%	12	30%	
2,3,4,6-Tetrachlorophenol	1.53	0.339	0.676	mg/kg dry	20	1.35	ND	113	44-125%	9	30%	
2,3,5,6-Tetrachlorophenol	1.59	0.339	0.676	mg/kg dry	20	1.35	ND	117	40-120%	1	30%	
2,4,5-Trichlorophenol	1.60	0.339	0.676	mg/kg dry	20	1.35	ND	118	41-124%	2	30%	
2,4,6-Trichlorophenol	1.63	0.339	0.676	mg/kg dry	20	1.35	ND	120	39-126%	4	30%	
Bis(2-ethylhexyl)phthalate	1.74	1.02	2.03	mg/kg dry	20	1.35	ND	128	51-133%	11	30%	Ja
Butyl benzyl phthalate	1.83	0.339	0.676	mg/kg dry	20	1.35	ND	135	48-132%	7	30%	Q-01
Diethylphthalate	1.48	0.339	0.676	mg/kg dry	20	1.35	ND	109	50-124%	0.8	30%	
Dimethylphthalate	1.44	0.339	0.676	mg/kg dry	20	1.35	ND	106	48-124%	0.7	30%	
Di-n-butylphthalate	1.60	0.339	0.676	mg/kg dry	20	1.35	ND	118	51-128%	3	30%	
Di-n-octyl phthalate	2.15	0.543	0.676	mg/kg dry	20	1.35	ND	158	44-140%	6	30%	Q-01
N-Nitrosodimethylamine	0.856	0.169	0.339	mg/kg dry	20	1.35	ND	63	23-120%	0.6	30%	
N-Nitroso-di-n-propylamine	1.23	0.169	0.339	mg/kg dry	20	1.35	ND	91	36-120%	4	30%	
N-Nitrosodiphenylamine	1.50	0.169	0.339	mg/kg dry	20	1.35	ND	111	38-127%	0.8	30%	
Bis(2-Chloroethoxy) methane	1.32	0.169	0.339	mg/kg dry	20	1.35	ND	97	36-121%	0.7	30%	
Bis(2-Chloroethyl) ether	1.01	0.169	0.339	mg/kg dry	20	1.35	ND	75	31-120%	1	30%	
2,2'-Oxybis(1-Chloropropane)	1.10	0.169	0.339	mg/kg dry	20	1.35	ND	81	33-131%	5	30%	

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
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QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100490 - EPA 3546												
Sediment												
Matrix Spike Dup (9100490-MSD2)												
Prepared: 10/01/19 10:35 Analyzed: 10/02/19 13:04												
QC Source Sample: Non-SDG (A9I0893-13RE1)												
Hexachlorobenzene	1.47	0.0676	0.136	mg/kg dry	20	1.35	ND	108	44-122%	6	30%	
Hexachlorobutadiene	1.39	0.169	0.339	mg/kg dry	20	1.35	ND	103	32-123%	8	30%	
Hexachlorocyclopentadiene	ND	0.339	0.676	mg/kg dry	20	1.35	ND		5-140%	200	30%	Q-11, Q-41
Hexachloroethane	1.17	0.169	0.339	mg/kg dry	20	1.35	ND	86	28-120%	3	30%	
2-Chloronaphthalene	1.45	0.0676	0.136	mg/kg dry	20	1.35	ND	107	41-120%	0.8	30%	
1,2-Dichlorobenzene	1.25	0.169	0.339	mg/kg dry	20	1.35	ND	92	33-120%	4	30%	
1,3-Dichlorobenzene	1.25	0.169	0.339	mg/kg dry	20	1.35	ND	92	30-120%	3	30%	
1,4-Dichlorobenzene	1.22	0.169	0.339	mg/kg dry	20	1.35	ND	90	31-120%	5	30%	
1,2,4-Trichlorobenzene	1.35	0.169	0.339	mg/kg dry	20	1.35	ND	100	34-120%	3	30%	
4-Bromophenyl phenyl ether	1.46	0.169	0.339	mg/kg dry	20	1.35	ND	108	46-124%	0.5	30%	
4-Chlorophenyl phenyl ether	1.42	0.169	0.339	mg/kg dry	20	1.35	ND	105	45-121%	4	30%	
Aniline	0.801	0.339	0.676	mg/kg dry	20	1.35	ND	59	7-120%	4	30%	Q-31
4-Chloroaniline	0.583	0.169	0.339	mg/kg dry	20	1.35	ND	43	16-120%	14	30%	Q-31
2-Nitroaniline	1.68	1.36	2.71	mg/kg dry	20	1.35	ND	124	44-127%	5	30%	Ja
3-Nitroaniline	ND	1.36	2.71	mg/kg dry	20	1.35	ND		33-120%		30%	Q-11
4-Nitroaniline	1.44	1.36	2.71	mg/kg dry	20	1.35	ND	107	35-120%	200	30%	Q-11, Q-41, Ja
Nitrobenzene	1.23	0.676	1.36	mg/kg dry	20	1.35	ND	91	34-122%	4	30%	Ja
2,4-Dinitrotoluene	1.49	0.676	1.36	mg/kg dry	20	1.35	ND	110	48-126%	3	30%	
2,6-Dinitrotoluene	1.47	0.676	1.36	mg/kg dry	20	1.35	ND	109	46-124%	3	30%	
Benzoic acid	ND	8.48	16.9	mg/kg dry	20	2.71	ND		5-140%		30%	Q-11, Q-41
Benzyl alcohol	1.24	0.339	0.676	mg/kg dry	20	1.35	ND	91	29-122%	11	30%	
Isophorone	1.32	0.169	0.339	mg/kg dry	20	1.35	ND	97	30-122%	9	30%	
Azobenzene (1,2-DPH)	1.31	0.169	0.339	mg/kg dry	20	1.35	ND	97	39-125%	1	30%	
Bis(2-Ethylhexyl) adipate	2.25	1.69	3.39	mg/kg dry	20	1.35	ND	166	60-121%	4	30%	Q-11, Ja
3,3'-Dichlorobenzidine	ND	1.36	2.71	mg/kg dry	20	2.71	ND		22-121%	200	30%	Q-01, Q-31
1,2-Dinitrobenzene	ND	1.69	3.39	mg/kg dry	20	1.35	ND		44-120%		30%	Q-11
1,3-Dinitrobenzene	ND	1.69	3.39	mg/kg dry	20	1.35	ND		42-127%		30%	Q-11
1,4-Dinitrobenzene	ND	1.69	3.39	mg/kg dry	20	1.35	ND		37-132%		30%	Q-11
Pyridine	0.598	0.339	0.676	mg/kg dry	20	1.35	ND	44	5-120%	17	30%	Ja
Surr: Nitrobenzene-d5 (Surr) Recovery: 82 % Limits: 37-122 % Dilution: 20x												
2-Fluorobiphenyl (Surr) 66 % 44-115 % "												
Phenol-d6 (Surr) 84 % 33-122 % "												

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Philip Nerenberg, Lab Director



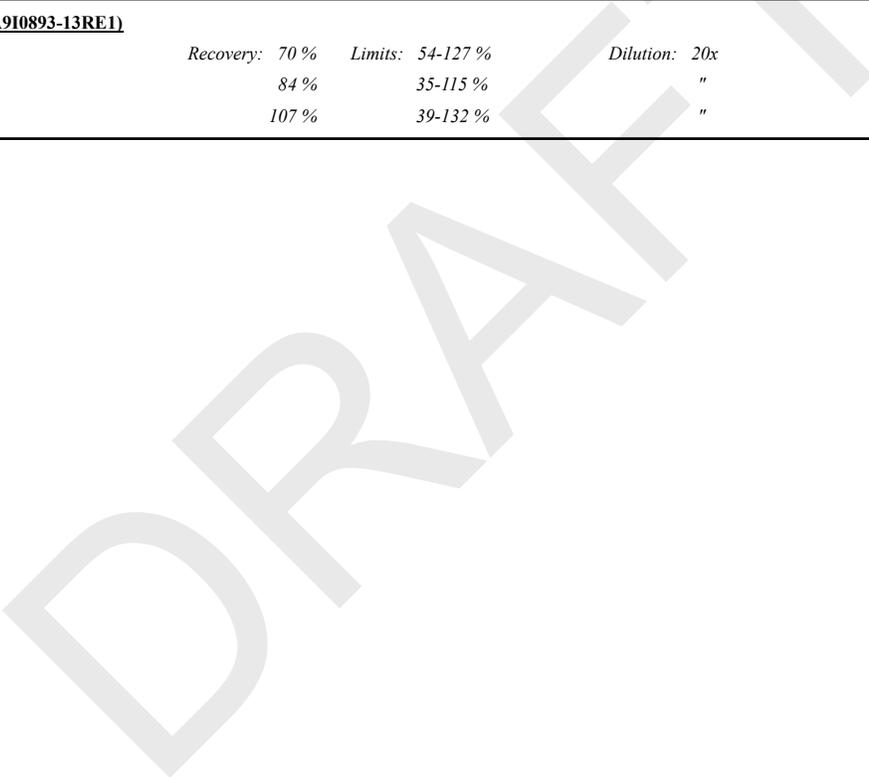
AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
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QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100490 - EPA 3546							Sediment					
Matrix Spike Dup (9100490-MSD2)					Prepared: 10/01/19 10:35 Analyzed: 10/02/19 13:04							
QC Source Sample: Non-SDG (A9I0893-13RE1)												
Surr: <i>p</i> -Terphenyl- <i>d</i> 14 (Surr)		Recovery: 70 %		Limits: 54-127 %		Dilution: 20x						
2-Fluorophenol (Surr)		84 %		35-115 %		"						
2,4,6-Tribromophenol (Surr)		107 %		39-132 %		"						





AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
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QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100740 - EPA 3546						Sediment						
Blank (9100740-BLK1)			Prepared: 10/07/19 11:27 Analyzed: 10/07/19 16:55									
EPA 8270D												
Acenaphthene	ND	0.00125	0.00250	mg/kg wet	1	---	---	---	---	---	---	
Acenaphthylene	ND	0.00125	0.00250	mg/kg wet	1	---	---	---	---	---	---	
Anthracene	ND	0.00125	0.00250	mg/kg wet	1	---	---	---	---	---	---	
Benz(a)anthracene	ND	0.00125	0.00250	mg/kg wet	1	---	---	---	---	---	---	
Benzo(a)pyrene	ND	0.00188	0.00375	mg/kg wet	1	---	---	---	---	---	---	
Benzo(b)fluoranthene	ND	0.00188	0.00375	mg/kg wet	1	---	---	---	---	---	---	
Benzo(k)fluoranthene	ND	0.00188	0.00375	mg/kg wet	1	---	---	---	---	---	---	
Benzo(g,h,i)perylene	ND	0.00125	0.00250	mg/kg wet	1	---	---	---	---	---	---	
Chrysene	ND	0.00125	0.00250	mg/kg wet	1	---	---	---	---	---	---	
Dibenz(a,h)anthracene	ND	0.00125	0.00250	mg/kg wet	1	---	---	---	---	---	---	
Fluoranthene	ND	0.00125	0.00250	mg/kg wet	1	---	---	---	---	---	---	
Fluorene	ND	0.00125	0.00250	mg/kg wet	1	---	---	---	---	---	---	
Indeno(1,2,3-cd)pyrene	ND	0.00125	0.00250	mg/kg wet	1	---	---	---	---	---	---	
1-Methylnaphthalene	ND	0.00250	0.00500	mg/kg wet	1	---	---	---	---	---	---	
2-Methylnaphthalene	ND	0.00250	0.00500	mg/kg wet	1	---	---	---	---	---	---	
Naphthalene	ND	0.00250	0.00500	mg/kg wet	1	---	---	---	---	---	---	
Phenanthrene	ND	0.00125	0.00250	mg/kg wet	1	---	---	---	---	---	---	
Pyrene	ND	0.00125	0.00250	mg/kg wet	1	---	---	---	---	---	---	
Carbazole	ND	0.00188	0.00375	mg/kg wet	1	---	---	---	---	---	---	
Dibenzofuran	ND	0.00125	0.00250	mg/kg wet	1	---	---	---	---	---	---	
4-Chloro-3-methylphenol	ND	0.0125	0.0250	mg/kg wet	1	---	---	---	---	---	---	
2-Chlorophenol	ND	0.00625	0.0125	mg/kg wet	1	---	---	---	---	---	---	
2,4-Dichlorophenol	ND	0.00625	0.0125	mg/kg wet	1	---	---	---	---	---	---	
2,4-Dimethylphenol	ND	0.00625	0.0125	mg/kg wet	1	---	---	---	---	---	---	
2,4-Dinitrophenol	ND	0.0312	0.0625	mg/kg wet	1	---	---	---	---	---	---	
4,6-Dinitro-2-methylphenol	ND	0.0312	0.0625	mg/kg wet	1	---	---	---	---	---	---	
2-Methylphenol	ND	0.00312	0.00625	mg/kg wet	1	---	---	---	---	---	---	
3+4-Methylphenol(s)	ND	0.00312	0.00625	mg/kg wet	1	---	---	---	---	---	---	
2-Nitrophenol	ND	0.0125	0.0250	mg/kg wet	1	---	---	---	---	---	---	
4-Nitrophenol	ND	0.0125	0.0250	mg/kg wet	1	---	---	---	---	---	---	
Pentachlorophenol (PCP)	ND	0.0125	0.0250	mg/kg wet	1	---	---	---	---	---	---	
Phenol	ND	0.00250	0.00500	mg/kg wet	1	---	---	---	---	---	---	
2,3,4,6-Tetrachlorophenol	ND	0.00625	0.0125	mg/kg wet	1	---	---	---	---	---	---	

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100740 - EPA 3546						Sediment						
Blank (9100740-BLK1)			Prepared: 10/07/19 11:27 Analyzed: 10/07/19 16:55									
2,3,5,6-Tetrachlorophenol	ND	0.00625	0.0125	mg/kg wet	1	---	---	---	---	---	---	
2,4,5-Trichlorophenol	ND	0.00625	0.0125	mg/kg wet	1	---	---	---	---	---	---	
2,4,6-Trichlorophenol	ND	0.00625	0.0125	mg/kg wet	1	---	---	---	---	---	---	
Bis(2-ethylhexyl)phthalate	ND	0.0188	0.0375	mg/kg wet	1	---	---	---	---	---	---	
Butyl benzyl phthalate	ND	0.00625	0.0125	mg/kg wet	1	---	---	---	---	---	---	
Diethylphthalate	ND	0.00625	0.0125	mg/kg wet	1	---	---	---	---	---	---	
Dimethylphthalate	ND	0.00625	0.0125	mg/kg wet	1	---	---	---	---	---	---	
Di-n-butylphthalate	ND	0.00625	0.0125	mg/kg wet	1	---	---	---	---	---	---	
Di-n-octyl phthalate	ND	0.0100	0.0125	mg/kg wet	1	---	---	---	---	---	---	
N-Nitrosodimethylamine	ND	0.00312	0.00625	mg/kg wet	1	---	---	---	---	---	---	
N-Nitroso-di-n-propylamine	ND	0.00312	0.00625	mg/kg wet	1	---	---	---	---	---	---	
N-Nitrosodiphenylamine	ND	0.00312	0.00625	mg/kg wet	1	---	---	---	---	---	---	
Bis(2-Chloroethoxy) methane	ND	0.00312	0.00625	mg/kg wet	1	---	---	---	---	---	---	
Bis(2-Chloroethyl) ether	ND	0.00312	0.00625	mg/kg wet	1	---	---	---	---	---	---	
2,2'-Oxybis(1-Chloropropane)	ND	0.00312	0.00625	mg/kg wet	1	---	---	---	---	---	---	
Hexachlorobenzene	ND	0.00125	0.00250	mg/kg wet	1	---	---	---	---	---	---	
Hexachlorobutadiene	ND	0.00312	0.00625	mg/kg wet	1	---	---	---	---	---	---	
Hexachlorocyclopentadiene	ND	0.00625	0.0125	mg/kg wet	1	---	---	---	---	---	---	
Hexachloroethane	ND	0.00312	0.00625	mg/kg wet	1	---	---	---	---	---	---	
2-Chloronaphthalene	ND	0.00125	0.00250	mg/kg wet	1	---	---	---	---	---	---	
1,2-Dichlorobenzene	ND	0.00312	0.00625	mg/kg wet	1	---	---	---	---	---	---	
1,3-Dichlorobenzene	ND	0.00312	0.00625	mg/kg wet	1	---	---	---	---	---	---	
1,4-Dichlorobenzene	ND	0.00312	0.00625	mg/kg wet	1	---	---	---	---	---	---	
1,2,4-Trichlorobenzene	ND	0.00312	0.00625	mg/kg wet	1	---	---	---	---	---	---	
4-Bromophenyl phenyl ether	ND	0.00312	0.00625	mg/kg wet	1	---	---	---	---	---	---	
4-Chlorophenyl phenyl ether	ND	0.00312	0.00625	mg/kg wet	1	---	---	---	---	---	---	
Aniline	ND	0.00625	0.0125	mg/kg wet	1	---	---	---	---	---	---	
4-Chloroaniline	ND	0.00312	0.00625	mg/kg wet	1	---	---	---	---	---	---	
2-Nitroaniline	ND	0.0250	0.0500	mg/kg wet	1	---	---	---	---	---	---	
3-Nitroaniline	ND	0.0250	0.0500	mg/kg wet	1	---	---	---	---	---	---	
4-Nitroaniline	ND	0.0250	0.0500	mg/kg wet	1	---	---	---	---	---	---	
Nitrobenzene	ND	0.0125	0.0250	mg/kg wet	1	---	---	---	---	---	---	
2,4-Dinitrotoluene	ND	0.0125	0.0250	mg/kg wet	1	---	---	---	---	---	---	
2,6-Dinitrotoluene	ND	0.0125	0.0250	mg/kg wet	1	---	---	---	---	---	---	

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
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QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100740 - EPA 3546												
Sediment												
Blank (9100740-BLK1)												
Prepared: 10/07/19 11:27 Analyzed: 10/07/19 16:55												
Benzoic acid	ND	0.157	0.312	mg/kg wet	1	---	---	---	---	---	---	
Benzyl alcohol	ND	0.00625	0.0125	mg/kg wet	1	---	---	---	---	---	---	
Isophorone	ND	0.00312	0.00625	mg/kg wet	1	---	---	---	---	---	---	
Azobenzene (1,2-DPH)	ND	0.00312	0.00625	mg/kg wet	1	---	---	---	---	---	---	
Bis(2-Ethylhexyl) adipate	ND	0.0312	0.0625	mg/kg wet	1	---	---	---	---	---	---	
3,3'-Dichlorobenzidine	ND	0.0250	0.0500	mg/kg wet	1	---	---	---	---	---	---	Q-52
1,2-Dinitrobenzene	ND	0.0312	0.0625	mg/kg wet	1	---	---	---	---	---	---	
1,3-Dinitrobenzene	ND	0.0312	0.0625	mg/kg wet	1	---	---	---	---	---	---	
1,4-Dinitrobenzene	ND	0.0312	0.0625	mg/kg wet	1	---	---	---	---	---	---	
Pyridine	ND	0.00625	0.0125	mg/kg wet	1	---	---	---	---	---	---	
<i>Surr: Nitrobenzene-d5 (Surr) Recovery: 77 % Limits: 37-122 % Dilution: 1x</i>												
<i>2-Fluorobiphenyl (Surr) 81 % 44-115 % "</i>												
<i>Phenol-d6 (Surr) 75 % 33-122 % "</i>												
<i>p-Terphenyl-d14 (Surr) 95 % 54-127 % "</i>												
<i>2-Fluorophenol (Surr) 71 % 35-115 % "</i>												
<i>2,4,6-Tribromophenol (Surr) 90 % 39-132 % "</i>												

LCS (9100740-BS1)												
Prepared: 10/07/19 11:27 Analyzed: 10/07/19 17:29												
EPA 8270D												
Acenaphthene	0.507	0.00532	0.0107	mg/kg wet	4	0.533	---	95	40-122%	---	---	
Acenaphthylene	0.522	0.00532	0.0107	mg/kg wet	4	0.533	---	98	32-132%	---	---	
Anthracene	0.531	0.00532	0.0107	mg/kg wet	4	0.533	---	100	47-123%	---	---	
Benz(a)anthracene	0.510	0.00532	0.0107	mg/kg wet	4	0.533	---	96	49-126%	---	---	
Benzo(a)pyrene	0.514	0.00800	0.0160	mg/kg wet	4	0.533	---	96	45-129%	---	---	
Benzo(b)fluoranthene	0.523	0.00800	0.0160	mg/kg wet	4	0.533	---	98	45-132%	---	---	
Benzo(k)fluoranthene	0.537	0.00800	0.0160	mg/kg wet	4	0.533	---	101	47-132%	---	---	
Benzo(g,h,i)perylene	0.517	0.00532	0.0107	mg/kg wet	4	0.533	---	97	43-134%	---	---	
Chrysene	0.509	0.00532	0.0107	mg/kg wet	4	0.533	---	95	50-124%	---	---	
Dibenz(a,h)anthracene	0.511	0.00532	0.0107	mg/kg wet	4	0.533	---	96	45-134%	---	---	
Fluoranthene	0.556	0.00532	0.0107	mg/kg wet	4	0.533	---	104	50-127%	---	---	
Fluorene	0.507	0.00532	0.0107	mg/kg wet	4	0.533	---	95	43-125%	---	---	
Indeno(1,2,3-cd)pyrene	0.481	0.00532	0.0107	mg/kg wet	4	0.533	---	90	45-133%	---	---	
1-Methylnaphthalene	0.486	0.0107	0.0213	mg/kg wet	4	0.533	---	91	40-120%	---	---	
2-Methylnaphthalene	0.494	0.0107	0.0213	mg/kg wet	4	0.533	---	93	38-122%	---	---	

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
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QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100740 - EPA 3546												
						Sediment						
LCS (9100740-BS1)			Prepared: 10/07/19 11:27 Analyzed: 10/07/19 17:29									
Naphthalene	0.494	0.0107	0.0213	mg/kg wet	4	0.533	---	93	35-123%	---	---	
Phenanthrene	0.520	0.00532	0.0107	mg/kg wet	4	0.533	---	98	50-121%	---	---	
Pyrene	0.560	0.00532	0.0107	mg/kg wet	4	0.533	---	105	47-127%	---	---	
Carbazole	0.594	0.00800	0.0160	mg/kg wet	4	0.533	---	111	50-122%	---	---	
Dibenzofuran	0.509	0.00532	0.0107	mg/kg wet	4	0.533	---	95	44-120%	---	---	
4-Chloro-3-methylphenol	0.516	0.0532	0.107	mg/kg wet	4	0.533	---	97	45-122%	---	---	
2-Chlorophenol	0.494	0.0267	0.0532	mg/kg wet	4	0.533	---	93	34-121%	---	---	
2,4-Dichlorophenol	0.527	0.0267	0.0532	mg/kg wet	4	0.533	---	99	40-122%	---	---	
2,4-Dimethylphenol	0.523	0.0267	0.0532	mg/kg wet	4	0.533	---	98	30-127%	---	---	
2,4-Dinitrophenol	0.452	0.133	0.267	mg/kg wet	4	0.533	---	85	5-137%	---	---	
4,6-Dinitro-2-methylphenol	0.567	0.133	0.267	mg/kg wet	4	0.533	---	106	29-132%	---	---	
2-Methylphenol	0.511	0.0133	0.0267	mg/kg wet	4	0.533	---	96	32-122%	---	---	
3+4-Methylphenol(s)	0.495	0.0133	0.0267	mg/kg wet	4	0.533	---	93	34-120%	---	---	
2-Nitrophenol	0.468	0.0532	0.107	mg/kg wet	4	0.533	---	88	36-123%	---	---	
4-Nitrophenol	0.436	0.0532	0.107	mg/kg wet	4	0.533	---	82	30-132%	---	---	
Pentachlorophenol (PCP)	0.434	0.0532	0.107	mg/kg wet	4	0.533	---	81	25-133%	---	---	
Phenol	0.502	0.0107	0.0213	mg/kg wet	4	0.533	---	94	34-120%	---	---	
2,3,4,6-Tetrachlorophenol	0.502	0.0267	0.0532	mg/kg wet	4	0.533	---	94	44-125%	---	---	
2,3,5,6-Tetrachlorophenol	0.488	0.0267	0.0532	mg/kg wet	4	0.533	---	92	40-120%	---	---	
2,4,5-Trichlorophenol	0.515	0.0267	0.0532	mg/kg wet	4	0.533	---	97	41-124%	---	---	
2,4,6-Trichlorophenol	0.506	0.0267	0.0532	mg/kg wet	4	0.533	---	95	39-126%	---	---	
Bis(2-ethylhexyl)phthalate	0.503	0.0800	0.160	mg/kg wet	4	0.533	---	94	51-133%	---	---	
Butyl benzyl phthalate	0.482	0.0267	0.0532	mg/kg wet	4	0.533	---	90	48-132%	---	---	
Diethylphthalate	0.505	0.0267	0.0532	mg/kg wet	4	0.533	---	95	50-124%	---	---	
Dimethylphthalate	0.504	0.0267	0.0532	mg/kg wet	4	0.533	---	95	48-124%	---	---	
Di-n-butylphthalate	0.537	0.0267	0.0532	mg/kg wet	4	0.533	---	101	51-128%	---	---	
Di-n-octyl phthalate	0.479	0.0428	0.0532	mg/kg wet	4	0.533	---	90	44-140%	---	---	
N-Nitrosodimethylamine	0.426	0.0133	0.0267	mg/kg wet	4	0.533	---	80	23-120%	---	---	
N-Nitroso-di-n-propylamine	0.484	0.0133	0.0267	mg/kg wet	4	0.533	---	91	36-120%	---	---	
N-Nitrosodiphenylamine	0.516	0.0133	0.0267	mg/kg wet	4	0.533	---	97	38-127%	---	---	
Bis(2-Chloroethoxy) methane	0.479	0.0133	0.0267	mg/kg wet	4	0.533	---	90	36-121%	---	---	
Bis(2-Chloroethyl) ether	0.416	0.0133	0.0267	mg/kg wet	4	0.533	---	78	31-120%	---	---	
2,2'-Oxybis(1-Chloropropane)	0.444	0.0133	0.0267	mg/kg wet	4	0.533	---	83	33-131%	---	---	
Hexachlorobenzene	0.518	0.00532	0.0107	mg/kg wet	4	0.533	---	97	44-122%	---	---	

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tideland Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
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QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100740 - EPA 3546												
Sediment												
LCS (9100740-BS1)												
Prepared: 10/07/19 11:27 Analyzed: 10/07/19 17:29												
Hexachlorobutadiene	0.506	0.0133	0.0267	mg/kg wet	4	0.533	---	95	32-123%	---	---	
Hexachlorocyclopentadiene	0.453	0.0267	0.0532	mg/kg wet	4	0.533	---	85	5-140%	---	---	
Hexachloroethane	0.477	0.0133	0.0267	mg/kg wet	4	0.533	---	89	28-120%	---	---	
2-Chloronaphthalene	0.530	0.00532	0.0107	mg/kg wet	4	0.533	---	99	41-120%	---	---	
1,2-Dichlorobenzene	0.466	0.0133	0.0267	mg/kg wet	4	0.533	---	87	33-120%	---	---	
1,3-Dichlorobenzene	0.471	0.0133	0.0267	mg/kg wet	4	0.533	---	88	30-120%	---	---	
1,4-Dichlorobenzene	0.470	0.0133	0.0267	mg/kg wet	4	0.533	---	88	31-120%	---	---	
1,2,4-Trichlorobenzene	0.491	0.0133	0.0267	mg/kg wet	4	0.533	---	92	34-120%	---	---	
4-Bromophenyl phenyl ether	0.511	0.0133	0.0267	mg/kg wet	4	0.533	---	96	46-124%	---	---	
4-Chlorophenyl phenyl ether	0.485	0.0133	0.0267	mg/kg wet	4	0.533	---	91	45-121%	---	---	
Aniline	0.445	0.0267	0.0532	mg/kg wet	4	0.533	---	83	7-120%	---	---	
4-Chloroaniline	0.372	0.0133	0.0267	mg/kg wet	4	0.533	---	70	16-120%	---	---	Q-31
2-Nitroaniline	0.503	0.107	0.213	mg/kg wet	4	0.533	---	94	44-127%	---	---	
3-Nitroaniline	0.416	0.107	0.213	mg/kg wet	4	0.533	---	78	33-120%	---	---	
4-Nitroaniline	0.541	0.107	0.213	mg/kg wet	4	0.533	---	101	35-120%	---	---	
Nitrobenzene	0.448	0.0532	0.107	mg/kg wet	4	0.533	---	84	34-122%	---	---	
2,4-Dinitrotoluene	0.512	0.0532	0.107	mg/kg wet	4	0.533	---	96	48-126%	---	---	
2,6-Dinitrotoluene	0.507	0.0532	0.107	mg/kg wet	4	0.533	---	95	46-124%	---	---	
Benzoic acid	0.775	0.668	0.668	mg/kg wet	4	1.07	---	73	5-140%	---	---	
Benzyl alcohol	0.484	0.0267	0.0532	mg/kg wet	4	0.533	---	91	29-122%	---	---	
Isophorone	0.473	0.0133	0.0267	mg/kg wet	4	0.533	---	89	30-122%	---	---	
Azobenzene (1,2-DPH)	0.475	0.0133	0.0267	mg/kg wet	4	0.533	---	89	39-125%	---	---	
Bis(2-Ethylhexyl) adipate	0.484	0.133	0.267	mg/kg wet	4	0.533	---	91	60-121%	---	---	
3,3'-Dichlorobenzidine	2.17	0.107	0.213	mg/kg wet	4	1.07	---	203	22-121%	---	---	Q-29, Q-31
1,2-Dinitrobenzene	0.481	0.133	0.267	mg/kg wet	4	0.533	---	90	44-120%	---	---	
1,3-Dinitrobenzene	0.504	0.133	0.267	mg/kg wet	4	0.533	---	94	42-127%	---	---	
1,4-Dinitrobenzene	0.506	0.133	0.267	mg/kg wet	4	0.533	---	95	37-132%	---	---	
Pyridine	0.363	0.0267	0.0532	mg/kg wet	4	0.533	---	68	5-120%	---	---	
Surr: Nitrobenzene-d5 (Surr) Recovery: 86 % Limits: 37-122 % Dilution: 4x												
2-Fluorobiphenyl (Surr) 100 % 44-115 % "												
Phenol-d6 (Surr) 91 % 33-122 % "												
p-Terphenyl-d14 (Surr) 100 % 54-127 % "												
2-Fluorophenol (Surr) 86 % 35-115 % "												
2,4,6-Tribromophenol (Surr) 111 % 39-132 % "												

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
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QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100740 - EPA 3546												
Sediment												
Duplicate (9100740-DUP1)												
Prepared: 10/07/19 11:27 Analyzed: 10/07/19 18:38												
QC Source Sample: SE-27-0-0.33 (A9J0006-24RE2)												
EPA 8270D												
Acenaphthene	ND	0.0131	0.0262	mg/kg dry	4	---	ND	---	---	---	30%	
Acenaphthylene	ND	0.0131	0.0262	mg/kg dry	4	---	ND	---	---	---	30%	
Anthracene	ND	0.0131	0.0262	mg/kg dry	4	---	ND	---	---	---	30%	
Benz(a)anthracene	ND	0.0131	0.0262	mg/kg dry	4	---	0.0203	---	---	***	30%	Q-05
Benzo(a)pyrene	ND	0.0197	0.0393	mg/kg dry	4	---	0.0236	---	---	***	30%	Q-05
Benzo(b)fluoranthene	ND	0.0197	0.0393	mg/kg dry	4	---	0.0208	---	---	***	30%	Q-05
Benzo(k)fluoranthene	ND	0.0197	0.0393	mg/kg dry	4	---	ND	---	---	---	30%	
Benzo(g,h,i)perylene	ND	0.0131	0.0262	mg/kg dry	4	---	ND	---	---	---	30%	
Chrysene	ND	0.0131	0.0262	mg/kg dry	4	---	0.0203	---	---	***	30%	Q-05
Dibenz(a,h)anthracene	ND	0.0131	0.0262	mg/kg dry	4	---	ND	---	---	---	30%	
Fluoranthene	ND	0.0131	0.0262	mg/kg dry	4	---	0.0363	---	---	***	30%	Q-04
Fluorene	ND	0.0131	0.0262	mg/kg dry	4	---	ND	---	---	---	30%	
Indeno(1,2,3-cd)pyrene	ND	0.0131	0.0262	mg/kg dry	4	---	ND	---	---	---	30%	
1-Methylnaphthalene	ND	0.0262	0.0524	mg/kg dry	4	---	ND	---	---	---	30%	
2-Methylnaphthalene	ND	0.0262	0.0524	mg/kg dry	4	---	ND	---	---	---	30%	
Naphthalene	ND	0.0262	0.0524	mg/kg dry	4	---	ND	---	---	---	30%	
Phenanthrene	ND	0.0131	0.0262	mg/kg dry	4	---	0.0181	---	---	***	30%	Q-05
Pyrene	ND	0.0131	0.0262	mg/kg dry	4	---	0.0324	---	---	***	30%	Q-05
Carbazole	ND	0.0197	0.0393	mg/kg dry	4	---	ND	---	---	---	30%	
Dibenzofuran	ND	0.0131	0.0262	mg/kg dry	4	---	ND	---	---	---	30%	
4-Chloro-3-methylphenol	ND	0.131	0.262	mg/kg dry	4	---	ND	---	---	---	30%	
2-Chlorophenol	ND	0.0656	0.131	mg/kg dry	4	---	ND	---	---	---	30%	
2,4-Dichlorophenol	ND	0.0656	0.131	mg/kg dry	4	---	ND	---	---	---	30%	
2,4-Dimethylphenol	ND	0.0656	0.131	mg/kg dry	4	---	ND	---	---	---	30%	
2,4-Dinitrophenol	ND	0.327	0.656	mg/kg dry	4	---	ND	---	---	---	30%	
4,6-Dinitro-2-methylphenol	ND	0.327	0.656	mg/kg dry	4	---	ND	---	---	---	30%	
2-Methylphenol	ND	0.0327	0.0656	mg/kg dry	4	---	ND	---	---	---	30%	
3+4-Methylphenol(s)	ND	0.0327	0.0656	mg/kg dry	4	---	0.0427	---	---	***	30%	Q-05
2-Nitrophenol	ND	0.131	0.262	mg/kg dry	4	---	ND	---	---	---	30%	
4-Nitrophenol	ND	0.131	0.262	mg/kg dry	4	---	ND	---	---	---	30%	
Pentachlorophenol (PCP)	ND	0.131	0.262	mg/kg dry	4	---	ND	---	---	---	30%	

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
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QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100740 - EPA 3546												
Sediment												
Duplicate (9100740-DUP1)												
Prepared: 10/07/19 11:27 Analyzed: 10/07/19 18:38												
QC Source Sample: SE-27-0-0.33 (A9J0006-24RE2)												
Phenol	ND	0.0262	0.0524	mg/kg dry	4	---	ND	---	---	---	30%	
2,3,4,6-Tetrachlorophenol	ND	0.0656	0.131	mg/kg dry	4	---	ND	---	---	---	30%	
2,3,5,6-Tetrachlorophenol	ND	0.0656	0.131	mg/kg dry	4	---	ND	---	---	---	30%	
2,4,5-Trichlorophenol	ND	0.0656	0.131	mg/kg dry	4	---	ND	---	---	---	30%	
2,4,6-Trichlorophenol	ND	0.0656	0.131	mg/kg dry	4	---	ND	---	---	---	30%	
Bis(2-ethylhexyl)phthalate	ND	0.197	0.393	mg/kg dry	4	---	ND	---	---	---	30%	
Butyl benzyl phthalate	ND	0.0656	0.131	mg/kg dry	4	---	ND	---	---	---	30%	
Diethylphthalate	ND	0.0656	0.131	mg/kg dry	4	---	ND	---	---	---	30%	
Dimethylphthalate	ND	0.0656	0.131	mg/kg dry	4	---	ND	---	---	---	30%	
Di-n-butylphthalate	ND	0.0656	0.131	mg/kg dry	4	---	ND	---	---	---	30%	
Di-n-octyl phthalate	ND	0.105	0.131	mg/kg dry	4	---	ND	---	---	---	30%	
N-Nitrosodimethylamine	ND	0.0327	0.0656	mg/kg dry	4	---	ND	---	---	---	30%	
N-Nitroso-di-n-propylamine	ND	0.0327	0.0656	mg/kg dry	4	---	ND	---	---	---	30%	
N-Nitrosodiphenylamine	ND	0.0327	0.0656	mg/kg dry	4	---	ND	---	---	---	30%	
Bis(2-Chloroethoxy) methane	ND	0.0327	0.0656	mg/kg dry	4	---	ND	---	---	---	30%	
Bis(2-Chloroethyl) ether	ND	0.0327	0.0656	mg/kg dry	4	---	ND	---	---	---	30%	
2,2'-Oxybis(1-Chloropropane)	ND	0.0327	0.0656	mg/kg dry	4	---	ND	---	---	---	30%	
Hexachlorobenzene	ND	0.0131	0.0262	mg/kg dry	4	---	ND	---	---	---	30%	
Hexachlorobutadiene	ND	0.0327	0.0656	mg/kg dry	4	---	ND	---	---	---	30%	
Hexachlorocyclopentadiene	ND	0.0656	0.131	mg/kg dry	4	---	ND	---	---	---	30%	
Hexachloroethane	ND	0.0327	0.0656	mg/kg dry	4	---	ND	---	---	---	30%	
2-Chloronaphthalene	ND	0.0131	0.0262	mg/kg dry	4	---	ND	---	---	---	30%	
1,2-Dichlorobenzene	ND	0.0327	0.0656	mg/kg dry	4	---	ND	---	---	---	30%	
1,3-Dichlorobenzene	ND	0.0327	0.0656	mg/kg dry	4	---	ND	---	---	---	30%	
1,4-Dichlorobenzene	ND	0.0327	0.0656	mg/kg dry	4	---	ND	---	---	---	30%	
1,2,4-Trichlorobenzene	ND	0.0327	0.0656	mg/kg dry	4	---	ND	---	---	---	30%	
4-Bromophenyl phenyl ether	ND	0.0327	0.0656	mg/kg dry	4	---	ND	---	---	---	30%	
4-Chlorophenyl phenyl ether	ND	0.0327	0.0656	mg/kg dry	4	---	ND	---	---	---	30%	
Aniline	ND	0.0656	0.131	mg/kg dry	4	---	ND	---	---	---	30%	
4-Chloroaniline	ND	0.0327	0.0656	mg/kg dry	4	---	ND	---	---	---	30%	
2-Nitroaniline	ND	0.262	0.524	mg/kg dry	4	---	ND	---	---	---	30%	
3-Nitroaniline	ND	0.262	0.524	mg/kg dry	4	---	ND	---	---	---	30%	
4-Nitroaniline	ND	0.262	0.524	mg/kg dry	4	---	ND	---	---	---	30%	

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
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QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100740 - EPA 3546												
Sediment												
Duplicate (9100740-DUP1)												
Prepared: 10/07/19 11:27						Analyzed: 10/07/19 18:38						
QC Source Sample: SE-27-0-0.33 (A9J0006-24RE2)												
Nitrobenzene	ND	0.131	0.262	mg/kg dry	4	---	ND	---	---	---	30%	
2,4-Dinitrotoluene	ND	0.131	0.262	mg/kg dry	4	---	ND	---	---	---	30%	
2,6-Dinitrotoluene	ND	0.131	0.262	mg/kg dry	4	---	ND	---	---	---	30%	
Benzoic acid	ND	1.64	3.27	mg/kg dry	4	---	ND	---	---	---	30%	
Benzyl alcohol	ND	0.0656	0.131	mg/kg dry	4	---	ND	---	---	---	30%	
Isophorone	ND	0.0327	0.0656	mg/kg dry	4	---	ND	---	---	---	30%	
Azobenzene (1,2-DPH)	ND	0.0327	0.0656	mg/kg dry	4	---	ND	---	---	---	30%	
Bis(2-Ethylhexyl) adipate	ND	0.327	0.656	mg/kg dry	4	---	ND	---	---	---	30%	
3,3'-Dichlorobenzidine	ND	0.262	0.524	mg/kg dry	4	---	ND	---	---	---	30%	Q-52
1,2-Dinitrobenzene	ND	0.327	0.656	mg/kg dry	4	---	ND	---	---	---	30%	
1,3-Dinitrobenzene	ND	0.327	0.656	mg/kg dry	4	---	ND	---	---	---	30%	
1,4-Dinitrobenzene	ND	0.327	0.656	mg/kg dry	4	---	ND	---	---	---	30%	
Pyridine	ND	0.0656	0.131	mg/kg dry	4	---	ND	---	---	---	30%	
<i>Surr: Nitrobenzene-d5 (Surr)</i>		<i>Recovery: 53 %</i>		<i>Limits: 37-122 %</i>		<i>Dilution: 4x</i>						
<i>2-Fluorobiphenyl (Surr)</i>		<i>23 %</i>		<i>44-115 %</i>		<i>"</i>						
<i>Phenol-d6 (Surr)</i>		<i>59 %</i>		<i>33-122 %</i>		<i>"</i>						
<i>p-Terphenyl-d14 (Surr)</i>		<i>34 %</i>		<i>54-127 %</i>		<i>"</i>						
<i>2-Fluorophenol (Surr)</i>		<i>55 %</i>		<i>35-115 %</i>		<i>"</i>						
<i>2,4,6-Tribromophenol (Surr)</i>		<i>73 %</i>		<i>39-132 %</i>		<i>"</i>						

Matrix Spike (9100740-MS1)												
Prepared: 10/07/19 11:27						Analyzed: 10/07/19 19:12						
QC Source Sample: SE-27-0-0.33 (A9J0006-24RE2)												
EPA 8270D												
Acenaphthene	1.17	0.0131	0.0263	mg/kg dry	4	1.32	ND	89	40-122%	---	---	
Acenaphthylene	1.19	0.0131	0.0263	mg/kg dry	4	1.32	ND	91	32-132%	---	---	
Anthracene	1.29	0.0131	0.0263	mg/kg dry	4	1.32	ND	98	47-123%	---	---	
Benz(a)anthracene	1.22	0.0131	0.0263	mg/kg dry	4	1.32	0.0203	91	49-126%	---	---	
Benzo(a)pyrene	1.27	0.0197	0.0395	mg/kg dry	4	1.32	0.0236	95	45-129%	---	---	
Benzo(b)fluoranthene	1.27	0.0197	0.0395	mg/kg dry	4	1.32	0.0208	95	45-132%	---	---	
Benzo(k)fluoranthene	1.30	0.0197	0.0395	mg/kg dry	4	1.32	ND	99	47-132%	---	---	
Benzo(g,h,i)perylene	1.28	0.0131	0.0263	mg/kg dry	4	1.32	ND	97	43-134%	---	---	
Chrysene	1.22	0.0131	0.0263	mg/kg dry	4	1.32	0.0203	91	50-124%	---	---	
Dibenz(a,h)anthracene	1.28	0.0131	0.0263	mg/kg dry	4	1.32	ND	97	45-134%	---	---	

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
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QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100740 - EPA 3546												
Sediment												
Matrix Spike (9100740-MS1)												
Prepared: 10/07/19 11:27 Analyzed: 10/07/19 19:12												
QC Source Sample: SE-27-0-0.33 (A9J0006-24RE2)												
Fluoranthene	1.28	0.0131	0.0263	mg/kg dry	4	1.32	0.0363	95	50-127%	---	---	
Fluorene	1.24	0.0131	0.0263	mg/kg dry	4	1.32	ND	94	43-125%	---	---	
Indeno(1,2,3-cd)pyrene	1.18	0.0131	0.0263	mg/kg dry	4	1.32	ND	90	45-133%	---	---	
1-Methylnaphthalene	1.05	0.0263	0.0526	mg/kg dry	4	1.32	ND	80	40-120%	---	---	
2-Methylnaphthalene	1.07	0.0263	0.0526	mg/kg dry	4	1.32	ND	81	38-122%	---	---	
Naphthalene	1.03	0.0263	0.0526	mg/kg dry	4	1.32	ND	78	35-123%	---	---	
Phenanthrene	1.26	0.0131	0.0263	mg/kg dry	4	1.32	0.0181	94	50-121%	---	---	
Pyrene	1.32	0.0131	0.0263	mg/kg dry	4	1.32	0.0324	98	47-127%	---	---	
Carbazole	1.48	0.0197	0.0395	mg/kg dry	4	1.32	ND	113	50-122%	---	---	
Dibenzofuran	1.19	0.0131	0.0263	mg/kg dry	4	1.32	ND	91	44-120%	---	---	
4-Chloro-3-methylphenol	1.25	0.131	0.263	mg/kg dry	4	1.32	ND	95	45-122%	---	---	
2-Chlorophenol	1.00	0.0658	0.131	mg/kg dry	4	1.32	ND	76	34-121%	---	---	
2,4-Dichlorophenol	1.18	0.0658	0.131	mg/kg dry	4	1.32	ND	90	40-122%	---	---	
2,4-Dimethylphenol	1.22	0.0658	0.131	mg/kg dry	4	1.32	ND	93	30-127%	---	---	
2,4-Dinitrophenol	ND	0.329	0.658	mg/kg dry	4	1.32	ND		5-137%	---	---	Q-01
4,6-Dinitro-2-methylphenol	0.609	0.329	0.329	mg/kg dry	4	1.32	ND	46	29-132%	---	---	
2-Methylphenol	1.14	0.0329	0.0658	mg/kg dry	4	1.32	ND	87	32-122%	---	---	
3+4-Methylphenol(s)	1.14	0.0329	0.0658	mg/kg dry	4	1.32	0.0427	83	34-120%	---	---	
2-Nitrophenol	0.918	0.131	0.263	mg/kg dry	4	1.32	ND	70	36-123%	---	---	
4-Nitrophenol	1.06	0.131	0.263	mg/kg dry	4	1.32	ND	81	30-132%	---	---	
Pentachlorophenol (PCP)	1.16	0.131	0.263	mg/kg dry	4	1.32	ND	88	25-133%	---	---	
Phenol	1.13	0.0263	0.0526	mg/kg dry	4	1.32	ND	86	34-120%	---	---	
2,3,4,6-Tetrachlorophenol	1.32	0.0658	0.131	mg/kg dry	4	1.32	ND	100	44-125%	---	---	
2,3,5,6-Tetrachlorophenol	1.25	0.0658	0.131	mg/kg dry	4	1.32	ND	95	40-120%	---	---	
2,4,5-Trichlorophenol	1.30	0.0658	0.131	mg/kg dry	4	1.32	ND	98	41-124%	---	---	
2,4,6-Trichlorophenol	1.27	0.0658	0.131	mg/kg dry	4	1.32	ND	96	39-126%	---	---	
Bis(2-ethylhexyl)phthalate	1.31	0.197	0.395	mg/kg dry	4	1.32	ND	100	51-133%	---	---	
Butyl benzyl phthalate	1.25	0.0658	0.131	mg/kg dry	4	1.32	ND	95	48-132%	---	---	
Diethylphthalate	1.22	0.0658	0.131	mg/kg dry	4	1.32	ND	93	50-124%	---	---	
Dimethylphthalate	1.23	0.0658	0.131	mg/kg dry	4	1.32	ND	93	48-124%	---	---	
Di-n-butylphthalate	1.32	0.0658	0.131	mg/kg dry	4	1.32	ND	101	51-128%	---	---	
Di-n-octyl phthalate	1.34	0.106	0.131	mg/kg dry	4	1.32	ND	102	44-140%	---	---	
N-Nitrosodimethylamine	0.852	0.0329	0.0658	mg/kg dry	4	1.32	ND	65	23-120%	---	---	

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tideland Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
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QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100740 - EPA 3546												
Sediment												
Matrix Spike (9100740-MS1)												
Prepared: 10/07/19 11:27 Analyzed: 10/07/19 19:12												
QC Source Sample: SE-27-0-0.33 (A9J0006-24RE2)												
N-Nitroso-di-n-propylamine	1.06	0.0329	0.0658	mg/kg dry	4	1.32	ND	80	36-120%	---	---	
N-Nitrosodiphenylamine	1.20	0.0329	0.0658	mg/kg dry	4	1.32	ND	91	38-127%	---	---	
Bis(2-Chloroethoxy) methane	1.02	0.0329	0.0658	mg/kg dry	4	1.32	ND	77	36-121%	---	---	
Bis(2-Chloroethyl) ether	0.855	0.0329	0.0658	mg/kg dry	4	1.32	ND	65	31-120%	---	---	
2,2'-Oxybis(1-Chloropropane)	0.893	0.0329	0.0658	mg/kg dry	4	1.32	ND	68	33-131%	---	---	
Hexachlorobenzene	1.26	0.0131	0.0263	mg/kg dry	4	1.32	ND	96	44-122%	---	---	
Hexachlorobutadiene	1.00	0.0329	0.0658	mg/kg dry	4	1.32	ND	76	32-123%	---	---	
Hexachlorocyclopentadiene	0.408	0.0658	0.131	mg/kg dry	4	1.32	ND	31	5-140%	---	---	
Hexachloroethane	0.866	0.0329	0.0658	mg/kg dry	4	1.32	ND	66	28-120%	---	---	
2-Chloronaphthalene	1.19	0.0131	0.0263	mg/kg dry	4	1.32	ND	90	41-120%	---	---	
1,2-Dichlorobenzene	0.891	0.0329	0.0658	mg/kg dry	4	1.32	ND	68	33-120%	---	---	
1,3-Dichlorobenzene	0.884	0.0329	0.0658	mg/kg dry	4	1.32	ND	67	30-120%	---	---	
1,4-Dichlorobenzene	0.911	0.0329	0.0658	mg/kg dry	4	1.32	ND	69	31-120%	---	---	
1,2,4-Trichlorobenzene	0.966	0.0329	0.0658	mg/kg dry	4	1.32	ND	73	34-120%	---	---	
4-Bromophenyl phenyl ether	1.28	0.0329	0.0658	mg/kg dry	4	1.32	ND	98	46-124%	---	---	
4-Chlorophenyl phenyl ether	1.17	0.0329	0.0658	mg/kg dry	4	1.32	ND	89	45-121%	---	---	
Aniline	1.00	0.0658	0.131	mg/kg dry	4	1.32	ND	76	7-120%	---	---	
4-Chloroaniline	0.566	0.0329	0.0658	mg/kg dry	4	1.32	ND	43	16-120%	---	---	Q-31
2-Nitroaniline	1.32	0.263	0.526	mg/kg dry	4	1.32	ND	100	44-127%	---	---	
3-Nitroaniline	0.712	0.263	0.526	mg/kg dry	4	1.32	ND	54	33-120%	---	---	
4-Nitroaniline	1.19	0.263	0.526	mg/kg dry	4	1.32	ND	91	35-120%	---	---	
Nitrobenzene	0.966	0.131	0.263	mg/kg dry	4	1.32	ND	73	34-122%	---	---	
2,4-Dinitrotoluene	1.26	0.131	0.263	mg/kg dry	4	1.32	ND	96	48-126%	---	---	
2,6-Dinitrotoluene	1.23	0.131	0.263	mg/kg dry	4	1.32	ND	93	46-124%	---	---	
Benzoic acid	ND	1.65	3.29	mg/kg dry	4	2.63	ND		5-140%	---	---	Q-01
Benzyl alcohol	1.08	0.0658	0.131	mg/kg dry	4	1.32	ND	82	29-122%	---	---	
Isophorone	1.05	0.0329	0.0658	mg/kg dry	4	1.32	ND	80	30-122%	---	---	
Azobenzene (1,2-DPH)	1.16	0.0329	0.0658	mg/kg dry	4	1.32	ND	88	39-125%	---	---	
Bis(2-Ethylhexyl) adipate	1.27	0.329	0.658	mg/kg dry	4	1.32	ND	97	60-121%	---	---	
3,3'-Dichlorobenzidine	3.23	0.263	0.526	mg/kg dry	4	2.63	ND	123	22-121%	---	---	Q-01, Q-31
1,2-Dinitrobenzene	1.06	0.329	0.658	mg/kg dry	4	1.32	ND	80	44-120%	---	---	
1,3-Dinitrobenzene	1.17	0.329	0.658	mg/kg dry	4	1.32	ND	89	42-127%	---	---	
1,4-Dinitrobenzene	1.02	0.329	0.658	mg/kg dry	4	1.32	ND	77	37-132%	---	---	

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
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QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100740 - EPA 3546												
Sediment												
Matrix Spike (9100740-MS1)												
Prepared: 10/07/19 11:27 Analyzed: 10/07/19 19:12												
QC Source Sample: SE-27-0-0.33 (A9J0006-24RE2)												
Pyridine	0.739	0.0658	0.131	mg/kg dry	4	1.32	ND	56	5-120%	---	---	
<i>Surr: Nitrobenzene-d5 (Surr)</i>												
<i>Recovery: 69 % Limits: 37-122 % Dilution: 4x</i>												
<i>2-Fluorobiphenyl (Surr)</i>												
<i>48 % 44-115 % "</i>												
<i>Phenol-d6 (Surr)</i>												
<i>77 % 33-122 % "</i>												
<i>p-Terphenyl-d14 (Surr)</i>												
<i>42 % 54-127 % "</i>												
<i>2-Fluorophenol (Surr)</i>												
<i>66 % 35-115 % "</i>												
<i>2,4,6-Tribromophenol (Surr)</i>												
<i>98 % 39-132 % "</i>												

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AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
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QUALITY CONTROL (QC) SAMPLE RESULTS

Total Metals by EPA 6020A (ICPMS)

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100629 - EPA 3051A												
Sediment												
Blank (9100629-BLK1) Prepared: 10/03/19 14:31 Analyzed: 10/07/19 20:11												
<u>EPA 6020A</u>												
Arsenic	ND	0.240	0.481	mg/kg wet	5	---	---	---	---	---	---	
Cadmium	ND	0.0481	0.0962	mg/kg wet	5	---	---	---	---	---	---	
Chromium	ND	0.240	0.481	mg/kg wet	5	---	---	---	---	---	---	
Copper	ND	0.240	0.481	mg/kg wet	5	---	---	---	---	---	---	
Lead	ND	0.0481	0.0962	mg/kg wet	5	---	---	---	---	---	---	
Nickel	ND	0.481	0.962	mg/kg wet	5	---	---	---	---	---	---	
Selenium	ND	0.240	0.481	mg/kg wet	5	---	---	---	---	---	---	
Silver	ND	0.0481	0.0962	mg/kg wet	5	---	---	---	---	---	---	
Zinc	ND	0.962	1.92	mg/kg wet	5	---	---	---	---	---	---	
LCS (9100629-BS1) Prepared: 10/03/19 14:31 Analyzed: 10/07/19 20:15												
<u>EPA 6020A</u>												
Arsenic	23.8	0.250	0.500	mg/kg wet	5	25.0	---	95	80-120%	---	---	
Cadmium	24.8	0.0500	0.100	mg/kg wet	5	25.0	---	99	80-120%	---	---	
Chromium	26.2	0.250	0.500	mg/kg wet	5	25.0	---	105	80-120%	---	---	
Copper	26.7	0.250	0.500	mg/kg wet	5	25.0	---	107	80-120%	---	---	
Lead	26.9	0.0500	0.100	mg/kg wet	5	25.0	---	108	80-120%	---	---	
Nickel	26.6	0.500	1.00	mg/kg wet	5	25.0	---	106	80-120%	---	---	
Selenium	11.7	0.250	0.500	mg/kg wet	5	12.5	---	94	80-120%	---	---	
Silver	13.9	0.0500	0.100	mg/kg wet	5	12.5	---	111	80-120%	---	---	
Zinc	25.3	1.00	2.00	mg/kg wet	5	25.0	---	101	80-120%	---	---	
Matrix Spike (9100629-MS1) Prepared: 10/03/19 14:31 Analyzed: 10/07/19 20:29												
<u>QC Source Sample: Non-SDG (A9I0893-13)</u>												
<u>EPA 6020A</u>												
Arsenic	63.5	0.637	1.27	mg/kg dry	5	63.7	5.47	91	75-125%	---	---	
Cadmium	60.6	0.127	0.255	mg/kg dry	5	63.7	0.595	94	75-125%	---	---	
Chromium	92.5	0.637	1.27	mg/kg dry	5	63.7	25.2	106	75-125%	---	---	
Copper	150	0.637	1.27	mg/kg dry	5	63.7	56.1	148	75-125%	---	---	Q-04
Lead	89.2	0.127	0.255	mg/kg dry	5	63.7	24.0	102	75-125%	---	---	
Nickel	92.3	1.27	2.55	mg/kg dry	5	63.7	25.1	105	75-125%	---	---	
Selenium	29.9	0.637	1.27	mg/kg dry	5	31.8	0.667	92	75-125%	---	---	
Silver	33.1	0.127	0.255	mg/kg dry	5	31.8	0.138	104	75-125%	---	---	

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
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QUALITY CONTROL (QC) SAMPLE RESULTS

Total Metals by EPA 6020A (ICPMS)

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100629 - EPA 3051A												
Sediment												
Matrix Spike (9100629-MS1)						Prepared: 10/03/19 14:31 Analyzed: 10/07/19 20:29						
QC Source Sample: Non-SDG (A910893-13)												
Zinc	135	2.55	5.09	mg/kg dry	5	63.7	71.9	99	75-125%	---	---	
Matrix Spike Dup (9100629-MSD1)						Prepared: 10/03/19 14:31 Analyzed: 10/07/19 20:33						
QC Source Sample: Non-SDG (A910893-13)												
Arsenic	68.0	0.649	1.30	mg/kg dry	5	64.9	5.47	96	75-125%	7	40%	
Cadmium	65.5	0.130	0.260	mg/kg dry	5	64.9	0.595	100	75-125%	8	40%	
Chromium	95.0	0.649	1.30	mg/kg dry	5	64.9	25.2	108	75-125%	3	40%	
Copper	124	0.649	1.30	mg/kg dry	5	64.9	56.1	105	75-125%	19	40%	
Lead	102	0.130	0.260	mg/kg dry	5	64.9	24.0	119	75-125%	13	40%	
Nickel	90.8	1.30	2.60	mg/kg dry	5	64.9	25.1	101	75-125%	2	40%	
Selenium	32.3	0.649	1.30	mg/kg dry	5	32.5	0.667	98	75-125%	8	40%	
Silver	36.2	0.130	0.260	mg/kg dry	5	32.5	0.138	111	75-125%	9	40%	
Zinc	146	2.60	5.19	mg/kg dry	5	64.9	71.9	113	75-125%	8	40%	



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QUALITY CONTROL (QC) SAMPLE RESULTS

Ammonia by Plumb Extraction, Gas Diffusion and Colorimetric Detection

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100530 - Plumb 1981 Ammonia (Acidified KCl Leach)							Soil					
Blank (9100530-BLK1)						Prepared: 10/02/19 08:28 Analyzed: 10/02/19 14:02						
<u>Plumb/SM 4500-NH3 G</u>												
Ammonia as N	ND	0.100	0.100	mg/kg wet	1	---	---	---	---	---	---	
LCS (9100530-BS1)						Prepared: 10/02/19 08:28 Analyzed: 10/02/19 14:03						
<u>Plumb/SM 4500-NH3 G</u>												
Ammonia as N	10.3	0.100	0.100	mg/kg wet	1	10.0	---	103	80-120%	---	---	
Matrix Spike (9100530-MS1)						Prepared: 10/02/19 08:28 Analyzed: 10/02/19 14:33						
<u>QC Source Sample: SE-24-0-0.33 (A9J0006-01)</u>												
<u>Plumb/SM 4500-NH3 G</u>												
Ammonia as N	33.8	0.271	0.271	mg/kg dry	1	27.1	9.49	90	75-125%	---	---	
Matrix Spike Dup (9100530-MSD1)						Prepared: 10/02/19 08:28 Analyzed: 10/02/19 14:42						
<u>QC Source Sample: SE-24-0-0.33 (A9J0006-01)</u>												
<u>Plumb/SM 4500-NH3 G</u>												
Ammonia as N	33.7	0.270	0.270	mg/kg dry	1	27.0	9.49	90	75-125%	0.5	20%	



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QUALITY CONTROL (QC) SAMPLE RESULTS

Demand Parameters

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100832 - PSEP-5310B TOC						Sediment						
Blank (9100832-BLK1)			Prepared: 10/08/19 17:15 Analyzed: 10/11/19 19:58									
<u>EPA 9060Amod</u>												
Total Organic Carbon	ND	200	200	mg/kg	1	---	---	---	---	---	---	
Blank (9100832-BLK2)			Prepared: 10/08/19 17:15 Analyzed: 10/11/19 20:09									
<u>EPA 9060Amod</u>												
Total Organic Carbon	ND	200	200	mg/kg	1	---	---	---	---	---	---	A-01
LCS (9100832-BS1)			Prepared: 10/08/19 17:15 Analyzed: 10/11/19 20:19									
<u>EPA 9060Amod</u>												
Total Organic Carbon	9900			mg/kg	1	10000	---	99	90-110%	---	---	
Duplicate (9100832-DUP1)			Prepared: 10/08/19 17:15 Analyzed: 10/11/19 20:41									
<u>QC Source Sample: Non-SDG (A910953-02)</u>												
Total Organic Carbon	44000	200	200	mg/kg	1	---	41000	---	---	8	20%	
Duplicate (9100832-DUP2)			Prepared: 10/08/19 17:15 Analyzed: 10/11/19 20:52									
<u>QC Source Sample: Non-SDG (A910953-02)</u>												
Total Organic Carbon	41000	200	200	mg/kg	1	---	41000	---	---	2	20%	



AMENDED REPORT

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QUALITY CONTROL (QC) SAMPLE RESULTS

Demand Parameters

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100833 - PSEP-5310B TOC						Sediment						
Blank (9100833-BLK1)						Prepared: 10/08/19 17:15 Analyzed: 10/11/19 08:48						
<u>EPA 9060Amod</u>												
Total Organic Carbon	ND	200	200	mg/kg	1	---	---	---	---	---	---	
LCS (9100833-BS1)						Prepared: 10/08/19 17:15 Analyzed: 10/11/19 09:15						
<u>EPA 9060Amod</u>												
Total Organic Carbon	10000			mg/kg	1	10000	---	100	90-110%	---	---	
Duplicate (9100833-DUP1)						Prepared: 10/08/19 17:15 Analyzed: 10/11/19 10:27						
<u>QC Source Sample: SE-26-0-0.33 (A9J0006-16)</u>												
<u>EPA 9060Amod</u>												
Total Organic Carbon	130000	200	200	mg/kg	1	---	130000	---	---	1	20%	

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AMENDED REPORT

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QUALITY CONTROL (QC) SAMPLE RESULTS

Solid and Moisture Determinations

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100520 - Total Solids (SM2540G/PSEP)							Sediment					
Duplicate (9100520-DUP1)					Prepared: 10/01/19 17:33 Analyzed: 10/02/19 12:42							
<u>QC Source Sample: SE-24-0-0.33 (A9J0006-01)</u>												
<u>PSEP 1986</u>												
Total Solids	45.7	1.00	1.00	%	1	---	35.5	---	---	25	20%	Q-04

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AMENDED REPORT

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QUALITY CONTROL (QC) SAMPLE RESULTS

Solid and Moisture Determinations

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100558 - Total Volatile Solids (non-aq)							Solid					
Duplicate (9100558-DUP1)			Prepared: 10/02/19 13:00 Analyzed: 10/03/19 10:09									
<u>QC Source Sample: SE-24-0-0.33 (A9J0006-01)</u>												
<u>SM 2540.G</u>												
Total Volatile Solids	12.8	1.00	1.00	%	1	---	18.9	---	---	38	10%	Q-04

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<u>Maul Foster & Alongi, INC.</u> 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: <u>Seaport Tidelands</u> Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
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QUALITY CONTROL (QC) SAMPLE RESULTS

Solid and Moisture Determinations

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100571 - Total Solids (SM2540G/PSEP)							Sediment					
Duplicate (9100571-DUP1)					Prepared: 10/02/19 16:19 Analyzed: 10/03/19 12:11							
<u>QC Source Sample: SE-25-0-0.33 (A9J0006-13)</u>												
<u>PSEP 1986</u>												
Total Solids	29.9	1.00	1.00	%	1	---	40.6	---	---	31	20%	Q-04

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QUALITY CONTROL (QC) SAMPLE RESULTS

Solid and Moisture Determinations

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100621 - Total Volatile Solids (non-aq)							Solid					
Duplicate (9100621-DUP1)			Prepared: 10/03/19 12:48 Analyzed: 10/03/19 16:24									
<u>QC Source Sample: SE-25-0-0.33 (A9J0006-13)</u>												
<u>SM 2540 G</u>												
Total Volatile Solids	20.4	1.00	1.00	%	1	---	19.0	---	---	7	10%	

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QUALITY CONTROL (QC) SAMPLE RESULTS

Solid and Moisture Determinations

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100630 - Total Solids (SM2540G/PSEP)							Sediment					
Duplicate (9100630-DUP1)					Prepared: 10/03/19 14:52 Analyzed: 10/07/19 11:30							
<u>QC Source Sample: SE-22-0-0.33 (A9J0006-23)</u>												
<u>PSEP 1986</u>												
Total Solids	33.5	1.00	1.00	%	1	---	33.4	---	---	0.3	20%	

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QUALITY CONTROL (QC) SAMPLE RESULTS

Solid and Moisture Determinations

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100742 - Total Volatile Solids (non-aq)							Solid					
Duplicate (9100742-DUP1)			Prepared: 10/03/19 14:52 Analyzed: 10/07/19 17:15									
<u>QC Source Sample: SE-22-0-0.33 (A9J0006-23)</u>												
<u>SM 2540 G</u>												
Total Volatile Solids	11.0	1.00	1.00	%	1	---	11.6	---	---	6	10%	

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 503-718-2323
 EPA ID: OR01039

AMENDED REPORT

<u>Maul Foster & Alongi, INC.</u> 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: <u>Seaport Tidelands</u> Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
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QUALITY CONTROL (QC) SAMPLE RESULTS

Percent Dry Weight

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100520 - Total Solids (SM2540G/PSEP)							Sediment					
Duplicate (9100520-DUP1)			Prepared: 10/01/19 17:33 Analyzed: 10/02/19 12:42									
<u>QC Source Sample: SE-24-0-0.33 (A9J0006-01)</u>												
<u>EPA 8000C</u>												
% Solids	45.7	1.00	1.00	%	1	---	35.5	---	---	25	10%	Q-04

No Client related Batch QC samples analyzed for this batch. See notes page for more information.

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QUALITY CONTROL (QC) SAMPLE RESULTS

Percent Dry Weight

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100571 - Total Solids (SM2540G/PSEP)							Sediment					
Duplicate (9100571-DUP1)			Prepared: 10/02/19 16:19 Analyzed: 10/03/19 12:11									
<u>QC Source Sample: SE-25-0-0.33 (A9J0006-13)</u>												
<u>EPA 8000C</u>												
% Solids	29.9	1.00	1.00	%	1	---	40.6	---	---	31	10%	Q-04

No Client related Batch QC samples analyzed for this batch. See notes page for more information.

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QUALITY CONTROL (QC) SAMPLE RESULTS

Percent Dry Weight

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9100630 - Total Solids (SM2540G/PSEP)							Sediment					
Duplicate (9100630-DUP1)			Prepared: 10/03/19 14:52 Analyzed: 10/07/19 11:30									
<u>QC Source Sample: SE-22-0-0.33 (A9J0006-23)</u>												
<u>EPA 8000C</u>												
% Solids	33.5	1.00	1.00	%	1	---	33.4	---	---	0.3	10%	

No Client related Batch QC samples analyzed for this batch. See notes page for more information.

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QUALITY CONTROL (QC) SAMPLE RESULTS

Percent Dry Weight

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9101585 - Total Solids (Dry Weight)							Soil					
Duplicate (9101585-DUP1)			Prepared: 10/25/19 08:44 Analyzed: 10/28/19 07:41									
<u>QC Source Sample: Non-SDG (A9I0893-22)</u>												
% Solids	92.7	1.00	1.00	%	1	---	92.6	---	---	0.09	10%	
Duplicate (9101585-DUP2)			Prepared: 10/25/19 08:44 Analyzed: 10/28/19 07:41									
<u>QC Source Sample: Non-SDG (A9J0894-01)</u>												
% Solids	71.6	1.00	1.00	%	1	---	72.1	---	---	0.8	10%	
Duplicate (9101585-DUP3)			Prepared: 10/25/19 08:44 Analyzed: 10/28/19 07:41									
<u>QC Source Sample: Non-SDG (A9J0896-01)</u>												
% Solids	91.2	1.00	1.00	%	1	---	91.7	---	---	0.5	10%	
Duplicate (9101585-DUP4)			Prepared: 10/25/19 08:44 Analyzed: 10/28/19 07:41									
<u>QC Source Sample: Non-SDG (A9J0922-01)</u>												
% Solids	78.0	1.00	1.00	%	1	---	79.1	---	---	2	10%	
Duplicate (9101585-DUP5)			Prepared: 10/25/19 17:55 Analyzed: 10/28/19 07:41									
<u>QC Source Sample: Non-SDG (A9J0958-01)</u>												
% Solids	85.0	1.00	1.00	%	1	---	85.7	---	---	0.8	10%	
Duplicate (9101585-DUP6)			Prepared: 10/25/19 17:55 Analyzed: 10/28/19 07:41									
<u>QC Source Sample: Non-SDG (A9J0964-02)</u>												
% Solids	80.5	1.00	1.00	%	1	---	80.2	---	---	0.3	10%	

No Client related Batch QC samples analyzed for this batch. See notes page for more information.



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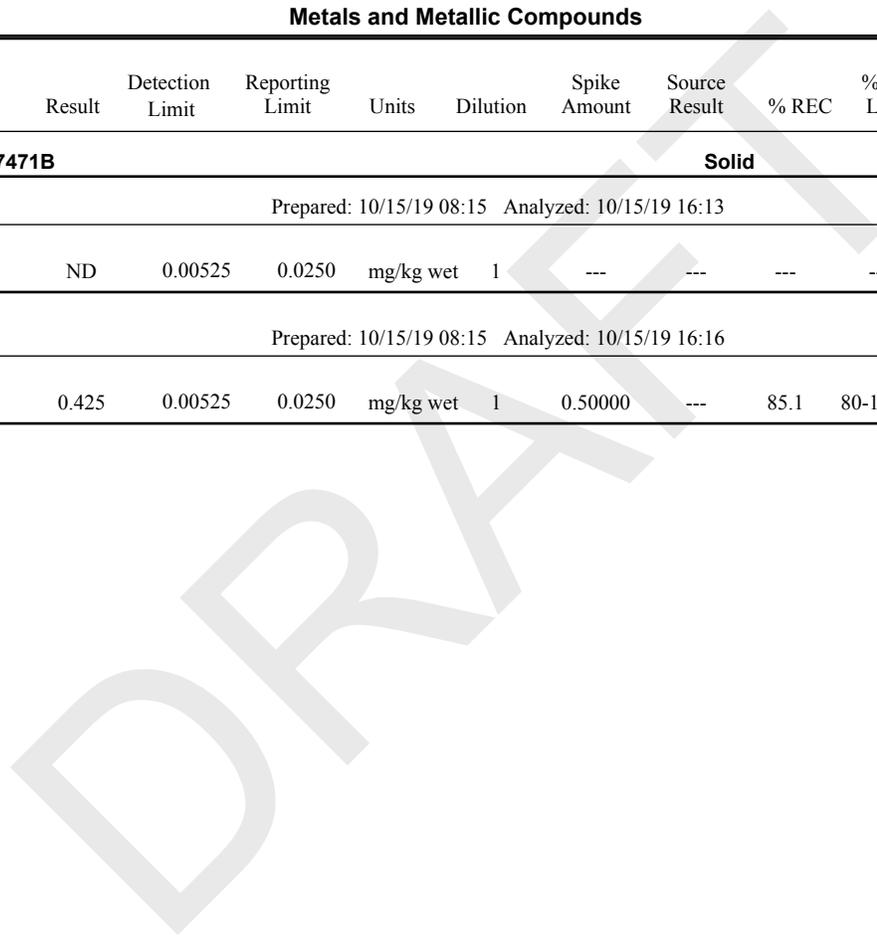
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QUALITY CONTROL (QC) SAMPLE RESULTS

Metals and Metallic Compounds

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch BHJ0445 - SMM EPA 7471B						Solid						
Blank (BHJ0445-BLK1)						Prepared: 10/15/19 08:15 Analyzed: 10/15/19 16:13						
<u>EPA 7471B</u>												
Mercury	ND	0.00525	0.0250	mg/kg wet	1	---	---	---	---	---	---	U
LCS (BHJ0445-BS1)						Prepared: 10/15/19 08:15 Analyzed: 10/15/19 16:16						
<u>EPA 7471B</u>												
Mercury	0.425	0.00525	0.0250	mg/kg wet	1	0.50000	---	85.1	80-120%	---	---	



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Analytical Resources, Inc.

QUALITY CONTROL (QC) SAMPLE RESULTS

Wet Chemistry

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch BHJ0088 - No Prep Wet Chem						Solid						
Blank (BHJ0088-BLK1)						Prepared: 10/02/19 17:56 Analyzed: 10/02/19 23:02						
<u>PSEP 1986</u>												
Total Solids, Sulfide	ND	0.04	0.04	%	1	---	---	---	---	---	---	U
Duplicate (BHJ0088-DUP1)						Prepared: 10/02/19 17:56 Analyzed: 10/02/19 23:02						
<u>QC Source Sample: A9J0006-01 (A9J0006-01)</u>												
<u>PSEP 1986</u>												
Total Solids, Sulfide	34.32	0.04	0.04	%	1	---	32.53	---	---	5.33	20%	

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Analytical Resources, Inc.

QUALITY CONTROL (QC) SAMPLE RESULTS

Wet Chemistry

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch BHJ0091 - No Prep Wet Chem						Solid						
Blank (BHJ0091-BLK1)						Prepared: 10/03/19 09:16 Analyzed: 10/04/19 15:28						
<u>SM 4500-S2 D-00</u>												
Sulfide	ND	1.00	1.00	mg/kg wet	1	---	---	---	---	---	---	U
LCS (BHJ0091-BS1)						Prepared: 10/03/19 09:16 Analyzed: 10/04/19 15:29						
<u>SM 4500-S2 D-00</u>												
Sulfide	156	10.0	10.0	mg/kg wet	10	169.77	---	91.7	75-125%	---	---	D
Duplicate (BHJ0091-DUP1)						Prepared: 10/03/19 09:16 Analyzed: 10/04/19 15:29						
<u>QC Source Sample: A9J0006-01 (A9J0006-01)</u>												
<u>SM 4500-S2 D-00</u>												
Sulfide	272	29.8	29.8	mg/kg dry	10	---	281	---	---	3.18	20%	D
Matrix Spike (BHJ0091-MS1)						Prepared: 10/03/19 09:16 Analyzed: 10/04/19 15:30						
<u>QC Source Sample: A9J0006-01 (A9J0006-01)</u>												
<u>SM 4500-S2 D-00</u>												
Sulfide	820	60.1	60.1	mg/kg dry	20	510.54	281	106	75-125%	---	---	D



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Analytical Resources, Inc.

QUALITY CONTROL (QC) SAMPLE RESULTS

Wet Chemistry

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch BHJ0124 - No Prep Wet Chem							Solid					
Blank (BHJ0124-BLK1)						Prepared: 10/04/19 08:57 Analyzed: 10/04/19 15:35						
<u>SM 4500-S2 D-00</u>												
Sulfide	ND	1.00	1.00	mg/kg wet	1	---	---	---	---	---	---	U
LCS (BHJ0124-BS1)						Prepared: 10/04/19 08:57 Analyzed: 10/04/19 15:36						
<u>SM 4500-S2 D-00</u>												
Sulfide	159	10.0	10.0	mg/kg wet	10	169.77	---	93.5	75-125%	---	---	D
Duplicate (BHJ0124-DUP1)						Prepared: 10/04/19 08:57 Analyzed: 10/04/19 15:38						
<u>QC Source Sample: A9J0006-20 (A9J0006-20)</u>												
<u>SM 4500-S2 D-00</u>												
Sulfide	471	99.0	99.0	mg/kg dry	50	---	397	---	---	17.2	20%	D
Matrix Spike (BHJ0124-MS1)						Prepared: 10/04/19 08:57 Analyzed: 10/04/19 15:40						
<u>QC Source Sample: A9J0006-20 (A9J0006-20)</u>												
<u>SM 4500-S2 D-00</u>												
Sulfide	1270	96.0	96.0	mg/kg dry	50	325.82	397	268	75-125%	---	---	*, D



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QUALITY CONTROL (QC) SAMPLE RESULTS

Wet Chemistry

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch BHJ0145 - No Prep Wet Chem						Water						
Blank (BHJ0145-BLK1)						Prepared: 10/04/19 13:20 Analyzed: 10/04/19 14:49						
<u>SM 4500-S2 D-00</u>												
Sulfide	ND	0.050	0.050	mg/L	1	---	---	---	---	---	---	U
LCS (BHJ0145-BS1)						Prepared: 10/04/19 13:20 Analyzed: 10/04/19 14:49						
<u>SM 4500-S2 D-00</u>												
Sulfide	0.509	0.050	0.050	mg/L	1	0.50250	---	101	75-125%	---	---	
Duplicate (BHJ0145-DUP1)						Prepared: 10/04/19 13:20 Analyzed: 10/04/19 14:50						
<u>QC Source Sample: A9J0006-02 (A9J0006-02)</u>												
<u>SM 4500-S2 D-00</u>												
Sulfide	0.101	0.050	0.050	mg/L	1	---	0.098	---	---	3.02	20%	
Matrix Spike (BHJ0145-MS1)						Prepared: 10/04/19 13:20 Analyzed: 10/04/19 14:50						
<u>QC Source Sample: A9J0006-02 (A9J0006-02)</u>												
<u>SM 4500-S2 D-00</u>												
Sulfide	0.299	0.050	0.050	mg/L	1	0.50250	0.098	40.0	75-125%	---	---	*
Matrix Spike (BHJ0145-MS2)						Prepared: 10/04/19 13:20 Analyzed: 10/04/19 14:52						
<u>QC Source Sample: A9J0006-04 (A9J0006-04)</u>												
<u>SM 4500-S2 D-00</u>												
Sulfide	0.350	0.050	0.050	mg/L	1	0.50250	0.126	44.6	75-125%	---	---	*
Matrix Spike (BHJ0145-MS3)						Prepared: 10/04/19 13:20 Analyzed: 10/04/19 14:53						
<u>QC Source Sample: A9J0006-15 (A9J0006-15)</u>												
<u>SM 4500-S2 D-00</u>												
Sulfide	0.383	0.050	0.050	mg/L	1	0.50250	0.062	63.9	75-125%	---	---	*
Matrix Spike (BHJ0145-MS4)						Prepared: 10/04/19 13:20 Analyzed: 10/04/19 14:54						
<u>QC Source Sample: A9J0006-17 (A9J0006-17)</u>												
<u>SM 4500-S2 D-00</u>												

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Analytical Resources, Inc.

QUALITY CONTROL (QC) SAMPLE RESULTS

Wet Chemistry

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch BHJ0145 - No Prep Wet Chem							Water					
Matrix Spike (BHJ0145-MS4)			Prepared: 10/04/19 13:20 Analyzed: 10/04/19 14:54									
<u>QC Source Sample: A9J0006-17 (A9J0006-17)</u>												
Sulfide	0.421	0.050	0.050	mg/L	1	0.50250	0.115	60.9	75-125%	---	---	*
Matrix Spike (BHJ0145-MS5)			Prepared: 10/04/19 13:20 Analyzed: 10/04/19 14:55									
<u>QC Source Sample: A9J0006-19 (A9J0006-19)</u>												
<u>SM 4500-S2 D-00</u>												
Sulfide	0.409	0.050	0.050	mg/L	1	0.50250	ND	81.4	75-125%	---	---	
Matrix Spike (BHJ0145-MS6)			Prepared: 10/04/19 13:20 Analyzed: 10/04/19 14:56									
<u>QC Source Sample: A9J0006-26 (A9J0006-26)</u>												
<u>SM 4500-S2 D-00</u>												
Sulfide	0.418	0.050	0.050	mg/L	1	0.50250	ND	83.2	75-125%	---	---	



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SAMPLE PREPARATION INFORMATION

Diesel and/or Oil Hydrocarbons by NWTPH-Dx with Acid/Silica Gel Cleanup

Prep: EPA 3546 w/SG+Acid (NWTPH)

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
<u>Batch: 9101200</u>							
A9J0006-01	Sediment	NWTPH-Dx/SG	09/27/19 13:13	10/03/19 13:22	10.01g/5mL	10g/5mL	1.00
A9J0006-03	Sediment	NWTPH-Dx/SG	09/27/19 14:02	10/03/19 13:22	10.52g/5mL	10g/5mL	0.95
A9J0006-05	Sediment	NWTPH-Dx/SG	09/27/19 10:23	10/03/19 13:22	10.36g/5mL	10g/5mL	0.97
A9J0006-06	Sediment	NWTPH-Dx/SG	09/27/19 09:47	10/03/19 13:22	10.3g/5mL	10g/5mL	0.97
A9J0006-07	Sediment	NWTPH-Dx/SG	09/27/19 11:44	10/03/19 13:22	10.21g/5mL	10g/5mL	0.98
A9J0006-08	Sediment	NWTPH-Dx/SG	09/27/19 15:07	10/03/19 13:22	10.18g/5mL	10g/5mL	0.98
A9J0006-13	Sediment	NWTPH-Dx/SG	09/27/19 18:15	10/03/19 13:22	10.2g/5mL	10g/5mL	0.98
A9J0006-16	Sediment	NWTPH-Dx/SG	09/27/19 17:25	10/03/19 13:22	10.08g/5mL	10g/5mL	0.99
A9J0006-18	Sediment	NWTPH-Dx/SG	09/27/19 11:54	10/03/19 13:22	10.04g/5mL	10g/5mL	1.00
A9J0006-20	Sediment	NWTPH-Dx/SG	09/27/19 12:10	10/03/19 13:22	10.05g/5mL	10g/5mL	1.00
A9J0006-21	Sediment	NWTPH-Dx/SG	09/27/19 09:00	10/03/19 13:22	10.28g/5mL	10g/5mL	0.97
A9J0006-23	Sediment	NWTPH-Dx/SG	09/27/19 19:30	10/03/19 13:22	10.02g/5mL	10g/5mL	1.00
A9J0006-24	Sediment	NWTPH-Dx/SG	09/27/19 14:35	10/03/19 13:22	10.49g/5mL	10g/5mL	0.95
A9J0006-25	Sediment	NWTPH-Dx/SG	09/27/19 14:35	10/03/19 13:22	10.09g/5mL	10g/5mL	0.99

Gasoline Range Hydrocarbons (Benzene through Naphthalene) by NWTPH-Gx

Prep: EPA 5035A

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
<u>Batch: 9100478</u>							
A9J0006-01	Sediment	NWTPH-Gx (MS)	09/27/19 13:13	09/27/19 13:13	3.73g/5mL	5g/5mL	1.34
A9J0006-07	Sediment	NWTPH-Gx (MS)	09/27/19 11:44	09/27/19 11:44	4.25g/5mL	5g/5mL	1.18
A9J0006-08	Sediment	NWTPH-Gx (MS)	09/27/19 15:07	09/27/19 15:07	4.21g/5mL	5g/5mL	1.19
A9J0006-13	Sediment	NWTPH-Gx (MS)	09/27/19 18:15	09/27/19 18:15	4.79g/5mL	5g/5mL	1.04
A9J0006-16	Sediment	NWTPH-Gx (MS)	09/27/19 17:25	09/27/19 17:25	4.72g/5mL	5g/5mL	1.06
A9J0006-18	Sediment	NWTPH-Gx (MS)	09/27/19 11:54	09/27/19 11:54	4.34g/5mL	5g/5mL	1.15
<u>Batch: 9100509</u>							
A9J0006-20	Sediment	NWTPH-Gx (MS)	09/27/19 12:10	09/27/19 12:10	5.01g/5mL	5g/5mL	1.00
A9J0006-21	Sediment	NWTPH-Gx (MS)	09/27/19 09:00	09/27/19 09:00	3.82g/5mL	5g/5mL	1.31
A9J0006-23	Sediment	NWTPH-Gx (MS)	09/27/19 19:30	09/27/19 19:30	3.4g/5mL	5g/5mL	1.47
A9J0006-24	Sediment	NWTPH-Gx (MS)	09/27/19 14:35	09/27/19 14:35	4.16g/5mL	5g/5mL	1.20
A9J0006-25	Sediment	NWTPH-Gx (MS)	09/27/19 14:35	09/27/19 14:35	3.65g/5mL	5g/5mL	1.37
<u>Batch: 9100546</u>							
A9J0006-03	Sediment	NWTPH-Gx (MS)	09/27/19 14:02	09/27/19 14:02	4.42g/5mL	5g/5mL	1.13
A9J0006-05	Sediment	NWTPH-Gx (MS)	09/27/19 10:23	09/27/19 10:23	4.58g/5mL	5g/5mL	1.09

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AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tideland Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
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SAMPLE PREPARATION INFORMATION

Gasoline Range Hydrocarbons (Benzene through Naphthalene) by NWTPH-Gx

Prep: EPA 5035A

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
A9J0006-06	Sediment	NWTPH-Gx (MS)	09/27/19 09:47	09/27/19 09:47	2.87g/5mL	5g/5mL	1.74

Polychlorinated Biphenyls by EPA 8082A

Prep: EPA 3546

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
<u>Batch: 9100667</u>							
A9J0006-01	Sediment	EPA 8082A	09/27/19 13:13	10/04/19 10:52	10.05g/2mL	10g/2mL	1.00
A9J0006-03	Sediment	EPA 8082A	09/27/19 14:02	10/04/19 10:52	10.01g/2mL	10g/2mL	1.00
A9J0006-05	Sediment	EPA 8082A	09/27/19 10:23	10/04/19 10:52	10.02g/2mL	10g/2mL	1.00
A9J0006-07	Sediment	EPA 8082A	09/27/19 11:44	10/04/19 10:52	10.07g/2mL	10g/2mL	0.99
A9J0006-08	Sediment	EPA 8082A	09/27/19 15:07	10/04/19 10:52	10.01g/2mL	10g/2mL	1.00
A9J0006-13	Sediment	EPA 8082A	09/27/19 18:15	10/04/19 10:52	10.8g/2mL	10g/2mL	0.93
A9J0006-16	Sediment	EPA 8082A	09/27/19 17:25	10/04/19 10:52	10.66g/2mL	10g/2mL	0.94
A9J0006-20	Sediment	EPA 8082A	09/27/19 12:10	10/04/19 10:52	10.34g/2mL	10g/2mL	0.97
<u>Batch: 9101592</u>							
A9J0006-27	Sediment	EPA 8082A	09/27/19 09:47	10/25/19 10:03	10.23g/2mL	10g/2mL	0.98
A9J0006-28	Sediment	EPA 8082A	09/27/19 11:54	10/25/19 10:03	10.29g/2mL	10g/2mL	0.97
A9J0006-29	Sediment	EPA 8082A	09/27/19 09:00	10/25/19 10:03	10.26g/2mL	10g/2mL	0.98
A9J0006-30	Sediment	EPA 8082A	09/27/19 19:30	10/25/19 10:03	10.4g/2mL	10g/2mL	0.96
A9J0006-31	Sediment	EPA 8082A	09/27/19 14:35	10/25/19 10:03	10.14g/2mL	10g/2mL	0.99
A9J0006-32	Sediment	EPA 8082A	09/27/19 14:35	10/25/19 10:03	10.93g/2mL	10g/2mL	0.92

Semivolatile Organic Compounds by EPA 8270D

Prep: EPA 3546

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
<u>Batch: 9100490</u>							
A9J0006-01RE1	Sediment	EPA 8270D	09/27/19 13:13	10/01/19 15:14	15.21g/2mL	15g/2mL	0.99
A9J0006-03RE1	Sediment	EPA 8270D	09/27/19 14:02	10/01/19 15:14	15.2g/2mL	15g/2mL	0.99
A9J0006-05RE1	Sediment	EPA 8270D	09/27/19 10:23	10/01/19 15:14	15.47g/2mL	15g/2mL	0.97
A9J0006-06RE1	Sediment	EPA 8270D	09/27/19 09:47	10/01/19 15:14	15.68g/2mL	15g/2mL	0.96
A9J0006-07RE1	Sediment	EPA 8270D	09/27/19 11:44	10/01/19 15:14	15.25g/2mL	15g/2mL	0.98
A9J0006-08RE1	Sediment	EPA 8270D	09/27/19 15:07	10/01/19 15:14	15.17g/2mL	15g/2mL	0.99
A9J0006-13RE1	Sediment	EPA 8270D	09/27/19 18:15	10/01/19 15:14	15.17g/2mL	15g/2mL	0.99
A9J0006-16RE1	Sediment	EPA 8270D	09/27/19 17:25	10/01/19 15:14	15.38g/2mL	15g/2mL	0.98
A9J0006-18RE1	Sediment	EPA 8270D	09/27/19 11:54	10/01/19 15:14	15.16g/2mL	15g/2mL	0.99

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
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SAMPLE PREPARATION INFORMATION

Semivolatile Organic Compounds by EPA 8270D

Prep: EPA 3546

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
A9J0006-20RE1	Sediment	EPA 8270D	09/27/19 12:10	10/01/19 15:14	15.24g/2mL	15g/2mL	0.98
A9J0006-21RE1	Sediment	EPA 8270D	09/27/19 09:00	10/01/19 15:14	15.5g/2mL	15g/2mL	0.97
A9J0006-23RE1	Sediment	EPA 8270D	09/27/19 19:30	10/01/19 15:14	15.12g/2mL	15g/2mL	0.99
A9J0006-25RE1	Sediment	EPA 8270D	09/27/19 14:35	10/01/19 15:14	15.38g/2mL	15g/2mL	0.98
Batch: 9100740							
A9J0006-24RE2	Sediment	EPA 8270D	09/27/19 14:35	10/07/19 11:27	15.48g/2mL	15g/2mL	0.97

Total Metals by EPA 6020A (ICPMS)

Prep: EPA 3051A

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
Batch: 9100629							
A9J0006-01	Sediment	EPA 6020A	09/27/19 13:13	10/03/19 14:31	0.512g/50mL	0.5g/50mL	0.98
A9J0006-03	Sediment	EPA 6020A	09/27/19 14:02	10/03/19 14:31	0.516g/50mL	0.5g/50mL	0.97
A9J0006-05	Sediment	EPA 6020A	09/27/19 10:23	10/03/19 14:31	0.508g/50mL	0.5g/50mL	0.98
A9J0006-06	Sediment	EPA 6020A	09/27/19 09:47	10/03/19 14:31	0.519g/50mL	0.5g/50mL	0.96
A9J0006-07	Sediment	EPA 6020A	09/27/19 11:44	10/03/19 14:31	0.5g/50mL	0.5g/50mL	1.00
A9J0006-08	Sediment	EPA 6020A	09/27/19 15:07	10/03/19 14:31	0.5g/50mL	0.5g/50mL	1.00
A9J0006-13	Sediment	EPA 6020A	09/27/19 18:15	10/03/19 14:31	0.487g/50mL	0.5g/50mL	1.03
A9J0006-16	Sediment	EPA 6020A	09/27/19 17:25	10/03/19 14:31	0.497g/50mL	0.5g/50mL	1.01
A9J0006-18	Sediment	EPA 6020A	09/27/19 11:54	10/03/19 14:31	0.485g/50mL	0.5g/50mL	1.03
A9J0006-20	Sediment	EPA 6020A	09/27/19 12:10	10/03/19 14:31	0.49g/50mL	0.5g/50mL	1.02
A9J0006-21	Sediment	EPA 6020A	09/27/19 09:00	10/03/19 14:31	0.515g/50mL	0.5g/50mL	0.97
A9J0006-23	Sediment	EPA 6020A	09/27/19 19:30	10/03/19 14:31	0.509g/50mL	0.5g/50mL	0.98
A9J0006-24	Sediment	EPA 6020A	09/27/19 14:35	10/03/19 14:31	0.511g/50mL	0.5g/50mL	0.98
A9J0006-25	Sediment	EPA 6020A	09/27/19 14:35	10/03/19 14:31	0.507g/50mL	0.5g/50mL	0.99

Ammonia by Plumb Extraction, Gas Diffusion and Colorimetric Detection

Prep: Plumb 1981 Ammonia (Acidified KCl Leach)

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
Batch: 9100530							
A9J0006-01	Sediment	Plumb/SM 4500-NH3 G	09/27/19 13:13	10/02/19 08:28	10.0898g/50mL	10g/50mL	0.99
A9J0006-03	Sediment	Plumb/SM 4500-NH3 G	09/27/19 14:02	10/02/19 08:28	10.1504g/50mL	10g/50mL	0.99

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
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SAMPLE PREPARATION INFORMATION

Ammonia by Plumb Extraction, Gas Diffusion and Colorimetric Detection

<u>Prep: Plumb 1981 Ammonia (Acidified KCl Leach)</u>							
Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
A9J0006-05	Sediment	Plumb/SM 4500-NH3 G	09/27/19 10:23	10/02/19 08:28	10.3745g/50mL	10g/50mL	0.96
A9J0006-06	Sediment	Plumb/SM 4500-NH3 G	09/27/19 09:47	10/02/19 08:28	10.3459g/50mL	10g/50mL	0.97
A9J0006-07	Sediment	Plumb/SM 4500-NH3 G	09/27/19 11:44	10/02/19 08:28	10.0607g/50mL	10g/50mL	0.99
A9J0006-08	Sediment	Plumb/SM 4500-NH3 G	09/27/19 15:07	10/02/19 08:28	10.176g/50mL	10g/50mL	0.98
A9J0006-13	Sediment	Plumb/SM 4500-NH3 G	09/27/19 18:15	10/02/19 08:28	10.4561g/50mL	10g/50mL	0.96
A9J0006-14	Sediment	Plumb/SM 4500-NH3 G	09/27/19 18:40	10/02/19 08:28	10.5203g/50mL	10g/50mL	0.95
A9J0006-16	Sediment	Plumb/SM 4500-NH3 G	09/27/19 17:25	10/02/19 08:28	10.5093g/50mL	10g/50mL	0.95
A9J0006-18	Sediment	Plumb/SM 4500-NH3 G	09/27/19 11:54	10/02/19 08:28	10.2103g/50mL	10g/50mL	0.98
A9J0006-20	Sediment	Plumb/SM 4500-NH3 G	09/27/19 12:10	10/02/19 08:28	10.3042g/50mL	10g/50mL	0.97
A9J0006-21	Sediment	Plumb/SM 4500-NH3 G	09/27/19 09:00	10/02/19 08:28	10.0476g/50mL	10g/50mL	1.00
A9J0006-22	Sediment	Plumb/SM 4500-NH3 G	09/27/19 08:30	10/02/19 08:28	10.4144g/50mL	10g/50mL	0.96
A9J0006-23	Sediment	Plumb/SM 4500-NH3 G	09/27/19 19:30	10/02/19 08:28	10.1604g/50mL	10g/50mL	0.98
A9J0006-24	Sediment	Plumb/SM 4500-NH3 G	09/27/19 14:35	10/02/19 08:28	10.4805g/50mL	10g/50mL	0.95
A9J0006-25	Sediment	Plumb/SM 4500-NH3 G	09/27/19 14:35	10/02/19 08:28	10.3144g/50mL	10g/50mL	0.97

Demand Parameters

<u>Prep: PSEP-5310B TOC</u>							
Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
<u>Batch: 9100832</u>							
A9J0006-01RE1	Sediment	EPA 9060Amod	09/27/19 13:13	10/08/19 17:15			NA
A9J0006-03	Sediment	EPA 9060Amod	09/27/19 14:02	10/08/19 17:15			NA
A9J0006-05	Sediment	EPA 9060Amod	09/27/19 10:23	10/08/19 17:15			NA
A9J0006-06	Sediment	EPA 9060Amod	09/27/19 09:47	10/08/19 17:15			NA
A9J0006-07	Sediment	EPA 9060Amod	09/27/19 11:44	10/08/19 17:15			NA
A9J0006-08	Sediment	EPA 9060Amod	09/27/19 15:07	10/08/19 17:15			NA

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AMENDED REPORT

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SAMPLE PREPARATION INFORMATION

Demand Parameters

Prep: PSEP-5310B TOC

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
A9J0006-13RE1	Sediment	EPA 9060Amod	09/27/19 18:15	10/08/19 17:15			NA
A9J0006-14	Sediment	EPA 9060Amod	09/27/19 18:40	10/08/19 17:15			NA
<u>Batch: 9100833</u>							
A9J0006-16	Sediment	EPA 9060Amod	09/27/19 17:25	10/08/19 17:15			NA
A9J0006-18	Sediment	EPA 9060Amod	09/27/19 11:54	10/08/19 17:15			NA
A9J0006-20	Sediment	EPA 9060Amod	09/27/19 12:10	10/08/19 17:15			NA
A9J0006-21	Sediment	EPA 9060Amod	09/27/19 09:00	10/08/19 17:15			NA
A9J0006-22	Sediment	EPA 9060Amod	09/27/19 08:30	10/08/19 17:15			NA
A9J0006-23	Sediment	EPA 9060Amod	09/27/19 19:30	10/08/19 17:15			NA
A9J0006-24	Sediment	EPA 9060Amod	09/27/19 14:35	10/08/19 17:15			NA
A9J0006-25	Sediment	EPA 9060Amod	09/27/19 14:35	10/08/19 17:15			NA

Solid and Moisture Determinations

Prep: Total Solids (SM2540G/PSEP)

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
<u>Batch: 9100520</u>							
A9J0006-01	Sediment	PSEP 1986	09/27/19 13:13	10/01/19 17:33			NA
A9J0006-03	Sediment	PSEP 1986	09/27/19 14:02	10/01/19 17:33			NA
A9J0006-05	Sediment	PSEP 1986	09/27/19 10:23	10/01/19 17:33			NA
A9J0006-06	Sediment	PSEP 1986	09/27/19 09:47	10/01/19 17:33			NA
A9J0006-07	Sediment	PSEP 1986	09/27/19 11:44	10/01/19 17:33			NA
A9J0006-08	Sediment	PSEP 1986	09/27/19 15:07	10/01/19 17:33			NA
<u>Batch: 9100571</u>							
A9J0006-13	Sediment	PSEP 1986	09/27/19 18:15	10/02/19 16:19			NA
A9J0006-14	Sediment	PSEP 1986	09/27/19 18:40	10/02/19 16:19			NA
A9J0006-16	Sediment	PSEP 1986	09/27/19 17:25	10/02/19 16:19			NA
A9J0006-18	Sediment	PSEP 1986	09/27/19 11:54	10/02/19 16:19			NA
A9J0006-20	Sediment	PSEP 1986	09/27/19 12:10	10/02/19 16:19			NA
<u>Batch: 9100630</u>							
A9J0006-21	Sediment	PSEP 1986	09/27/19 09:00	10/03/19 14:52			NA
A9J0006-22	Sediment	PSEP 1986	09/27/19 08:30	10/03/19 14:52			NA
A9J0006-23	Sediment	PSEP 1986	09/27/19 19:30	10/03/19 14:52			NA
A9J0006-24	Sediment	PSEP 1986	09/27/19 14:35	10/03/19 14:52			NA
A9J0006-25	Sediment	PSEP 1986	09/27/19 14:35	10/03/19 14:52			NA

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AMENDED REPORT

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SAMPLE PREPARATION INFORMATION

Solid and Moisture Determinations

Prep: Total Volatile Solids (non-aq)					Sample	Default	RL Prep
Lab Number	Matrix	Method	Sampled	Prepared	Initial/Final	Initial/Final	Factor
<u>Batch: 9100558</u>							
A9J0006-01	Sediment	SM 2540 G	09/27/19 13:13	10/02/19 13:00			NA
A9J0006-03	Sediment	SM 2540 G	09/27/19 14:02	10/02/19 13:00			NA
A9J0006-05	Sediment	SM 2540 G	09/27/19 10:23	10/02/19 13:00			NA
A9J0006-06	Sediment	SM 2540 G	09/27/19 09:47	10/02/19 13:00			NA
A9J0006-07	Sediment	SM 2540 G	09/27/19 11:44	10/02/19 13:00			NA
A9J0006-08	Sediment	SM 2540 G	09/27/19 15:07	10/02/19 13:00			NA
<u>Batch: 9100621</u>							
A9J0006-13	Sediment	SM 2540 G	09/27/19 18:15	10/03/19 12:48			NA
A9J0006-14	Sediment	SM 2540 G	09/27/19 18:40	10/03/19 12:48			NA
A9J0006-16	Sediment	SM 2540 G	09/27/19 17:25	10/03/19 12:48			NA
A9J0006-18	Sediment	SM 2540 G	09/27/19 11:54	10/03/19 12:48			NA
A9J0006-20	Sediment	SM 2540 G	09/27/19 12:10	10/03/19 12:48			NA
<u>Batch: 9100742</u>							
A9J0006-21	Sediment	SM 2540 G	09/27/19 09:00	10/03/19 14:52			NA
A9J0006-22	Sediment	SM 2540 G	09/27/19 08:30	10/03/19 14:52			NA
A9J0006-23	Sediment	SM 2540 G	09/27/19 19:30	10/03/19 14:52			NA
A9J0006-24	Sediment	SM 2540 G	09/27/19 14:35	10/03/19 14:52			NA
A9J0006-25	Sediment	SM 2540 G	09/27/19 14:35	10/03/19 14:52			NA

Grain Size by ASTM D 422m/PSET Parameters

Prep: ASTM D 421					Sample	Default	RL Prep
Lab Number	Matrix	Method	Sampled	Prepared	Initial/Final	Initial/Final	Factor
<u>Batch: 9100866</u>							
A9J0006-01	Sediment	D422mod	09/27/19 13:13	10/09/19 10:53			NA
A9J0006-03	Sediment	D422mod	09/27/19 14:02	10/09/19 11:16			NA
A9J0006-05	Sediment	D422mod	09/27/19 10:23	10/09/19 11:39			NA
A9J0006-06	Sediment	D422mod	09/27/19 09:47	10/09/19 12:00			NA
A9J0006-07	Sediment	D422mod	09/27/19 11:44	10/09/19 12:23			NA
<u>Batch: 9101058</u>							
A9J0006-08	Sediment	D422mod	09/27/19 15:07	10/14/19 09:38			NA
A9J0006-13	Sediment	D422mod	09/27/19 18:15	10/14/19 09:08			NA
A9J0006-16	Sediment	D422mod	09/27/19 17:25	10/14/19 08:48			NA
A9J0006-18	Sediment	D422mod	09/27/19 11:54	10/14/19 09:27			NA
A9J0006-20	Sediment	D422mod	09/27/19 12:10	10/14/19 08:30			NA

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SAMPLE PREPARATION INFORMATION

Grain Size by ASTM D 422m/PSET Parameters

Prep: ASTM D 421

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
A9J0006-21	Sediment	D422mod	09/27/19 09:00	10/14/19 09:18			NA
A9J0006-23	Sediment	D422mod	09/27/19 19:30	10/14/19 08:57			NA
A9J0006-24	Sediment	D422mod	09/27/19 14:35	10/14/19 08:38			NA
A9J0006-25	Sediment	D422mod	09/27/19 14:35	10/14/19 08:16			NA

Percent Dry Weight

Prep: Total Solids (Dry Weight)

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
<u>Batch: 9101585</u>							
A9J0006-27	Sediment	EPA 8000C	09/27/19 09:47	10/25/19 08:44			NA
A9J0006-28	Sediment	EPA 8000C	09/27/19 11:54	10/25/19 08:44			NA
A9J0006-29	Sediment	EPA 8000C	09/27/19 09:00	10/25/19 08:44			NA
A9J0006-30	Sediment	EPA 8000C	09/27/19 19:30	10/25/19 08:44			NA
A9J0006-31	Sediment	EPA 8000C	09/27/19 14:35	10/25/19 08:44			NA
A9J0006-32	Sediment	EPA 8000C	09/27/19 14:35	10/25/19 08:44			NA

Prep: Total Solids (SM2540G/PSEP)

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
<u>Batch: 9100520</u>							
A9J0006-01	Sediment	EPA 8000C	09/27/19 13:13	10/01/19 17:33			NA
A9J0006-03	Sediment	EPA 8000C	09/27/19 14:02	10/01/19 17:33			NA
A9J0006-05	Sediment	EPA 8000C	09/27/19 10:23	10/01/19 17:33			NA
A9J0006-06	Sediment	EPA 8000C	09/27/19 09:47	10/01/19 17:33			NA
A9J0006-07	Sediment	EPA 8000C	09/27/19 11:44	10/01/19 17:33			NA
A9J0006-08	Sediment	EPA 8000C	09/27/19 15:07	10/01/19 17:33			NA
<u>Batch: 9100571</u>							
A9J0006-13	Sediment	EPA 8000C	09/27/19 18:15	10/02/19 16:19			NA
A9J0006-14	Sediment	EPA 8000C	09/27/19 18:40	10/02/19 16:19			NA
A9J0006-16	Sediment	EPA 8000C	09/27/19 17:25	10/02/19 16:19			NA
A9J0006-18	Sediment	EPA 8000C	09/27/19 11:54	10/02/19 16:19			NA
A9J0006-20	Sediment	EPA 8000C	09/27/19 12:10	10/02/19 16:19			NA
<u>Batch: 9100630</u>							
A9J0006-21	Sediment	EPA 8000C	09/27/19 09:00	10/03/19 14:52			NA
A9J0006-22	Sediment	EPA 8000C	09/27/19 08:30	10/03/19 14:52			NA
A9J0006-23	Sediment	EPA 8000C	09/27/19 19:30	10/03/19 14:52			NA

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Philip Nerenberg, Lab Director



Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
EPA ID: OR01039

AMENDED REPORT

<u>Maul Foster & Alongi, INC.</u> 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: <u>Seaport Tidelands</u> Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
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SAMPLE PREPARATION INFORMATION

Percent Dry Weight

<u>Prep: Total Solids (SM2540G/PSEP)</u>					Sample	Default	RL Prep
Lab Number	Matrix	Method	Sampled	Prepared	Initial/Final	Initial/Final	Factor
A9J0006-24	Sediment	EPA 8000C	09/27/19 14:35	10/03/19 14:52			NA
A9J0006-25	Sediment	EPA 8000C	09/27/19 14:35	10/03/19 14:52			NA

DRAFT

Apex Laboratories

Philip Nerenberg, Lab Director

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AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tideland Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
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Analytical Resources, Inc.

SAMPLE PREPARATION INFORMATION

Metals and Metallic Compounds

Prep: SMM EPA 7471B

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
Batch: BJJ0445							
A9J0006-01	Sediment	EPA 7471B	09/27/19 13:13	10/15/19 08:15	0.271g/50mL	0.2g/50mL	0.74
A9J0006-03	Sediment	EPA 7471B	09/27/19 14:02	10/15/19 08:15	0.248g/50mL	0.2g/50mL	0.81
A9J0006-05	Sediment	EPA 7471B	09/27/19 10:23	10/15/19 08:15	0.207g/50mL	0.2g/50mL	0.97
A9J0006-06	Sediment	EPA 7471B	09/27/19 09:47	10/15/19 08:15	0.224g/50mL	0.2g/50mL	0.89
A9J0006-07	Sediment	EPA 7471B	09/27/19 11:44	10/15/19 08:15	0.245g/50mL	0.2g/50mL	0.82
A9J0006-08	Sediment	EPA 7471B	09/27/19 15:07	10/15/19 08:15	0.207g/50mL	0.2g/50mL	0.97
A9J0006-13	Sediment	EPA 7471B	09/27/19 18:15	10/15/19 08:15	0.232g/50mL	0.2g/50mL	0.86
A9J0006-14	Sediment	EPA 7471B	09/27/19 18:40	10/15/19 08:15	0.275g/50mL	0.2g/50mL	0.73
A9J0006-16	Sediment	EPA 7471B	09/27/19 17:25	10/15/19 08:15	0.287g/50mL	0.2g/50mL	0.70
A9J0006-18	Sediment	EPA 7471B	09/27/19 11:54	10/15/19 08:15	0.243g/50mL	0.2g/50mL	0.82
A9J0006-20	Sediment	EPA 7471B	09/27/19 12:10	10/15/19 08:15	0.25g/50mL	0.2g/50mL	0.80
A9J0006-21	Sediment	EPA 7471B	09/27/19 09:00	10/15/19 08:15	0.227g/50mL	0.2g/50mL	0.88
A9J0006-22	Sediment	EPA 7471B	09/27/19 08:30	10/15/19 08:15	0.219g/50mL	0.2g/50mL	0.91
A9J0006-23	Sediment	EPA 7471B	09/27/19 19:30	10/15/19 08:15	0.234g/50mL	0.2g/50mL	0.86
A9J0006-24	Sediment	EPA 7471B	09/27/19 14:35	10/15/19 08:15	0.213g/50mL	0.2g/50mL	0.94
A9J0006-25	Sediment	EPA 7471B	09/27/19 14:35	10/15/19 08:15	0.292g/50mL	0.2g/50mL	0.69

Wet Chemistry

Prep: No Prep Wet Chem

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
Batch: BJJ0088							
A9J0006-01	Sediment	PSEP 1986	09/27/19 13:13	10/02/19 17:56	5g/5g	5g/5g	1.00
A9J0006-03	Sediment	PSEP 1986	09/27/19 14:02	10/02/19 17:56	5g/5g	5g/5g	1.00
A9J0006-05	Sediment	PSEP 1986	09/27/19 10:23	10/02/19 17:56	5g/5g	5g/5g	1.00
A9J0006-06	Sediment	PSEP 1986	09/27/19 09:47	10/02/19 17:56	5g/5g	5g/5g	1.00
A9J0006-07	Sediment	PSEP 1986	09/27/19 11:44	10/02/19 17:56	5g/5g	5g/5g	1.00
A9J0006-08	Sediment	PSEP 1986	09/27/19 15:07	10/02/19 17:56	5g/5g	5g/5g	1.00
A9J0006-13	Sediment	PSEP 1986	09/27/19 18:15	10/02/19 17:56	5g/5g	5g/5g	1.00
A9J0006-14	Sediment	PSEP 1986	09/27/19 18:40	10/02/19 17:56	5g/5g	5g/5g	1.00
A9J0006-16	Sediment	PSEP 1986	09/27/19 17:25	10/02/19 17:56	5g/5g	5g/5g	1.00
A9J0006-18	Sediment	PSEP 1986	09/27/19 11:54	10/02/19 17:56	5g/5g	5g/5g	1.00
A9J0006-20	Sediment	PSEP 1986	09/27/19 12:10	10/02/19 17:56	5g/5g	5g/5g	1.00
A9J0006-21	Sediment	PSEP 1986	09/27/19 09:00	10/02/19 17:56	5g/5g	5g/5g	1.00
A9J0006-22	Sediment	PSEP 1986	09/27/19 08:30	10/02/19 17:56	5g/5g	5g/5g	1.00

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tideland Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
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Analytical Resources, Inc.

SAMPLE PREPARATION INFORMATION

Wet Chemistry

Prep: No Prep Wet Chem

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
A9J0006-23	Sediment	PSEP 1986	09/27/19 19:30	10/02/19 17:56	5g/5g	5g/5g	1.00
A9J0006-24	Sediment	PSEP 1986	09/27/19 14:35	10/02/19 17:56	5g/5g	5g/5g	1.00
A9J0006-25	Sediment	PSEP 1986	09/27/19 14:35	10/02/19 17:56	5g/5g	5g/5g	1.00
Batch: BHJ0091							
A9J0006-01	Sediment	SM 4500-S2 D-00	09/27/19 13:13	10/03/19 09:16	5.093g/100mL	5g/100mL	0.98
A9J0006-03	Sediment	SM 4500-S2 D-00	09/27/19 14:02	10/03/19 09:16	5.226g/100mL	5g/100mL	0.96
A9J0006-05	Sediment	SM 4500-S2 D-00	09/27/19 10:23	10/03/19 09:16	5.327g/100mL	5g/100mL	0.94
A9J0006-06	Sediment	SM 4500-S2 D-00	09/27/19 09:47	10/03/19 09:16	5.064g/100mL	5g/100mL	0.99
A9J0006-07	Sediment	SM 4500-S2 D-00	09/27/19 11:44	10/03/19 09:16	5.556g/100mL	5g/100mL	0.90
A9J0006-08	Sediment	SM 4500-S2 D-00	09/27/19 15:07	10/03/19 09:16	5.143g/100mL	5g/100mL	0.97
A9J0006-13	Sediment	SM 4500-S2 D-00	09/27/19 18:15	10/03/19 09:16	5.376g/100mL	5g/100mL	0.93
A9J0006-14	Sediment	SM 4500-S2 D-00	09/27/19 18:40	10/03/19 09:16	5.318g/100mL	5g/100mL	0.94
A9J0006-16	Sediment	SM 4500-S2 D-00	09/27/19 17:25	10/03/19 09:16	5.768g/100mL	5g/100mL	0.87
A9J0006-18	Sediment	SM 4500-S2 D-00	09/27/19 11:54	10/03/19 09:16	5.384g/100mL	5g/100mL	0.93
Batch: BHJ0124							
A9J0006-20	Sediment	SM 4500-S2 D-00	09/27/19 12:10	10/04/19 08:57	5.729g/100mL	5g/100mL	0.87
A9J0006-21	Sediment	SM 4500-S2 D-00	09/27/19 09:00	10/04/19 08:57	5.324g/100mL	5g/100mL	0.94
A9J0006-22	Sediment	SM 4500-S2 D-00	09/27/19 08:30	10/04/19 08:57	5.019g/100mL	5g/100mL	1.00
A9J0006-23	Sediment	SM 4500-S2 D-00	09/27/19 19:30	10/04/19 08:57	5.591g/100mL	5g/100mL	0.89
A9J0006-24	Sediment	SM 4500-S2 D-00	09/27/19 14:35	10/04/19 08:57	5.149g/100mL	5g/100mL	0.97
A9J0006-25	Sediment	SM 4500-S2 D-00	09/27/19 14:35	10/04/19 08:57	5.232g/100mL	5g/100mL	0.96

Wet Chemistry

Prep: No Prep Wet Chem

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
Batch: BHJ0145							
A9J0006-02	Water	SM 4500-S2 D-00	09/27/19 13:13	10/04/19 13:20	5mL/5mL	5mL/5mL	1.00
A9J0006-04	Water	SM 4500-S2 D-00	09/27/19 13:13	10/04/19 13:20	5mL/5mL	5mL/5mL	1.00
A9J0006-15	Water	SM 4500-S2 D-00	09/27/19 18:40	10/04/19 13:20	5mL/5mL	5mL/5mL	1.00
A9J0006-17	Water	SM 4500-S2 D-00	09/27/19 17:25	10/04/19 13:20	5mL/5mL	5mL/5mL	1.00
A9J0006-19	Water	SM 4500-S2 D-00	09/27/19 11:54	10/04/19 13:20	5mL/5mL	5mL/5mL	1.00
A9J0006-26	Water	SM 4500-S2 D-00	09/27/19 09:00	10/04/19 13:20	5mL/5mL	5mL/5mL	1.00

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Philip Nerenberg, Lab Director



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
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QUALIFIER DEFINITIONS

Client Sample and Quality Control (QC) Sample Qualifier Definitions:

Apex Laboratories

- A-01 Puck Mill Grind Blank
- C-07 Extract has undergone Sulfuric Acid Cleanup by EPA 3665A, Sulfur Cleanup by EPA 3660B, and Florisil Cleanup by EPA 3620B in order to minimize matrix interference.
- GS-01 See detailed Particle Size Analysis results, accumulation curves, and Case Narratives at the end of this report.
- Ja Estimated Result. Result detected below the lowest point of the calibration curve, but above the specified MDL.
- M-04 Due to matrix interference, this analyte cannot be accurately quantified. The reported result may contain a high bias.
- M-05 Estimated results. Peak separation for structural isomers is insufficient for accurate quantification.
- P-10 Result estimated due to the presence of multiple PCB Aroclors and/or matrix interference.
- Q-01 Spike recovery and/or RPD is outside acceptance limits.
- Q-03 Spike recovery and/or RPD is outside control limits due to the high concentration of analyte present in the sample.
- Q-04 Spike recovery and/or RPD is outside control limits due to a non-homogeneous sample matrix.
- Q-05 Analyses are not controlled on RPD values from sample and duplicate concentrations that are below 5 times the reporting level.
- Q-11 Spike recovery cannot be accurately quantified due to sample dilution required for high analyte concentration and/or matrix interference.
- Q-29 Recovery for Lab Control Spike (LCS) is above the upper control limit. Data may be biased high.
- Q-31 Estimated Results. Recovery of Continuing Calibration Verification sample below lower control limit for this analyte. Results are likely biased low.
- Q-41 Estimated Results. Recovery of Continuing Calibration Verification sample above upper control limit for this analyte. Results are likely biased high.
- Q-42 Matrix Spike and/or Duplicate analysis was performed on this sample. % Recovery or RPD for this analyte is outside laboratory control limits. (Refer to the QC Section of Analytical Report.)
- Q-52 Due to erratic or low blank spike recoveries, results for this analyte are considered Estimated Values.
- R-04 Reporting levels elevated due to preparation and/or analytical dilution necessary for analysis.
- S-03 Reextraction and analysis, or analysis of laboratory duplicate, confirms surrogate failure due to sample matrix effect.
- S-06 Surrogate recovery is outside of established control limits.

Analytical Resources, Inc.

- * Flagged value is not within established control limits.
- D The reported value is from a dilution
- J Estimated concentration value detected below the reporting limit.

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Apex Laboratories, LLC

6700 S.W. Sandburg Street

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503-718-2323

EPA ID: OR01039

AMENDED REPORT

<u>Maul Foster & Alongi, INC.</u>	Project: <u>Seaport Tidelands</u>	<u>Report ID:</u>
2001 NW 19th Ave, STE 200	Project Number: 1044.02.06-02	A9J0006 - 01 09 20 1630
Portland, OR 97209	Project Manager: Emily Hess	

U This analyte is not detected above the reporting limit (RL) or if noted, not detected above the limit of detection (LOD).

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Philip Nerenberg, Lab Director



AMENDED REPORT

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REPORTING NOTES AND CONVENTIONS:

Abbreviations:

- DET Analyte DETECTED at or above the detection or reporting limit.
- ND Analyte NOT DETECTED at or above the detection or reporting limit.
- NR Result Not Reported
- RPD Relative Percent Difference. RPDs for Matrix Spikes and Matrix Spike Duplicates are based on concentration, not recovery.

Detection Limits: Limit of Detection (LOD)

Limits of Detection (LODs) are normally set at a level of one half the validated Limit of Quantitation (LOQ).
If no value is listed ('-----'), then the data has not been evaluated below the Reporting Limit.

Reporting Limits: Limit of Quantitation (LOQ)

Validated Limits of Quantitation (LOQs) are reported as the Reporting Limits for all analyses where the LOQ, MRL, PQL or CRL are requested. The LOQ represents a level at or above the low point of the calibration curve, that has been validated according to Apex Laboratories' comprehensive LOQ policies and procedures.

Reporting Conventions:

- Basis: Results for soil samples are generally reported on a 100% dry weight basis. The Result Basis is listed following the units as "dry", "wet", or "" (blank) designation.
 - "dry" Sample results and Reporting Limits are reported on a dry weight basis. (i.e. "ug/kg dry")
See Percent Solids section for details of dry weight analysis.
 - "wet" Sample results and Reporting Limits for this analysis are normally dry weight corrected, but have not been modified in this case.
 - "" Results without 'wet' or 'dry' designation are not normally dry weight corrected. These results are considered 'As Received'.

QC Source:

In cases where there is insufficient sample provided for Sample Duplicates and/or Matrix Spikes, a Lab Control Sample Duplicate (LCS Dup) may be analyzed to demonstrate accuracy and precision of the extraction batch.

Non-Client Batch QC Samples (Duplicates and Matrix Spike/Duplicates) may not be included in this report. Please request a Full QC report if this data is required.

Miscellaneous Notes:

- " --- " QC results are not applicable. For example, % Recoveries for Blanks and Duplicates, % RPD for Blanks, Blank Spikes and Matrix Spikes, etc.
- " *** " Used to indicate a possible discrepancy with the Sample and Sample Duplicate results when the %RPD is not available. In this case, either the Sample or the Sample Duplicate has a reportable result for this analyte, while the other is Non Detect (ND).

Blanks:

Standard practice is to evaluate the results from Blank QC Samples down to a level equal to 1/2 the Reporting Limit (RL).
-For Blank hits falling between 1/2 the RL and the RL (J flagged hits), the associated sample and QC data will receive a 'B-02' qualifier.
-For Blank hits above the RL, the associated sample and QC data will receive a 'B' qualifier, per Apex Laboratories' Blank Policy.
For further details, please request a copy of this document.



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
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REPORTING NOTES AND CONVENTIONS (Cont.):

Blanks (Cont.):

Sample results flagged with a 'B' or 'B-02' qualifier are potentially biased high if the sample results are less than ten times the level found in the blank for inorganic analyses, or less than five times the level found in the blank for organic analyses.

'B' and 'B-02' qualifications are only applied to sample results detected above the Reporting Level.

Preparation Notes:

Mixed Matrix Samples:

Water Samples:

Water samples containing significant amounts of sediment are decanted or separated prior to extraction, and only the water portion analyzed, unless otherwise directed by the client.

Soil and Sediment Samples:

Soil and Sediment samples containing significant amounts of water are decanted prior to extraction, and only the solid portion analyzed, unless otherwise directed by the client.

Sampling and Preservation Notes:

Certain regulatory programs, such as National Pollutant Discharge Elimination System (NPDES), require that activities such as sample filtration (for dissolved metals, orthophosphate, hexavalent chromium, etc.) and testing of short hold analytes (pH, Dissolved Oxygen, etc.) be performed in the field (on-site) within a short time window. In addition, sample matrix spikes are required for some analyses, and sufficient volume must be provided, and billable site specific QC requested, if this is required. All regulatory permits should be reviewed to ensure that these requirements are being met.

Data users should be aware of which regulations pertain to the samples they submit for testing. If related sample collection activities are not approved for a particular regulatory program, results should be considered estimates. Apex Laboratories will qualify these analytes according to the most stringent requirements, however results for samples that are for non-regulatory purposes may be acceptable.

Samples that have been filtered and preserved at Apex Laboratories per client request are listed in the preparation section of the report with the date and time of filtration listed.

Apex Laboratories maintains detailed records on sample receipt, including client label verification, cooler temperature, sample preservation, hold time compliance and field filtration. Data is qualified as necessary, and the lack of qualification indicates compliance with required parameters.



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
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LABORATORY ACCREDITATION INFORMATION

TNI Certification ID: OR100062 (Primary Accreditation) - EPA ID: OR01039

All methods and analytes reported from work performed at Apex Laboratories are included on Apex Laboratories' ORELAP Scope of Certification, with the exception of any analyte(s) listed below:

Apex Laboratories

Matrix	Analysis	TNI_ID	Analyte	TNI_ID	Accreditation
<u>All reported analytes are included in Apex Laboratories' current ORELAP scope.</u>					

Secondary Accreditations

Apex Laboratories also maintains reciprocal accreditation with non-TNI states (Washington DOE), as well as other state specific accreditations not listed here.

Subcontract Laboratory Accreditations

Subcontracted data falls outside of Apex Laboratories' Scope of Accreditation. Please see the Subcontract Laboratory report for full details, or contact your Project Manager for more information.

Field Testing Parameters

Results for Field Tested data are provided by the client or sampler, and fall outside of Apex Laboratories' Scope of Accreditation.



AMENDED REPORT

Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A9J0006 - 01 09 20 1630
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APEX LABS COOLER RECEIPT FORM 113

Client: MFA **Element WO#:** A9 J0006

Project/Project #: Seaport in-water RE/1044.02.06-02

Delivery Info:
Date/time received: 9-30-19 @ 1210 By: MK
Delivered by: Apex Client ESS FedEx UPS Swift Senvoy SDS Other

Cooler Inspection Date/time inspected: 9-30-19 @ 1330 By: MK
Chain of Custody included? Yes No Custody seals? Yes No
Signed/dated by client? Yes No
Signed/dated by Apex? Yes No

	Cooler #1	Cooler #2	Cooler #3	Cooler #4	Cooler #5	Cooler #6	Cooler #7
Temperature (°C)	<u>2.3</u>	<u>3.0</u>	<u>1.6</u>	<u>4.8</u>	<u>1.9</u>	<u>5.5</u>	<u>1.3</u>
Received on ice? (Y/N)	<u>Y</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>
Temp. blanks? (Y/N)	<u>Y</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>
Ice type: (Gel/Real/Other)	<u>Real</u>	<u>"</u>	<u>"</u>	<u>"</u>	<u>"</u>	<u>"</u>	<u>"</u>
Condition:	<u>good</u>	<u>"</u>	<u>"</u>	<u>"</u>	<u>"</u>	<u>"</u>	<u>"</u>

Cooler out of temp? (Y/N) Possible reason why: _____
If some coolers are in temp and some out, were green dots applied to out of temperature samples? Yes/No/NA NA
Out of temperature samples form initiated? Yes/No/NA NA
Samples Inspection: Date/time inspected: 10/1/19 @ 1104 By: [Signature]
All samples intact? Yes No Comments: _____
Bottle labels/COCs agree? Yes No Comments: See form
COC/container discrepancies form initiated? Yes No NA
Containers/volumes received appropriate for analysis? Yes No Comments: _____
Do VOA vials have visible headspace? Yes No NA
Comments: _____
Water samples: pH checked: Yes No NA pH appropriate? Yes No NA
Comments: _____
Additional information: _____
Label by: [Signature] Witness: [Signature] Cooler Inspected by: CFH See Project Contact Form: Y

Philip Nerenberg



AMENDED REPORT

Maul Foster & Alongi, INC.
2001 NW 19th Ave, STE 200
Portland, OR 97209

Project: **Seaport Tidelands**
Project Number: **1044.02.06-02**
Project Manager: **Emily Hess**

Report ID:
A9J0006 - 01 09 20 1630

APEX LABS COOLER RECEIPT FORM

2/3

Client: MFA **Element WO#:** A9 J0006

Project/Project #: Seaport m-water RE / 1044.02.06-02

Delivery Info:

Date/time received: 9-30-19 @ 1210 **By:** MK

Delivered by: Apex Client ESS FedEx UPS Swift Senvoy SDS Other

Cooler Inspection **Date/time inspected:** 9-30-19 @ 1330 **By:** MK

Chain of Custody included? Yes No **Custody seals?** Yes No

Signed/dated by client? Yes No

Signed/dated by Apex? Yes No

Cooler #1 **Cooler #2** **Cooler #3** **Cooler #4** **Cooler #5** **Cooler #6** **Cooler #7**

Temperature (°C) 1.8 _____

Received on ice? (Y/N) Y _____

Temp. blanks? (Y/N) Y _____

Ice type: (Gel/Real/Other) Real " " " " " "

Condition: good _____

Cooler out of temp? (Y/N) Y **Possible reason why:** _____

If some coolers are in temp and some out, were green dots applied to out of temperature samples? Yes/No/NA NA

Out of temperature samples form initiated? Yes/No/NA NA

Samples Inspection: **Date/time inspected:** 10/1/19 @ 1104 **By:** [Signature]

All samples intact? Yes No **Comments:** _____

Bottle labels/COCs agree? Yes No **Comments:** See form

COC/container discrepancies form initiated? Yes No NA

Containers/volumes received appropriate for analysis? Yes No **Comments:** _____

Do VOA vials have visible headspace? Yes No NA

Comments: _____

Water samples: pH checked: Yes No NA **pH appropriate?** Yes No NA

Comments: _____

Additional information: _____

Labeled by: [Signature] **Witness:** [Signature] **Cooler Inspected by:** [Signature] **See Project Contact Form:** Y

Philip Nerenberg

Apex Laboratories, LLC

Particle Size Analysis of Soil by ASTM D 422

Sample ID:	A9J0006-01	Client Sample ID:	SE-24-0-0.33	Batch Number:	9100866
Data Entered by:	SJL	Date:	10/14/19	Data Reviewed by:	JW
Date:				Date:	10/17/19
Sample Description:	Gravelly SILT with some Clay and trace Sand		Max Particle Size:	Gravel	
Particle Shape:	Sub-angular to Sub-rounded		Hardness	Hard and Durable	

Whole Sample	Tare	Air Dry + Tare	Air Dry	Moisture	Dry Wt.
	11.876	257.487	245.61	8.46	226.5

Sieve Number	Opening (mm)	Tare	Dry + Tare	Weight Retained	Cumulative Wt. Retained	% Retained	% Passing
4	4.75	6.054	82.823	76.77	76.77	33.9	66.1
10	2.00	6.117	15.839	9.72	86.49	4.3	61.8
Pan		11.884	167.170	155.29	241.78	62.8	

Hygroscopic Moisture Correction

Hygroscopic Correction Factor	Oven Sample	Pan No.	Tare	Air Dry + Tare	Oven Dry + Tare	Moisture
		J00601	1.308	16.956	15.736	8.46

Hydrometer Analysis

Start Date/Time	10/9/2019	10:53	Dispersing Agent	NaPO ₃
Air Dry Sample Wt. for Hydrometer Test (g)	50.072		G _s Correction Factor (α)	1.000
Percent Passing No.10 Sieve	61.8		Specific Gravity (G _s)	2.65
Dry Weight of Soil Tested (g)	46.17		Corrected Dry Weight of Soil Tested (g) (W)	74.70

Elapsed Time (min)	Hydrometer Reading	Temperature (°C)	Corrected Hydrometer Reading [R]	% Finer of Hydrometer Sample	L	K	Particle Diameter (mm)	Percent Passing
1	41.5	19.5	35.11	47.0	9.2	0.01365	0.041	29.05
2	38.5	19.6	32.15	43.0	9.7	0.01365	0.030	26.60
4	34	19.6	27.65	37.0	10.5	0.01365	0.022	22.88
8	28.5	19.7	22.18	29.7	11.4	0.01365	0.016	18.35
15	26	19.6	19.65	26.3	11.9	0.01365	0.012	16.26
30	21.5	19.6	15.15	20.3	12.5	0.01365	0.009	12.53
60	18.5	19.5	12.11	16.2	13	0.01365	0.006	10.02
90	16.5	19.4	10.08	13.5	13.3	0.01382	0.005	8.34
120	15.5	19.3	9.05	12.1	13.5	0.01382	0.005	7.49
240	14.5	19.4	8.08	10.8	13.7	0.01382	0.003	6.69
360	13.5	19.6	7.15	9.6	13.8	0.01365	0.003	5.91
1440	11.5	18.5	4.78	6.4	14.2	0.01382	0.001	3.95

Sieve Analysis of Portion Finer Than No. 10 Sieve

Sieve Number	Opening (mm)	Tare	Dry + Tare	Weight Retained	Cumulative Retained	% Retained	% Passing
20	0.850	1.297	4.455	3.16	96.28	4.2	57.6
40	0.425	1.309	4.414	3.11	105.91	4.2	53.4
60	0.250	1.315	3.130	1.82	111.54	2.4	51.0
100	0.150	1.337	2.249	0.91	114.37	1.2	49.8
140	0.105	1.337	1.847	0.51	115.95	0.7	49.1
200	0.075	1.310	1.975	0.67	118.02	0.9	48.2
230	0.063	1.319	1.806	0.49	119.53	0.7	47.5
			Sum	10.65	230 Minus	35.52	

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

Sample ID: SE-24-0-0.33 (A9J0006-01)

Grain Size Analysis Summary from Sieving and Hydrometer Testing	Particle Size (mm)	Percent Finer	Total Percent of Sample
Gravel			38.19
Retained on No. 4 sieve	4.75	66.1	33.9
Gravel, passing No. 4 sieve and retained on No. 10 sieve	2.00	61.81	4.29
Sand			14.26
Coarse sand, passing No.10 sieve and retained on No. 20 sieve	0.8500	57.58	4.23
Medium sand, passing No.20 sieve and retained on No. 40 sieve	0.4250	53.42	4.16
Medium sand, passing No.40 sieve and retained on No. 60 sieve	0.2500	50.99	2.43
Medium sand, passing No. 60 sieve and retained on No.100 sieve	0.1500	49.77	1.22
Fine sand, passing No. 100 sieve and retained on No.140 sieve	0.1060	49.09	0.68
Fine sand passing No. 140 sieve and retained on No. 200 sieve	0.0750	48.2	0.89
Fine sand, passing No. 200 sieve and retained on No. 230 sieve	0.0630	47.55	0.65
Silt and Clay (Measurements in the Clay fraction are noted)			47.55
Hydrometer Test	0.0414	29.05	18.49
Hydrometer Test	0.0301	26.6	2.45
Hydrometer Test	0.0221	22.88	3.72
Hydrometer Test	0.0163	18.35	4.52
Hydrometer Test	0.0122	16.26	2.1
Hydrometer Test	0.0088	12.53	3.72
Hydrometer Test	0.0064	10.02	2.51
Hydrometer Test	0.0053	8.34	1.68
Hydrometer Test Clay	0.0046	7.49	0.86
Hydrometer Test Clay	0.0033	6.69	0.8
Hydrometer Test Clay	0.0027	5.91	0.77
Hydrometer Test Clay	0.0014	3.95	1.96

Grain Size Summary	Percent of Total Sample
Gravel	38.2
Sand	14.3
Coarse sand	4.2
Medium sand	7.8
Fine sand	2.2
Silt	39.2
Clay	8.3

Case Narrative for Sample ID: SE-24-0-0.33 (A9J0006-01)

This data is not to be used for engineering purposes.
 No difficulty dispersing the fraction passing the No. 10 sieve.
 Dispersion device used: Commercial drink mixer operating at least 10,000 rpm for one minute.
 The assumed specific gravity used in the calculations was 2.65.

Abundant organic and possible anthropogenic material present in +4 and +10 fractions.
 +20 to +100 fractions consist mostly of organic material.



Express 12/31/19

Apex Laboratories, LLC

Particle Size Analysis of Soil by ASTM D 422

Sample ID:	A9J0006-03	Client Sample ID:	SE-14-0-0.33	Batch Number:	9100866
Data Entered by:	SJL	Date:	10/14/19	Data Reviewed by:	JW
Date:				Date:	10/17/19
Sample Description:	SILT with some Sand, Gravel, and Clay		Max Particle Size:	Gravel	
Particle Shape:	Sub-angular to Sub-rounded		Hardness	Hard and Durable	

Whole Sample	Tare	Air Dry + Tare	Air Dry	Moisture	Dry Wt.
	12.021	222.441	210.42	7.28	196.1

Sieve Number	Opening (mm)	Tare	Dry + Tare	Weight Retained	Cumulative Wt. Retained	% Retained	% Passing
4	4.75	6.091	31.048	24.96	24.96	12.7	87.3
10	2.00	1.315	20.272	18.96	43.91	9.7	77.6
Pan		12.026	176.381	164.36	208.27	77.7	

Hygroscopic Moisture Correction

Hygroscopic Correction Factor	Oven Sample	Pan No.	Tare	Air Dry + Tare	Oven Dry + Tare	Moisture
	0.9321	J006-03	1.324	22.026	20.621	7.28

Hydrometer Analysis

Start Date/Time	10/9/2019	11:16	Dispersing Agent	NaPO ₃
Air Dry Sample Wt. for Hydrometer Test (g)	53.419		G _s Correction Factor (α)	1.000
Percent Passing No.10 Sieve	77.6		Specific Gravity (G _s)	2.65
Dry Weight of Soil Tested (g)	49.79		Corrected Dry Weight of Soil Tested (g) (W)	64.16

Elapsed Time (min)	Hydrometer Reading	Temperature (°C)	Corrected Hydrometer Reading [R]	% Finer of Hydrometer Sample	L	K	Particle Diameter (mm)	Percent Passing
1	37	19.7	30.68	47.8	10.1	0.01365	0.043	37.11
2	33.5	19.7	27.18	42.4	10.5	0.01365	0.031	32.88
4	29.5	19.5	23.11	36.0	11.2	0.01365	0.023	27.96
8	26.5	19.6	20.15	31.4	11.7	0.01365	0.017	24.37
15	21.5	19.8	15.21	23.7	12.5	0.01365	0.012	18.40
30	17.5	19.7	11.18	17.4	13.2	0.01365	0.009	13.52
60	15	19.5	8.61	13.4	13.7	0.01365	0.007	10.42
90	14	19.4	7.58	11.8	13.8	0.01382	0.005	9.17
120	13	19.5	6.61	10.3	14	0.01365	0.005	8.00
240	12	19.5	5.61	8.7	14.2	0.01365	0.003	6.79
360	11.5	19.5	5.11	8.0	14.2	0.01365	0.003	6.19
1440	10.5	18.6	3.81	5.9	14.3	0.01382	0.001	4.61

Sieve Analysis of Portion Finer Than No. 10 Sieve

Sieve Number	Opening (mm)	Tare	Dry + Tare	Weight Retained	Cumulative Retained	% Retained	% Passing
20	0.850	1.335	8.016	6.68	64.47	10.4	67.2
40	0.425	1.312	6.011	4.70	78.93	7.3	59.9
60	0.250	1.326	4.442	3.12	88.51	4.9	55.0
100	0.150	1.314	2.998	1.68	93.70	2.6	52.4
140	0.105	1.321	1.922	0.60	95.54	0.9	51.5
200	0.075	1.306	1.804	0.50	97.08	0.8	50.7
230	0.063	1.310	1.529	0.22	97.75	0.3	50.3
			Sum	17.50	230 Minus	32.30	

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

Sample ID: SE-14-0-0.33 (A9J0006-03)

Grain Size Analysis Summary from Sieving and Hydrometer Testing	Particle Size (mm)	Percent Finer	Total Percent of Sample
Gravel			22.39
Retained on No. 4 sieve	4.75	87.28	12.72
Gravel, passing No. 4 sieve and retained on No. 10 sieve	2.00	77.61	9.67
Sand			27.27
Coarse sand, passing No.10 sieve and retained on No. 20 sieve	0.8500	67.2	10.41
Medium sand, passing No.20 sieve and retained on No. 40 sieve	0.4250	59.87	7.32
Medium sand, passing No.40 sieve and retained on No. 60 sieve	0.2500	55.02	4.86
Medium sand, passing No. 60 sieve and retained on No.100 sieve	0.1500	52.39	2.62
Fine sand, passing No. 100 sieve and retained on No.140 sieve	0.1060	51.46	0.94
Fine sand passing No. 140 sieve and retained on No. 200 sieve	0.0750	50.68	0.78
Fine sand, passing No. 200 sieve and retained on No. 230 sieve	0.0630	50.34	0.34
Silt and Clay (Measurements in the Clay fraction are noted)			50.34
Hydrometer Test	0.0434	37.11	13.22
Hydrometer Test	0.0313	32.88	4.23
Hydrometer Test	0.0228	27.96	4.92
Hydrometer Test	0.0165	24.37	3.59
Hydrometer Test	0.0125	18.4	5.97
Hydrometer Test	0.0091	13.52	4.88
Hydrometer Test	0.0065	10.42	3.11
Hydrometer Test	0.0054	9.17	1.25
Hydrometer Test Clay	0.0047	8	1.17
Hydrometer Test Clay	0.0033	6.79	1.21
Hydrometer Test Clay	0.0027	6.19	0.6
Hydrometer Test Clay	0.0014	4.61	1.57

Grain Size Summary	Percent of Total Sample
Gravel	22.4
Sand	27.3
Coarse sand	10.4
Medium sand	14.8
Fine sand	2.1
Silt	41.2
Clay	9.2

Case Narrative for Sample ID: SE-14-0-0.33 (A9J0006-03)

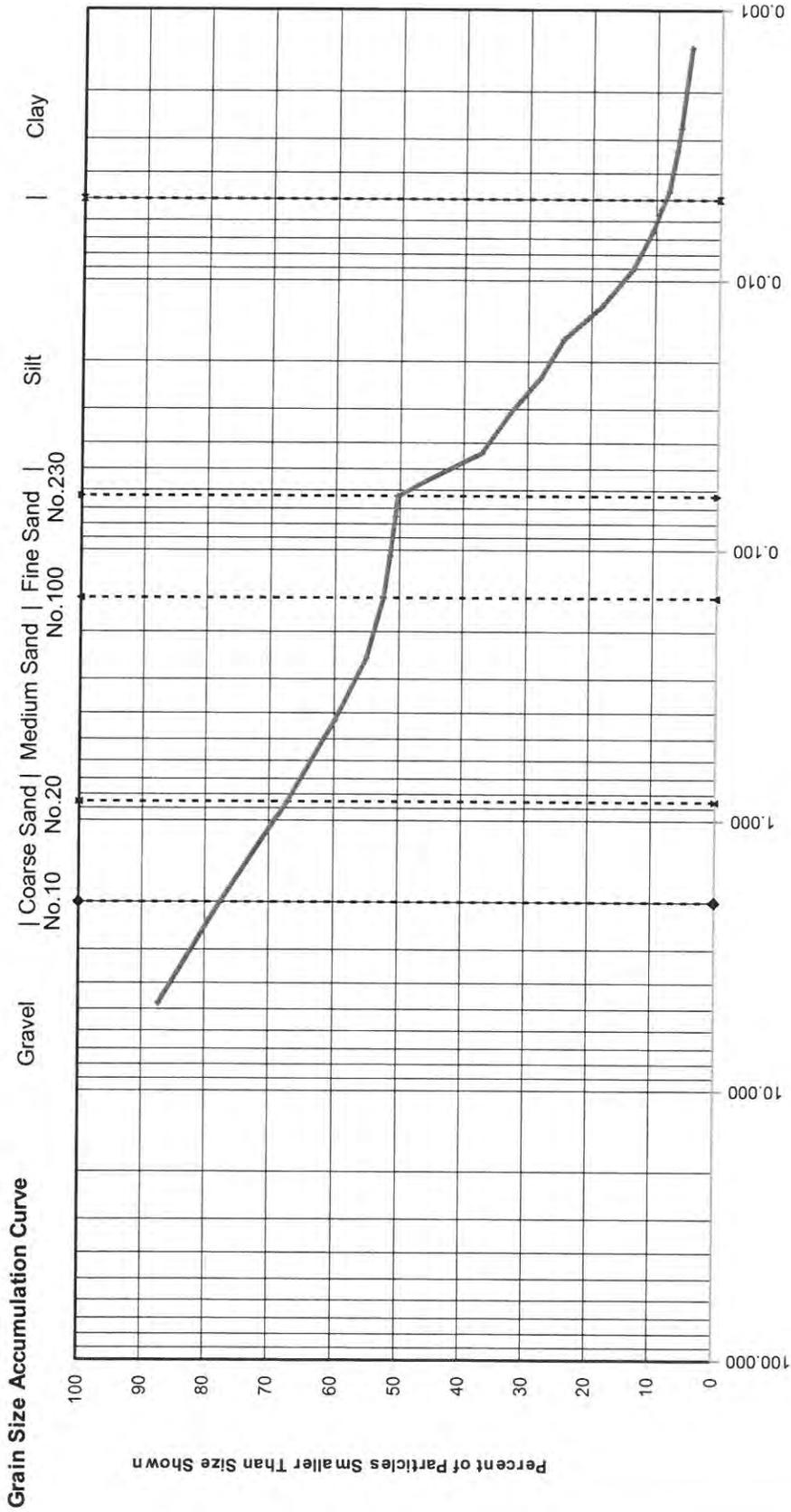
This data is not to be used for engineering purposes.
 No difficulty dispersing the fraction passing the No. 10 sieve.
 Dispersion device used: Commercial drink mixer operating at least 10,000 rpm for one minute.
 The assumed specific gravity used in the calculations was 2.65.

Organic and possible anthropogenic material present in +4 and +10 fractions.
 +20 to +100 fractions consist mostly of organic material.



Jason P. Woodcock 12/31/19

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



Sample ID: SE-14-0-0.33 (A9J0006-03)		GRAVEL & SAND		SOIL DESCRIPTION
Specific Gravity	2.65	MAXIMUM PARTICLE SIZE	Gravel	
		PARTICLE SHAPE	Sub-angular to Sub-rounded	SILT with some Sand, Gravel, and Clay
		HARDNESS	Hard and Durable	

Apex Laboratories, LLC

Particle Size Analysis of Soil by ASTM D 422

Sample ID:	A9J0006-05	Client Sample ID:	SE-23-0-0.33	Batch Number:	9100866
Data Entered by:	SJL	Date:	10/14/19	Data Reviewed by:	JW
Date:				Date:	10/17/19
Sample Description:	Clayey Sandy SILT with trace Gravel		Max Particle Size:	Gravel	
Particle Shape:	Angular to Sub-rounded		Hardness	Hard and Durable	

Whole Sample	Tare	Air Dry + Tare	Air Dry	Moisture	Dry Wt.
	11.873	333.313	321.44	6.52	301.8

Sieve Number	Opening (mm)	Tare	Dry + Tare	Weight Retained	Cumulative Wt. Retained	% Retained	% Passing
4	4.75	1.340	13.377	12.04	12.04	4.0	96.0
10	2.00	1.320	12.961	11.64	23.68	3.9	92.2
Pan		11.879	307.975	296.10	319.77	91.7	

Hygroscopic Moisture Correction

Hygroscopic Correction Factor	Oven Sample	Pan No.	Tare	Air Dry + Tare	Oven Dry + Tare	Moisture
		J006-05	1.303	21.078	19.867	6.52

Hydrometer Analysis

Start Date/Time	10/9/2019	11:39	Dispersing Agent	NaPO ₃
Air Dry Sample Wt. for Hydrometer Test (g)	53.283		G _s Correction Factor (α)	1.000
Percent Passing No. 10 Sieve	92.2		Specific Gravity (G _s)	2.65
Dry Weight of Soil Tested (g)	50.02		Corrected Dry Weight of Soil Tested (g) (W)	54.28

Elapsed Time (min)	Hydrometer Reading	Temperature (°C)	Corrected Hydrometer Reading [R]	% Finer of Hydrometer Sample	L	K	Particle Diameter (mm)	Percent Passing
1	35	19.7	30.13	55.5	10.4	0.01365	0.044	51.15
2	31.5	19.7	26.63	49.1	10.9	0.01365	0.032	45.21
4	27.5	19.8	22.66	41.7	11.5	0.01365	0.023	38.46
8	23.5	19.7	18.63	34.3	12.2	0.01365	0.017	31.63
15	20	19.7	15.13	27.9	12.9	0.01365	0.013	25.69
30	17.5	19.7	12.63	23.3	13.2	0.01365	0.009	21.44
60	15	19.6	10.11	18.6	13.7	0.01365	0.007	17.16
90	13.5	19.6	8.61	15.9	13.8	0.01365	0.005	14.61
120	12	19.6	7.11	13.1	14.2	0.01365	0.005	12.06
240	11	19.5	6.08	11.2	14.3	0.01365	0.003	10.32
360	10.5	19.6	5.61	10.3	14.3	0.01365	0.003	9.52
1440	9	18.6	3.85	7.1	14.7	0.01382	0.001	6.54

Sieve Analysis of Portion Finer Than No. 10 Sieve

Sieve Number	Opening (mm)	Tare	Dry + Tare	Weight Retained	Cumulative Retained	% Retained	% Passing
20	0.850	1.334	5.237	3.90	45.37	7.2	85.0
40	0.425	1.319	4.578	3.26	63.48	6.0	79.0
60	0.250	1.331	4.151	2.82	79.15	5.2	73.8
100	0.150	1.321	5.359	4.04	101.59	7.4	66.3
140	0.105	1.318	4.129	2.81	117.21	5.2	61.1
200	0.075	1.323	4.134	2.81	132.83	5.2	56.0
230	0.063	1.325	2.512	1.19	139.43	2.2	53.8
Sum				20.83	230 Minus	29.19	

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

Sample ID: SE-23-0-0.33 (A9J0006-05)

Grain Size Analysis Summary from Sieving and Hydrometer Testing	Particle Size (mm)	Percent Finer	Total Percent of Sample
Gravel			7.85
Retained on No. 4 sieve	4.75	96.01	3.99
Gravel, passing No. 4 sieve and retained on No. 10 sieve	2.00	92.15	3.86
Sand			38.37
Coarse sand, passing No.10 sieve and retained on No. 20 sieve	0.8500	84.96	7.19
Medium sand, passing No.20 sieve and retained on No. 40 sieve	0.4250	78.96	6.83
Medium sand, passing No.40 sieve and retained on No. 60 sieve	0.2500	73.76	5.22
Medium sand, passing No. 60 sieve and retained on No.100 sieve	0.1500	66.32	4.44
Fine sand, passing No. 100 sieve and retained on No.140 sieve	0.1060	61.15	3.98
Fine sand passing No. 140 sieve and retained on No. 200 sieve	0.0750	55.97	3.18
Fine sand, passing No. 200 sieve and retained on No. 230 sieve	0.0630	53.78	2.19
Silt and Clay (Measurements in the Clay fraction are noted)			53.78
Hydrometer Test	0.0440	51.15	2.62
Hydrometer Test	0.0319	45.21	2.94
Hydrometer Test	0.0231	38.46	3.75
Hydrometer Test	0.0169	31.63	4.83
Hydrometer Test	0.0127	25.69	5.94
Hydrometer Test	0.0091	21.44	7.24
Hydrometer Test	0.0065	17.16	8.29
Hydrometer Test	0.0053	14.61	9.55
Hydrometer Test Clay	0.0047	12.06	10.85
Hydrometer Test Clay	0.0033	10.32	12.74
Hydrometer Test Clay	0.0027	9.52	14.81
Hydrometer Test Clay	0.0014	6.54	17.28

Grain Size Summary	Percent of Total Sample
Gravel	7.8
Sand	38.4
Coarse sand	7.2
Medium sand	18.6
Fine sand	12.5
Silt	39.2
Clay	14.6

Case Narrative for Sample ID: SE-23-0-0.33 (A9J0006-05)

This data is not to be used for engineering purposes.

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

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

The assumed specific gravity used in the calculations was 2.65.

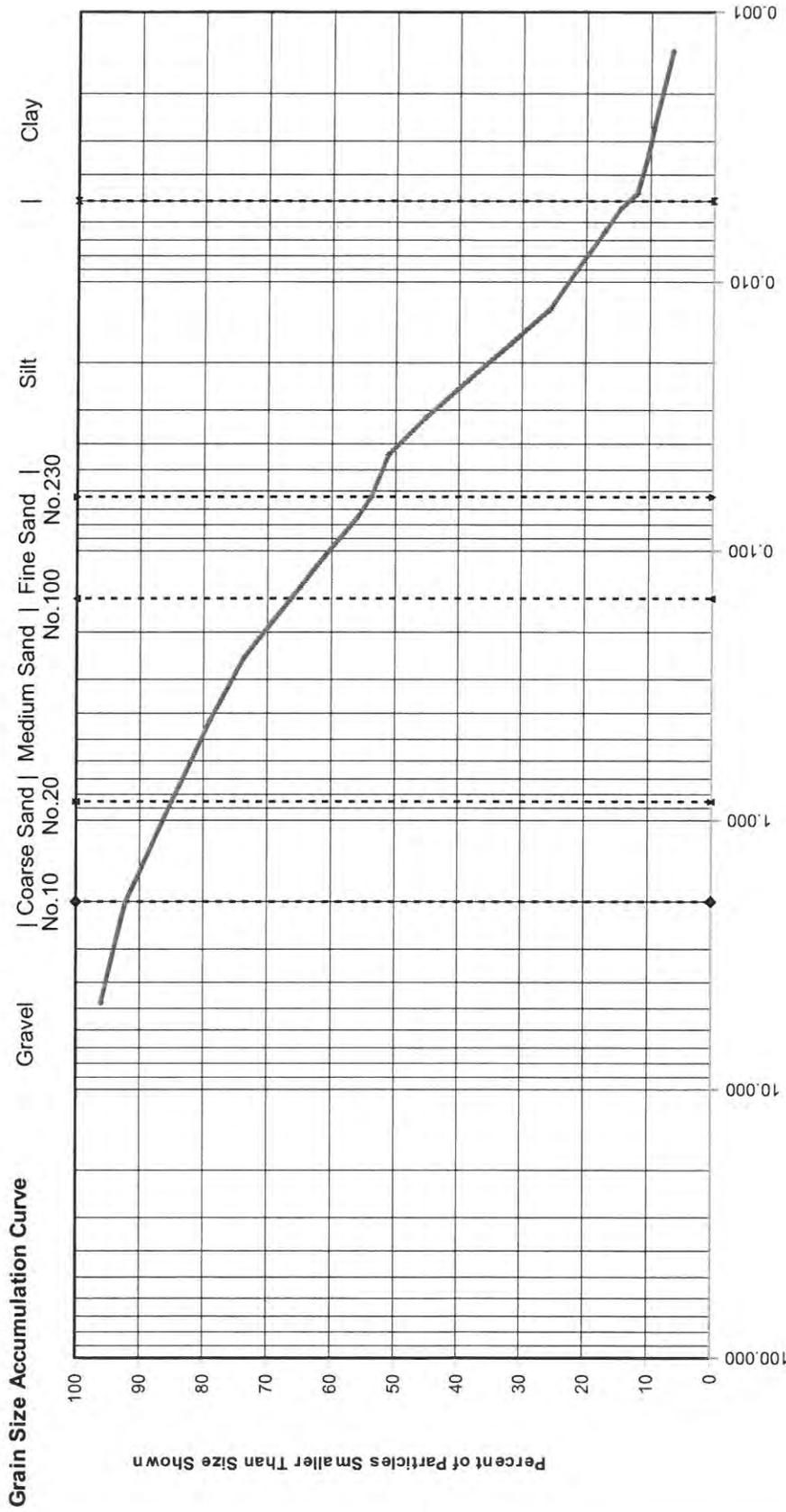
Organic and anthropogenic material present in +4 fraction.

Organic material present in +10, +20, and +40 fractions.



Signature
 Expires 12/31/19

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



Sample ID:	SE-23-0-0.33 (A9J0006-05)		
Specific Gravity	2.65	MAXIMUM PARTICLE SIZE	Gravel
		GRAVEL & SAND	
		PARTICLE SHAPE	Angular to Sub-rounded
		HARDNESS	Hard and Durable
		SOIL DESCRIPTION	
		Clayey Sandy SILT with trace Gravel	

Apex Laboratories, LLC

Particle Size Analysis of Soil by ASTM D 422

Sample ID:	A9J0006-06	Client Sample ID:	SE-17-0-0.33	Batch Number:	9100866
Data Entered by:	SJL	Date:	10/14/19	Data Reviewed by:	JW
Date:				Date:	10/17/19
Sample Description:	Clayey SILT with some Sand		Max Particle Size:	Gravel	
Particle Shape:	N/A		Hardness	N/A	

Whole Sample	Tare	Air Dry + Tare	Air Dry	Moisture	Dry Wt.
	6.041	255.909	249.87	5.48	236.9

Sieve Number	Opening (mm)	Tare	Dry + Tare	Weight Retained	Cumulative Wt. Retained	% Retained	% Passing
4	4.75	1.322	2.055	0.73	0.73	0.3	99.7
10	2.00	1.317	1.878	0.56	1.29	0.2	99.5
Pan		6.052	253.779	247.73	249.02	98.8	

Hygroscopic Moisture Correction

	Hygroscopic Correction Factor	Oven Sample	Pan No.	Tare	Air Dry + Tare	Oven Dry + Tare	Moisture
	0.9480		J00606	1.314	28.845	27.414	5.48

Hydrometer Analysis

Start Date/Time	10/9/2019	12:00	Dispersing Agent	NaPO ₃
Air Dry Sample Wt. for Hydrometer Test (g)	54.648		G _s Correction Factor (α)	1.000
Percent Passing No.10 Sieve	99.5		Specific Gravity (G _s)	2.65
Dry Weight of Soil Tested (g)	51.81		Corrected Dry Weight of Soil Tested (g) (W)	52.09

Elapsed Time (min)	Hydrometer Reading	Temperature (°C)	Corrected Hydrometer Reading [R]	% Finer of Hydrometer Sample	L	K	Particle Diameter (mm)	Percent Passing
1	46	19.3	41.03	78.8	8.6	0.01382	0.041	78.33
2	41.5	19.3	36.53	70.1	9.2	0.01382	0.030	69.74
4	36	19.4	31.05	59.6	10.2	0.01382	0.022	59.29
8	30.5	19.5	25.58	49.1	11.1	0.01365	0.016	48.84
15	26.5	19.5	21.58	41.4	11.7	0.01365	0.012	41.20
30	22.5	19.5	17.58	33.7	12.4	0.01365	0.009	33.56
60	20.5	19.5	15.58	29.9	12.7	0.01365	0.006	29.75
90	17.5	19.6	12.61	24.2	13.2	0.01365	0.005	24.07
120	16	19.6	11.11	21.3	13.5	0.01365	0.005	21.20
240	14.5	19.5	9.58	18.4	13.7	0.01365	0.003	18.29
360	13.5	19.6	8.61	16.5	13.8	0.01365	0.003	16.43
1440	11	18.6	5.85	11.2	14.3	0.01382	0.001	11.17

Sieve Analysis of Portion Finer Than No. 10 Sieve

Sieve Number	Opening (mm)	Tare	Dry + Tare	Weight Retained	Cumulative Retained	% Retained	% Passing
20	0.850	1.322	1.440	0.12	1.83	0.2	99.2
40	0.425	1.335	1.719	0.38	3.57	0.7	98.5
60	0.250	1.319	1.860	0.54	6.02	1.0	97.5
100	0.150	1.330	3.659	2.33	16.58	4.5	93.0
140	0.105	1.326	4.058	2.73	28.96	5.2	87.7
200	0.075	1.319	3.876	2.56	40.56	4.9	82.8
230	0.063	1.322	2.280	0.96	44.90	1.8	81.0
Sum				9.62	230 Minus	42.19	

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

Sample ID: SE-17-0-0.33 (A9J0006-06)

Grain Size Analysis Summary from Sieving and Hydrometer Testing	Particle Size (mm)	Percent Finer	Total Percent of Sample
Gravel			0.55
Retained on No. 4 sieve	4.75	99.69	0.31
Gravel, passing No. 4 sieve and retained on No. 10 sieve	2.00	99.45	0.24
Sand			18.47
Coarse sand, passing No.10 sieve and retained on No. 20 sieve	0.8500	99.23	0.23
Medium sand, passing No.20 sieve and retained on No. 40 sieve	0.4250	98.49	0.74
Medium sand, passing No.40 sieve and retained on No. 60 sieve	0.2500	97.45	1.04
Medium sand, passing No. 60 sieve and retained on No.100 sieve	0.1500	92.98	4.47
Fine sand, passing No. 100 sieve and retained on No.140 sieve	0.1060	87.74	5.24
Fine sand passing No. 140 sieve and retained on No. 200 sieve	0.0750	82.83	4.91
Fine sand, passing No. 200 sieve and retained on No. 230 sieve	0.0630	80.99	1.84
Silt and Clay (Measurements in the Clay fraction are noted)			80.99
Hydrometer Test	0.0405	78.33	2.66
Hydrometer Test	0.0296	69.74	8.59
Hydrometer Test	0.0221	59.29	10.45
Hydrometer Test	0.0161	48.84	10.45
Hydrometer Test	0.0121	41.2	7.64
Hydrometer Test	0.0088	33.56	7.64
Hydrometer Test	0.0063	29.75	3.82
Hydrometer Test	0.0052	24.07	5.68
Hydrometer Test Clay	0.0046	21.2	2.86
Hydrometer Test Clay	0.0033	18.29	2.91
Hydrometer Test Clay	0.0027	16.43	1.86
Hydrometer Test Clay	0.0014	11.17	5.26

Grain Size Summary	Percent of Total Sample
Gravel	0.5
Sand	18.5
Coarse sand	0.2
Medium sand	6.2
Fine sand	12.0
Silt	56.9
Clay	24.1

Case Narrative for Sample ID: SE-17-0-0.33 (A9J0006-06)

This data is not to be used for engineering purposes.

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

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

The assumed specific gravity used in the calculations was 2.65.

+4 fraction consists entirely of organic material.

+10 fraction consists almost entirely of organic material.



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Apex Laboratories, LLC

Particle Size Analysis of Soil by ASTM D 422

Sample ID:	A9J0006-07	Client Sample ID:	SE-15-0-0.33	Batch Number:	9100866
Data Entered by:	SJL	Date:	10/14/19	Data Reviewed by:	JW
Date:				Date:	10/17/19
Sample Description:	SILT with some Sand, Gravel, and Clay		Max Particle Size:	Gravel	
Particle Shape:	Sub-angular to Sub-rounded		Hardness	Hard and Durable	

Whole Sample	Tare	Air Dry + Tare	Air Dry	Moisture	Dry Wt.
	11.971	302.809	290.84	5.71	275.1

Sieve Number	Opening (mm)	Tare	Dry + Tare	Weight Retained	Cumulative Wt. Retained	% Retained	% Passing
4	4.75	6.382	56.213	49.83	49.83	18.1	81.9
10	2.00	1.324	21.250	19.93	69.76	7.2	74.6
Pan		11.975	227.911	215.94	285.69	74.0	

Hygroscopic Moisture Correction

	Hygroscopic Correction Factor	Oven Sample	Pan No.	Tare	Air Dry + Tare	Oven Dry + Tare	Moisture
	0.9460		J006-07	1.322	21.502	20.412	5.71

Hydrometer Analysis

Start Date/Time	10/9/2019	12:23	Dispersing Agent	NaPO ₃
Air Dry Sample Wt. for Hydrometer Test (g)	53.199		G _s Correction Factor (α)	1.000
Percent Passing No. 10 Sieve	74.6		Specific Gravity (G _s)	2.65
Dry Weight of Soil Tested (g)	50.33		Corrected Dry Weight of Soil Tested (g) (W)	67.42

Elapsed Time (min)	Hydrometer Reading	Temperature (°C)	Corrected Hydrometer Reading [R]	% Finer of Hydrometer Sample	L	K	Particle Diameter (mm)	Percent Passing
1	40	19.6	35.11	52.1	9.6	0.01365	0.042	38.87
2	36.5	19.6	31.61	46.9	10.1	0.01365	0.031	34.99
4	32.5	19.6	27.61	40.9	10.7	0.01365	0.022	30.56
8	28	19.7	23.13	34.3	11.5	0.01365	0.016	25.61
15	24	19.7	19.13	28.4	12.2	0.01365	0.012	21.18
30	20	19.6	15.11	22.4	12.9	0.01365	0.009	16.72
60	17	19.7	12.13	18.0	13.3	0.01365	0.006	13.43
90	15	19.7	10.13	15.0	13.7	0.01365	0.005	11.22
120	14	19.6	9.11	13.5	13.8	0.01365	0.005	10.08
240	13	19.6	8.11	12.0	14	0.01365	0.003	8.97
360	12	19.5	7.08	10.5	14.2	0.01365	0.003	7.84
1440	10	18.8	4.9	7.3	14.5	0.01382	0.001	5.43

Sieve Analysis of Portion Finer Than No. 10 Sieve

Sieve Number	Opening (mm)	Tare	Dry + Tare	Weight Retained	Cumulative Retained	% Retained	% Passing
20	0.850	1.310	3.446	2.14	78.43	3.2	71.5
40	0.425	1.323	3.254	1.93	86.27	2.9	68.6
60	0.250	1.337	3.031	1.69	93.14	2.5	66.1
100	0.150	1.318	3.900	2.58	103.62	3.8	62.3
140	0.105	1.319	3.527	2.21	112.58	3.3	59.0
200	0.075	1.316	3.805	2.49	122.69	3.7	55.3
230	0.063	1.332	2.438	1.11	127.18	1.6	53.7
			Sum	14.15	230 Minus	36.18	

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

Sample ID: SE-15-0-0.33 (A9J0006-07)

Grain Size Analysis Summary from Sieving and Hydrometer Testing	Particle Size (mm)	Percent Finer	Total Percent of Sample
Gravel			25.35
Retained on No. 4 sieve	4.75	81.89	18.11
Gravel, passing No. 4 sieve and retained on No. 10 sieve	2.00	74.65	7.24
Sand			20.98
Coarse sand, passing No.10 sieve and retained on No. 20 sieve	0.8500	71.48	3.17
Medium sand, passing No.20 sieve and retained on No. 40 sieve	0.4250	68.61	2.86
Medium sand, passing No.40 sieve and retained on No. 60 sieve	0.2500	66.1	2.51
Medium sand, passing No. 60 sieve and retained on No.100 sieve	0.1500	62.27	3.83
Fine sand, passing No. 100 sieve and retained on No.140 sieve	0.1060	59	3.28
Fine sand passing No. 140 sieve and retained on No. 200 sieve	0.0750	55.3	3.69
Fine sand, passing No. 200 sieve and retained on No. 230 sieve	0.0630	53.66	1.64
Silt and Clay (Measurements in the Clay fraction are noted)			53.66
Hydrometer Test	0.0423	38.87	14.8
Hydrometer Test	0.0307	34.99	3.88
Hydrometer Test	0.0223	30.56	4.43
Hydrometer Test	0.0164	25.61	4.95
Hydrometer Test	0.0123	21.18	4.43
Hydrometer Test	0.0090	16.72	4.46
Hydrometer Test	0.0064	13.43	3.29
Hydrometer Test	0.0053	11.22	2.21
Hydrometer Test	Clay	0.0046	10.08
Hydrometer Test	Clay	0.0033	8.97
Hydrometer Test	Clay	0.0027	7.84
Hydrometer Test	Clay	0.0014	5.43

Grain Size Summary	Percent of Total Sample
Gravel	25.4
Sand	21.0
Coarse sand	3.2
Medium sand	9.2
Fine sand	8.6
Silt	42.4
Clay	11.2

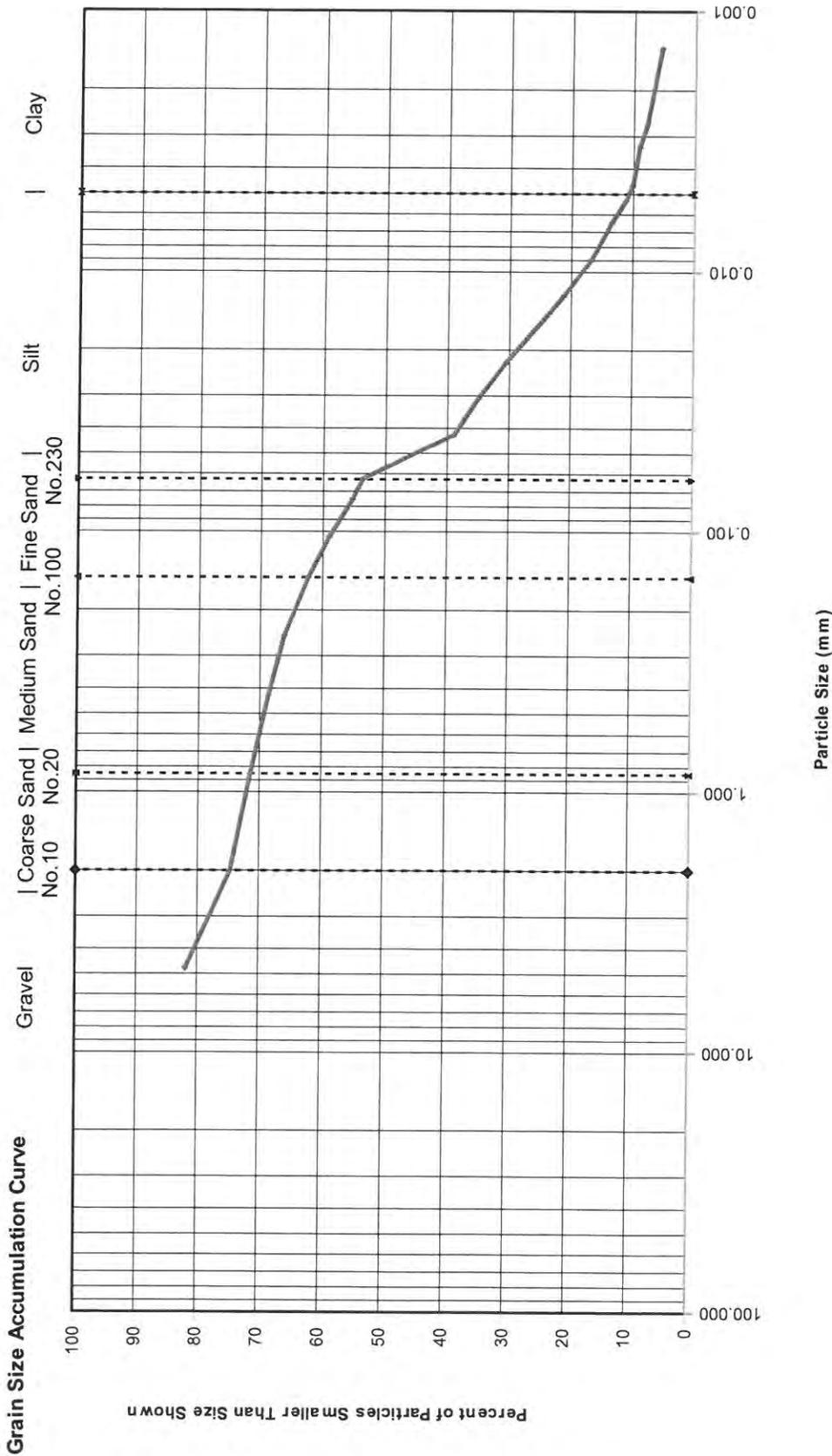
Case Narrative for Sample ID: SE-15-0-0.33 (A9J0006-07)

This data is not to be used for engineering purposes.
 No difficulty dispersing the fraction passing the No. 10 sieve.
 Dispersion device used: Commercial drink mixer operating at least 10,000 rpm for one minute.
 The assumed specific gravity used in the calculations was 2.65.

Abundant organic material present in +4 and +10 fractions.
 +20 to +100 fractions consist mostly of organic material.



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



Sample ID: SE-15-0-0.33 (A9J0006-07)		GRAVEL & SAND		SOIL DESCRIPTION
Specific Gravity	2.65	MAXIMUM PARTICLE SIZE	Gravel	
		PARTICLE SHAPE	Sub-angular to Sub-rounded	SILT with some Sand, Gravel, and Clay
		HARDNESS	Hard and Durable	

Apex Laboratories, LLC

Particle Size Analysis of Soil by ASTM D 422

Sample ID:	A9J0006-08	Client Sample ID:	SE-21-0-0.33	Batch Number:	9101058
Data Entered by:	JSJ	Date:	10/18/19	Data Reviewed by:	JW
Date:				Date:	10/23/19
Sample Description:	Clayey Silty SAND with trace Gravel		Max Particle Size:	Gravel	
Particle Shape:	Angular to Sub-rounded		Hardness	Hard and Durable	

Whole Sample	Tare	Air Dry + Tare	Air Dry	Moisture	Dry Wt.
	5.896	302.920	297.02	3.57	286.8

Sieve Number	Opening (mm)	Tare	Dry + Tare	Weight Retained	Cumulative Wt. Retained	% Retained	% Passing
4	4.75	1.321	11.293	9.97	9.97	3.5	96.5
10	2.00	1.305	10.813	9.51	19.48	3.3	93.2
Pan		5.906	280.435	274.53	294.01	92.3	

Hygroscopic Moisture Correction

Hygroscopic Correction Factor	Oven Sample	Pan No.	Tare	Air Dry + Tare	Oven Dry + Tare	Moisture
		J00608	1.320	21.794	21.088	3.57

Hydrometer Analysis

Start Date/Time	10/14/2019	9:38	Dispersing Agent	NaPO ₃
Air Dry Sample Wt. for Hydrometer Test (g)	52.427		G _s Correction Factor (α)	1.000
Percent Passing No.10 Sieve	93.2		Specific Gravity (G _s)	2.65
Dry Weight of Soil Tested (g)	50.62		Corrected Dry Weight of Soil Tested (g) (W)	54.31

Elapsed Time (min)	Hydrometer Reading	Temperature (°C)	Corrected Hydrometer Reading [R]	% Finer of Hydrometer Sample	L	K	Particle Diameter (mm)	Percent Passing
1	30	19.9	23.75	43.7	11.2	0.01365	0.046	40.76
2	28	19.9	21.75	40.0	11.5	0.01365	0.033	37.32
4	25.5	19.9	19.25	35.4	11.9	0.01365	0.024	33.03
8	21	19.9	14.75	27.2	12.7	0.01365	0.017	25.31
15	18	20.1	11.81	21.8	13.2	0.01365	0.013	20.28
30	17	20.5	10.95	20.2	13.3	0.01348	0.009	18.79
60	15	20.4	8.91	16.4	13.7	0.01365	0.007	15.30
90	14	20.3	7.88	14.5	13.8	0.01365	0.005	13.52
120	15	20.5	8.26	15.2	13.7	0.01348	0.005	14.18
240	13.5	20.3	6.7	12.3	13.8	0.01365	0.003	11.51
360	13	19.7	6.03	11.1	14	0.01365	0.003	10.35
1440	11.5	18.7	4.25	7.8	14.2	0.01382	0.001	7.29

Sieve Analysis of Portion Finer Than No. 10 Sieve

Sieve Number	Opening (mm)	Tare	Dry + Tare	Weight Retained	Cumulative Retained	% Retained	% Passing
20	0.850	1.316	2.121	0.81	23.70	1.5	91.7
40	0.425	1.303	2.884	1.58	31.97	2.9	88.8
60	0.250	1.312	6.364	5.05	58.43	9.3	79.5
100	0.150	1.324	11.822	10.50	113.40	19.3	60.2
140	0.105	1.317	5.358	4.04	134.56	7.4	52.7
200	0.075	1.314	3.544	2.23	146.24	4.1	48.6
230	0.063	1.311	2.178	0.87	150.78	1.6	47.0

Sum	25.07	230 Minus	25.55
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Apex Laboratories, LLC
Particle Size Analysis of Soil by ASTM D 422 Modified

Sample ID: SE-21-0-0.33 (A9J0006-08)

Grain Size Analysis Summary from Sieving and Hydrometer Testing	Particle Size (mm)	Percent Finer	Total Percent of Sample
Gravel			6.79
Retained on No. 4 sieve	4.75	96.52	3.48
Gravel, passing No. 4 sieve and retained on No. 10 sieve	2.00	93.21	3.32
Sand			46.17
Coarse sand, passing No.10 sieve and retained on No. 20 sieve	0.8500	91.73	1.48
Medium sand, passing No.20 sieve and retained on No. 40 sieve	0.4250	88.81	2.91
Medium sand, passing No.40 sieve and retained on No. 60 sieve	0.2500	79.51	9.3
Medium sand, passing No. 60 sieve and retained on No.100 sieve	0.1500	60.18	19.33
Fine sand, passing No. 100 sieve and retained on No.140 sieve	0.1060	52.74	7.44
Fine sand passing No. 140 sieve and retained on No. 200 sieve	0.0750	48.63	4.11
Fine sand, passing No. 200 sieve and retained on No. 230 sieve	0.0630	47.04	1.6
Silt and Clay (Measurements in the Clay fraction are noted)			47.04
Hydrometer Test	0.0457	40.76	6.28
Hydrometer Test	0.0327	37.32	3.43
Hydrometer Test	0.0235	33.03	4.29
Hydrometer Test	0.0172	25.31	7.72
Hydrometer Test	0.0128	20.28	5.03
Hydrometer Test	0.0090	18.79	1.49
Hydrometer Test	0.0065	15.3	3.49
Hydrometer Test	0.0053	13.52	1.77
Hydrometer Test Clay	0.0046	14.18	0
Hydrometer Test Clay	0.0033	11.51	2.02
Hydrometer Test Clay	0.0027	10.35	1.15
Hydrometer Test Clay	0.0014	7.29	3.06

Grain Size Summary	Percent of Total Sample
Gravel	6.8
Sand	46.2
Coarse sand	1.5
Medium sand	31.5
Fine sand	13.1
Silt	33.5
Clay	13.5

Case Narrative for Sample ID: SE-21-0-0.33 (A9J0006-08)

This data is not to be used for engineering purposes.

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

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

The assumed specific gravity used in the calculations was 2.65.

+4 and +10 fractions contain abundant organic material.



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Apex Laboratories, LLC

Particle Size Analysis of Soil by ASTM D 422

Sample ID:	A9J0006-13	Client Sample ID:	SE-25-0-0.33	Batch Number:	9101058
Data Entered by:	SJL/JSJ	Date:	10/18/19	Data Reviewed by:	JW
		Date:		Date:	10/23/19
Sample Description:	Silty Sandy GRAVEL with trace Clay		Max Particle Size:	Gravel	
Particle Shape:	Sub-angular to Rounded		Hardness	Hard and Durable	

Whole Sample	Tare	Air Dry + Tare	Air Dry	Moisture	Dry Wt.
	11.971	273.271	261.30	6.75	244.8

Sieve Number	Opening (mm)	Tare	Dry + Tare	Weight Retained	Cumulative Wt. Retained	% Retained	% Passing
4	4.75	6.090	85.746	79.66	79.66	32.5	67.5
10	2.00	6.093	51.188	45.10	124.75	18.4	49.0
Pan		11.978	144.513	132.54	257.29	50.5	

Hygroscopic Moisture Correction

	Hygroscopic Correction Factor	Oven Sample	Pan No.	Tare	Air Dry + Tare	Oven Dry + Tare	Moisture
	0.9368		J0006013	1.328	21.260	20.000	6.75

Hydrometer Analysis

Start Date/Time	10/14/2019	9:08	Dispersing Agent	NaPO ₃
Air Dry Sample Wt. for Hydrometer Test (g)	50.397		G _s Correction Factor (α)	1.000
Percent Passing No.10 Sieve	49.0		Specific Gravity (G _s)	2.65
Dry Weight of Soil Tested (g)	47.21		Corrected Dry Weight of Soil Tested (g) (W)	96.28

Elapsed Time (min)	Hydrometer Reading	Temperature (°C)	Corrected Hydrometer Reading [R]	% Finer of Hydrometer Sample	L	K	Particle Diameter (mm)	Percent Passing
1	24	19.7	17.68	18.4	12.2	0.01365	0.048	9.00
2	21.5	19.7	15.18	15.8	12.5	0.01365	0.034	7.73
4	19.5	19.9	13.25	13.8	12.9	0.01365	0.025	6.75
8	17.5	19.9	11.25	11.7	13.2	0.01365	0.018	5.73
15	16	20	9.78	10.2	13.5	0.01365	0.013	4.98
30	13.5	20	7.28	7.6	13.8	0.01365	0.009	3.71
60	12.5	20.4	6.41	6.7	14	0.01365	0.007	3.27
90	12	20.5	5.95	6.2	14.2	0.01348	0.005	3.03
120	11.5	20.5	5.45	5.7	14.2	0.01348	0.005	2.77
240	11.5	20.5	4.76	4.9	14.2	0.01348	0.003	2.42
360	11.5	19.8	4.56	4.7	14.2	0.01365	0.003	2.32
1440	10.5	18.7	3.25	3.4	14.3	0.01382	0.001	1.65

Sieve Analysis of Portion Finer Than No. 10 Sieve

Sieve Number	Opening (mm)	Tare	Dry + Tare	Weight Retained	Cumulative Retained	% Retained	% Passing
20	0.850	1.312	11.111	9.80	150.52	10.2	38.9
40	0.425	1.305	12.463	11.16	179.86	11.6	27.3
60	0.250	1.318	8.162	6.84	197.86	7.1	20.2
100	0.150	1.325	3.892	2.57	204.61	2.7	17.5
140	0.105	1.291	2.092	0.80	206.72	0.8	16.7
200	0.075	1.322	1.881	0.56	208.19	0.6	16.1
230	0.063	1.304	1.529	0.23	208.78	0.2	15.8
			Sum	31.95	230 Minus	15.26	

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

Sample ID: SE-25-0-0.33 (A9J0006-13)

Grain Size Analysis Summary from Sieving and Hydrometer Testing	Particle Size (mm)	Percent Finer	Total Percent of Sample
Gravel			50.96
Retained on No. 4 sieve	4.75	67.46	32.54
Gravel, passing No. 4 sieve and retained on No. 10 sieve	2.00	49.04	18.42
Sand			33.19
Coarse sand, passing No.10 sieve and retained on No. 20 sieve	0.8500	38.86	10.18
Medium sand, passing No.20 sieve and retained on No. 40 sieve	0.4250	27.27	11.59
Medium sand, passing No.40 sieve and retained on No. 60 sieve	0.2500	20.16	7.11
Medium sand, passing No. 60 sieve and retained on No.100 sieve	0.1500	17.49	2.67
Fine sand, passing No. 100 sieve and retained on No.140 sieve	0.1060	16.66	0.83
Fine sand passing No. 140 sieve and retained on No. 200 sieve	0.0750	16.08	0.58
Fine sand, passing No. 200 sieve and retained on No. 230 sieve	0.0630	15.85	0.23
Silt and Clay (Measurements in the Clay fraction are noted)			15.85
Hydrometer Test	0.0477	9	6.84
Hydrometer Test	0.0341	7.73	1.27
Hydrometer Test	0.0245	6.75	0.98
Hydrometer Test	0.0175	5.73	1.02
Hydrometer Test	0.0129	4.98	0.75
Hydrometer Test	0.0093	3.71	1.27
Hydrometer Test	0.0066	3.27	0.44
Hydrometer Test	0.0054	3.03	0.24
Hydrometer Test	Clay	0.0046	2.77
Hydrometer Test	Clay	0.0033	2.42
Hydrometer Test	Clay	0.0027	0.1
Hydrometer Test	Clay	0.0014	1.65

Grain Size Summary	Percent of Total Sample
Gravel	51.0
Sand	33.2
Coarse sand	10.2
Medium sand	21.4
Fine sand	1.6
Silt	12.8
Clay	3.0

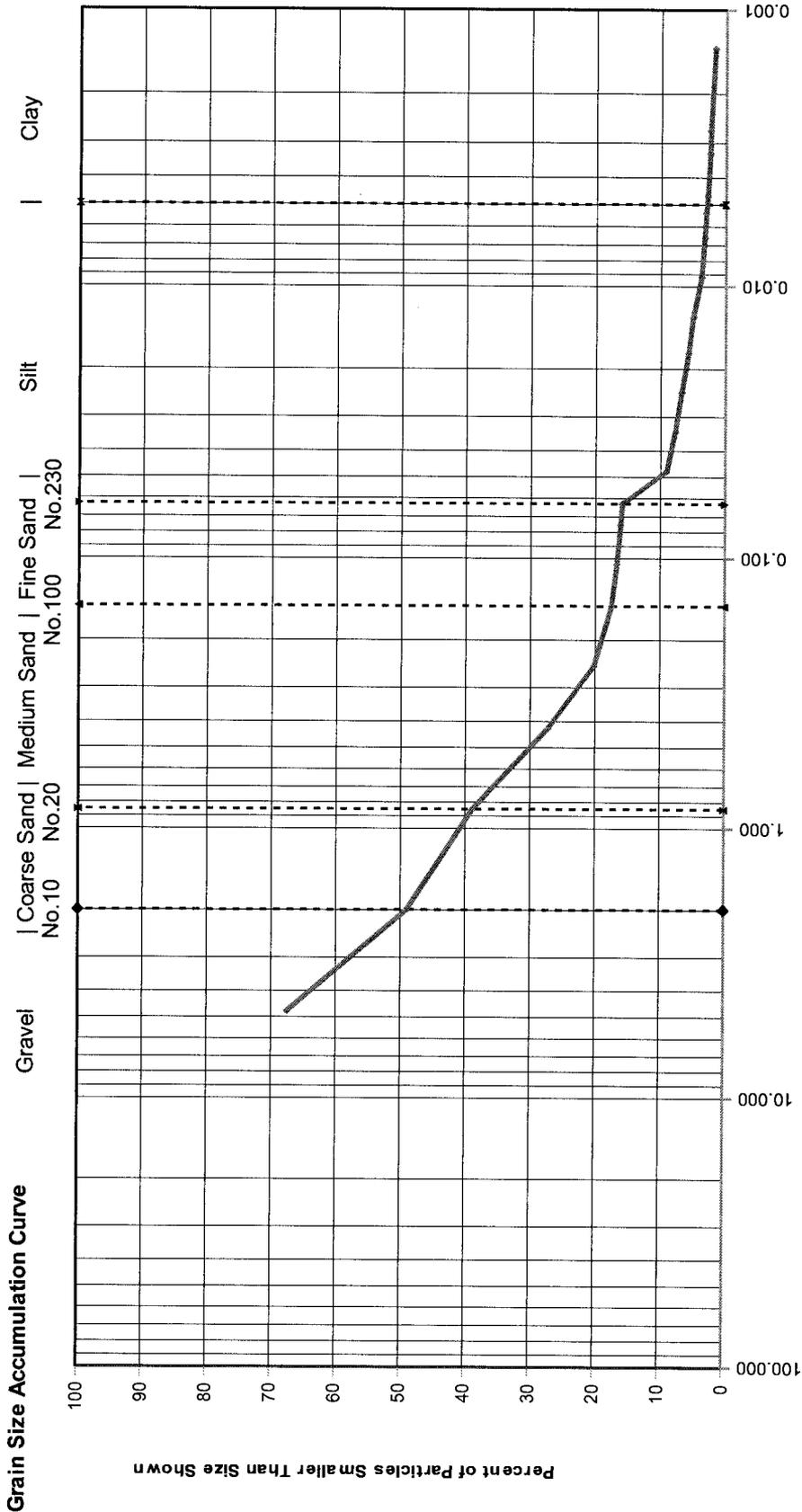
Case Narrative for Sample ID: SE-25-0-0.33 (A9J0006-13)

This data is not to be used for engineering purposes.
 No difficulty dispersing the fraction passing the No. 10 sieve.
 Dispersion device used: Commercial drink mixer operating at least 10,000 rpm for one minute.
 The assumed specific gravity used in the calculations was 2.65.
 +4 and +10 fractions contain abundant organic material and possible anthropogenic material.



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



Sample ID: SE-25-0-0.33 (A9J0006-13)		GRAVEL & SAND		SOIL DESCRIPTION
Specific Gravity	2.65	MAXIMUM PARTICLE SIZE	HARDNESS	
		Gravel	Hard and Durable	Silty Sandy GRAVEL with trace Clay
		Sub-angular to Rounded		

Apex Laboratories, LLC

Particle Size Analysis of Soil by ASTM D 422

Sample ID:	A9J0006-16	Client Sample ID:	SE-26-0-0.33	Batch Number:	9101058
Data Entered by:	JSJ	Date:	10/18/19	Data Reviewed by:	JW
		Date:	10/23/19		
Sample Description:	Silty Gravelly SAND with some Clay		Max Particle Size:	Gravel	
Particle Shape:	Angular to Rounded		Hardness	Hard and Durable	

Whole Sample	Tare	Air Dry + Tare	Air Dry	Moisture	Dry Wt.
	11.447	220.995	209.55	5.61	198.4

Sieve Number	Opening (mm)	Tare	Dry + Tare	Weight Retained	Cumulative Wt. Retained	% Retained	% Passing
4	4.75	6.051	37.030	30.98	30.98	15.6	84.4
10	2.00	6.016	44.548	38.53	69.51	19.4	65.0
Pan		11.454	149.024	137.57	207.08	65.4	

Hygroscopic Moisture Correction

Hygroscopic Correction Factor	Oven Sample	Pan No.	Tare	Air Dry + Tare	Oven Dry + Tare	Moisture
		0.9469	J00616	1.338	19.341	18.385

Hydrometer Analysis

Start Date/Time	10/14/2019	8:48	Dispersing Agent	NaPO ₃
Air Dry Sample Wt. for Hydrometer Test (g)	50.087		G _s Correction Factor (α)	1.000
Percent Passing No.10 Sieve	65.0		Specific Gravity (G _s)	2.65
Dry Weight of Soil Tested (g)	47.43		Corrected Dry Weight of Soil Tested (g) (W)	73.00

Elapsed Time (min)	Hydrometer Reading	Temperature (°C)	Corrected Hydrometer Reading [R]	% Finer of Hydrometer Sample	L	K	Particle Diameter (mm)	Percent Passing
1	27	19.9	20.75	28.4	11.7	0.01365	0.047	18.46
2	25	19.9	18.75	25.7	12	0.01365	0.033	16.68
4	23.5	20	17.28	23.7	12.2	0.01365	0.024	15.38
8	21.5	20	15.28	20.9	12.5	0.01365	0.017	13.60
15	19.5	20	13.28	18.2	12.9	0.01365	0.013	11.82
30	16.5	20.3	10.38	14.2	13.3	0.01365	0.009	9.24
60	15	20.5	8.95	12.3	13.7	0.01348	0.006	7.96
90	14	20.6	7.98	10.9	13.8	0.01348	0.005	7.10
120	13	20.6	6.98	9.6	14	0.01348	0.005	6.21
240	14	20.5	7.26	9.9	13.8	0.01348	0.003	6.46
360	13	19.7	6.03	8.3	14	0.01365	0.003	5.37
1440	12	18.7	4.75	6.5	14.2	0.01382	0.001	4.23

Sieve Analysis of Portion Finer Than No. 10 Sieve

Sieve Number	Opening (mm)	Tare	Dry + Tare	Weight Retained	Cumulative Retained	% Retained	% Passing
20	0.850	1.317	10.647	9.33	95.14	12.8	52.2
40	0.425	1.311	10.580	9.27	120.60	12.7	39.5
60	0.250	1.314	6.227	4.91	134.09	6.7	32.8
100	0.150	1.308	3.470	2.16	140.03	3.0	29.8
140	0.105	1.322	2.009	0.69	141.91	0.9	28.9
200	0.075	1.307	1.864	0.56	143.44	0.8	28.1
230	0.063	1.326	1.551	0.23	144.06	0.3	27.8

Sum	27.14	230 Minus	20.28
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Apex Laboratories, LLC
Particle Size Analysis of Soil by ASTM D 422 Modified

Sample ID: SE-26-0-0.33 (A9J0006-16)

Grain Size Analysis Summary from Sieving and Hydrometer Testing	Particle Size (mm)	Percent Finer	Total Percent of Sample
Gravel			35.03
Retained on No. 4 sieve	4.75	84.39	15.61
Gravel, passing No. 4 sieve and retained on No. 10 sieve	2.00	64.97	19.42
Sand			37.18
Coarse sand, passing No.10 sieve and retained on No. 20 sieve	0.8500	52.19	12.78
Medium sand, passing No.20 sieve and retained on No. 40 sieve	0.4250	39.49	12.7
Medium sand, passing No.40 sieve and retained on No. 60 sieve	0.2500	32.76	6.73
Medium sand, passing No. 60 sieve and retained on No.100 sieve	0.1500	29.8	2.96
Fine sand, passing No. 100 sieve and retained on No.140 sieve	0.1060	28.86	0.94
Fine sand passing No. 140 sieve and retained on No. 200 sieve	0.0750	28.09	0.76
Fine sand, passing No. 200 sieve and retained on No. 230 sieve	0.0630	27.79	0.31
Silt and Clay (Measurements in the Clay fraction are noted)			27.79
Hydrometer Test	0.0467	18.46	9.32
Hydrometer Test	0.0334	16.68	1.78
Hydrometer Test	0.0238	15.38	1.31
Hydrometer Test	0.0171	13.6	1.78
Hydrometer Test	0.0127	11.82	1.78
Hydrometer Test	0.0091	9.24	2.58
Hydrometer Test	0.0064	7.96	1.28
Hydrometer Test	0.0053	7.1	0.86
Hydrometer Test	Clay 0.0046	6.21	0.89
Hydrometer Test	Clay 0.0032	6.46	0
Hydrometer Test	Clay 0.0027	5.37	0.84
Hydrometer Test	Clay 0.0014	4.23	1.14

Grain Size Summary	Percent of Total Sample
Gravel	35.0
Sand	37.2
Coarse sand	12.8
Medium sand	22.4
Fine sand	2.0
Silt	20.7
Clay	7.1

Case Narrative for Sample ID: SE-26-0-0.33 (A9J0006-16)

This data is not to be used for engineering purposes.

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

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

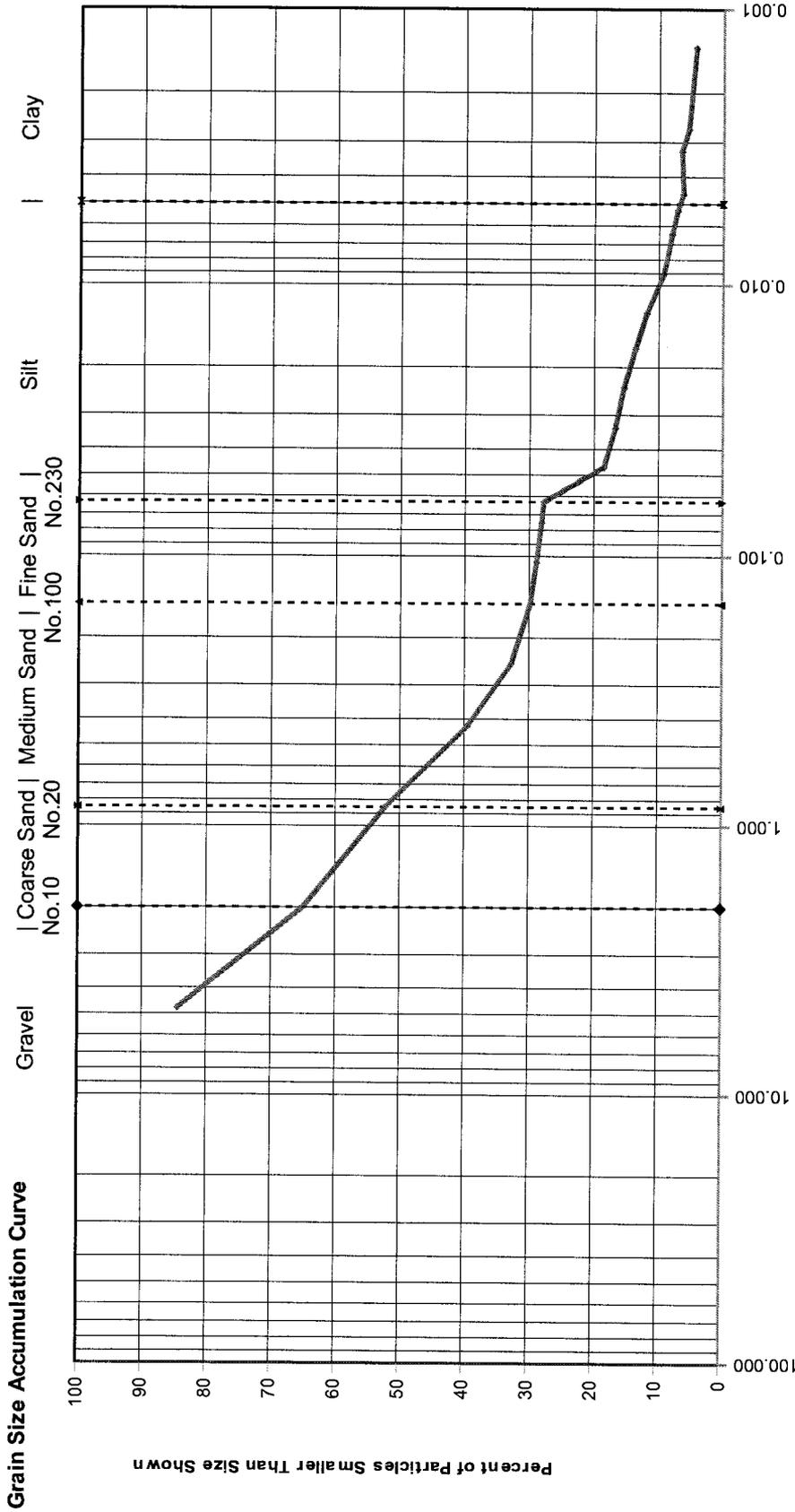
The assumed specific gravity used in the calculations was 2.65.

+4 and +10 fractions contain abundant organic material.



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



Particle Size (m m)

Sample ID:	SE-26-0-0.33 (A9J0006-16)		
Specific Gravity	2.65	GRAVEL & SAND	
		MAXIMUM PARTICLE SIZE	HARDNESS
	Gravel	Angular to Rounded	Hard and Durable
SOIL DESCRIPTION			Silty Gravelly SAND with some Clay

Apex Laboratories, LLC

Particle Size Analysis of Soil by ASTM D 422

Sample ID:	A9J0006-18	Client Sample ID:	SE-18-0-0.33	Batch Number:	9101058
Data Entered by:	JSJ	Date:	10/18/19	Data Reviewed by:	JW
		Date:		Date:	10/23/19
Sample Description:	Clayey Sandy SILT		Max Particle Size:	Gravel	
Particle Shape:	N/A		Hardness	N/A	

Whole Sample	Tare	Air Dry + Tare	Air Dry	Moisture	Dry Wt.
	5.783	296.336	290.55	4.38	278.4

Sieve Number	Opening (mm)	Tare	Dry + Tare	Weight Retained	Cumulative Wt. Retained	% Retained	% Passing
4	4.75	0.000	0.000	0.00	0.00	0.0	100.0
10	2.00	1.333	1.401	0.07	0.07	0.0	100.0
Pan		5.786	296.214	290.43	290.50	99.8	

Hygroscopic Moisture Correction

Hygroscopic Correction Factor	Oven Sample	Pan No.	Tare	Air Dry + Tare	Oven Dry + Tare	Moisture
		J00618	1.318	22.082	21.211	4.38

Hydrometer Analysis

Start Date/Time	10/14/2019	9:27	Dispersing Agent	NaPO ₃
Air Dry Sample Wt. for Hydrometer Test (g)	53.141		G _s Correction Factor (α)	1.000
Percent Passing No.10 Sieve	100.0		Specific Gravity (G _s)	2.65
Dry Weight of Soil Tested (g)	50.91		Corrected Dry Weight of Soil Tested (g) (W)	50.92

Elapsed Time (min)	Hydrometer Reading	Temperature (°C)	Corrected Hydrometer Reading [R]	% Finer of Hydrometer Sample	L	K	Particle Diameter (mm)	Percent Passing
1	34.5	19.7	28.18	55.3	10.4	0.01365	0.044	55.32
2	32	19.7	25.68	50.4	10.9	0.01365	0.032	50.42
4	28.5	19.7	22.18	43.6	11.4	0.01365	0.023	43.54
8	24.5	19.9	18.25	35.8	12	0.01365	0.017	35.82
15	22	19.9	15.75	30.9	12.5	0.01365	0.012	30.91
30	19	20	12.78	25.1	13	0.01365	0.009	25.09
60	16.5	20.3	10.38	20.4	13.3	0.01365	0.006	20.38
90	15	20.3	8.88	17.4	13.7	0.01365	0.005	17.43
120	15	20.3	8.2	16.1	13.7	0.01365	0.005	16.11
240	14	20.4	7.23	14.2	13.8	0.01365	0.003	14.20
360	13.5	19.7	6.53	12.8	13.8	0.01365	0.003	12.82
1440	12	18.7	4.75	9.3	14.2	0.01382	0.001	9.32

Sieve Analysis of Portion Finer Than No. 10 Sieve

Sieve Number	Opening (mm)	Tare	Dry + Tare	Weight Retained	Cumulative Retained	% Retained	% Passing
20	0.850	1.309	1.359	0.05	0.34	0.1	99.9
40	0.425	1.321	1.734	0.41	2.60	0.8	99.1
60	0.250	1.297	3.588	2.29	15.12	4.5	94.6
100	0.150	1.318	11.157	9.84	68.89	19.3	75.2
140	0.105	1.309	5.300	3.99	90.70	7.8	67.4
200	0.075	1.310	3.473	2.16	102.52	4.2	63.2
230	0.063	1.320	2.304	0.98	107.90	1.9	61.2

Sum	19.73	230 Minus	31.18
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Apex Laboratories, LLC
Particle Size Analysis of Soil by ASTM D 422 Modified

Sample ID: SE-18-0-0.33 (A9J0006-18)

Grain Size Analysis Summary from Sieving and Hydrometer Testing	Particle Size (mm)	Percent Finer	Total Percent of Sample	
Gravel			0.02	
Retained on No. 4 sieve	4.75	100	0	
Gravel, passing No. 4 sieve and retained on No. 10 sieve	2.00	99.98	0.02	
Sand			38.75	
Coarse sand, passing No.10 sieve and retained on No. 20 sieve	0.8500	99.88	0.1	
Medium sand, passing No.20 sieve and retained on No. 40 sieve	0.4250	99.07	0.81	
Medium sand, passing No.40 sieve and retained on No. 60 sieve	0.2500	94.57	4.5	
Medium sand, passing No. 60 sieve and retained on No.100 sieve	0.1500	75.25	19.32	
Fine sand, passing No. 100 sieve and retained on No.140 sieve	0.1060	67.41	7.84	
Fine sand passing No. 140 sieve and retained on No. 200 sieve	0.0750	63.16	4.25	
Fine sand, passing No. 200 sieve and retained on No. 230 sieve	0.0630	61.23	1.93	
Silt and Clay (Measurements in the Clay fraction are noted)			61.23	
Hydrometer Test	0.0440	55.32	5.91	
Hydrometer Test	0.0319	50.42	4.91	
Hydrometer Test	0.0230	43.54	6.87	
Hydrometer Test	0.0167	35.82	7.72	
Hydrometer Test	0.0125	30.91	4.91	
Hydrometer Test	0.0090	25.09	5.82	
Hydrometer Test	0.0064	20.38	4.71	
Hydrometer Test	0.0053	17.43	2.94	
Hydrometer Test	Clay	0.0046	16.11	1.33
Hydrometer Test	Clay	0.0033	14.2	1.91
Hydrometer Test	Clay	0.0027	12.82	1.37
Hydrometer Test	Clay	0.0014	9.32	3.5

Grain Size Summary	Percent of Total Sample
Gravel	0.0
Sand	38.7
Coarse sand	0.1
Medium sand	24.6
Fine sand	14.0
Silt	43.8
Clay	17.4

Case Narrative for Sample ID: SE-18-0-0.33 (A9J0006-18)

This data is not to be used for engineering purposes.

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

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

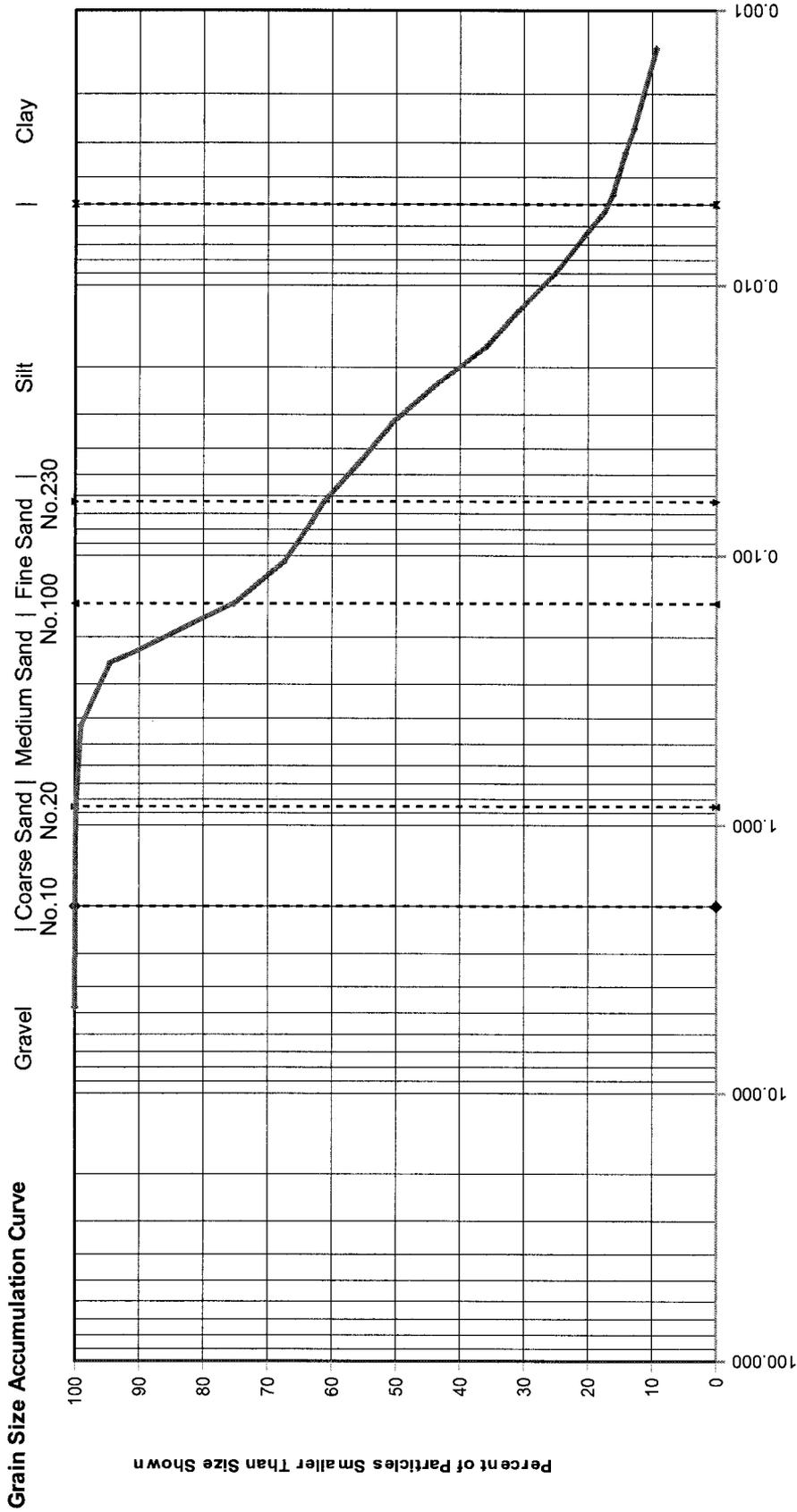
The assumed specific gravity used in the calculations was 2.65.

+10 fraction consists entirely of organic material.



Express 12/31/19

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



Sample ID: SE-18-0-0.33 (A9J0006-18)			
Specific Gravity	MAXIMUM PARTICLE SIZE	GRAVEL & SAND	
	2.65	PARTICLE SHAPE	HARDNESS
	Gravel	N/A	N/A
SOIL DESCRIPTION		Clayey Sandy SILT	

Apex Laboratories, LLC

Particle Size Analysis of Soil by ASTM D 422

Sample ID:	A9J0006-20		Client Sample ID:	SE-31-0-0.33		Batch Number:	9101058
Data Entered by:	JSJ	Date:	10/21/19	Data Reviewed by:	JW	Date:	10/23/19
Sample Description:	Clayey Silty SAND			Max Particle Size:	Gravel		
Particle Shape:	N/A			Hardness	N/A		

Whole Sample	Tare	Air Dry + Tare	Air Dry	Moisture	Dry Wt.
	11.689	293.444	281.76	3.89	271.2

Sieve Number	Opening (mm)	Tare	Dry + Tare	Weight Retained	Cumulative Wt. Retained	% Retained	% Passing
4	4.75	1.325	5.162	3.84	3.84	1.4	98.6
10	2.00	1.318	5.586	4.27	8.11	1.6	97.0
Pan		5.851	278.271	272.42	280.53	96.5	

Hygroscopic Moisture Correction

	Hygroscopic Correction Factor	Oven Sample	Pan No.	Tare	Air Dry + Tare	Oven Dry + Tare	Moisture
	0.9626		J00620	1.338	27.055	26.093	3.89

Hydrometer Analysis

Start Date/Time	10/14/2019	8:30	Dispersing Agent	NaPO ₃
Air Dry Sample Wt. for Hydrometer Test (g)	54.866		G _s Correction Factor (α)	1.000
Percent Passing No.10 Sieve	97.0		Specific Gravity (G _s)	2.65
Dry Weight of Soil Tested (g)	52.81		Corrected Dry Weight of Soil Tested (g) (W)	54.44

Elapsed Time (min)	Hydrometer Reading	Temperature (°C)	Corrected Hydrometer Reading [R]	% Finer of Hydrometer Sample	L	K	Particle Diameter (mm)	Percent Passing
1	33	19.7	26.68	49.0	10.7	0.01365	0.045	47.54
2	31	19.7	24.68	45.3	11.1	0.01365	0.032	43.98
4	28	19.7	21.68	39.8	11.5	0.01365	0.023	38.63
8	24.5	19.7	18.18	33.4	12	0.01365	0.017	32.40
15	24	19.9	17.75	32.6	12.2	0.01365	0.012	31.62
30	19	20.1	12.81	23.5	13	0.01365	0.009	22.83
60	17	20.3	10.88	20.0	13.3	0.01365	0.006	19.39
90	15	20.5	8.95	16.4	13.7	0.01348	0.005	15.94
120	14	20.5	7.95	14.6	13.8	0.01348	0.005	14.16
240	14	20.5	7.26	13.3	13.8	0.01348	0.003	12.94
360	13.5	20.5	6.76	12.4	13.8	0.01348	0.003	12.05
1440	12	18.7	4.75	8.7	14.2	0.01382	0.001	8.46

Sieve Analysis of Portion Finer Than No. 10 Sieve

Sieve Number	Opening (mm)	Tare	Dry + Tare	Weight Retained	Cumulative Retained	% Retained	% Passing
20	0.850	1.311	1.988	0.68	11.47	1.2	95.8
40	0.425	1.324	2.262	0.94	16.12	1.7	94.0
60	0.250	1.316	3.784	2.47	28.38	4.5	89.5
100	0.150	1.323	12.949	11.63	86.10	21.4	68.2
140	0.105	1.304	6.076	4.77	109.80	8.8	59.4
200	0.075	1.313	4.061	2.75	123.44	5.0	54.3
230	0.063	1.308	2.267	0.96	128.20	1.8	52.6

Sum	24.19	230 Minus	28.63
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Apex Laboratories, LLC
Particle Size Analysis of Soil by ASTM D 422 Modified

Sample ID: SE-31-0-0.33 (A9J0006-20)

Grain Size Analysis Summary from Sieving and Hydrometer Testing	Particle Size (mm)	Percent Finer	Total Percent of Sample	
Gravel			2.99	
Retained on No. 4 sieve	4.75	98.59	1.41	
Gravel, passing No. 4 sieve and retained on No. 10 sieve	2.00	97.01	1.57	
Sand			44.43	
Coarse sand, passing No.10 sieve and retained on No. 20 sieve	0.8500	95.77	1.24	
Medium sand, passing No.20 sieve and retained on No. 40 sieve	0.4250	94.05	1.72	
Medium sand, passing No.40 sieve and retained on No. 60 sieve	0.2500	89.51	4.53	
Medium sand, passing No. 60 sieve and retained on No.100 sieve	0.1500	68.16	21.36	
Fine sand, passing No. 100 sieve and retained on No.140 sieve	0.1060	59.39	8.77	
Fine sand passing No. 140 sieve and retained on No. 200 sieve	0.0750	54.34	5.05	
Fine sand, passing No. 200 sieve and retained on No. 230 sieve	0.0630	52.58	1.76	
Silt and Clay (Measurements in the Clay fraction are noted)			52.58	
Hydrometer Test	0.0447	47.54	5.04	
Hydrometer Test	0.0322	43.98	3.56	
Hydrometer Test	0.0231	38.63	5.35	
Hydrometer Test	0.0167	32.4	6.24	
Hydrometer Test	0.0123	31.62	0.77	
Hydrometer Test	0.0090	22.83	8.79	
Hydrometer Test	0.0064	19.39	3.44	
Hydrometer Test	0.0053	15.94	3.44	
Hydrometer Test	Clay	0.0046	14.16	1.78
Hydrometer Test	Clay	0.0032	12.94	1.22
Hydrometer Test	Clay	0.0026	12.05	0.89
Hydrometer Test	Clay	0.0014	8.46	3.59

Grain Size Summary	Percent of Total Sample
Gravel	3.0
Sand	44.4
Coarse sand	1.2
Medium sand	27.6
Fine sand	15.6
Silt	36.6
Clay	15.9

Case Narrative for Sample ID: SE-31-0-0.33 (A9J0006-20)

This data is not to be used for engineering purposes.

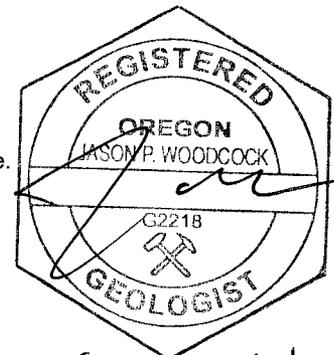
No difficulty dispersing the fraction passing the No. 10 sieve.

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

The assumed specific gravity used in the calculations was 2.65.

+4 fraction consists entirely of organic material.

+10 to +60 fractions consists almost entirely of organic material.



Express 12/31/19

Apex Laboratories, LLC

Particle Size Analysis of Soil by ASTM D 422

Sample ID:	A9J0006-21	Client Sample ID:	SE-16-0-0.33	Batch Number:	9101058
Data Entered by:	JSJ	Date:	10/21/19	Data Reviewed by:	JW
		Date:		Date:	10/23/19
Sample Description:	Clayey Silty SAND	Max Particle Size:	Gravel		
Particle Shape:	N/A	Hardness	N/A		

Whole Sample	Tare	Air Dry + Tare	Air Dry	Moisture	Dry Wt.
	11.393	359.402	348.01	3.66	335.7

Sieve Number	Opening (mm)	Tare	Dry + Tare	Weight Retained	Cumulative Wt. Retained	% Retained	% Passing
4	4.75	1.323	2.477	1.15	1.15	0.3	99.7
10	2.00	1.335	1.484	0.15	1.30	0.0	99.6
Pan		11.417	357.013	345.60	346.90	99.2	

Hygroscopic Moisture Correction

Hygroscopic Correction Factor	Oven Sample	Pan No.	Tare	Air Dry + Tare	Oven Dry + Tare	Moisture
		0.9647	J00621	1.320	20.385	19.712

Hydrometer Analysis

Start Date/Time	10/14/2019	9:18	Dispersing Agent	NaPO ₃
Air Dry Sample Wt. for Hydrometer Test (g)	52.778		G _s Correction Factor (α)	1.000
Percent Passing No.10 Sieve	99.6		Specific Gravity (G _s)	2.65
Dry Weight of Soil Tested (g)	50.91		Corrected Dry Weight of Soil Tested (g) (W)	51.11

Elapsed Time (min)	Hydrometer Reading	Temperature (°C)	Corrected Hydrometer Reading [R]	% Finer of Hydrometer Sample	L	K	Particle Diameter (mm)	Percent Passing
1	35	20	30.21	59.1	10.4	0.01365	0.044	58.87
2	28.5	19.9	23.68	46.3	11.4	0.01365	0.033	46.15
4	25	19.9	20.18	39.5	12	0.01365	0.024	39.33
8	22	19.9	17.18	33.6	12.5	0.01365	0.017	33.48
15	20	20	15.21	29.8	12.9	0.01365	0.013	29.64
30	16	20.2	11.26	22.0	13.5	0.01365	0.009	21.94
60	15	20.5	8.95	17.5	13.7	0.01348	0.006	17.44
90	14	20.4	7.91	15.5	13.8	0.01365	0.005	15.42
120	13.5	20.4	7.66	15.0	13.8	0.01365	0.005	14.92
240	12	20.4	6.16	12.0	14.2	0.01365	0.003	12.00
360	11.5	19.7	5.45	10.7	14.2	0.01365	0.003	10.63
1440	10	18.7	3.66	7.2	14.5	0.01382	0.001	7.14

Sieve Analysis of Portion Finer Than No. 10 Sieve

Sieve Number	Opening (mm)	Tare	Dry + Tare	Weight Retained	Cumulative Retained	% Retained	% Passing
20	0.850	1.317	1.358	0.04	1.57	0.1	99.5
40	0.425	1.315	1.619	0.30	3.56	0.6	98.9
60	0.250	1.326	2.075	0.75	8.47	1.5	97.5
100	0.150	1.312	8.276	6.96	54.07	13.6	83.8
140	0.105	1.307	8.080	6.77	98.42	13.3	70.6
200	0.075	1.304	5.946	4.64	128.81	9.1	61.5
230	0.063	1.308	3.201	1.89	141.21	3.7	57.8

Sum	21.37	230 Minus	29.55
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Apex Laboratories, LLC
Particle Size Analysis of Soil by ASTM D 422 Modified

Sample ID: SE-16-0-0.33 (A9J0006-21)

Grain Size Analysis Summary from Sieving and Hydrometer Testing	Particle Size (mm)	Percent Finer	Total Percent of Sample
Gravel			0.39
Retained on No. 4 sieve	4.75	99.66	0.34
Gravel, passing No. 4 sieve and retained on No. 10 sieve	2.00	99.61	0.04
Sand			41.8
Coarse sand, passing No.10 sieve and retained on No. 20 sieve	0.8500	99.53	0.08
Medium sand, passing No.20 sieve and retained on No. 40 sieve	0.4250	98.94	0.59
Medium sand, passing No.40 sieve and retained on No. 60 sieve	0.2500	97.47	1.47
Medium sand, passing No. 60 sieve and retained on No.100 sieve	0.1500	83.85	13.62
Fine sand, passing No. 100 sieve and retained on No.140 sieve	0.1060	70.6	13.25
Fine sand passing No. 140 sieve and retained on No. 200 sieve	0.0750	61.51	9.08
Fine sand, passing No. 200 sieve and retained on No. 230 sieve	0.0630	57.81	3.7
Silt and Clay (Measurements in the Clay fraction are noted)			57.81
Hydrometer Test	0.0440	58.87	0
Hydrometer Test	0.0326	46.15	11.66
Hydrometer Test	0.0236	39.33	6.82
Hydrometer Test	0.0171	33.48	5.85
Hydrometer Test	0.0127	29.64	3.85
Hydrometer Test	0.0092	21.94	7.7
Hydrometer Test	0.0064	17.44	4.5
Hydrometer Test	0.0053	15.42	2.01
Hydrometer Test	Clay 0.0046	14.92	0.5
Hydrometer Test	Clay 0.0033	12	2.92
Hydrometer Test	Clay 0.0027	10.63	1.37
Hydrometer Test	Clay 0.0014	7.14	3.49

Grain Size Summary	Percent of Total Sample
Gravel	0.4
Sand	41.8
Coarse sand	0.1
Medium sand	15.7
Fine sand	26.0
Silt	42.4
Clay	15.4

Case Narrative for Sample ID: SE-16-0-0.33 (A9J0006-21)

This data is not to be used for engineering purposes.

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

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

The assumed specific gravity used in the calculations was 2.65.

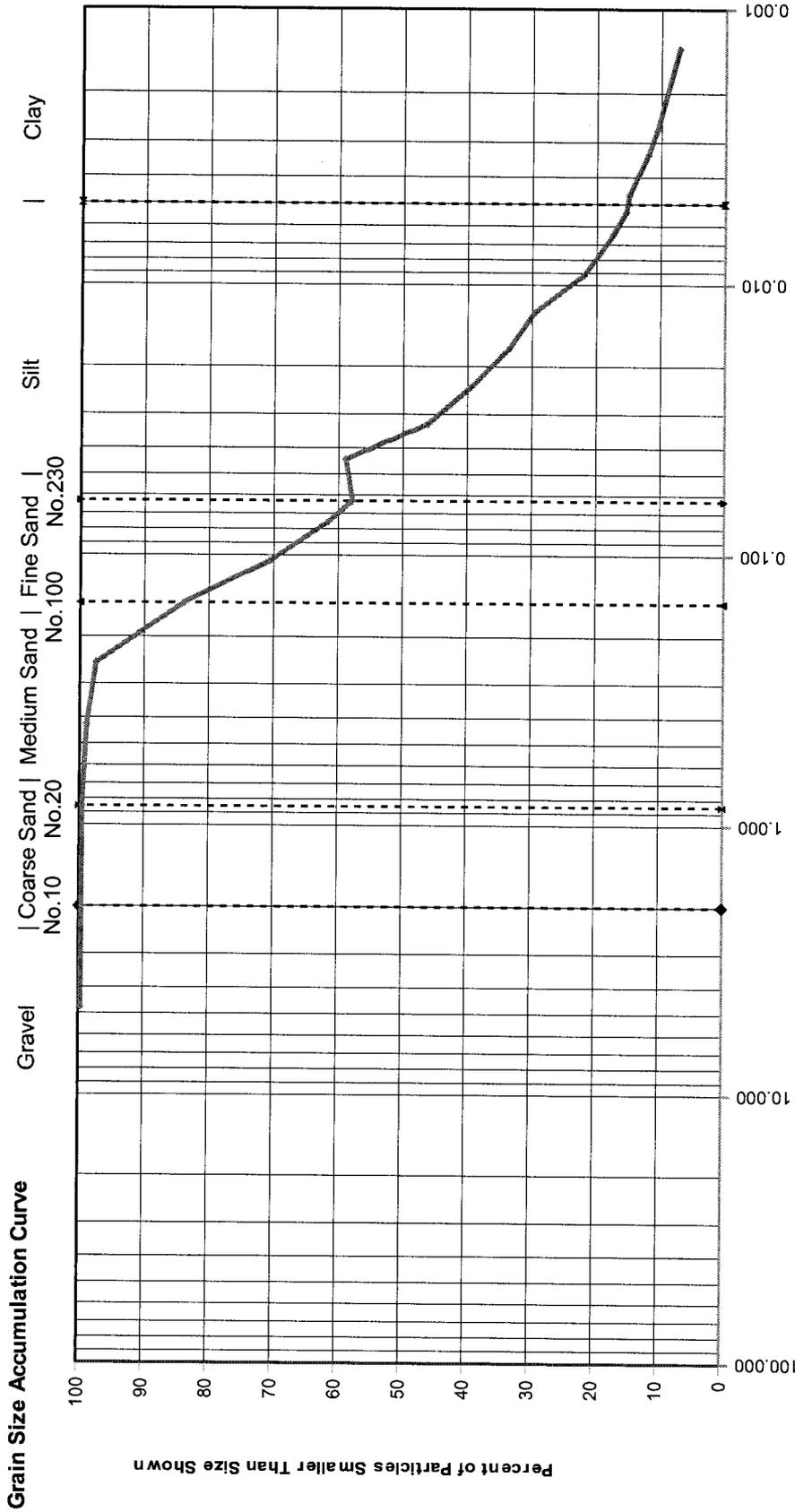
+4 and +10 fractions consist entirely of organic material.

+20 to +60 fractions consists almost entirely of organic material.



Expires 12/31/19

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



Particle Size (mm)

Sample ID:	SE-16-0-0.33 (A9J0006-21)		
Specific Gravity	2.65	GRAVEL & SAND	
		MAXIMUM PARTICLE SIZE	PARTICLE SHAPE
	Gravel	N/A	N/A
		HARDNESS	N/A
SOIL DESCRIPTION			Clayey Silty SAND

Apex Laboratories, LLC

Particle Size Analysis of Soil by ASTM D 422

Sample ID:	A9J0006-23	Client Sample ID:	SE-22-0-0.33	Batch Number:	9101058
Data Entered by:	JSJ	Date:	10/21/19	Data Reviewed by:	JW
Date:				Date:	10/23/19
Sample Description:	Clayey SILT with some Gravel and trace Sand		Max Particle Size:	Gravel	
Particle Shape:	Angular		Hardness	Hard and Durable	

Whole Sample	Tare	Air Dry + Tare	Air Dry	Moisture	Dry Wt.
	5.574	209.761	204.19	6.07	192.5

Sieve Number	Opening (mm)	Tare	Dry + Tare	Weight Retained	Cumulative Wt. Retained	% Retained	% Passing
4	4.75	6.052	32.190	26.14	26.14	13.6	86.4
10	2.00	1.337	7.482	6.15	32.28	3.2	83.2
Pan		5.577	175.498	169.92	202.20	82.9	

Hygroscopic Moisture Correction

	Hygroscopic Correction Factor	Oven Sample	Pan No.	Tare	Air Dry + Tare	Oven Dry + Tare	Moisture
	0.9428		J00623	1.320	21.781	20.610	6.07

Hydrometer Analysis

Start Date/Time	10/14/2019	8:57	Dispersing Agent	NaPO ₃
Air Dry Sample Wt. for Hydrometer Test (g)	53.907		G _s Correction Factor (α)	1.000
Percent Passing No.10 Sieve	83.2		Specific Gravity (G _s)	2.65
Dry Weight of Soil Tested (g)	50.82		Corrected Dry Weight of Soil Tested (g) (W)	61.06

Elapsed Time (min)	Hydrometer Reading	Temperature (°C)	Corrected Hydrometer Reading [R]	% Finer of Hydrometer Sample	L	K	Particle Diameter (mm)	Percent Passing
1	47.5	19.9	42.68	69.9	8.3	0.01365	0.039	58.18
2	45	19.8	40.16	65.8	8.8	0.01365	0.029	54.73
4	42	19.8	37.16	60.8	9.2	0.01365	0.021	50.64
8	37.5	19.7	32.63	53.4	9.9	0.01365	0.015	44.48
15	32	19.9	27.18	44.5	10.9	0.01365	0.012	37.05
30	26	20.1	21.23	34.8	11.9	0.01365	0.009	28.94
60	24	20.4	17.91	29.3	12.2	0.01365	0.006	24.42
90	21	20.5	14.95	24.5	12.7	0.01348	0.005	20.37
120	19	20.5	12.95	21.2	13	0.01348	0.004	17.65
240	17	20.5	11.19	18.3	13.3	0.01348	0.003	15.25
360	16	19.9	10.01	16.4	13.5	0.01365	0.003	13.65
1440	13	18.7	6.66	10.9	14	0.01382	0.001	9.08

Sieve Analysis of Portion Finer Than No. 10 Sieve

Sieve Number	Opening (mm)	Tare	Dry + Tare	Weight Retained	Cumulative Retained	% Retained	% Passing
20	0.850	1.326	2.655	1.33	36.47	2.2	81.1
40	0.425	1.318	3.916	2.60	44.66	4.3	76.8
60	0.250	1.308	2.885	1.58	49.63	2.6	74.2
100	0.150	1.308	2.555	1.25	53.56	2.0	72.2
140	0.105	1.322	1.933	0.61	55.49	1.0	71.2
200	0.075	1.318	1.980	0.66	57.58	1.1	70.1
230	0.063	1.317	1.619	0.30	58.53	0.5	69.6

Sum	8.33	230 Minus	42.50
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Apex Laboratories, LLC
Particle Size Analysis of Soil by ASTM D 422 Modified

Sample ID: SE-22-0-0.33 (A9J0006-23)

Grain Size Analysis Summary from Sieving and Hydrometer Testing	Particle Size (mm)	Percent Finer	Total Percent of Sample	
Gravel			16.77	
Retained on No. 4 sieve	4.75	86.42	13.58	
Gravel, passing No. 4 sieve and retained on No. 10 sieve	2.00	83.23	3.19	
Sand			13.64	
Coarse sand, passing No.10 sieve and retained on No. 20 sieve	0.8500	81.05	2.18	
Medium sand, passing No.20 sieve and retained on No. 40 sieve	0.4250	76.8	4.25	
Medium sand, passing No.40 sieve and retained on No. 60 sieve	0.2500	74.22	2.58	
Medium sand, passing No. 60 sieve and retained on No.100 sieve	0.1500	72.17	2.04	
Fine sand, passing No. 100 sieve and retained on No.140 sieve	0.1060	71.17	1	
Fine sand passing No. 140 sieve and retained on No. 200 sieve	0.0750	70.09	1.08	
Fine sand, passing No. 200 sieve and retained on No. 230 sieve	0.0630	69.59	0.49	
Silt and Clay (Measurements in the Clay fraction are noted)			69.59	
Hydrometer Test	0.0393	58.18	11.42	
Hydrometer Test	0.0286	54.73	3.44	
Hydrometer Test	0.0207	50.64	4.09	
Hydrometer Test	0.0152	44.48	6.17	
Hydrometer Test	0.0116	37.05	7.43	
Hydrometer Test	0.0086	28.94	8.11	
Hydrometer Test	0.0062	24.42	4.52	
Hydrometer Test	0.0051	20.37	4.04	
Hydrometer Test	Clay	0.0044	17.65	2.73
Hydrometer Test	Clay	0.0032	15.25	2.4
Hydrometer Test	Clay	0.0026	13.65	1.6
Hydrometer Test	Clay	0.0014	9.08	4.56

Grain Size Summary	Percent of Total Sample
Gravel	16.8
Sand	13.6
Coarse sand	2.2
Medium sand	8.9
Fine sand	2.6
Silt	49.2
Clay	20.4

Case Narrative for Sample ID: SE-22-0-0.33 (A9J0006-23)

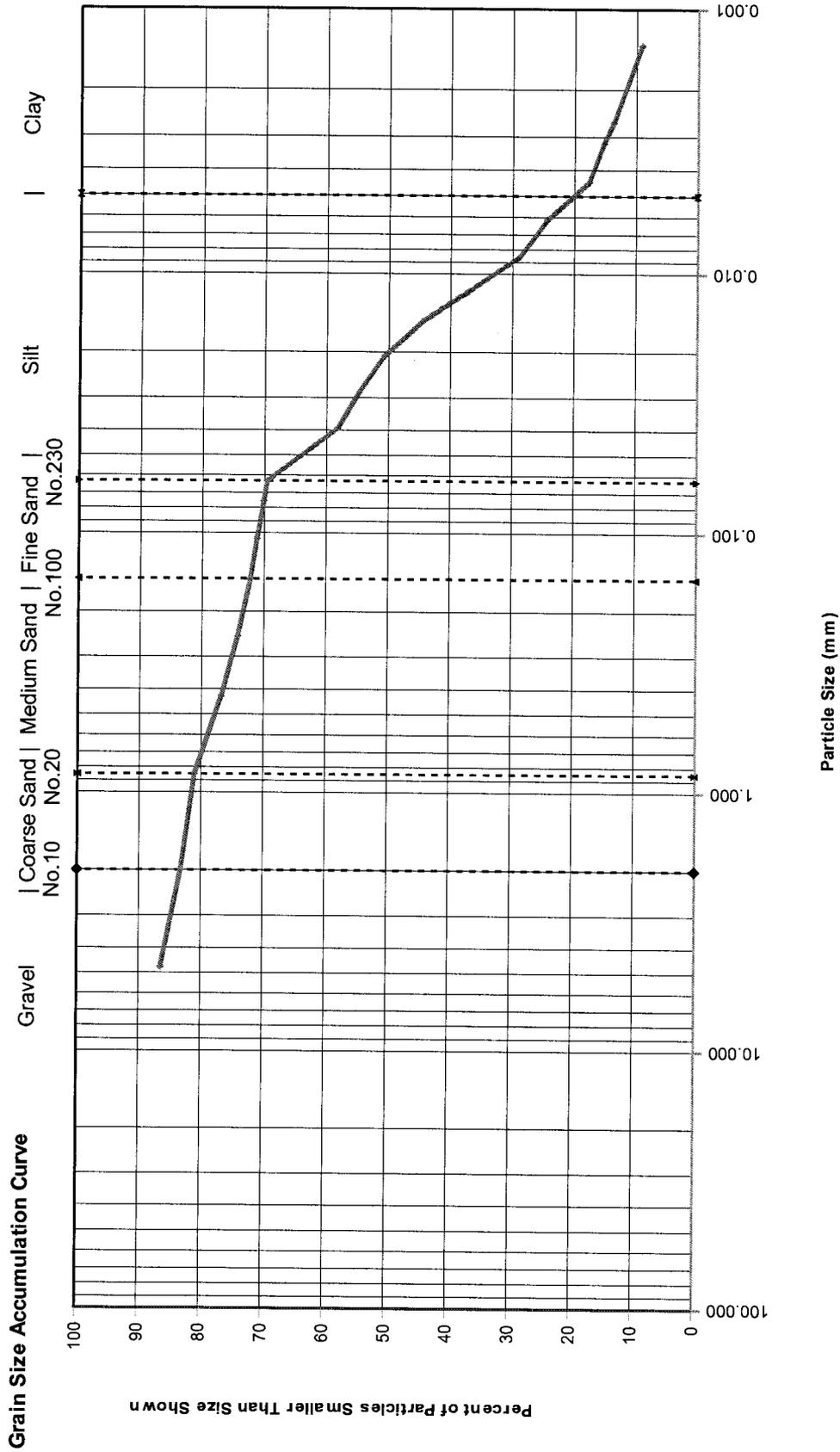
This data is not to be used for engineering purposes.
 No difficulty dispersing the fraction passing the No. 10 sieve.
 Dispersion device used: Commercial drink mixer operating at least 10,000 rpm for one minute.
 The assumed specific gravity used in the calculations was 2.65.

+4 and +10 fractions contain abundant organic material.
 +20 to +200 fractions consist almost entirely of organic material.



Exp. 12/31/19

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



Sample ID: SE-22-0-0.33 (A9J0006-23)			
Specific Gravity	2.65	GRAVEL & SAND	
		PARTICLE SHAPE	HARDNESS
MAXIMUM PARTICLE SIZE	Gravel	Angular	Hard and Durable
SOIL DESCRIPTION			Clayey SILT with some Gravel and trace Sand

Apex Laboratories, LLC

Particle Size Analysis of Soil by ASTM D 422

Sample ID:	A9J0006-24	Client Sample ID:	SE-27-0-0.33	Batch Number:	9101058
Data Entered by:	JSJ	Date:	10/21/19	Data Reviewed by:	JW
		Date:		Date:	10/23/19
Sample Description:	Clayey SILT with some Sand and Gravel		Max Particle Size:	Gravel	
Particle Shape:	Angular		Hardness:	Hard and Durable	

Whole Sample	Tare	Air Dry + Tare	Air Dry	Moisture	Dry Wt.
	5.516	227.339	221.82	4.82	211.6

Sieve Number	Opening (mm)	Tare	Dry + Tare	Weight Retained	Cumulative Wt. Retained	% Retained	% Passing
4	4.75	5.986	40.865	34.88	34.88	16.5	83.5
10	2.00	1.330	3.867	2.54	37.42	1.2	82.3
Pan		5.520	186.557	181.04	218.45	81.4	

Hygroscopic Moisture Correction

Hygroscopic Correction Factor	Oven Sample	Pan No.	Tare	Air Dry + Tare	Oven Dry + Tare	Moisture
		J00624	1.323	21.465	20.539	4.82

Hydrometer Analysis

Start Date/Time	10/14/2019	8:38	Dispersing Agent	NaPO ₃
Air Dry Sample Wt. for Hydrometer Test (g)	53.363		G _s Correction Factor (α)	1.000
Percent Passing No.10 Sieve	82.3		Specific Gravity (G _s)	2.65
Dry Weight of Soil Tested (g)	50.91		Corrected Dry Weight of Soil Tested (g) (W)	61.84

Elapsed Time (min)	Hydrometer Reading	Temperature (°C)	Corrected Hydrometer Reading [R]	% Finer of Hydrometer Sample	L	K	Particle Diameter (mm)	Percent Passing
1	43	19.8	38.16	61.7	9.1	0.01365	0.041	50.79
2	39	19.8	34.16	55.2	9.7	0.01365	0.030	45.46
4	32	19.8	27.16	43.9	10.9	0.01365	0.023	36.15
8	28	20.1	23.23	37.6	11.5	0.01365	0.016	30.92
15	23.5	20	18.71	30.2	12.2	0.01365	0.012	24.90
30	20.5	20.1	15.73	25.4	12.7	0.01365	0.009	20.94
60	18	20.5	13.33	21.6	13.2	0.01348	0.006	17.75
90	17	20.8	11.05	17.9	13.3	0.01348	0.005	14.71
120	17	20.6	10.98	17.8	13.3	0.01348	0.004	14.62
240	15	20.5	9.19	14.9	13.7	0.01348	0.003	12.23
360	14.5	19.9	8.51	13.8	13.7	0.01365	0.003	11.33
1440	12	18.7	5.66	9.2	14.2	0.01382	0.001	7.54

Sieve Analysis of Portion Finer Than No. 10 Sieve

Sieve Number	Opening (mm)	Tare	Dry + Tare	Weight Retained	Cumulative Retained	% Retained	% Passing
20	0.850	1.300	1.633	0.33	38.55	0.5	81.8
40	0.425	1.314	2.532	1.22	42.68	2.0	79.8
60	0.250	1.309	2.642	1.33	47.20	2.2	77.7
100	0.150	1.324	3.049	1.73	53.05	2.8	74.9
140	0.105	1.324	3.068	1.74	58.97	2.8	72.0
200	0.075	1.317	3.494	2.18	66.35	3.5	68.5
230	0.063	1.315	2.538	1.22	70.50	2.0	66.5

Sum	9.75	230 Minus	41.16
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Apex Laboratories, LLC
Particle Size Analysis of Soil by ASTM D 422 Modified

Sample ID: SE-27-0-0.33 (A9J0006-24)

Grain Size Analysis Summary from Sieving and Hydrometer Testing	Particle Size (mm)	Percent Finer	Total Percent of Sample
Gravel			17.68
Retained on No. 4 sieve	4.75	83.52	16.48
Gravel, passing No. 4 sieve and retained on No. 10 sieve	2.00	82.32	1.2
Sand			15.77
Coarse sand, passing No.10 sieve and retained on No. 20 sieve	0.8500	81.78	0.54
Medium sand, passing No.20 sieve and retained on No. 40 sieve	0.4250	79.81	1.97
Medium sand, passing No.40 sieve and retained on No. 60 sieve	0.2500	77.66	2.16
Medium sand, passing No. 60 sieve and retained on No.100 sieve	0.1500	74.87	2.79
Fine sand, passing No. 100 sieve and retained on No.140 sieve	0.1060	72.05	2.82
Fine sand passing No. 140 sieve and retained on No. 200 sieve	0.0750	68.53	3.52
Fine sand, passing No. 200 sieve and retained on No. 230 sieve	0.0630	66.55	1.98
Silt and Clay (Measurements in the Clay fraction are noted)			66.55
Hydrometer Test	0.0412	50.79	15.76
Hydrometer Test	0.0301	45.46	5.32
Hydrometer Test	0.0225	36.15	9.32
Hydrometer Test	0.0164	30.92	5.22
Hydrometer Test	0.0123	24.9	6.02
Hydrometer Test	0.0089	20.94	3.96
Hydrometer Test	0.0063	17.75	3.19
Hydrometer Test	0.0052	14.71	3.04
Hydrometer Test Clay	0.0045	14.62	0.09
Hydrometer Test Clay	0.0032	12.23	2.39
Hydrometer Test Clay	0.0027	11.33	0.9
Hydrometer Test Clay	0.0014	7.54	3.79

Grain Size Summary	Percent of Total Sample
Gravel	17.7
Sand	15.8
Coarse sand	0.5
Medium sand	6.9
Fine sand	8.3
Silt	51.8
Clay	14.7

Case Narrative for Sample ID: SE-27-0-0.33 (A9J0006-24)

This data is not to be used for engineering purposes.
 No difficulty dispersing the fraction passing the No. 10 sieve.
 Dispersion device used: Commercial drink mixer operating at least 10,000 rpm for one minute.
 The assumed specific gravity used in the calculations was 2.65.

+4 and +10 fractions contain abundant organic material.
 +20 to +60 fractions consist almost entirely of organic material.



Expires 12/31/19

Apex Laboratories, LLC

Particle Size Analysis of Soil by ASTM D 422

Sample ID:	A9J0006-25	Client Sample ID:	SE-27-0-0.33-Dup	Batch Number:	9101058
Data Entered by:	JSJ	Date:	10/21/19	Data Reviewed by:	JW
		Date:		Date:	10/23/19
Sample Description:	Clayey SILT with some Sand and trace Gravel		Max Particle Size:	Gravel	
Particle Shape:	Angular to Sub-angular		Hardness	Hard and Durable	

Whole Sample	Tare	Air Dry + Tare	Air Dry	Moisture	Dry Wt.
	5.722	243.335	237.61	4.88	226.6

Sieve Number	Opening (mm)	Tare	Dry + Tare	Weight Retained	Cumulative Wt. Retained	% Retained	% Passing
4	4.75	6.024	23.192	17.17	17.17	7.6	92.4
10	2.00	1.333	3.573	2.24	19.41	1.0	91.4
Pan		5.746	221.873	216.13	235.54	90.7	

Hygroscopic Moisture Correction

Hygroscopic Correction Factor	Oven Sample	Pan No.	Tare	Air Dry + Tare	Oven Dry + Tare	Moisture
		0.9535	J00625	1.337	24.111	23.052

Hydrometer Analysis

Start Date/Time	10/14/2019	8:16	Dispersing Agent	NaPO ₃
Air Dry Sample Wt. for Hydrometer Test (g)	51.381		G _s Correction Factor (α)	1.000
Percent Passing No.10 Sieve	91.4		Specific Gravity (G _s)	2.65
Dry Weight of Soil Tested (g)	48.99		Corrected Dry Weight of Soil Tested (g) (W)	53.58

Elapsed Time (min)	Hydrometer Reading	Temperature (°C)	Corrected Hydrometer Reading [R]	% Finer of Hydrometer Sample	L	K	Particle Diameter (mm)	Percent Passing
1	45	19.7	40.13	74.9	8.8	0.01365	0.040	68.48
2	41	19.7	36.13	67.4	9.4	0.01365	0.030	61.65
4	35.5	19.7	30.63	57.2	10.2	0.01365	0.022	52.27
8	30	20	25.21	47.0	11.2	0.01365	0.016	43.01
15	25	19.9	20.18	37.7	12	0.01365	0.012	34.44
30	22.5	20.2	17.76	33.1	12.4	0.01365	0.009	30.30
60	19	20.5	14.33	26.7	13	0.01348	0.006	24.46
90	17	20.8	12.41	23.2	13.3	0.01348	0.005	21.17
120	17	20.9	11.08	20.7	13.3	0.01348	0.004	18.91
240	16	20.5	10.19	19.0	13.5	0.01348	0.003	17.38
360	15	20	9.04	16.9	13.7	0.01365	0.003	15.43
1440	13	18.7	6.66	12.4	14	0.01382	0.001	11.37

Sieve Analysis of Portion Finer Than No. 10 Sieve

Sieve Number	Opening (mm)	Tare	Dry + Tare	Weight Retained	Cumulative Retained	% Retained	% Passing
20	0.850	1.311	1.633	0.32	20.76	0.6	90.8
40	0.425	1.313	2.485	1.17	25.69	2.2	88.6
60	0.250	1.322	2.561	1.24	30.90	2.3	86.3
100	0.150	1.327	2.948	1.62	37.72	3.0	83.3
140	0.105	1.326	3.006	1.68	44.79	3.1	80.2
200	0.075	1.308	3.416	2.11	53.66	3.9	76.2
230	0.063	1.310	2.425	1.12	58.35	2.1	74.2

Sum	9.26	230 Minus	39.73
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Apex Laboratories, LLC
Particle Size Analysis of Soil by ASTM D 422 Modified

Sample ID: SE-27-0-0.33-Dup (A9J0006-25)

Grain Size Analysis Summary from Sieving and Hydrometer Testing	Particle Size (mm)	Percent Finer	Total Percent of Sample
Gravel			8.57
Retained on No. 4 sieve	4.75	92.42	7.58
Gravel, passing No. 4 sieve and retained on No. 10 sieve	2.00	91.43	0.99
Sand			17.28
Coarse sand, passing No.10 sieve and retained on No. 20 sieve	0.8500	90.83	0.6
Medium sand, passing No.20 sieve and retained on No. 40 sieve	0.4250	88.65	2.19
Medium sand, passing No.40 sieve and retained on No. 60 sieve	0.2500	86.33	2.31
Medium sand, passing No. 60 sieve and retained on No.100 sieve	0.1500	83.31	3.03
Fine sand, passing No. 100 sieve and retained on No.140 sieve	0.1060	80.17	3.14
Fine sand passing No. 140 sieve and retained on No. 200 sieve	0.0750	76.24	3.93
Fine sand, passing No. 200 sieve and retained on No. 230 sieve	0.0630	74.16	2.08
Silt and Clay (Measurements in the Clay fraction are noted)			74.16
Hydrometer Test	0.0405	68.48	5.68
Hydrometer Test	0.0296	61.65	6.83
Hydrometer Test	0.0218	52.27	9.39
Hydrometer Test	0.0162	43.01	9.26
Hydrometer Test	0.0122	34.44	8.58
Hydrometer Test	0.0088	30.3	4.14
Hydrometer Test	0.0063	24.46	5.84
Hydrometer Test	0.0052	21.17	3.28
Hydrometer Test Clay	0.0045	18.91	2.27
Hydrometer Test Clay	0.0032	17.38	1.53
Hydrometer Test Clay	0.0027	15.43	1.95
Hydrometer Test Clay	0.0014	11.37	4.06

Grain Size Summary	Percent of Total Sample
Gravel	8.6
Sand	17.3
Coarse sand	0.6
Medium sand	7.5
Fine sand	9.2
Silt	53.0
Clay	21.2

Case Narrative for Sample ID: SE-27-0-0.33-Dup (A9J0006-25)

This data is not to be used for engineering purposes.

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

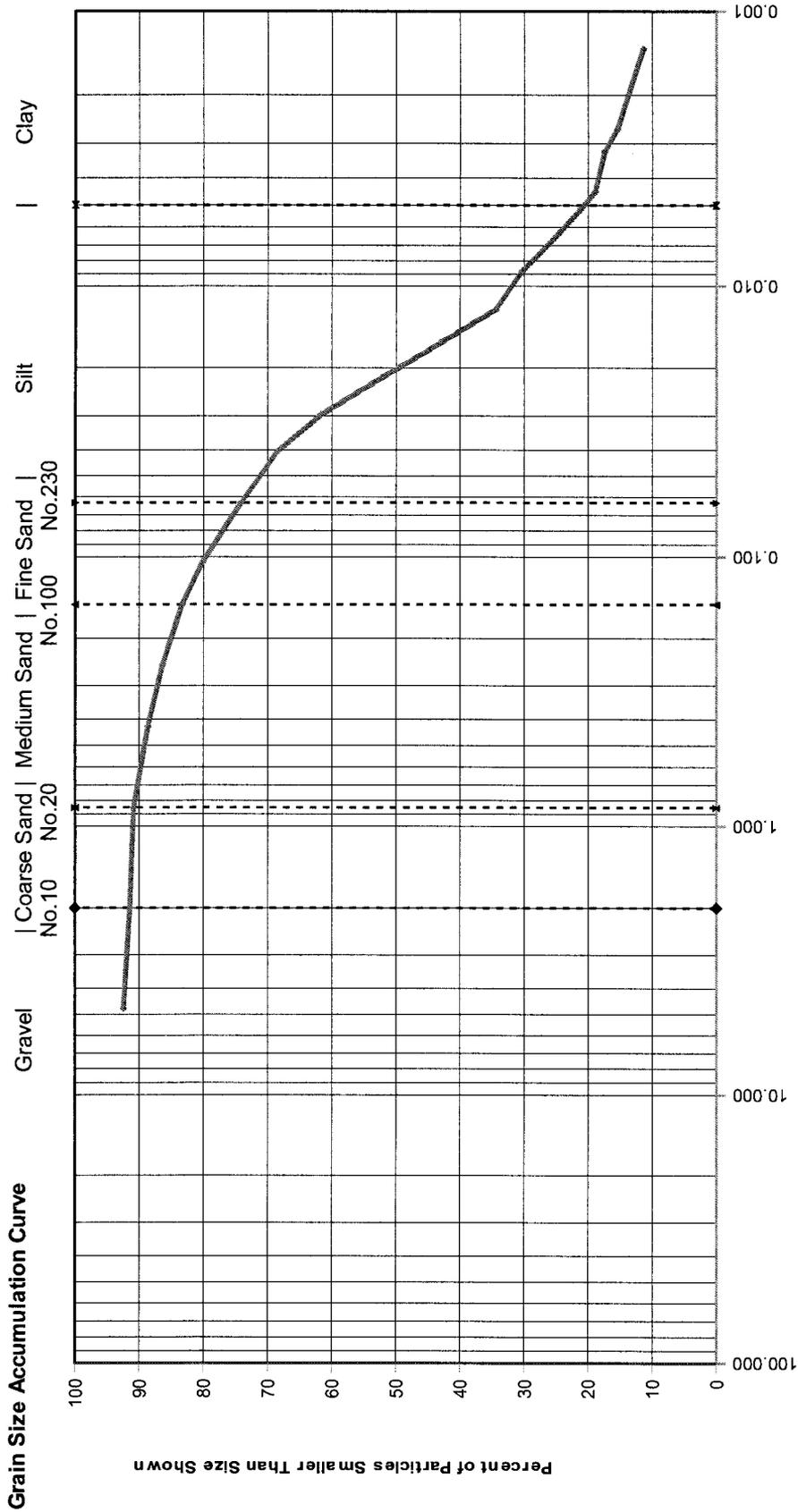
Dispersion device used: Commercial drink mixer operating at least 10,000 rpm for one minute.

The assumed specific gravity used in the calculations was 2.65.



Expires 12/31/19

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



Particle Size (mm)

Sample ID: SE-27-0-0.33-Dup (A9J0006-25)				
Specific Gravity	2.65	GRAVEL & SAND		SOIL DESCRIPTION
		MAXIMUM PARTICLE SIZE	PARTICLE SHAPE	
	Gravel	Angular to Sub-angular	Hard and Durable	Clayey SILT with some Sand and trace Gravel

November 07, 2019

Mr. Philip Nerenberg
Apex Laboratories
6700 SW Sandburg Street
Portland, Oregon 97223

Re: DXN & PCB Subcontract
Work Order: 15582
SDG: A9J0006

Dear Mr. Nerenberg:

Cape Fear Analytical LLC (CFA) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on October 02, 2019. This original data report has been prepared and reviewed in accordance with CFA's standard operating procedures.

Our policy is to provide high quality, personalized analytical services to enable you to meet your analytical needs on time every time. We trust that you will find everything in order and to your satisfaction. If you have any questions, please do not hesitate to call me at 910-795-0421.

Sincerely,



Cynde Larkins
Project Manager

Enclosures

SUBCONTRACT ORDER

Apex Laboratories

A9J0006

10/11/19

SENDING LABORATORY:

Apex Laboratories
6700 S.W. Sandburg Street
Tigard, OR 97223
Phone: (503) 718-2323
Fax: (503) 336-0745
Project Manager: Philip Nerenberg

RECEIVING LABORATORY:

Cape Fear Analytical, LLC
3306 Kitty Hawk Rd Suite 120
Wilmington, NC 28405
Phone :(910) 795-0421
Fax: -

CFA NO# 15582

Sample Name: SE-14-0-0.33 Sedimen Sampled: 09/27/19 14:02 (A9J0006-03)

Table with 4 columns: Analysis, Due, Expires, Comments. Row 1: 1613B Dioxins and Furans (SUB), 10/11/19 17:00, 03/25/20 14:02, Cape Fear. Includes 'Containers Supplied: (E)4 oz Glass Jar'.

Sample Name: SE-21-0-0.33 Sedimen Sampled: 09/27/19 15:07 (A9J0006-08)

Table with 4 columns: Analysis, Due, Expires, Comments. Row 1: 1613B Dioxins and Furans (SUB), 10/11/19 17:00, 03/25/20 15:07, Cape Fear. Includes 'Containers Supplied: (E)4 oz Glass Jar'.

Sample Name: SE-22-0-0.33 Sedimen Sampled: 09/27/19 19:30 (A9J0006-23)

Table with 4 columns: Analysis, Due, Expires, Comments. Row 1: 1613B Dioxins and Furans (SUB), 10/11/19 17:00, 03/25/20 19:30, Cape Fear. Includes 'Containers Supplied: (E)4 oz Glass Jar'.

Standard CFA

temp. = 1.9°C

Released By: [Signature] Date: 10/11/19 1430 Received By: [Signature] Date: 02 OCT 19
Fed Ex (Shipper) Fed Ex (Shipper)

SAMPLE RECEIPT CHECKLIST
Cape Fear Analytical

Client: APEX	Work Order: 15582
Shipping Company: FedEx	Date/Time Received: 02 OCT 19 0945

Suspected Hazard Information	Yes	NA	No
Shipped as DOT Hazardous?			✓
Samples identified as Foreign Soil?			✓

DOE Site Sample Packages	Yes	NA	No*
Screened <0.5 mR/hr?			✓
Samples < 2x background?			✓

* Notify RSO of any responses in this column immediately.

Air Sample Receipt Specifics	Yes	NA	No
Air sample in shipment?			✓

Air Witness: _____

Sample Receipt Criteria	Yes	NA	No	Comments/Qualifiers (required for Non-Conforming Items)
1 Shipping containers received intact and sealed?	✓			Circle Applicable: seals broken damaged container leaking container other(describe)
2 Custody seal/s present on cooler?			✓	Seal Intact? Yes No
3 Chain of Custody documents included with shipment?	✓			
4 Samples requiring cold preservation within 0-6°C?	✓			Preservation Method: Ice bags blue ice dry ice none other (describe) Temperature Blank present: Yes No 2.0° - 0.1 = 1.9° C
5 Aqueous samples found to have visible solids?		✓		Sample IDs, containers affected:
5 Samples requiring chemical preservation at proper pH?		✓		Sample IDs, containers affected and pH observed: If preservative added, Lot#:
7 Samples requiring preservation have no residual chlorine?		✓		Sample IDs, containers affected: If preservative added, Lot#:
8 Samples received within holding time?	✓			Sample IDs, tests affected:
9 Sample IDs on COC match IDs on containers?	✓			Sample IDs, containers affected:
10 Date & time of COC match date & time on containers?	✓			Sample IDs, containers affected:
11 Number of containers received match number indicated on COC?	✓			List type and number of containers / Sample IDs, containers affected: 3 - 4oz clear glass soil jars
12 COC form is properly signed in relinquished/received sections?	✓			

Comments:

Checklist performed by: Initials: CA Date: 02 OCT 19

High Resolution Dioxins and Furans Analysis

DRAFT

Case Narrative

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**HDOX Case Narrative
Apex Laboratories (APEX)
SDG A9J0006
Work Order 15582**

Method/Analysis Information

Product: Dioxins/Furans by EPA Method 1613B in Solids
Analytical Method: EPA Method 1613B
Extraction Method: SW846 3540C
Analytical Batch Number: 42121
Clean Up Batch Number: 42120
Extraction Batch Number: 42119

Sample Analysis

Samples were received at 1.9°C (15582001, 15582002, 15582003). The following samples were analyzed using the analytical protocol as established in Method 1613B:

Sample ID	Client ID
12025124	Method Blank (MB)
12025125	Laboratory Control Sample (LCS)
12025126	Laboratory Control Sample Duplicate (LCSD)
15582001	SE-14-0-0.33
15582002	SE-21-0-0.33
15582003	SE-22-0-0.33

The samples in this SDG were analyzed on a "dry weight" basis.

SOP Reference

Procedure for preparation, analysis and reporting of analytical data are controlled by Cape Fear Analytical LLC (CFA) as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with CF-OA-E-002 REV# 15.

Raw data reports are processed and reviewed by the analyst using the TargetLynx software package.

Calibration Information

Initial Calibration

All initial calibration requirements have been met for this sample delivery group (SDG).

Continuing Calibration Verification (CCV) Requirements

All associated calibration verification standard(s) (CCV) met the acceptance criteria.

Quality Control (QC) Information

Certification Statement

The test results presented in this document are certified to meet all requirements of the 2009 TNI Standard.

Method Blank (MB) Statement

The MB(s) analyzed with this SDG met the acceptance criteria.

Surrogate Recoveries

All surrogate recoveries were within the established acceptance criteria for this SDG.

Laboratory Control Sample (LCS) Recovery

The LCS spike recoveries met the acceptance limits.

Laboratory Control Sample Duplicate (LCSD) Recovery

The LCSD spike recoveries met the acceptance limits.

LCS/LCSD Relative Percent Difference (RPD) Statement

The RPD(s) between the LCS and LCSD met the acceptance limits.

QC Sample Designation

A matrix spike and matrix spike duplicate analysis was not required for this SDG.

Technical Information

Holding Time Specifications

CFA assigns holding times based on the associated methodology, which assigns the date and time from sample collection. Those holding times expressed in hours are calculated in the AlphaLIMS system. Those holding times expressed as days expire at midnight on the day of expiration. All samples in this SDG met the specified holding time.

Preparation/Analytical Method Verification

All procedures were performed as stated in the SOP.

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-extraction/Re-analysis

Re-extractions or re-analyses were not required in this SDG.

Miscellaneous Information

Nonconformance (NCR) Documentation

A NCR was not required for this SDG.

Manual Integrations

Certain standards and QC samples required manual integrations to correctly position the baseline as set in the calibration standard injections. Where manual integrations were performed, copies of all manual integration peak profiles are included in the raw data section of this fraction. Manual integrations were required for data files in this SDG.

Sample preparation

No difficulties were encountered during sample preparation.

Electronic Packaging Comment

This data package was generated using an electronic data processing program referred to as virtual packaging. In an effort to increase quality and efficiency, the laboratory has developed systems to generate all data packages electronically. The following change from traditional packages should be noted: Analyst/peer reviewer initials and dates are not present on the electronic data files. Presently, all initials and dates are present on the original raw data. These hard copies are temporarily stored in the laboratory. An electronic signature page inserted after the case narrative will include the data validator's signature and title. The signature page also includes the data qualifiers used in the fractional package. Data that are not generated electronically, such as hand written pages, will be scanned and inserted into the electronic package.

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Sample Data Summary

DRAFT

Cape Fear Analytical, LLC

3306 Kitty Hawk Road Suite 120, Wilmington, NC 28405 - (910) 795-0421 - www.capefearanalytical.com

Qualifier Definition Report for

APEX001 Apex Laboratories

Client SDG: A9J0006 CFA Work Order: 15582

The Qualifiers in this report are defined as follows:

- * A quality control analyte recovery is outside of specified acceptance criteria
- ** Analyte is a surrogate compound
- B The target analyte was detected in the associated blank.
- J Value is estimated
- K Estimated Maximum Possible Concentration
- U Analyte was analyzed for, but not detected above the specified detection limit.
- DL Indicates that sample is diluted.
- RA Indicates that sample is re-analyzed without re-extraction.
- RE Indicates that sample is re-extracted.

Review/Validation

Cape Fear Analytical requires all analytical data to be verified by a qualified data reviewer.

The following data validator verified the information presented in this case narrative:

Signature:



Name: Heather Patterson

Date: 07 NOV 2019

Title: Group Leader

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**Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary**

Page 1 of 2

SDG Number: A9J0006	Client: APEX001	Project: APEX00319
Lab Sample ID: 15582001	Date Collected: 09/27/2019 14:02	Matrix: SOIL
Client Sample: 1613B Soil	Date Received: 10/02/2019 09:45	%Moisture: 68.6
Client ID: SE-14-0-0.33		Prep Basis: Dry Weight
Batch ID: 42121	Method: EPA Method 1613B	
Run Date: 10/31/2019 07:22	Analyst: MLL	Instrument: HRP763
Data File: b29oct19a_5-4		Dilution: 1
Prep Batch: 42119	Prep Method: SW846 3540C	
Prep Date: 18-OCT-19	Prep Aliquot: 25.07 g	

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
1746-01-6	2,3,7,8-TCDD		1.73	pg/g	0.364	1.27
40321-76-4	1,2,3,7,8-PeCDD	BJK	2.46	pg/g	1.11	6.36
39227-28-6	1,2,3,4,7,8-HxCDD	BJ	5.92	pg/g	1.18	6.36
57653-85-7	1,2,3,6,7,8-HxCDD		10.0	pg/g	1.04	6.36
19408-74-3	1,2,3,7,8,9-HxCDD	BJ	6.08	pg/g	1.14	6.36
35822-46-9	1,2,3,4,6,7,8-HpCDD		263	pg/g	2.21	6.36
3268-87-9	1,2,3,4,6,7,8,9-OCDD		2830	pg/g	4.27	12.7
51207-31-9	2,3,7,8-TCDF		1.78	pg/g	0.504	1.27
57117-41-6	1,2,3,7,8-PeCDF	BJ	1.26	pg/g	0.412	6.36
57117-31-4	2,3,4,7,8-PeCDF	BJ	1.23	pg/g	0.344	6.36
70648-26-9	1,2,3,4,7,8-HxCDF	BJ	2.61	pg/g	0.417	6.36
57117-44-9	1,2,3,6,7,8-HxCDF	BJ	1.66	pg/g	0.405	6.36
60851-34-5	2,3,4,6,7,8-HxCDF	BJ	1.85	pg/g	0.430	6.36
72918-21-9	1,2,3,7,8,9-HxCDF	U	0.641	pg/g	0.641	6.36
67562-39-4	1,2,3,4,6,7,8-HpCDF		52.5	pg/g	0.690	6.36
55673-89-7	1,2,3,4,7,8,9-HpCDF	BJK	2.34	pg/g	1.05	6.36
39001-02-0	1,2,3,4,6,7,8,9-OCDF		116	pg/g	1.66	12.7
41903-57-5	Total TeCDD	JK	14.1	pg/g	0.364	1.27
36088-22-9	Total PeCDD	JK	33.8	pg/g	1.11	6.36
34465-46-8	Total HxCDD	JK	118	pg/g	1.04	6.36
37871-00-4	Total HpCDD	J	836	pg/g	2.21	6.36
30402-14-3	Total TeCDF	JK	14.1	pg/g	0.504	1.27
30402-15-4	Total PeCDF	JK	22.2	pg/g	0.137	6.36
55684-94-1	Total HxCDF	J	64.7	pg/g	0.405	6.36
38998-75-3	Total HpCDF	JK	180	pg/g	0.690	6.36
3333-30-2	TEQ WHO2005 ND=0 with EMPCs		11.7	pg/g		
3333-30-3	TEQ WHO2005 ND=0.5 with EMPCs		11.7	pg/g		

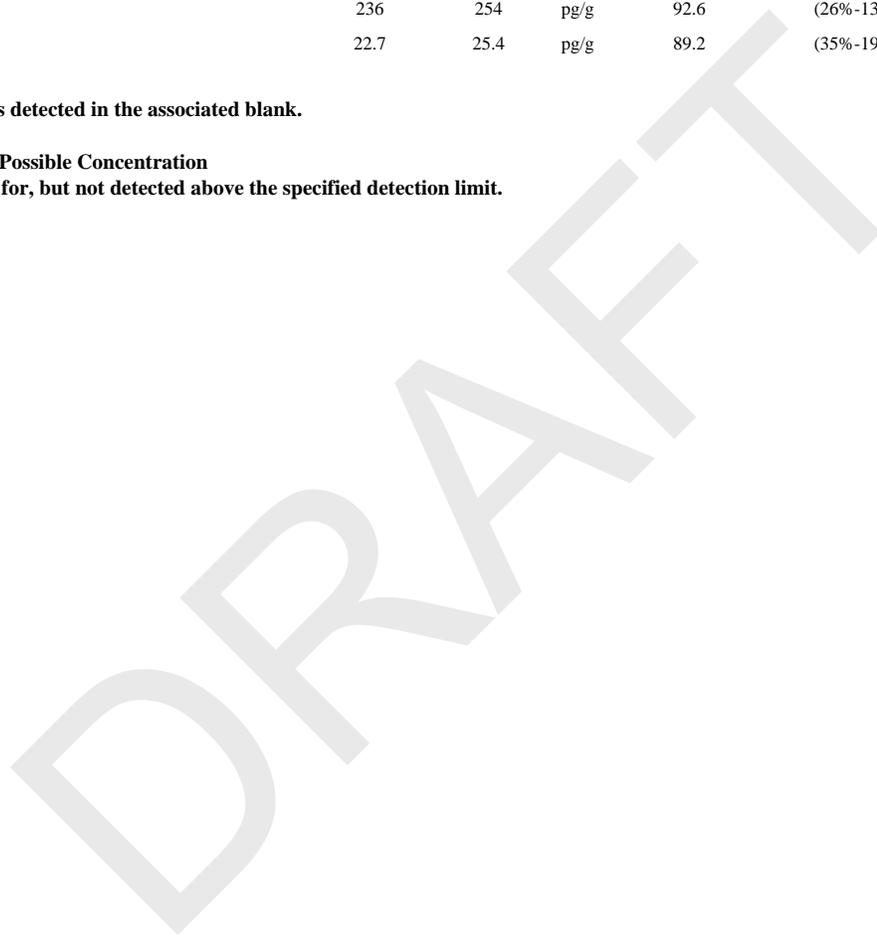
Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-2,3,7,8-TCDD		222	254	pg/g	87.2	(25%-164%)
13C-1,2,3,7,8-PeCDD		287	254	pg/g	113	(25%-181%)
13C-1,2,3,4,7,8-HxCDD		212	254	pg/g	83.2	(32%-141%)
13C-1,2,3,6,7,8-HxCDD		223	254	pg/g	87.5	(28%-130%)
13C-1,2,3,4,6,7,8-HpCDD		244	254	pg/g	95.8	(23%-140%)
13C-OCDD		454	509	pg/g	89.2	(17%-157%)
13C-2,3,7,8-TCDF		233	254	pg/g	91.6	(24%-169%)
13C-1,2,3,7,8-PeCDF		289	254	pg/g	113	(24%-185%)
13C-2,3,4,7,8-PeCDF		287	254	pg/g	113	(21%-178%)
13C-1,2,3,4,7,8-HxCDF		216	254	pg/g	84.9	(26%-152%)
13C-1,2,3,6,7,8-HxCDF		222	254	pg/g	87.1	(26%-123%)
13C-2,3,4,6,7,8-HxCDF		226	254	pg/g	88.8	(28%-136%)
13C-1,2,3,7,8,9-HxCDF		238	254	pg/g	93.3	(29%-147%)

**Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary**

SDG Number: A9J0006	Client: APEX001	Project: APEX00319
Lab Sample ID: 15582001	Date Collected: 09/27/2019 14:02	Matrix: SOIL
Client Sample: 1613B Soil	Date Received: 10/02/2019 09:45	%Moisture: 68.6
Client ID: SE-14-0-0.33		Prep Basis: Dry Weight
Batch ID: 42121	Method: EPA Method 1613B	
Run Date: 10/31/2019 07:22	Analyst: MLL	Instrument: HRP763
Data File: b29oct19a_5-4		Dilution: 1
Prep Batch: 42119	Prep Method: SW846 3540C	
Prep Date: 18-OCT-19	Prep Aliquot: 25.07 g	

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
Surrogate/Tracer recovery						
		Qual	Result	Nominal	Units	Recovery%
						Acceptable Limits
13C-1,2,3,4,6,7,8-HpCDF			219	254	pg/g	85.9 (28%-143%)
13C-1,2,3,4,7,8,9-HpCDF			236	254	pg/g	92.6 (26%-138%)
37Cl-2,3,7,8-TCDD			22.7	25.4	pg/g	89.2 (35%-197%)

- Comments:**
- B** The target analyte was detected in the associated blank.
 - J** Value is estimated
 - K** Estimated Maximum Possible Concentration
 - U** Analyte was analyzed for, but not detected above the specified detection limit.



**Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary**

SDG Number: A9J0006	Client: APEX001	Project: APEX00319
Lab Sample ID: 15582001	Date Collected: 09/27/2019 14:02	Matrix: SOIL
Client Sample: 1613B Soil	Date Received: 10/02/2019 09:45	%Moisture: 68.6
Client ID: SE-14-0-0.33		Prep Basis: Dry Weight
Batch ID: 42121	Method: EPA Method 1613B	
Run Date: 11/05/2019 13:02	Analyst: MLL	Instrument: HRP763
Data File: b05nov19c-4		Dilution: 1
Prep Batch: 42119	Prep Method: SW846 3540C	
Prep Date: 18-OCT-19	Prep Aliquot: 25.07 g	

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
51207-31-9	2,3,7,8-TCDF		1.75	pg/g	0.417	1.27

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
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Comments:

- B** The target analyte was detected in the associated blank.
- J** Value is estimated
- K** Estimated Maximum Possible Concentration
- U** Analyte was analyzed for, but not detected above the specified detection limit.

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**Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary**

Page 1 of 2

SDG Number: A9J0006	Client: APEX001	Project: APEX00319
Lab Sample ID: 15582002	Date Collected: 09/27/2019 15:07	Matrix: SOIL
Client Sample: 1613B Soil	Date Received: 10/02/2019 09:45	%Moisture: 46.6
Client ID: SE-21-0-0.33		Prep Basis: Dry Weight
Batch ID: 42121	Method: EPA Method 1613B	
Run Date: 10/31/2019 08:10	Analyst: MLL	Instrument: HRP763
Data File: b29oct19a_5-5		Dilution: 1
Prep Batch: 42119	Prep Method: SW846 3540C	
Prep Date: 18-OCT-19	Prep Aliquot: 18.81 g	

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
1746-01-6	2,3,7,8-TCDD	U	0.341	pg/g	0.341	0.996
40321-76-4	1,2,3,7,8-PeCDD	BJ	0.643	pg/g	0.227	4.98
39227-28-6	1,2,3,4,7,8-HxCDD	U	0.317	pg/g	0.317	4.98
57653-85-7	1,2,3,6,7,8-HxCDD	BJ	0.850	pg/g	0.293	4.98
19408-74-3	1,2,3,7,8,9-HxCDD	BJ	1.14	pg/g	0.315	4.98
35822-46-9	1,2,3,4,6,7,8-HpCDD		19.3	pg/g	0.480	4.98
3268-87-9	1,2,3,4,6,7,8,9-OCDD		177	pg/g	1.31	9.96
51207-31-9	2,3,7,8-TCDF	JK	0.575	pg/g	0.305	0.996
57117-41-6	1,2,3,7,8-PeCDF	U	0.161	pg/g	0.161	4.98
57117-31-4	2,3,4,7,8-PeCDF	BJK	0.315	pg/g	0.144	4.98
70648-26-9	1,2,3,4,7,8-HxCDF	BJK	0.376	pg/g	0.152	4.98
57117-44-9	1,2,3,6,7,8-HxCDF	BJK	0.346	pg/g	0.143	4.98
60851-34-5	2,3,4,6,7,8-HxCDF	BJK	0.414	pg/g	0.144	4.98
72918-21-9	1,2,3,7,8,9-HxCDF	U	0.217	pg/g	0.217	4.98
67562-39-4	1,2,3,4,6,7,8-HpCDF		9.17	pg/g	0.207	4.98
55673-89-7	1,2,3,4,7,8,9-HpCDF	BJ	0.462	pg/g	0.311	4.98
39001-02-0	1,2,3,4,6,7,8,9-OCDF	B	13.4	pg/g	0.647	9.96
41903-57-5	Total TeCDD	JK	0.404	pg/g	0.341	0.996
36088-22-9	Total PeCDD	BJK	3.71	pg/g	0.227	4.98
34465-46-8	Total HxCDD	BJ	11.3	pg/g	0.293	4.98
37871-00-4	Total HpCDD		43.1	pg/g	0.480	4.98
30402-14-3	Total TeCDF	JK	3.19	pg/g	0.305	0.996
30402-15-4	Total PeCDF	BJK	3.70	pg/g	0.122	4.98
55684-94-1	Total HxCDF	BJK	8.49	pg/g	0.143	4.98
38998-75-3	Total HpCDF	J	23.5	pg/g	0.207	4.98
3333-30-2	TEQ WHO2005 ND=0 with EMPCs		1.45	pg/g		
3333-30-3	TEQ WHO2005 ND=0.5 with EMPCs		1.65	pg/g		

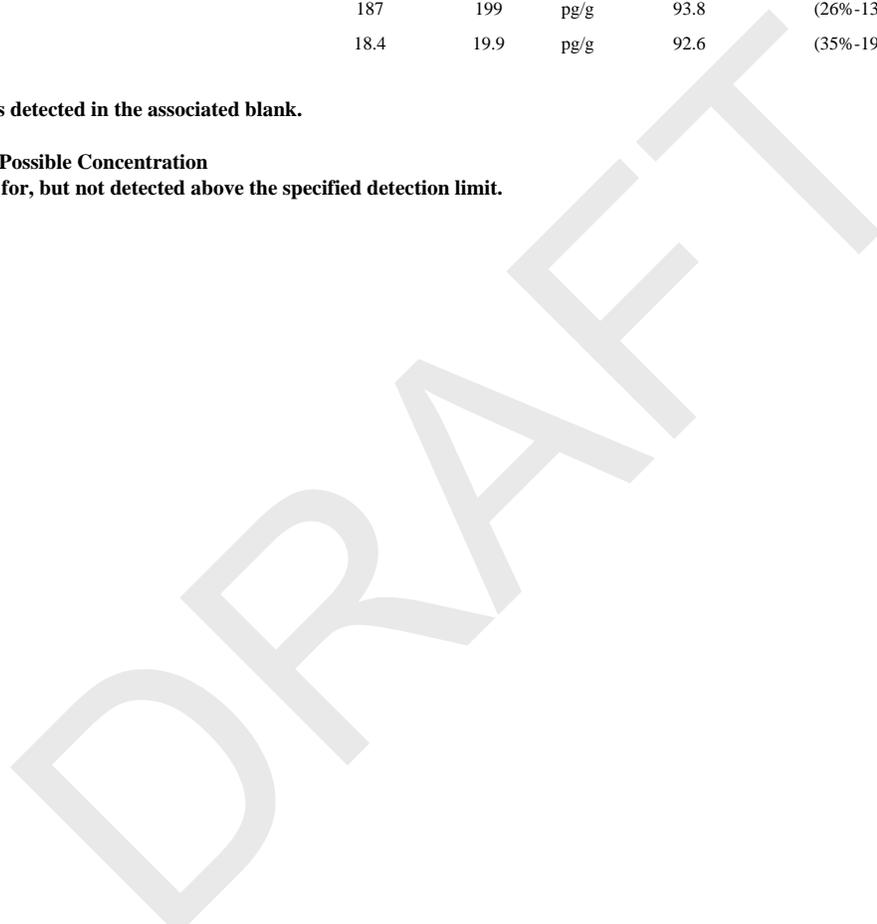
Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-2,3,7,8-TCDD		165	199	pg/g	82.8	(25%-164%)
13C-1,2,3,7,8-PeCDD		226	199	pg/g	113	(25%-181%)
13C-1,2,3,4,7,8-HxCDD		175	199	pg/g	87.7	(32%-141%)
13C-1,2,3,6,7,8-HxCDD		160	199	pg/g	80.3	(28%-130%)
13C-1,2,3,4,6,7,8-HpCDD		182	199	pg/g	91.4	(23%-140%)
13C-OCDD		365	398	pg/g	91.7	(17%-157%)
13C-2,3,7,8-TCDF		179	199	pg/g	89.9	(24%-169%)
13C-1,2,3,7,8-PeCDF		223	199	pg/g	112	(24%-185%)
13C-2,3,4,7,8-PeCDF		231	199	pg/g	116	(21%-178%)
13C-1,2,3,4,7,8-HxCDF		174	199	pg/g	87.2	(26%-152%)
13C-1,2,3,6,7,8-HxCDF		162	199	pg/g	81.5	(26%-123%)
13C-2,3,4,6,7,8-HxCDF		172	199	pg/g	86.2	(28%-136%)
13C-1,2,3,7,8,9-HxCDF		184	199	pg/g	92.5	(29%-147%)

**Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary**

SDG Number: A9J0006	Client: APEX001	Project: APEX00319
Lab Sample ID: 15582002	Date Collected: 09/27/2019 15:07	Matrix: SOIL
Client Sample: 1613B Soil	Date Received: 10/02/2019 09:45	%Moisture: 46.6
Client ID: SE-21-0-0.33		Prep Basis: Dry Weight
Batch ID: 42121	Method: EPA Method 1613B	
Run Date: 10/31/2019 08:10	Analyst: MLL	Instrument: HRP763
Data File: b29oct19a_5-5		Dilution: 1
Prep Batch: 42119	Prep Method: SW846 3540C	
Prep Date: 18-OCT-19	Prep Aliquot: 18.81 g	

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
Surrogate/Tracer recovery						
		Qual	Result	Nominal	Units	Recovery%
						Acceptable Limits
13C-1,2,3,4,6,7,8-HpCDF			172	199	pg/g	86.5 (28%-143%)
13C-1,2,3,4,7,8,9-HpCDF			187	199	pg/g	93.8 (26%-138%)
37Cl-2,3,7,8-TCDD			18.4	19.9	pg/g	92.6 (35%-197%)

- Comments:**
- B** The target analyte was detected in the associated blank.
 - J** Value is estimated
 - K** Estimated Maximum Possible Concentration
 - U** Analyte was analyzed for, but not detected above the specified detection limit.



**Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary**

Page 1 of 2

SDG Number: A9J0006	Client: APEX001	Project: APEX00319
Lab Sample ID: 15582003	Date Collected: 09/27/2019 19:30	Matrix: SOIL
Client Sample: 1613B Soil	Date Received: 10/02/2019 09:45	%Moisture: 66.9
Client ID: SE-22-0-0.33		Prep Basis: Dry Weight
Batch ID: 42121	Method: EPA Method 1613B	
Run Date: 10/31/2019 08:58	Analyst: MLL	Instrument: HRP763
Data File: b29oct19a_5-6		Dilution: 1
Prep Batch: 42119	Prep Method: SW846 3540C	
Prep Date: 18-OCT-19	Prep Aliquot: 25.08 g	

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
1746-01-6	2,3,7,8-TCDD		1.74	pg/g	0.361	1.20
40321-76-4	1,2,3,7,8-PeCDD	J	4.75	pg/g	0.474	6.02
39227-28-6	1,2,3,4,7,8-HxCDD		8.61	pg/g	0.788	6.02
57653-85-7	1,2,3,6,7,8-HxCDD		19.4	pg/g	0.747	6.02
19408-74-3	1,2,3,7,8,9-HxCDD		14.8	pg/g	0.792	6.02
35822-46-9	1,2,3,4,6,7,8-HpCDD		401	pg/g	2.00	6.02
3268-87-9	1,2,3,4,6,7,8,9-OCDD		3250	pg/g	2.91	12.0
51207-31-9	2,3,7,8-TCDF		1.82	pg/g	0.385	1.20
57117-41-6	1,2,3,7,8-PeCDF	BJ	1.16	pg/g	0.291	6.02
57117-31-4	2,3,4,7,8-PeCDF	BJ	2.15	pg/g	0.267	6.02
70648-26-9	1,2,3,4,7,8-HxCDF	BJ	3.54	pg/g	0.294	6.02
57117-44-9	1,2,3,6,7,8-HxCDF	BJ	2.79	pg/g	0.284	6.02
60851-34-5	2,3,4,6,7,8-HxCDF	BJ	4.24	pg/g	0.287	6.02
72918-21-9	1,2,3,7,8,9-HxCDF	BJ	1.15	pg/g	0.393	6.02
67562-39-4	1,2,3,4,6,7,8-HpCDF		92.5	pg/g	0.631	6.02
55673-89-7	1,2,3,4,7,8,9-HpCDF	BJ	4.41	pg/g	0.922	6.02
39001-02-0	1,2,3,4,6,7,8,9-OCDF		262	pg/g	0.999	12.0
41903-57-5	Total TeCDD	JK	14.1	pg/g	0.361	1.20
36088-22-9	Total PeCDD	JK	29.5	pg/g	0.474	6.02
34465-46-8	Total HxCDD	JK	141	pg/g	0.747	6.02
37871-00-4	Total HpCDD		737	pg/g	2.00	6.02
30402-14-3	Total TeCDF	JK	16.8	pg/g	0.385	1.20
30402-15-4	Total PeCDF	JK	40.4	pg/g	0.122	6.02
55684-94-1	Total HxCDF	J	107	pg/g	0.284	6.02
38998-75-3	Total HpCDF	J	259	pg/g	0.631	6.02
3333-30-2	TEQ WHO2005 ND=0 with EMPCs		18.8	pg/g		
3333-30-3	TEQ WHO2005 ND=0.5 with EMPCs		18.8	pg/g		

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-2,3,7,8-TCDD		194	241	pg/g	80.5	(25%-164%)
13C-1,2,3,7,8-PeCDD		268	241	pg/g	111	(25%-181%)
13C-1,2,3,4,7,8-HxCDD		205	241	pg/g	85.0	(32%-141%)
13C-1,2,3,6,7,8-HxCDD		194	241	pg/g	80.7	(28%-130%)
13C-1,2,3,4,6,7,8-HpCDD		224	241	pg/g	93.1	(23%-140%)
13C-OCDD		454	482	pg/g	94.2	(17%-157%)
13C-2,3,7,8-TCDF		216	241	pg/g	89.7	(24%-169%)
13C-1,2,3,7,8-PeCDF		259	241	pg/g	107	(24%-185%)
13C-2,3,4,7,8-PeCDF		273	241	pg/g	113	(21%-178%)
13C-1,2,3,4,7,8-HxCDF		204	241	pg/g	84.6	(26%-152%)
13C-1,2,3,6,7,8-HxCDF		191	241	pg/g	79.5	(26%-123%)
13C-2,3,4,6,7,8-HxCDF		202	241	pg/g	84.0	(28%-136%)
13C-1,2,3,7,8,9-HxCDF		224	241	pg/g	93.0	(29%-147%)

**Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary**

Page 2 of 2

SDG Number: A9J0006	Client: APEX001	Project: APEX00319
Lab Sample ID: 15582003	Date Collected: 09/27/2019 19:30	Matrix: SOIL
Client Sample: 1613B Soil	Date Received: 10/02/2019 09:45	%Moisture: 66.9
Client ID: SE-22-0-0.33		Prep Basis: Dry Weight
Batch ID: 42121	Method: EPA Method 1613B	
Run Date: 10/31/2019 08:58	Analyst: MLL	Instrument: HRP763
Data File: b29oct19a_5-6		Dilution: 1
Prep Batch: 42119	Prep Method: SW846 3540C	
Prep Date: 18-OCT-19	Prep Aliquot: 25.08 g	

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
Surrogate/Tracer recovery						
		Qual	Result	Nominal	Units	Recovery%
						Acceptable Limits
	13C-1,2,3,4,6,7,8-HpCDF		207	241	pg/g	86.0 (28%-143%)
	13C-1,2,3,4,7,8,9-HpCDF		222	241	pg/g	92.3 (26%-138%)
	37Cl-2,3,7,8-TCDD		22.3	24.1	pg/g	92.7 (35%-197%)

Comments:

- B** The target analyte was detected in the associated blank.
- J** Value is estimated
- K** Estimated Maximum Possible Concentration
- U** Analyte was analyzed for, but not detected above the specified detection limit.

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**Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary**

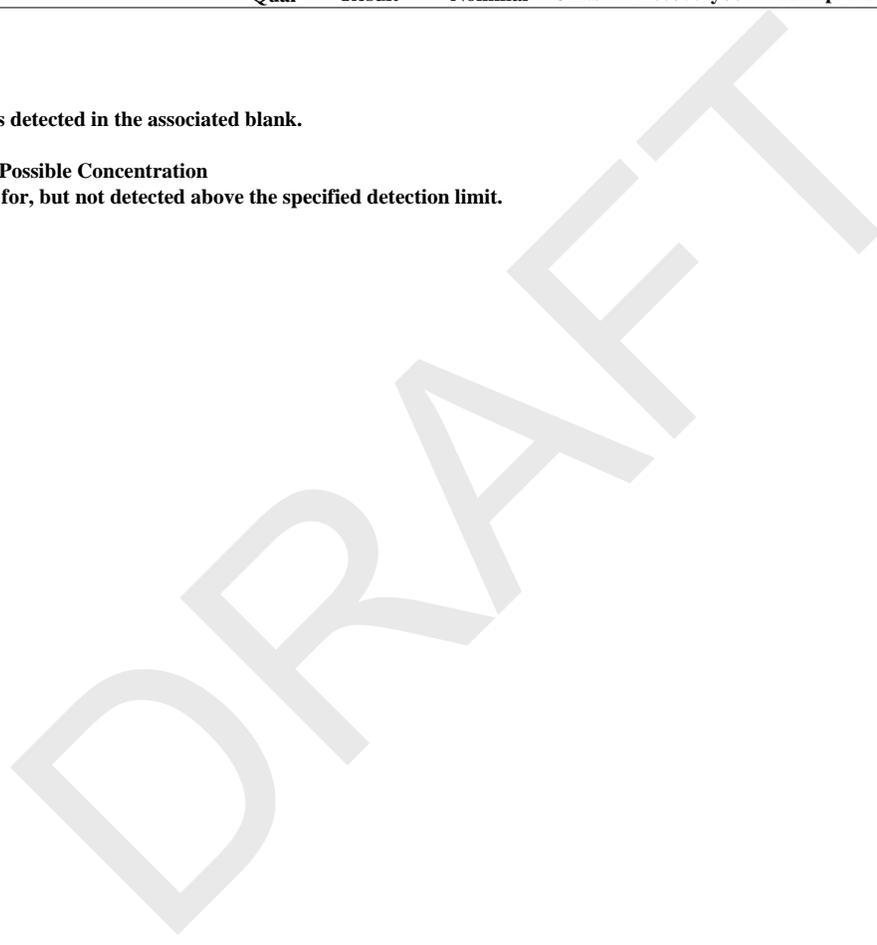
SDG Number: A9J0006	Client: APEX001	Project: APEX00319
Lab Sample ID: 15582003	Date Collected: 09/27/2019 19:30	Matrix: SOIL
Client Sample: 1613B Soil	Date Received: 10/02/2019 09:45	%Moisture: 66.9
Client ID: SE-22-0-0.33		Prep Basis: Dry Weight
Batch ID: 42121	Method: EPA Method 1613B	
Run Date: 11/05/2019 13:23	Analyst: MLL	Instrument: HRP763
Data File: b05nov19c-5		Dilution: 1
Prep Batch: 42119	Prep Method: SW846 3540C	
Prep Date: 18-OCT-19	Prep Aliquot: 25.08 g	

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
51207-31-9	2,3,7,8-TCDF		1.89	pg/g	0.194	1.20

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
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Comments:

- B** The target analyte was detected in the associated blank.
- J** Value is estimated
- K** Estimated Maximum Possible Concentration
- U** Analyte was analyzed for, but not detected above the specified detection limit.



Quality Control Summary

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Hi-Res Dioxins/Furans
Surrogate Recovery Report

SDG Number: A9J0006

Matrix Type: SOLID

Sample ID	Client ID	Surrogate	QUAL	Recovery (%)	Acceptance Limits
12025125	LCS for batch 42119	13C-2,3,7,8-TCDD		80.5	(20%-175%)
		13C-1,2,3,7,8-PeCDD		96.2	(21%-227%)
		13C-1,2,3,4,7,8-HxCDD		78.4	(21%-193%)
		13C-1,2,3,6,7,8-HxCDD		85.3	(25%-163%)
		13C-1,2,3,4,6,7,8-HpCDD		80.3	(22%-166%)
		13C-OCDD		70.9	(13%-199%)
		13C-2,3,7,8-TCDF		88.6	(22%-152%)
		13C-1,2,3,7,8-PeCDF		96.9	(21%-192%)
		13C-2,3,4,7,8-PeCDF		101	(13%-328%)
		13C-1,2,3,4,7,8-HxCDF		80.3	(19%-202%)
		13C-1,2,3,6,7,8-HxCDF		83.7	(21%-159%)
		13C-2,3,4,6,7,8-HxCDF		85.8	(22%-176%)
		13C-1,2,3,7,8,9-HxCDF		85.6	(17%-205%)
		13C-1,2,3,4,6,7,8-HpCDF		79.2	(21%-158%)
		13C-1,2,3,4,7,8,9-HpCDF		77.1	(20%-186%)
		37Cl-2,3,7,8-TCDD		90.1	(31%-191%)
		12025126	LCSD for batch 42119	13C-2,3,7,8-TCDD	
13C-1,2,3,7,8-PeCDD				97.2	(21%-227%)
13C-1,2,3,4,7,8-HxCDD				78.9	(21%-193%)
13C-1,2,3,6,7,8-HxCDD				84.0	(25%-163%)
13C-1,2,3,4,6,7,8-HpCDD				80.0	(22%-166%)
13C-OCDD				73.5	(13%-199%)
13C-2,3,7,8-TCDF				87.5	(22%-152%)
13C-1,2,3,7,8-PeCDF				99.0	(21%-192%)
13C-2,3,4,7,8-PeCDF				99.6	(13%-328%)
13C-1,2,3,4,7,8-HxCDF				82.6	(19%-202%)
13C-1,2,3,6,7,8-HxCDF				85.2	(21%-159%)
13C-2,3,4,6,7,8-HxCDF				87.4	(22%-176%)
13C-1,2,3,7,8,9-HxCDF				84.8	(17%-205%)
13C-1,2,3,4,6,7,8-HpCDF				80.1	(21%-158%)
13C-1,2,3,4,7,8,9-HpCDF				77.7	(20%-186%)
37Cl-2,3,7,8-TCDD				92.7	(31%-191%)
12025124	MB for batch 42119			13C-2,3,7,8-TCDD	
		13C-1,2,3,7,8-PeCDD		90.4	(25%-181%)
		13C-1,2,3,4,7,8-HxCDD		78.6	(32%-141%)
		13C-1,2,3,6,7,8-HxCDD		80.8	(28%-130%)
		13C-1,2,3,4,6,7,8-HpCDD		77.3	(23%-140%)
		13C-OCDD		68.3	(17%-157%)
		13C-2,3,7,8-TCDF		86.1	(24%-169%)
		13C-1,2,3,7,8-PeCDF		90.1	(24%-185%)
		13C-2,3,4,7,8-PeCDF		92.2	(21%-178%)
		13C-1,2,3,4,7,8-HxCDF		78.4	(26%-152%)
		13C-1,2,3,6,7,8-HxCDF		83.2	(26%-123%)
		13C-2,3,4,6,7,8-HxCDF		84.3	(28%-136%)
		13C-1,2,3,7,8,9-HxCDF		86.5	(29%-147%)
		13C-1,2,3,4,6,7,8-HpCDF		75.0	(28%-143%)
		13C-1,2,3,4,7,8,9-HpCDF		73.9	(26%-138%)
		37Cl-2,3,7,8-TCDD		92.0	(35%-197%)
		15582001	SE-14-0-0.33	13C-2,3,7,8-TCDD	

Hi-Res Dioxins/Furans
Surrogate Recovery Report

SDG Number: A9J0006

Matrix Type: SOLID

Sample ID	Client ID	Surrogate	QUAL	Recovery (%)	Acceptance Limits
15582001	SE-14-0-0.33	13C-1,2,3,7,8-PeCDD		113	(25%-181%)
		13C-1,2,3,4,7,8-HxCDD		83.2	(32%-141%)
		13C-1,2,3,6,7,8-HxCDD		87.5	(28%-130%)
		13C-1,2,3,4,6,7,8-HpCDD		95.8	(23%-140%)
		13C-OCDD		89.2	(17%-157%)
		13C-2,3,7,8-TCDF		91.6	(24%-169%)
		13C-1,2,3,7,8-PeCDF		113	(24%-185%)
		13C-2,3,4,7,8-PeCDF		113	(21%-178%)
		13C-1,2,3,4,7,8-HxCDF		84.9	(26%-152%)
		13C-1,2,3,6,7,8-HxCDF		87.1	(26%-123%)
		13C-2,3,4,6,7,8-HxCDF		88.8	(28%-136%)
		13C-1,2,3,7,8,9-HxCDF		93.3	(29%-147%)
		13C-1,2,3,4,6,7,8-HpCDF		85.9	(28%-143%)
		13C-1,2,3,4,7,8,9-HpCDF		92.6	(26%-138%)
		37Cl-2,3,7,8-TCDD		89.2	(35%-197%)
15582002	SE-21-0-0.33	13C-2,3,7,8-TCDD		82.8	(25%-164%)
		13C-1,2,3,7,8-PeCDD		113	(25%-181%)
		13C-1,2,3,4,7,8-HxCDD		87.7	(32%-141%)
		13C-1,2,3,6,7,8-HxCDD		80.3	(28%-130%)
		13C-1,2,3,4,6,7,8-HpCDD		91.4	(23%-140%)
		13C-OCDD		91.7	(17%-157%)
		13C-2,3,7,8-TCDF		89.9	(24%-169%)
		13C-1,2,3,7,8-PeCDF		112	(24%-185%)
		13C-2,3,4,7,8-PeCDF		116	(21%-178%)
		13C-1,2,3,4,7,8-HxCDF		87.2	(26%-152%)
		13C-1,2,3,6,7,8-HxCDF		81.5	(26%-123%)
		13C-2,3,4,6,7,8-HxCDF		86.2	(28%-136%)
		13C-1,2,3,7,8,9-HxCDF		92.5	(29%-147%)
		13C-1,2,3,4,6,7,8-HpCDF		86.5	(28%-143%)
		13C-1,2,3,4,7,8,9-HpCDF		93.8	(26%-138%)
37Cl-2,3,7,8-TCDD		92.6	(35%-197%)		
15582003	SE-22-0-0.33	13C-2,3,7,8-TCDD		80.5	(25%-164%)
		13C-1,2,3,7,8-PeCDD		111	(25%-181%)
		13C-1,2,3,4,7,8-HxCDD		85.0	(32%-141%)
		13C-1,2,3,6,7,8-HxCDD		80.7	(28%-130%)
		13C-1,2,3,4,6,7,8-HpCDD		93.1	(23%-140%)
		13C-OCDD		94.2	(17%-157%)
		13C-2,3,7,8-TCDF		89.7	(24%-169%)
		13C-1,2,3,7,8-PeCDF		107	(24%-185%)
		13C-2,3,4,7,8-PeCDF		113	(21%-178%)
		13C-1,2,3,4,7,8-HxCDF		84.6	(26%-152%)
		13C-1,2,3,6,7,8-HxCDF		79.5	(26%-123%)
		13C-2,3,4,6,7,8-HxCDF		84.0	(28%-136%)
		13C-1,2,3,7,8,9-HxCDF		93.0	(29%-147%)
		13C-1,2,3,4,6,7,8-HpCDF		86.0	(28%-143%)
		13C-1,2,3,4,7,8,9-HpCDF		92.3	(26%-138%)
37Cl-2,3,7,8-TCDD		92.7	(35%-197%)		

* Recovery outside Acceptance Limits

**Hi-Res Dioxins/Furans
Surrogate Recovery Report**

SDG Number: A9J0006

Matrix Type: SOLID

Sample ID	Client ID	Surrogate	QUAL	Recovery (%)	Acceptance Limits
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* Recovery outside Acceptance Limits

Column to be used to flag recovery values

D Sample Diluted

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Hi-Res Dioxins/Furans
Quality Control Summary
Spike Recovery Report

SDG Number: A9J0006
Client ID: LCS for batch 42119
Lab Sample ID: 12025125
Instrument: HRP763
Analyst: MLL

Sample Type: Laboratory Control Sample
Matrix: SOLID
Analysis Date: 10/31/2019 04:58
Prep Batch ID: 42119
Batch ID: 42121

Dilution: 1

CAS No.	Parmname	Amount Added pg/g	Spike Conc. pg/g	Recovery %	Acceptance Limits
1746-01-6	LCS 2,3,7,8-TCDD	20.0	20.5	102	67-158
40321-76-4	LCS 1,2,3,7,8-PeCDD	100	102	102	70-142
39227-28-6	LCS 1,2,3,4,7,8-HxCDD	100	102	102	70-164
57653-85-7	LCS 1,2,3,6,7,8-HxCDD	100	102	102	76-134
19408-74-3	LCS 1,2,3,7,8,9-HxCDD	100	108	108	64-162
35822-46-9	LCS 1,2,3,4,6,7,8-HpCDD	100	96.0	96	70-140
3268-87-9	LCS 1,2,3,4,6,7,8,9-OCDD	200	189	94.7	78-144
51207-31-9	LCS 2,3,7,8-TCDF	20.0	19.3	96.5	75-158
57117-41-6	LCS 1,2,3,7,8-PeCDF	100	98.7	98.7	80-134
57117-31-4	LCS 2,3,4,7,8-PeCDF	100	96.1	96.1	68-160
70648-26-9	LCS 1,2,3,4,7,8-HxCDF	100	101	101	72-134
57117-44-9	LCS 1,2,3,6,7,8-HxCDF	100	103	103	84-130
60851-34-5	LCS 2,3,4,6,7,8-HxCDF	100	97.1	97.1	70-156
72918-21-9	LCS 1,2,3,7,8,9-HxCDF	100	100	100	78-130
67562-39-4	LCS 1,2,3,4,6,7,8-HpCDF	100	105	105	82-122
55673-89-7	LCS 1,2,3,4,7,8,9-HpCDF	100	104	104	78-138
39001-02-0	LCS 1,2,3,4,6,7,8,9-OCDF	200	213	107	63-170

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Hi-Res Dioxins/Furans
Quality Control Summary
Spike Recovery Report

SDG Number: A9J0006

Sample Type: Laboratory Control Sample Duplicate

Client ID: LCSD for batch 42119

Matrix: SOLID

Lab Sample ID: 12025126

Instrument: HRP763

Analysis Date: 10/31/2019 05:46

Dilution: 1

Analyst: MLL

Prep Batch ID: 42119

Batch ID: 42121

CAS No.	Parmname	Amount Added pg/g	Spike Conc. pg/g	Recovery %	Acceptance Limits	RPD %	Acceptance Limits
1746-01-6	LCSD 2,3,7,8-TCDD	20.0	20.2	101	67-158	1.29	0-20
40321-76-4	LCSD 1,2,3,7,8-PeCDD	100	98.9	98.9	70-142	3.45	0-20
39227-28-6	LCSD 1,2,3,4,7,8-HxCDD	100	98.9	98.9	70-164	2.74	0-20
57653-85-7	LCSD 1,2,3,6,7,8-HxCDD	100	99.0	99	76-134	3.47	0-20
19408-74-3	LCSD 1,2,3,7,8,9-HxCDD	100	104	104	64-162	3.67	0-20
35822-46-9	LCSD 1,2,3,4,6,7,8-HpCDD	100	94.8	94.8	70-140	1.32	0-20
3268-87-9	LCSD 1,2,3,4,6,7,8,9-OCDD	200	188	94.1	78-144	0.656	0-20
51207-31-9	LCSD 2,3,7,8-TCDF	20.0	19.6	97.8	75-158	1.30	0-20
57117-41-6	LCSD 1,2,3,7,8-PeCDF	100	94.4	94.4	80-134	4.45	0-20
57117-31-4	LCSD 2,3,4,7,8-PeCDF	100	94.2	94.2	68-160	1.97	0-20
70648-26-9	LCSD 1,2,3,4,7,8-HxCDF	100	95.9	95.9	72-134	4.79	0-20
57117-44-9	LCSD 1,2,3,6,7,8-HxCDF	100	98.0	98	84-130	5.36	0-20
60851-34-5	LCSD 2,3,4,6,7,8-HxCDF	100	95.5	95.5	70-156	1.62	0-20
72918-21-9	LCSD 1,2,3,7,8,9-HxCDF	100	99.4	99.4	78-130	0.802	0-20
67562-39-4	LCSD 1,2,3,4,6,7,8-HpCDF	100	100	100	82-122	4.21	0-20
55673-89-7	LCSD 1,2,3,4,7,8,9-HpCDF	100	103	103	78-138	0.615	0-20
39001-02-0	LCSD 1,2,3,4,6,7,8,9-OCDF	200	199	99.3	63-170	7.12	0-20

DRY

Method Blank Summary

SDG Number: A9J0006
Client ID: MB for batch 42119
Lab Sample ID: 12025124
Column:

Client: APEX001
Instrument ID: HRP763
Prep Date: 18-OCT-19

Matrix: SOLID
Data File: b29oct19a_5-3
Analyzed: 10/31/19 06:34

This method blank applies to the following samples and quality control samples:

Client Sample ID	Lab Sample ID	File ID	Date Analyzed	Time Analyzed
01 LCS for batch 42119	12025125	b29oct19a_5-1	10/31/19	0458
02 LCSD for batch 42119	12025126	b29oct19a_5-2	10/31/19	0546
03 SE-14-0-0.33	15582001	b29oct19a_5-4	10/31/19	0722
04 SE-21-0-0.33	15582002	b29oct19a_5-5	10/31/19	0810
05 SE-22-0-0.33	15582003	b29oct19a_5-6	10/31/19	0858
06 SE-14-0-0.33	15582001	b05nov19c-4	11/05/19	1302
07 SE-22-0-0.33	15582003	b05nov19c-5	11/05/19	1323

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**Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary**

Page 1 of 2

SDG Number: A9J0006
Lab Sample ID: 12025124
Client Sample: QC for batch 42119
Client ID: MB for batch 42119
Batch ID: 42121
Run Date: 10/31/2019 06:34
Data File: b29oct19a_5-3
Prep Batch: 42119
Prep Date: 18-OCT-19

Client: APEX001
Method: EPA Method 1613B
Analyst: MLL
Prep Method: SW846 3540C
Prep Aliquot: 10 g

Project: APEX00319
Matrix: SOLID
Prep Basis: As Received
Instrument: HRP763
Dilution: 1

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
1746-01-6	2,3,7,8-TCDD	U	0.338	pg/g	0.338	1.00
40321-76-4	1,2,3,7,8-PeCDD	JK	0.436	pg/g	0.218	5.00
39227-28-6	1,2,3,4,7,8-HxCDD	J	0.598	pg/g	0.408	5.00
57653-85-7	1,2,3,6,7,8-HxCDD	J	0.400	pg/g	0.386	5.00
19408-74-3	1,2,3,7,8,9-HxCDD	J	0.698	pg/g	0.408	5.00
35822-46-9	1,2,3,4,6,7,8-HpCDD	J	0.690	pg/g	0.610	5.00
3268-87-9	1,2,3,4,6,7,8,9-OCDD	JK	1.92	pg/g	0.882	10.0
51207-31-9	2,3,7,8-TCDF	U	0.374	pg/g	0.374	1.00
57117-41-6	1,2,3,7,8-PeCDF	JK	0.458	pg/g	0.302	5.00
57117-31-4	2,3,4,7,8-PeCDF	JK	0.442	pg/g	0.268	5.00
70648-26-9	1,2,3,4,7,8-HxCDF	J	0.610	pg/g	0.312	5.00
57117-44-9	1,2,3,6,7,8-HxCDF	J	0.496	pg/g	0.300	5.00
60851-34-5	2,3,4,6,7,8-HxCDF	JK	0.496	pg/g	0.300	5.00
72918-21-9	1,2,3,7,8,9-HxCDF	J	0.618	pg/g	0.482	5.00
67562-39-4	1,2,3,4,6,7,8-HpCDF	J	0.692	pg/g	0.346	5.00
55673-89-7	1,2,3,4,7,8,9-HpCDF	J	0.790	pg/g	0.536	5.00
39001-02-0	1,2,3,4,6,7,8,9-OCDF	JK	1.58	pg/g	1.09	10.0
41903-57-5	Total TeCDD	U	0.338	pg/g	0.338	1.00
36088-22-9	Total PeCDD	JK	0.436	pg/g	0.218	5.00
34465-46-8	Total HxCDD	J	1.70	pg/g	0.386	5.00
37871-00-4	Total HpCDD	J	0.690	pg/g	0.610	5.00
30402-14-3	Total TeCDF	U	0.374	pg/g	0.374	1.00
30402-15-4	Total PeCDF	JK	0.900	pg/g	0.214	5.00
55684-94-1	Total HxCDF	JK	2.22	pg/g	0.300	5.00
38998-75-3	Total HpCDF	J	1.48	pg/g	0.346	5.00
3333-30-2	TEQ WHO2005 ND=0 with EMPCs		0.997	pg/g		
3333-30-3	TEQ WHO2005 ND=0.5 with EMPCs		1.18	pg/g		

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-2,3,7,8-TCDD		156	200	pg/g	78.1	(25%-164%)
13C-1,2,3,7,8-PeCDD		181	200	pg/g	90.4	(25%-181%)
13C-1,2,3,4,7,8-HxCDD		157	200	pg/g	78.6	(32%-141%)
13C-1,2,3,6,7,8-HxCDD		162	200	pg/g	80.8	(28%-130%)
13C-1,2,3,4,6,7,8-HpCDD		155	200	pg/g	77.3	(23%-140%)
13C-OCDD		273	400	pg/g	68.3	(17%-157%)
13C-2,3,7,8-TCDF		172	200	pg/g	86.1	(24%-169%)
13C-1,2,3,7,8-PeCDF		180	200	pg/g	90.1	(24%-185%)
13C-2,3,4,7,8-PeCDF		184	200	pg/g	92.2	(21%-178%)
13C-1,2,3,4,7,8-HxCDF		157	200	pg/g	78.4	(26%-152%)
13C-1,2,3,6,7,8-HxCDF		166	200	pg/g	83.2	(26%-123%)
13C-2,3,4,6,7,8-HxCDF		169	200	pg/g	84.3	(28%-136%)
13C-1,2,3,7,8,9-HxCDF		173	200	pg/g	86.5	(29%-147%)

**Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary**

Page 2 of 2

SDG Number: A9J0006	Client: APEX001	Project: APEX00319
Lab Sample ID: 12025124		Matrix: SOLID
Client Sample: QC for batch 42119		
Client ID: MB for batch 42119		Prep Basis: As Received
Batch ID: 42121	Method: EPA Method 1613B	
Run Date: 10/31/2019 06:34	Analyst: MLL	Instrument: HRP763
Data File: b29oct19a_5-3		Dilution: 1
Prep Batch: 42119	Prep Method: SW846 3540C	
Prep Date: 18-OCT-19	Prep Aliquot: 10 g	

CAS No.	Parmname	Qual	Result	Units	EDL	PQL	
Surrogate/Tracer recovery							
		Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
	13C-1,2,3,4,6,7,8-HpCDF		150	200	pg/g	75.0	(28%-143%)
	13C-1,2,3,4,7,8,9-HpCDF		148	200	pg/g	73.9	(26%-138%)
	37Cl-2,3,7,8-TCDD		18.4	20.0	pg/g	92.0	(35%-197%)

Comments:

- J** Value is estimated
- K** Estimated Maximum Possible Concentration
- U** Analyte was analyzed for, but not detected above the specified detection limit.

DRAFT

**Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary**

Page 1 of 1

SDG Number: A9J0006	Client: APEX001	Project: APEX00319
Lab Sample ID: 12025125		Matrix: SOLID
Client Sample: QC for batch 42119		
Client ID: LCS for batch 42119		Prep Basis: As Received
Batch ID: 42121	Method: EPA Method 1613B	
Run Date: 10/31/2019 04:58	Analyst: MLL	Instrument: HRP763
Data File: b29oct19a_5-1		Dilution: 1
Prep Batch: 42119	Prep Method: SW846 3540C	
Prep Date: 18-OCT-19	Prep Aliquot: 10 g	

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
1746-01-6	2,3,7,8-TCDD		20.5	pg/g	0.314	1.00
40321-76-4	1,2,3,7,8-PeCDD		102	pg/g	0.892	5.00
39227-28-6	1,2,3,4,7,8-HxCDD		102	pg/g	1.12	5.00
57653-85-7	1,2,3,6,7,8-HxCDD		102	pg/g	1.00	5.00
19408-74-3	1,2,3,7,8,9-HxCDD		108	pg/g	1.09	5.00
35822-46-9	1,2,3,4,6,7,8-HpCDD		96.0	pg/g	1.20	5.00
3268-87-9	1,2,3,4,6,7,8,9-OCDD		189	pg/g	3.96	10.0
51207-31-9	2,3,7,8-TCDF		19.3	pg/g	0.340	1.00
57117-41-6	1,2,3,7,8-PeCDF		98.7	pg/g	0.590	5.00
57117-31-4	2,3,4,7,8-PeCDF		96.1	pg/g	0.490	5.00
70648-26-9	1,2,3,4,7,8-HxCDF		101	pg/g	0.964	5.00
57117-44-9	1,2,3,6,7,8-HxCDF		103	pg/g	0.946	5.00
60851-34-5	2,3,4,6,7,8-HxCDF		97.1	pg/g	0.942	5.00
72918-21-9	1,2,3,7,8,9-HxCDF		100	pg/g	1.47	5.00
67562-39-4	1,2,3,4,6,7,8-HpCDF		105	pg/g	0.896	5.00
55673-89-7	1,2,3,4,7,8,9-HpCDF		104	pg/g	1.44	5.00
39001-02-0	1,2,3,4,6,7,8,9-OCDF		213	pg/g	2.44	10.0

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-2,3,7,8-TCDD		161	200	pg/g	80.5	(20%-175%)
13C-1,2,3,7,8-PeCDD		192	200	pg/g	96.2	(21%-227%)
13C-1,2,3,4,7,8-HxCDD		157	200	pg/g	78.4	(21%-193%)
13C-1,2,3,6,7,8-HxCDD		171	200	pg/g	85.3	(25%-163%)
13C-1,2,3,4,6,7,8-HpCDD		161	200	pg/g	80.3	(22%-166%)
13C-OCDD		283	400	pg/g	70.9	(13%-199%)
13C-2,3,7,8-TCDF		177	200	pg/g	88.6	(22%-152%)
13C-1,2,3,7,8-PeCDF		194	200	pg/g	96.9	(21%-192%)
13C-2,3,4,7,8-PeCDF		201	200	pg/g	101	(13%-328%)
13C-1,2,3,4,7,8-HxCDF		161	200	pg/g	80.3	(19%-202%)
13C-1,2,3,6,7,8-HxCDF		167	200	pg/g	83.7	(21%-159%)
13C-2,3,4,6,7,8-HxCDF		172	200	pg/g	85.8	(22%-176%)
13C-1,2,3,7,8,9-HxCDF		171	200	pg/g	85.6	(17%-205%)
13C-1,2,3,4,6,7,8-HpCDF		158	200	pg/g	79.2	(21%-158%)
13C-1,2,3,4,7,8,9-HpCDF		154	200	pg/g	77.1	(20%-186%)
37Cl-2,3,7,8-TCDD		18.0	20.0	pg/g	90.1	(31%-191%)

Comments:**J** Value is estimated**K** Estimated Maximum Possible Concentration

**Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary**

Page 1 of 1

SDG Number: A9J0006	Client: APEX001	Project: APEX00319
Lab Sample ID: 12025126		Matrix: SOLID
Client Sample: QC for batch 42119		
Client ID: LCSD for batch 42119		Prep Basis: As Received
Batch ID: 42121	Method: EPA Method 1613B	
Run Date: 10/31/2019 05:46	Analyst: MLL	Instrument: HRP763
Data File: b29oct19a_5-2		Dilution: 1
Prep Batch: 42119	Prep Method: SW846 3540C	
Prep Date: 18-OCT-19	Prep Aliquot: 10 g	

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
1746-01-6	2,3,7,8-TCDD		20.2	pg/g	0.195	1.00
40321-76-4	1,2,3,7,8-PeCDD		98.9	pg/g	0.398	5.00
39227-28-6	1,2,3,4,7,8-HxCDD		98.9	pg/g	0.554	5.00
57653-85-7	1,2,3,6,7,8-HxCDD		99.0	pg/g	0.498	5.00
19408-74-3	1,2,3,7,8,9-HxCDD		104	pg/g	0.540	5.00
35822-46-9	1,2,3,4,6,7,8-HpCDD		94.8	pg/g	1.15	5.00
3268-87-9	1,2,3,4,6,7,8,9-OCDD		188	pg/g	2.34	10.0
51207-31-9	2,3,7,8-TCDF		19.6	pg/g	0.250	1.00
57117-41-6	1,2,3,7,8-PeCDF		94.4	pg/g	0.410	5.00
57117-31-4	2,3,4,7,8-PeCDF		94.2	pg/g	0.352	5.00
70648-26-9	1,2,3,4,7,8-HxCDF		95.9	pg/g	0.710	5.00
57117-44-9	1,2,3,6,7,8-HxCDF		98.0	pg/g	0.658	5.00
60851-34-5	2,3,4,6,7,8-HxCDF		95.5	pg/g	0.710	5.00
72918-21-9	1,2,3,7,8,9-HxCDF		99.4	pg/g	1.14	5.00
67562-39-4	1,2,3,4,6,7,8-HpCDF		100	pg/g	0.724	5.00
55673-89-7	1,2,3,4,7,8,9-HpCDF		103	pg/g	1.20	5.00
39001-02-0	1,2,3,4,6,7,8,9-OCDF		199	pg/g	1.90	10.0

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-2,3,7,8-TCDD		158	200	pg/g	78.9	(20%-175%)
13C-1,2,3,7,8-PeCDD		194	200	pg/g	97.2	(21%-227%)
13C-1,2,3,4,7,8-HxCDD		158	200	pg/g	78.9	(21%-193%)
13C-1,2,3,6,7,8-HxCDD		168	200	pg/g	84.0	(25%-163%)
13C-1,2,3,4,6,7,8-HpCDD		160	200	pg/g	80.0	(22%-166%)
13C-OCDD		294	400	pg/g	73.5	(13%-199%)
13C-2,3,7,8-TCDF		175	200	pg/g	87.5	(22%-152%)
13C-1,2,3,7,8-PeCDF		198	200	pg/g	99.0	(21%-192%)
13C-2,3,4,7,8-PeCDF		199	200	pg/g	99.6	(13%-328%)
13C-1,2,3,4,7,8-HxCDF		165	200	pg/g	82.6	(19%-202%)
13C-1,2,3,6,7,8-HxCDF		170	200	pg/g	85.2	(21%-159%)
13C-2,3,4,6,7,8-HxCDF		175	200	pg/g	87.4	(22%-176%)
13C-1,2,3,7,8,9-HxCDF		170	200	pg/g	84.8	(17%-205%)
13C-1,2,3,4,6,7,8-HpCDF		160	200	pg/g	80.1	(21%-158%)
13C-1,2,3,4,7,8,9-HpCDF		155	200	pg/g	77.7	(20%-186%)
37Cl-2,3,7,8-TCDD		18.5	20.0	pg/g	92.7	(31%-191%)

Comments:

U Analyte was analyzed for, but not detected above the specified detection limit.



Monday, April 13, 2020

Emily Hess
Maul Foster & Alongi, INC.
2001 NW 19th Ave, STE 200
Portland, OR 97209

RE: A0D0095 - Seaport Tidelands - 1044.02.06-02

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

Enclosed are the results of analyses for work order A0D0095, which was received by the laboratory on 9/27/2019 at 12:10:00PM.

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

Please note: All samples will be disposed of within 30 days of sample receipt, unless prior arrangements have been made.

Cooler Receipt Information

(See Cooler Receipt Form for details)

Cooler #1	1.3 degC	Cooler #2	1.7 degC
Cooler #3	1.1 degC	Cooler #4	0.5 degC

This Final Report is the official version of the data results for this sample submission, unless superseded by a subsequent, labeled amended report.

All other deliverables derived from this data, including Electronic Data Deliverables (EDDs), CLP-like forms, client requested summary sheets, and all other products are considered secondary to this report.



Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
EPA ID: OR01039

Maul Foster & Alongi, INC.

2001 NW 19th Ave, STE 200
Portland, OR 97209

Project: **Seaport Tidelands**

Project Number: **1044.02.06-02**

Project Manager: **Emily Hess**

Report ID:

A0D0095 - 04 13 20 1553

ANALYTICAL REPORT FOR SAMPLES

SAMPLE INFORMATION

Client Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
SE-07A-0-1.0	A0D0095-01	Sediment	09/26/19 08:15	09/27/19 12:10

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Philip Nerenberg, Lab Director



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EPA ID: OR01039

Maul Foster & Alongi, INC.

2001 NW 19th Ave, STE 200

Portland, OR 97209

Project: Seaport Tidelands

Project Number: 1044.02.06-02

Project Manager: Emily Hess

Report ID:

A0D0095 - 04 13 20 1553

ANALYTICAL SAMPLE RESULTS

Diesel and/or Oil Hydrocarbons by NWTPH-Dx with Acid/Silica Gel Cleanup

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
SE-07A-0-1.0 (A0D0095-01)				Matrix: Sediment		Batch: 0040289		H-08
Diesel	ND	27.6	55.2	mg/kg dry	1	04/09/20 07:37	NWTPH-Dx/SG	
Oil	644	55.2	110	mg/kg dry	1	04/09/20 07:37	NWTPH-Dx/SG	
<i>Surrogate: o-Terphenyl (Surr)</i>		<i>Recovery: 113 %</i>		<i>Limits: 50-150 %</i>		<i>1</i>	<i>04/09/20 07:37</i>	<i>NWTPH-Dx/SG</i>

Apex Laboratories

Philip Nerenberg, Lab Director

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Portland, OR 97209

Project: **Seaport Tidelands**

Project Number: **1044.02.06-02**

Project Manager: **Emily Hess**

Report ID:

A0D0095 - 04 13 20 1553

ANALYTICAL SAMPLE RESULTS

Percent Dry Weight

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
SE-07A-0-1.0 (A0D0095-01)				Matrix: Sediment		Batch: 9101195		
% Solids	34.0	---	1.00	%	1	10/17/19 03:40	EPA 8000C	A-01

DRAFT

Apex Laboratories

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Philip Nerenberg, Lab Director



Maul Foster & Alongi, INC.
 2001 NW 19th Ave, STE 200
 Portland, OR 97209

Project: **Seaport Tidelands**
 Project Number: **1044.02.06-02**
 Project Manager: **Emily Hess**

Report ID:
A0D0095 - 04 13 20 1553

QUALITY CONTROL (QC) SAMPLE RESULTS

Diesel and/or Oil Hydrocarbons by NWTPH-Dx with Acid/Silica Gel Cleanup

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0040289 - EPA 3546 w/SG+Acid (NWTPH)												
Sediment												
Blank (0040289-BLK1)						Prepared: 04/08/20 13:02 Analyzed: 04/09/20 06:52						
<u>NWTPH-Dx/SG</u>												
Diesel	ND	9.09	25.0	mg/kg wet	1	---	---	---	---	---	---	
Oil	ND	18.2	50.0	mg/kg wet	1	---	---	---	---	---	---	
<i>Surr: o-Terphenyl (Surr)</i>		<i>Recovery: 118 %</i>		<i>Limits: 50-150 %</i>		<i>Dilution: 1x</i>						
LCS (0040289-BS1)						Prepared: 04/08/20 13:02 Analyzed: 04/09/20 07:14						
<u>NWTPH-Dx/SG</u>												
Diesel	128	10.0	25.0	mg/kg wet	1	125	---	103	73-115%	---	---	
<i>Surr: o-Terphenyl (Surr)</i>		<i>Recovery: 115 %</i>		<i>Limits: 50-150 %</i>		<i>Dilution: 1x</i>						
Duplicate (0040289-DUP1)						Prepared: 04/08/20 13:02 Analyzed: 04/09/20 07:59						
H-08												
<u>QC Source Sample: SE-07A-0-1.0 (A0D0095-01)</u>												
<u>NWTPH-Dx/SG</u>												
Diesel	ND	28.0	56.1	mg/kg dry	1	---	ND	---	---	---	30%	
Oil	726	56.1	112	mg/kg dry	1	---	644	---	---	12	30%	
<i>Surr: o-Terphenyl (Surr)</i>		<i>Recovery: 120 %</i>		<i>Limits: 50-150 %</i>		<i>Dilution: 1x</i>						



Maul Foster & Alongi, INC. 2001 NW 19th Ave, STE 200 Portland, OR 97209	Project: Seaport Tidelands Project Number: 1044.02.06-02 Project Manager: Emily Hess	Report ID: A0D0095 - 04 13 20 1553
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QUALITY CONTROL (QC) SAMPLE RESULTS

Percent Dry Weight

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9101195 - Total Solids (SM2540G/PSEP)							Sediment					
Duplicate (9101195-DUP1)			Prepared: 10/16/19 15:47 Analyzed: 10/17/19 03:40									
<u>QC Source Sample: Non-SDG (A9I0893-01)</u>												
% Solids	51.8	---	1.00	%	1	---	51.9	---	---	0.2	10%	
Duplicate (9101195-DUP2)			Prepared: 10/16/19 15:47 Analyzed: 10/17/19 03:40									
<u>QC Source Sample: Non-SDG (A9J0371-17)</u>												
% Solids	54.1	---	1.00	%	1	---	54.0	---	---	0.2	10%	
Duplicate (9101195-DUP3)			Prepared: 10/16/19 15:47 Analyzed: 04/10/20 14:58									
<u>EPA 8000C</u>												
% Solids	ND	---	1.00	%	1	---	---	---	---	---	10%	
Duplicate (9101195-DUP4)			Prepared: 10/16/19 15:47 Analyzed: 04/10/20 14:58									
<u>EPA 8000C</u>												
% Solids	ND	---	1.00	%	1	---	---	---	---	---	10%	

No Client related Batch QC samples analyzed for this batch. See notes page for more information.



Apex Laboratories, LLC

6700 S.W. Sandburg Street
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2001 NW 19th Ave, STE 200
 Portland, OR 97209

Project: **Seaport Tidelands**

Project Number: **1044.02.06-02**

Project Manager: **Emily Hess**

Report ID:

A0D0095 - 04 13 20 1553

SAMPLE PREPARATION INFORMATION

Diesel and/or Oil Hydrocarbons by NWTPH-Dx with Acid/Silica Gel Cleanup

Prep: EPA 3546 w/SG+Acid (NWTPH)

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
<u>Batch: 0040289</u>							
A0D0095-01	Sediment	NWTPH-Dx/SG	09/26/19 08:15	04/08/20 13:02	10.66g/5mL	10g/5mL	0.94

Percent Dry Weight

Prep: Total Solids (SM2540G/PSEP)

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
<u>Batch: 9101195</u>							
A0D0095-01	Sediment	EPA 8000C	09/26/19 08:15	10/16/19 15:47			NA

Apex Laboratories

Philip Nerenberg, Lab Director

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2001 NW 19th Ave, STE 200
Portland, OR 97209

Project: **Seaport Tidelands**

Project Number: **1044.02.06-02**

Project Manager: **Emily Hess**

Report ID:

A0D0095 - 04 13 20 1553

QUALIFIER DEFINITIONS

Client Sample and Quality Control (QC) Sample Qualifier Definitions:

Apex Laboratories

- A-01** Results from original dry weight analysis used for relogged samples.
- H-08** Sample hold time extended by freezing at -18 degrees C. Total time at 4 degrees C was less than the standard hold time.

DRAFT

Apex Laboratories

Philip Nerenberg, Lab Director

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Maul Foster & Alongi, INC.
2001 NW 19th Ave, STE 200
Portland, OR 97209

Project: **Seaport Tidelands**
Project Number: **1044.02.06-02**
Project Manager: **Emily Hess**

Report ID:
A0D0095 - 04 13 20 1553

REPORTING NOTES AND CONVENTIONS:

Abbreviations:

- DET Analyte DETECTED at or above the detection or reporting limit.
- ND Analyte NOT DETECTED at or above the detection or reporting limit.
- NR Result Not Reported
- RPD Relative Percent Difference. RPDs for Matrix Spikes and Matrix Spike Duplicates are based on concentration, not recovery.

Detection Limits: Limit of Detection (LOD)

Limits of Detection (LODs) are normally set at a level of one half the validated Limit of Quantitation (LOQ).
If no value is listed ('-----'), then the data has not been evaluated below the Reporting Limit.

Reporting Limits: Limit of Quantitation (LOQ)

Validated Limits of Quantitation (LOQs) are reported as the Reporting Limits for all analyses where the LOQ, MRL, PQL or CRL are requested. The LOQ represents a level at or above the low point of the calibration curve, that has been validated according to Apex Laboratories' comprehensive LOQ policies and procedures.

Reporting Conventions:

- Basis: Results for soil samples are generally reported on a 100% dry weight basis.
The Result Basis is listed following the units as "dry", "wet", or " " (blank) designation.
- "dry" Sample results and Reporting Limits are reported on a dry weight basis. (i.e. "ug/kg dry")
See Percent Solids section for details of dry weight analysis.
- "wet" Sample results and Reporting Limits for this analysis are normally dry weight corrected, but have not been modified in this case.
- " " Results without 'wet' or 'dry' designation are not normally dry weight corrected. These results are considered 'As Received'.

QC Source:

In cases where there is insufficient sample provided for Sample Duplicates and/or Matrix Spikes, a Lab Control Sample Duplicate (LCS Dup) may be analyzed to demonstrate accuracy and precision of the extraction batch.

Non-Client Batch QC Samples (Duplicates and Matrix Spike/Duplicates) may not be included in this report. Please request a Full QC report if this data is required.

Miscellaneous Notes:

- " --- " QC results are not applicable. For example, % Recoveries for Blanks and Duplicates, % RPD for Blanks, Blank Spikes and Matrix Spikes, etc.
- " *** " Used to indicate a possible discrepancy with the Sample and Sample Duplicate results when the %RPD is not available. In this case, either the Sample or the Sample Duplicate has a reportable result for this analyte, while the other is Non Detect (ND).

Blanks:

Standard practice is to evaluate the results from Blank QC Samples down to a level equal to 1/2 the Reporting Limit (RL).
-For Blank hits falling between 1/2 the RL and the RL (J flagged hits), the associated sample and QC data will receive a 'B-02' qualifier.
-For Blank hits above the RL, the associated sample and QC data will receive a 'B' qualifier, per Apex Laboratories' Blank Policy.
For further details, please request a copy of this document.



Maul Foster & Alongi, INC.
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Project: **Seaport Tidelands**
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Project Manager: **Emily Hess**

Report ID:
A0D0095 - 04 13 20 1553

REPORTING NOTES AND CONVENTIONS (Cont.):

Blanks (Cont.):

Sample results flagged with a 'B' or 'B-02' qualifier are potentially biased high if the sample results are less than ten times the level found in the blank for inorganic analyses, or less than five times the level found in the blank for organic analyses.

'B' and 'B-02' qualifications are only applied to sample results detected above the Reporting Level.

Preparation Notes:

Mixed Matrix Samples:

Water Samples:

Water samples containing significant amounts of sediment are decanted or separated prior to extraction, and only the water portion analyzed, unless otherwise directed by the client.

Soil and Sediment Samples:

Soil and Sediment samples containing significant amounts of water are decanted prior to extraction, and only the solid portion analyzed, unless otherwise directed by the client.

Sampling and Preservation Notes:

Certain regulatory programs, such as National Pollutant Discharge Elimination System (NPDES), require that activities such as sample filtration (for dissolved metals, orthophosphate, hexavalent chromium, etc.) and testing of short hold analytes (pH, Dissolved Oxygen, etc.) be performed in the field (on-site) within a short time window. In addition, sample matrix spikes are required for some analyses, and sufficient volume must be provided, and billable site specific QC requested, if this is required. All regulatory permits should be reviewed to ensure that these requirements are being met.

Data users should be aware of which regulations pertain to the samples they submit for testing. If related sample collection activities are not approved for a particular regulatory program, results should be considered estimates. Apex Laboratories will qualify these analytes according to the most stringent requirements, however results for samples that are for non-regulatory purposes may be acceptable.

Samples that have been filtered and preserved at Apex Laboratories per client request are listed in the preparation section of the report with the date and time of filtration listed.

Apex Laboratories maintains detailed records on sample receipt, including client label verification, cooler temperature, sample preservation, hold time compliance and field filtration. Data is qualified as necessary, and the lack of qualification indicates compliance with required parameters.



Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
EPA ID: OR01039

Maul Foster & Alongi, INC.
2001 NW 19th Ave, STE 200
Portland, OR 97209

Project: **Seaport Tidelands**
Project Number: **1044.02.06-02**
Project Manager: **Emily Hess**

Report ID:
A0D0095 - 04 13 20 1553

LABORATORY ACCREDITATION INFORMATION

TNI Certification ID: OR100062 (Primary Accreditation) - EPA ID: OR01039

All methods and analytes reported from work performed at Apex Laboratories are included on Apex Laboratories' ORELAP Scope of Certification, with the exception of any analyte(s) listed below:

Apex Laboratories

Matrix	Analysis	TNI_ID	Analyte	TNI_ID	Accreditation
<u>All reported analytes are included in Apex Laboratories' current ORELAP scope.</u>					

Secondary Accreditations

Apex Laboratories also maintains reciprocal accreditation with non-TNI states (Washington DOE), as well as other state specific accreditations not listed here.

Subcontract Laboratory Accreditations

Subcontracted data falls outside of Apex Laboratories' Scope of Accreditation. Please see the Subcontract Laboratory report for full details, or contact your Project Manager for more information.

Field Testing Parameters

Results for Field Tested data are provided by the client or sampler, and fall outside of Apex Laboratories' Scope of Accreditation.

Apex Laboratories

Philip Nerenberg, Lab Director

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Maul Foster & Alongi, INC.
2001 NW 19th Ave, STE 200
Portland, OR 97209

Project: Seaport Tidelands
Project Number: 1044.02.06-02
Project Manager: Emily Hess

Report ID:
A0D0095 - 04 13 20 1553

APEX LABS COOLER RECEIPT FORM

Client: Maul Foster & Alongi - Vancouver Element WO#: A9 I0893 A0D0095
1/2

Project/Project #: Seaport In-Water RI #1044.02.06-02

Delivery Info:

Date/time received: 9/27/19 @ 1210 By: AKK

Delivered by: Apex Client ESS FedEx UPS Swift Senvoy SDS Other

Cooler Inspection Date/time inspected: 9/27/19 @ 1225 By: AKK

Chain of Custody included? Yes No Custody seals? Yes No

Signed/dated by client? Yes No

Signed/dated by Apex? Yes No

	Cooler #1	Cooler #2	Cooler #3	Cooler #4	Cooler #5	Cooler #6	Cooler #7
Temperature (°C)	<u>1.3</u>	<u>1.7</u>	<u>1.1</u>	<u>0.5</u>			
Received on ice? (Y/N)	<u>Y</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>			
Temp. blanks? (Y/N)	<u>N</u>	<u>N</u>	<u>N</u>	<u>Y</u>			
Ice type: (Gel/Real/Other)	<u>Real</u>	<u>Real</u>	<u>Real</u>	<u>Real</u>			
Condition:	<u>Good</u>	<u>Good</u>	<u>Good</u>	<u>Good</u>			

Cooler out of temp? (Y/N) (N) Possible reason why: _____

If some coolers are in temp and some out, were green dots applied to out of temperature samples? Yes/No/NA

Out of temperature samples form initiated? Yes/No/NA

Samples Inspection: Date/time inspected: 9/27/19 @ 1715 By: (80)

All samples intact? Yes No Comments: _____

Bottle labels/COCs agree? Yes No Comments: See form

COC/container discrepancies form initiated? Yes No NA

Containers/volumes received appropriate for analysis? Yes No Comments: _____

Do VOA vials have visible headspace? Yes No NA

Comments: _____

Water samples: pH checked: Yes No NA pH appropriate? Yes No NA

Comments: _____

Additional information:

Labeled by: (80)

Witness: AKK

Cooler Inspected by: (80)

Subsampler: (80)
Witness: AKK
See Project Contact Form: Y

Philip Nerenberg



Tuesday, August 18, 2020

Emily Hess
Maul Foster & Alongi, INC.
3140 NE Broadway Street
Portland, OR 97232

RE: A0G0628 - Seaport Tidelands - 1044.02.14

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

Enclosed are the results of analyses for work order A0G0628, which was received by the laboratory on 7/23/2020 at 9:26:00AM.

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

Please note: All samples will be disposed of within 30 days of sample receipt, unless prior arrangements have been made.

Cooler Receipt Information

(See Cooler Receipt Form for details)

Cooler #1 1.1 degC Cooler #2 3.1 degC

This Final Report is the official version of the data results for this sample submission, unless superseded by a subsequent, labeled amended report.
All other deliverables derived from this data, including Electronic Data Deliverables (EDDs), CLP-like forms, client requested summary sheets, and all other products are considered secondary to this report.



Apex Laboratories

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Philip Nerenberg, Lab Director



Maul Foster & Alongi, INC.

3140 NE Broadway Street
Portland, OR 97232

Project: Seaport Tidelands

Project Number: 1044.02.14
Project Manager: Emily Hess

Report ID:

A0G0628 - 08 18 20 1544

ANALYTICAL REPORT FOR SAMPLES

SAMPLE INFORMATION

Client Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
SE-32---As Received	A0G0628-01	Sediment	07/22/20 09:22	07/23/20 09:26
SE-32---After Processing	A0G0628-02	Water	07/28/20 08:00	07/23/20 09:26
SE-33---As Received	A0G0628-03	Sediment	07/22/20 09:06	07/23/20 09:26
SE-33---After Processing	A0G0628-04	Water	07/27/20 21:00	07/23/20 09:26
SE-34---As Received	A0G0628-05	Sediment	07/22/20 08:56	07/23/20 09:26
SE-34---After Processing	A0G0628-06	Water	07/27/20 21:00	07/23/20 09:26
SE-35---As Received	A0G0628-07	Sediment	07/22/20 08:36	07/23/20 09:26
SE-35---After Processing	A0G0628-08	Water	07/27/20 21:00	07/23/20 09:26
SE-36---As Received	A0G0628-09	Sediment	07/22/20 07:56	07/23/20 09:26
SE-36---After Processing	A0G0628-10	Water	07/27/20 11:00	07/23/20 09:26
SE-37---As Received	A0G0628-11	Sediment	07/22/20 10:02	07/23/20 09:26
SE-37---After Processing	A0G0628-12	Water	07/27/20 14:30	07/23/20 09:26
SE-38---As Received	A0G0628-13	Sediment	07/22/20 10:16	07/23/20 09:26
SE-38---After Processing	A0G0628-14	Water	07/27/20 21:00	07/23/20 09:26
SE-39---As Received	A0G0628-15	Sediment	07/22/20 09:56	07/23/20 09:26
SE-40---As Received	A0G0628-17	Sediment	07/22/20 07:16	07/23/20 09:26
SE-40---After Processing	A0G0628-18	Water	07/27/20 14:30	07/23/20 09:26
SE-41---As Received	A0G0628-19	Sediment	07/22/20 07:26	07/23/20 09:26
SE-41---After Processing	A0G0628-20	Water	07/27/20 14:30	07/23/20 09:26



Maul Foster & Alongi, INC.

3140 NE Broadway Street
Portland, OR 97232

Project: **Seaport Tidelands**

Project Number: **1044.02.14**

Project Manager: **Emily Hess**

Report ID:

A0G0628 - 08 18 20 1544

ANALYTICAL SAMPLE RESULTS

Ammonia by Plumb Extraction, Gas Diffusion and Colorimetric Detection

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
SE-32---As Received (A0G0628-01)				Matrix: Sediment		Batch: 0070727		
Ammonia as N	7.61	0.209	0.209	mg/kg dry	1	07/24/20 16:23	Plumb/SM 4500-NH3 G	
SE-33---As Received (A0G0628-03)				Matrix: Sediment		Batch: 0070727		
Ammonia as N	26.4	0.175	0.175	mg/kg dry	1	07/24/20 16:27	Plumb/SM 4500-NH3 G	
SE-34---As Received (A0G0628-05)				Matrix: Sediment		Batch: 0070727		
Ammonia as N	4.82	0.184	0.184	mg/kg dry	1	07/24/20 16:29	Plumb/SM 4500-NH3 G	
SE-35---As Received (A0G0628-07)				Matrix: Sediment		Batch: 0070727		
Ammonia as N	7.45	0.198	0.198	mg/kg dry	1	07/24/20 16:30	Plumb/SM 4500-NH3 G	
SE-36---As Received (A0G0628-09)				Matrix: Sediment		Batch: 0070727		
Ammonia as N	4.10	0.199	0.199	mg/kg dry	1	07/24/20 16:32	Plumb/SM 4500-NH3 G	
SE-37---As Received (A0G0628-11)				Matrix: Sediment		Batch: 0070727		
Ammonia as N	14.2	0.213	0.213	mg/kg dry	1	07/24/20 16:33	Plumb/SM 4500-NH3 G	
SE-38---As Received (A0G0628-13)				Matrix: Sediment		Batch: 0070727		
Ammonia as N	3.49	0.193	0.193	mg/kg dry	1	07/24/20 16:35	Plumb/SM 4500-NH3 G	
SE-39---As Received (A0G0628-15)				Matrix: Sediment		Batch: 0070727		
Ammonia as N	1.16	0.374	0.374	mg/kg dry	1	07/24/20 16:36	Plumb/SM 4500-NH3 G	
SE-40---As Received (A0G0628-17)				Matrix: Sediment		Batch: 0070727		
Ammonia as N	0.783	0.124	0.124	mg/kg dry	1	07/24/20 16:45	Plumb/SM 4500-NH3 G	
SE-41---As Received (A0G0628-19)				Matrix: Sediment		Batch: 0070727		
Ammonia as N	8.41	0.226	0.226	mg/kg dry	1	07/24/20 16:47	Plumb/SM 4500-NH3 G	

Apex Laboratories

Philip Nerenberg, Lab Director

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Maul Foster & Alongi, INC.

3140 NE Broadway Street
Portland, OR 97232

Project: **Seaport Tidelands**

Project Number: **1044.02.14**

Project Manager: **Emily Hess**

Report ID:

A0G0628 - 08 18 20 1544

ANALYTICAL SAMPLE RESULTS

Demand Parameters

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
SE-32---As Received (A0G0628-01)				Matrix: Sediment				
Batch: 0070753								
Total Organic Carbon	11000	200	200	mg/kg	1	07/29/20 20:24	EPA 9060Amod	
SE-33---As Received (A0G0628-03)				Matrix: Sediment				
Batch: 0070753								
Total Organic Carbon	12000	200	200	mg/kg	1	07/29/20 20:57	EPA 9060Amod	
SE-34---As Received (A0G0628-05)				Matrix: Sediment				
Batch: 0070753								
Total Organic Carbon	12000	200	200	mg/kg	1	07/29/20 21:08	EPA 9060Amod	
SE-35---As Received (A0G0628-07)				Matrix: Sediment				
Batch: 0070753								
Total Organic Carbon	11000	200	200	mg/kg	1	07/29/20 21:18	EPA 9060Amod	
SE-36---As Received (A0G0628-09)				Matrix: Sediment				
Batch: 0070753								
Total Organic Carbon	11000	200	200	mg/kg	1	07/29/20 21:29	EPA 9060Amod	
SE-37---As Received (A0G0628-11)				Matrix: Sediment				
Batch: 0070753								
Total Organic Carbon	19000	200	200	mg/kg	1	07/29/20 21:40	EPA 9060Amod	
SE-38---As Received (A0G0628-13)				Matrix: Sediment				
Batch: 0070753								
Total Organic Carbon	17000	200	200	mg/kg	1	07/29/20 21:51	EPA 9060Amod	
SE-39---As Received (A0G0628-15RE1)				Matrix: Sediment				
Batch: 0070753								
Total Organic Carbon	39000	200	200	mg/kg	1	07/30/20 12:34	EPA 9060Amod	
SE-40---As Received (A0G0628-17)				Matrix: Sediment				
Batch: 0070753								
Total Organic Carbon	10000	200	200	mg/kg	1	07/29/20 22:34	EPA 9060Amod	
SE-41---As Received (A0G0628-19)				Matrix: Sediment				
Batch: 0070753								

Apex Laboratories

Philip Nerenberg, Lab Director

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Apex Laboratories, LLC

6700 S.W. Sandburg Street

Tigard, OR 97223

503-718-2323

ORELAP ID: OR100062

Maul Foster & Alongi, INC.

3140 NE Broadway Street

Portland, OR 97232

Project: **Seaport Tidelands**

Project Number: **1044.02.14**

Project Manager: **Emily Hess**

Report ID:

A0G0628 - 08 18 20 1544

ANALYTICAL SAMPLE RESULTS

Demand Parameters

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
SE-41---As Received (A0G0628-19)				Matrix: Sediment				
Total Organic Carbon	18000	200	200	mg/kg	1	07/29/20 22:45	EPA 9060Amod	

DRAFT

Apex Laboratories

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Philip Nerenberg, Lab Director



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3140 NE Broadway Street
Portland, OR 97232

Project: **Seaport Tidelands**

Project Number: **1044.02.14**

Project Manager: **Emily Hess**

Report ID:

A0G0628 - 08 18 20 1544

ANALYTICAL SAMPLE RESULTS

Solid and Moisture Determinations

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
SE-32---As Received (A0G0628-01) Matrix: Sediment								
Batch: 0070801								
Total Solids	46.4	1.00	1.00	%	1	07/29/20 15:27	PSEP 1986	
Batch: 0070942								
Total Volatile Solids	6.56	1.00	1.00	%	1	08/04/20 18:00	SM 2540 G	H-06
SE-33---As Received (A0G0628-03) Matrix: Sediment								
Batch: 0070801								
Total Solids	54.1	1.00	1.00	%	1	07/29/20 15:27	PSEP 1986	
Batch: 0070942								
Total Volatile Solids	6.45	1.00	1.00	%	1	08/04/20 18:00	SM 2540 G	H-06
SE-34---As Received (A0G0628-05) Matrix: Sediment								
Batch: 0070801								
Total Solids	53.0	1.00	1.00	%	1	07/29/20 15:27	PSEP 1986	
Batch: 0070942								
Total Volatile Solids	6.69	1.00	1.00	%	1	08/04/20 18:00	SM 2540 G	H-06
SE-35---As Received (A0G0628-07) Matrix: Sediment								
Batch: 0070801								
Total Solids	50.0	1.00	1.00	%	1	07/29/20 15:27	PSEP 1986	
Batch: 0070942								
Total Volatile Solids	6.68	1.00	1.00	%	1	08/04/20 18:00	SM 2540 G	H-06
SE-36---As Received (A0G0628-09) Matrix: Sediment								
Batch: 0070801								
Total Solids	49.0	1.00	1.00	%	1	07/29/20 15:27	PSEP 1986	
Batch: 0070942								
Total Volatile Solids	6.88	1.00	1.00	%	1	08/04/20 18:00	SM 2540 G	H-06
SE-37---As Received (A0G0628-11) Matrix: Sediment								
Batch: 0070801								
Total Solids	46.2	1.00	1.00	%	1	07/29/20 15:27	PSEP 1986	
Batch: 0070942								
Total Volatile Solids	15.2	1.00	1.00	%	1	08/04/20 18:00	SM 2540 G	H-06
SE-38---As Received (A0G0628-13) Matrix: Sediment								

Apex Laboratories

Philip Nerenberg, Lab Director

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3140 NE Broadway Street
 Portland, OR 97232

Project: **Seaport Tidelands**

Project Number: **1044.02.14**

Project Manager: **Emily Hess**

Report ID:

A0G0628 - 08 18 20 1544

ANALYTICAL SAMPLE RESULTS

Solid and Moisture Determinations

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
SE-38---As Received (A0G0628-13)				Matrix: Sediment				
Batch: 0070801								
Total Solids	49.6	1.00	1.00	%	1	07/29/20 15:27	PSEP 1986	
Batch: 0070942								
Total Volatile Solids	10.1	1.00	1.00	%	1	08/04/20 18:00	SM 2540 G	H-06
SE-39---As Received (A0G0628-15)				Matrix: Sediment				
Batch: 0070801								
Total Solids	25.5	1.00	1.00	%	1	07/29/20 15:27	PSEP 1986	
Batch: 0070942								
Total Volatile Solids	50.1	1.00	1.00	%	1	08/04/20 18:00	SM 2540 G	H-06
SE-40---As Received (A0G0628-17)				Matrix: Sediment				
Batch: 0070801								
Total Solids	77.6	1.00	1.00	%	1	07/29/20 15:27	PSEP 1986	
Batch: 0070942								
Total Volatile Solids	2.51	1.00	1.00	%	1	08/04/20 18:00	SM 2540 G	H-06
SE-41---As Received (A0G0628-19)				Matrix: Sediment				
Batch: 0070801								
Total Solids	43.4	1.00	1.00	%	1	07/29/20 15:27	PSEP 1986	
Batch: 0070942								
Total Volatile Solids	10.2	1.00	1.00	%	1	08/04/20 18:00	SM 2540 G	H-06



Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: Seaport Tidelands Project Number: 1044.02.14 Project Manager: Emily Hess	Report ID: A0G0628 - 08 18 20 1544
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Analytical Resources, Inc.

ANALYTICAL SAMPLE RESULTS (Subcontracted)

Wet Chemistry

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
SE-32---As Received (A0G0628-01)			Matrix: Sediment		Batch: BIG0596			
Batch: BIG0596								
Total Solids, Sulfide	44.90	0.04	0.04	%	1	07/27/20 15:40	PSEP 1986	
Batch: BIG0646								
Sulfide	337	22.2	22.2	mg/kg dry	10	08/01/20 13:57	SM 4500-S2 D-00 (PSEP)	D
SE-33---As Received (A0G0628-03)			Matrix: Sediment		Batch: BIG0596			
Batch: BIG0596								
Total Solids, Sulfide	45.01	0.04	0.04	%	1	07/27/20 15:40	PSEP 1986	
SE-33---As Received (A0G0628-03RE1)			Matrix: Sediment		Batch: BIG0646			
Batch: BIG0646								
Sulfide	473	44.4	44.4	mg/kg dry	20	08/01/20 14:51	SM 4500-S2 D-00 (PSEP)	D
SE-34---As Received (A0G0628-05)			Matrix: Sediment		Batch: BIG0596			
Batch: BIG0596								
Total Solids, Sulfide	46.78	0.04	0.04	%	1	07/27/20 15:40	PSEP 1986	
SE-34---As Received (A0G0628-05RE1)			Matrix: Sediment		Batch: BIG0646			
Batch: BIG0646								
Sulfide	921	106	106	mg/kg dry	50	08/01/20 14:52	SM 4500-S2 D-00 (PSEP)	D
SE-35---As Received (A0G0628-07)			Matrix: Sediment		Batch: BIG0596			
Batch: BIG0596								
Total Solids, Sulfide	45.19	0.04	0.04	%	1	07/27/20 15:40	PSEP 1986	
SE-35---As Received (A0G0628-07RE1)			Matrix: Sediment		Batch: BIG0646			
Batch: BIG0646								
Sulfide	447	42.7	42.7	mg/kg dry	20	08/01/20 14:52	SM 4500-S2 D-00 (PSEP)	D
SE-36---As Received (A0G0628-09)			Matrix: Sediment		Batch: BIG0596			
Batch: BIG0596								

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ANALYTICAL SAMPLE RESULTS (Subcontracted)

Wet Chemistry

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
SE-36---As Received (A0G0628-09)				Matrix: Sediment		Batch: BIG0596		
Total Solids, Sulfide	44.05	0.04	0.04	%	1	07/27/20 15:40	PSEP 1986	
SE-36---As Received (A0G0628-09RE1)				Matrix: Sediment		Batch: BIG0646		
Batch: BIG0646								
Sulfide	546	41.4	41.4	mg/kg dry	20	08/01/20 14:52	SM 4500-S2 D-00 (PSEP)	D
SE-37---As Received (A0G0628-11)				Matrix: Sediment		Batch: BIG0596		
Batch: BIG0596								
Total Solids, Sulfide	41.07	0.04	0.04	%	1	07/27/20 15:40	PSEP 1986	
Batch: BIG0646								
Sulfide	204	23.7	23.7	mg/kg dry	10	08/01/20 14:03	SM 4500-S2 D-00 (PSEP)	D
SE-38---As Received (A0G0628-13)				Matrix: Sediment		Batch: BIG0596		
Batch: BIG0596								
Total Solids, Sulfide	45.11	0.04	0.04	%	1	07/27/20 15:40	PSEP 1986	
Batch: BIG0646								
Sulfide	365	21.9	21.9	mg/kg dry	10	08/01/20 14:03	SM 4500-S2 D-00 (PSEP)	D
SE-39---As Received (A0G0628-15)				Matrix: Sediment		Batch: BIG0596		
Batch: BIG0596								
Total Solids, Sulfide	28.17	0.04	0.04	%	1	07/27/20 15:40	PSEP 1986	
SE-39---As Received (A0G0628-15RE1)				Matrix: Sediment		Batch: BIG0646		
Batch: BIG0646								
Sulfide	2110	161	161	mg/kg dry	50	08/01/20 14:52	SM 4500-S2 D-00 (PSEP)	D
SE-40---As Received (A0G0628-17)				Matrix: Sediment		Batch: BIG0596		
Batch: BIG0596								
Total Solids, Sulfide	73.65	0.04	0.04	%	1	07/27/20 15:40	PSEP 1986	
SE-40---As Received (A0G0628-17RE1)				Matrix: Sediment		Batch: BIG0646		
Batch: BIG0646								

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ANALYTICAL SAMPLE RESULTS (Subcontracted)

Wet Chemistry

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes	
SE-40---As Received (A0G0628-17RE1)				Matrix: Sediment		Batch: BIG0646			
Sulfide	392	26.1	26.1	mg/kg dry	20	08/01/20 14:53	SM 4500-S2 D-00 (PSEP)	D	
SE-41---As Received (A0G0628-19)				Matrix: Sediment		Batch: BIG0596			
Batch: BIG0596									
Total Solids, Sulfide	42.34	0.04	0.04	%	1	07/27/20 15:40	PSEP 1986		
SE-41---As Received (A0G0628-19RE1)				Matrix: Sediment		Batch: BIG0646			
Batch: BIG0646									
Sulfide	567	46.5	46.5	mg/kg dry	20	08/01/20 14:54	SM 4500-S2 D-00 (PSEP)	D	



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ANALYTICAL SAMPLE RESULTS (Subcontracted)

Wet Chemistry

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
SE-32---After Processing (A0G0628-02)			Matrix: Water		Batch: BIH0004			
Batch: BIH0004								
Sulfide	0.076	0.050	0.050	mg/L	1	08/01/20 13:52	SM 4500-S2 D-00	
Batch: BIH0034								
Salinity	16.5	0.10	0.10	ppt	1	08/03/20 14:22	SM 2520 B-00	
SE-33---After Processing (A0G0628-04)			Matrix: Water		Batch: BIH0004			
Batch: BIH0004								
Sulfide	0.104	0.050	0.050	mg/L	1	08/01/20 13:52	SM 4500-S2 D-00	
Batch: BIH0034								
Salinity	15.3	0.10	0.10	ppt	1	08/03/20 14:22	SM 2520 B-00	
SE-34---After Processing (A0G0628-06)			Matrix: Water		Batch: BIH0004			
Batch: BIH0004								
Sulfide	0.153	0.050	0.050	mg/L	1	08/01/20 13:52	SM 4500-S2 D-00	
Batch: BIH0034								
Salinity	15.3	0.10	0.10	ppt	1	08/03/20 14:22	SM 2520 B-00	
SE-35---After Processing (A0G0628-08)			Matrix: Water		Batch: BIH0004			
Batch: BIH0004								
Sulfide	ND	0.050	0.050	mg/L	1	08/01/20 13:53	SM 4500-S2 D-00	U
Batch: BIH0034								
Salinity	15.6	0.10	0.10	ppt	1	08/03/20 14:22	SM 2520 B-00	
SE-36---After Processing (A0G0628-10)			Matrix: Water		Batch: BIH0004			
Batch: BIH0004								
Sulfide	0.060	0.050	0.050	mg/L	1	08/01/20 13:53	SM 4500-S2 D-00	
Batch: BIH0034								
Salinity	15.6	0.10	0.10	ppt	1	08/03/20 14:22	SM 2520 B-00	
SE-37---After Processing (A0G0628-12)			Matrix: Water		Batch: BIH0004			
Batch: BIH0004								
Sulfide	0.163	0.050	0.050	mg/L	1	08/01/20 13:55	SM 4500-S2 D-00	
Batch: BIH0034								
Salinity	13.3	0.10	0.10	ppt	1	08/03/20 14:22	SM 2520 B-00	

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ANALYTICAL SAMPLE RESULTS (Subcontracted)

Wet Chemistry

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
SE-38---After Processing (A0G0628-14)			Matrix: Water		Batch: BIH0004			
Batch: BIH0004								
Sulfide	0.103	0.050	0.050	mg/L	1	08/01/20 13:55	SM 4500-S2 D-00	
Batch: BIH0034								
Salinity	15.5	0.10	0.10	ppt	1	08/03/20 14:22	SM 2520 B-00	
SE-40---After Processing (A0G0628-18)			Matrix: Water		Batch: BIH0004			
Batch: BIH0004								
Sulfide	0.202	0.050	0.050	mg/L	1	08/01/20 13:56	SM 4500-S2 D-00	
Batch: BIH0034								
Salinity	12.2	0.10	0.10	ppt	1	08/03/20 14:22	SM 2520 B-00	
SE-41---After Processing (A0G0628-20)			Matrix: Water		Batch: BIH0004			
Batch: BIH0004								
Sulfide	0.071	0.050	0.050	mg/L	1	08/01/20 13:56	SM 4500-S2 D-00	
Batch: BIH0034								
Salinity	17.2	0.10	0.10	ppt	1	08/03/20 14:22	SM 2520 B-00	



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Project: **Seaport Tidelands**

Project Number: **1044.02.14**

Project Manager: **Emily Hess**

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QUALITY CONTROL (QC) SAMPLE RESULTS

Ammonia by Plumb Extraction, Gas Diffusion and Colorimetric Detection

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0070727 - Plumb 1981 Ammonia (Acidified KCl Leach)						Sediment						
Blank (0070727-BLK1)						Prepared: 07/24/20 08:31 Analyzed: 07/24/20 15:45						
<u>Plumb/SM 4500-NH3 G</u>												
Ammonia as N	ND	0.100	0.100	mg/kg wet	1	---	---	---	---	---	---	
LCS (0070727-BS1)						Prepared: 07/24/20 08:31 Analyzed: 07/24/20 15:47						
<u>Plumb/SM 4500-NH3 G</u>												
Ammonia as N	11.2	0.100	0.100	mg/kg wet	1	10.0	---	112	80-120%	---	---	
Matrix Spike (0070727-MS1)						Prepared: 07/24/20 08:31 Analyzed: 07/24/20 16:24						
<u>QC Source Sample: SE-32---As Received (A0G0628-01)</u>												
<u>Plumb/SM 4500-NH3 G</u>												
Ammonia as N	28.9	0.214	0.214	mg/kg dry	1	21.4	7.61	100	75-125%	---	---	
Matrix Spike Dup (0070727-MSD1)						Prepared: 07/24/20 08:31 Analyzed: 07/24/20 16:26						
<u>QC Source Sample: SE-32---As Received (A0G0628-01)</u>												
<u>Plumb/SM 4500-NH3 G</u>												
Ammonia as N	29.1	0.211	0.211	mg/kg dry	1	21.1	7.61	102	75-125%	0.5	20%	



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Project Manager: **Emily Hess**

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QUALITY CONTROL (QC) SAMPLE RESULTS

Demand Parameters

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0070753 - PSEP-5310B TOC												
Soil												
Blank (0070753-BLK1)												
						Prepared: 07/24/20 11:36 Analyzed: 07/29/20 19:41						
<u>EPA 9060Amod</u>												
Total Organic Carbon	ND	200	200	mg/kg	1	---	---	---	---	---	---	
LCS (0070753-BS1)												
						Prepared: 07/24/20 11:36 Analyzed: 07/29/20 19:52						
<u>EPA 9060Amod</u>												
Total Organic Carbon	10000			mg/kg	1	10000	---	100	88-111%	---	---	
Duplicate (0070753-DUP1)												
						Prepared: 07/24/20 11:36 Analyzed: 07/29/20 20:35						
<u>QC Source Sample: SE-32---As Received (A0G0628-01)</u>												
<u>EPA 9060Amod</u>												
Total Organic Carbon	11000	200	200	mg/kg	1	---	11000	---	---	3	27%	
Duplicate (0070753-DUP2)												
						Prepared: 07/24/20 11:36 Analyzed: 07/29/20 20:46						
<u>QC Source Sample: SE-32---As Received (A0G0628-01)</u>												
<u>EPA 9060Amod</u>												
Total Organic Carbon	11000	200	200	mg/kg	1	---	11000	---	---	2	27%	



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QUALITY CONTROL (QC) SAMPLE RESULTS

Solid and Moisture Determinations

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0070801 - Total Solids (SM2540G/PSEP)							Sediment					
Duplicate (0070801-DUP1)			Prepared: 07/27/20 13:22 Analyzed: 07/29/20 15:27									
QC Source Sample: SE-32---As Received (A0G0628-01)												
PSEP 1986												
Total Solids	47.2	1.00	1.00	%	1	---	46.4	---	---	2	20%	

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QUALITY CONTROL (QC) SAMPLE RESULTS

Solid and Moisture Determinations

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0070942 - Total Volatile Solids (non-aq)							Sediment					
Duplicate (0070942-DUP1)			Prepared: 07/30/20 16:24 Analyzed: 08/04/20 18:00									
QC Source Sample: SE-32---As Received (A0G0628-01)												
SM 2540 G												
Total Volatile Solids	6.51	1.00	1.00	%	1	---	6.56	---	---	0.8	10%	H-06

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QUALITY CONTROL (QC) SAMPLE RESULTS

Wet Chemistry

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch BIG0596 - No Prep Wet Chem						Solid						
Blank (BIG0596-BLK1)						Prepared: 07/27/20 15:21 Analyzed: 07/27/20 15:40						
<u>PSEP 1986</u>												
Total Solids, Sulfide	ND	0.04	0.04	%	1	---	---	---	---	---	---	U
Duplicate (BIG0596-DUP1)						Prepared: 07/27/20 15:21 Analyzed: 07/27/20 15:40						
<u>QC Source Sample: A0G0628-01 (A0G0628-01)</u>												
<u>PSEP 1986</u>												
Total Solids, Sulfide	44.72	0.04	0.04	%	1	---	44.90	---	---	0.396	20%	

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QUALITY CONTROL (QC) SAMPLE RESULTS

Wet Chemistry

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch BIG0646 - PSEP 1986							Solid					
Blank (BIG0646-BLK1)						Prepared: 07/29/20 18:50 Analyzed: 08/01/20 13:56						
<u>SM 4500-S2 D-00 (PSEP)</u>												
Sulfide	ND	1.00	1.00	mg/kg wet	1	---	---	---	---	---	---	U
LCS (BIG0646-BS1)						Prepared: 07/29/20 18:50 Analyzed: 08/01/20 13:57						
<u>SM 4500-S2 D-00 (PSEP)</u>												
Sulfide	151	10.0	10.0	mg/kg wet	10	181.21	---	83.1	75-125%	---	---	D
Duplicate (BIG0646-DUP1)						Prepared: 07/29/20 18:50 Analyzed: 08/01/20 14:00						
<u>QC Source Sample: A0G0628-01 (A0G0628-01)</u>												
<u>SM 4500-S2 D-00 (PSEP)</u>												
Sulfide	355	21.0	21.0	mg/kg dry	10	---	337	---	---	5.29	20%	D
Matrix Spike (BIG0646-MS3)						Prepared: 07/29/20 18:48 Analyzed: 08/01/20 14:51						
<u>QC Source Sample: A0G0628-01 (A0G0628-01)</u>												
<u>SM 4500-S2 D-00 (PSEP)</u>												
Sulfide	686	43.7	43.7	mg/kg dry	20	395.90	337	88.2	75-125%	---	---	D



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QUALITY CONTROL (QC) SAMPLE RESULTS

Wet Chemistry

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch BIH0004 - No Prep Wet Chem						Water						
Blank (BIH0004-BLK1)						Prepared: 08/01/20 13:14 Analyzed: 08/01/20 13:51						
<u>SM 4500-S2 D-00</u>												
Sulfide	ND	0.050	0.050	mg/L	1	---	---	---	---	---	---	U
LCS (BIH0004-BS1)						Prepared: 08/01/20 13:14 Analyzed: 08/01/20 13:51						
<u>SM 4500-S2 D-00</u>												
Sulfide	0.502	0.050	0.050	mg/L	1	0.50738	---	98.9	75-125%	---	---	
Duplicate (BIH0004-DUP1)						Prepared: 08/01/20 13:14 Analyzed: 08/01/20 13:53						
<u>QC Source Sample: A0G0628-10 (A0G0628-10)</u>												
<u>SM 4500-S2 D-00</u>												
Sulfide	0.078	0.050	0.050	mg/L	1	---	0.060	---	---	26.1	20%	L
Matrix Spike (BIH0004-MS1)						Prepared: 08/01/20 13:14 Analyzed: 08/01/20 13:54						
<u>QC Source Sample: A0G0628-10 (A0G0628-10)</u>												
<u>SM 4500-S2 D-00</u>												
Sulfide	0.305	0.050	0.050	mg/L	1	0.50738	0.060	48.3	75-125%	---	---	*



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QUALITY CONTROL (QC) SAMPLE RESULTS

Wet Chemistry

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch BIH0034 - No Prep Wet Chem						Water						
Blank (BIH0034-BLK1)						Prepared: 08/03/20 14:16 Analyzed: 08/03/20 14:22						
<u>SM 2520 B-00</u>												
Salinity	ND	0.10	0.10	ppt	1	---	---	---	---	---	---	U
LCS (BIH0034-BS1)						Prepared: 08/03/20 14:16 Analyzed: 08/03/20 14:22						
<u>SM 2520 B-00</u>												
Salinity	36.9	0.10	0.10	ppt	1	35.000	---	105	90-110%	---	---	
Duplicate (BIH0034-DUP1)						Prepared: 08/03/20 14:16 Analyzed: 08/03/20 14:22						
<u>QC Source Sample: A0G0628-10 (A0G0628-10)</u>												
<u>SM 2520 B-00</u>												
Salinity	15.4	0.10	0.10	ppt	1	---	15.6	---	---	1.29	20%	



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Project: **Seaport Tidelands**

Project Number: **1044.02.14**

Project Manager: **Emily Hess**

Report ID:

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SAMPLE PREPARATION INFORMATION

Ammonia by Plumb Extraction, Gas Diffusion and Colorimetric Detection

Prep: **Plumb 1981 Ammonia (Acidified KCl Leach)**

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
Batch: 0070727							
A0G0628-01	Sediment	Plumb/SM 4500-NH3 G	07/22/20 09:22	07/24/20 08:31	10.307g/50mL	10g/50mL	0.97
A0G0628-03	Sediment	Plumb/SM 4500-NH3 G	07/22/20 09:06	07/24/20 08:31	10.5829g/50mL	10g/50mL	0.95
A0G0628-05	Sediment	Plumb/SM 4500-NH3 G	07/22/20 08:56	07/24/20 08:31	10.2735g/50mL	10g/50mL	0.97
A0G0628-07	Sediment	Plumb/SM 4500-NH3 G	07/22/20 08:36	07/24/20 08:31	10.1202g/50mL	10g/50mL	0.99
A0G0628-09	Sediment	Plumb/SM 4500-NH3 G	07/22/20 07:56	07/24/20 08:31	10.2711g/50mL	10g/50mL	0.97
A0G0628-11	Sediment	Plumb/SM 4500-NH3 G	07/22/20 10:02	07/24/20 08:31	10.1943g/50mL	10g/50mL	0.98
A0G0628-13	Sediment	Plumb/SM 4500-NH3 G	07/22/20 10:16	07/24/20 08:31	10.4408g/50mL	10g/50mL	0.96
A0G0628-15	Sediment	Plumb/SM 4500-NH3 G	07/22/20 09:56	07/24/20 08:31	10.4805g/50mL	10g/50mL	0.95
A0G0628-17	Sediment	Plumb/SM 4500-NH3 G	07/22/20 07:16	07/24/20 08:31	10.3705g/50mL	10g/50mL	0.96
A0G0628-19	Sediment	Plumb/SM 4500-NH3 G	07/22/20 07:26	07/24/20 08:31	10.1749g/50mL	10g/50mL	0.98

Demand Parameters

Prep: **PSEP-5310B TOC**

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
Batch: 0070753							
A0G0628-01	Sediment	EPA 9060Amod	07/22/20 09:22	07/24/20 11:36			NA
A0G0628-03	Sediment	EPA 9060Amod	07/22/20 09:06	07/24/20 11:36			NA
A0G0628-05	Sediment	EPA 9060Amod	07/22/20 08:56	07/24/20 11:36			NA
A0G0628-07	Sediment	EPA 9060Amod	07/22/20 08:36	07/24/20 11:36			NA
A0G0628-09	Sediment	EPA 9060Amod	07/22/20 07:56	07/24/20 11:36			NA
A0G0628-11	Sediment	EPA 9060Amod	07/22/20 10:02	07/24/20 11:36			NA
A0G0628-13	Sediment	EPA 9060Amod	07/22/20 10:16	07/24/20 11:36			NA
A0G0628-15RE1	Sediment	EPA 9060Amod	07/22/20 09:56	07/24/20 11:36			NA
A0G0628-17	Sediment	EPA 9060Amod	07/22/20 07:16	07/24/20 11:36			NA
A0G0628-19	Sediment	EPA 9060Amod	07/22/20 07:26	07/24/20 11:36			NA

Solid and Moisture Determinations

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



Maul Foster & Alongi, INC.

3140 NE Broadway Street
 Portland, OR 97232

Project: **Seaport Tidelands**

Project Number: **1044.02.14**

Project Manager: **Emily Hess**

Report ID:

A0G0628 - 08 18 20 1544

SAMPLE PREPARATION INFORMATION

Solid and Moisture Determinations

Prep: Total Solids (SM2540G/PSEP)

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
Batch: 0070801							
A0G0628-01	Sediment	PSEP 1986	07/22/20 09:22	07/27/20 13:22			NA
A0G0628-03	Sediment	PSEP 1986	07/22/20 09:06	07/27/20 13:22			NA
A0G0628-05	Sediment	PSEP 1986	07/22/20 08:56	07/27/20 13:22			NA
A0G0628-07	Sediment	PSEP 1986	07/22/20 08:36	07/27/20 13:22			NA
A0G0628-09	Sediment	PSEP 1986	07/22/20 07:56	07/27/20 13:22			NA
A0G0628-11	Sediment	PSEP 1986	07/22/20 10:02	07/27/20 13:22			NA
A0G0628-13	Sediment	PSEP 1986	07/22/20 10:16	07/27/20 13:22			NA
A0G0628-15	Sediment	PSEP 1986	07/22/20 09:56	07/27/20 13:22			NA
A0G0628-17	Sediment	PSEP 1986	07/22/20 07:16	07/27/20 13:22			NA
A0G0628-19	Sediment	PSEP 1986	07/22/20 07:26	07/27/20 13:22			NA

Prep: Total Volatile Solids (non-aq)

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
Batch: 0070942							
A0G0628-01	Sediment	SM 2540 G	07/22/20 09:22	07/30/20 16:24			NA
A0G0628-03	Sediment	SM 2540 G	07/22/20 09:06	07/30/20 16:24			NA
A0G0628-05	Sediment	SM 2540 G	07/22/20 08:56	07/30/20 16:24			NA
A0G0628-07	Sediment	SM 2540 G	07/22/20 08:36	07/30/20 16:24			NA
A0G0628-09	Sediment	SM 2540 G	07/22/20 07:56	07/30/20 16:24			NA
A0G0628-11	Sediment	SM 2540 G	07/22/20 10:02	07/30/20 16:24			NA
A0G0628-13	Sediment	SM 2540 G	07/22/20 10:16	07/30/20 16:24			NA
A0G0628-15	Sediment	SM 2540 G	07/22/20 09:56	07/30/20 16:24			NA
A0G0628-17	Sediment	SM 2540 G	07/22/20 07:16	07/30/20 16:24			NA
A0G0628-19	Sediment	SM 2540 G	07/22/20 07:26	07/30/20 16:24			NA



Maul Foster & Alongi, INC.

3140 NE Broadway Street
Portland, OR 97232

Project: **Seaport Tidelands**

Project Number: **1044.02.14**
Project Manager: **Emily Hess**

Report ID:
A0G0628 - 08 18 20 1544

Analytical Resources, Inc.

SAMPLE PREPARATION INFORMATION

Wet Chemistry

Prep: No Prep Wet Chem

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
Batch: BIG0596							
A0G0628-01	Sediment	PSEP 1986	07/22/20 09:22	07/27/20 15:21	5g/5g	5g/5g	1.00
A0G0628-03	Sediment	PSEP 1986	07/22/20 09:06	07/27/20 15:21	5g/5g	5g/5g	1.00
A0G0628-05	Sediment	PSEP 1986	07/22/20 08:56	07/27/20 15:21	5g/5g	5g/5g	1.00
A0G0628-07	Sediment	PSEP 1986	07/22/20 08:36	07/27/20 15:21	5g/5g	5g/5g	1.00
A0G0628-09	Sediment	PSEP 1986	07/22/20 07:56	07/27/20 15:21	5g/5g	5g/5g	1.00
A0G0628-11	Sediment	PSEP 1986	07/22/20 10:02	07/27/20 15:21	5g/5g	5g/5g	1.00
A0G0628-13	Sediment	PSEP 1986	07/22/20 10:16	07/27/20 15:21	5g/5g	5g/5g	1.00
A0G0628-15	Sediment	PSEP 1986	07/22/20 09:56	07/27/20 15:21	5g/5g	5g/5g	1.00
A0G0628-17	Sediment	PSEP 1986	07/22/20 07:16	07/27/20 15:21	5g/5g	5g/5g	1.00
A0G0628-19	Sediment	PSEP 1986	07/22/20 07:26	07/27/20 15:21	5g/5g	5g/5g	1.00

Prep: PSEP 1986

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
Batch: BIG0646							
A0G0628-01	Sediment	SM 4500-S2 D-00 (PSEP)	07/22/20 09:22	07/29/20 18:50	5.011g/100mL	5g/100mL	1.00
A0G0628-03RE1	Sediment	SM 4500-S2 D-00 (PSEP)	07/22/20 09:06	07/29/20 18:48	5.006g/100mL	5g/100mL	1.00
A0G0628-05RE1	Sediment	SM 4500-S2 D-00 (PSEP)	07/22/20 08:56	07/29/20 18:48	5.035g/100mL	5g/100mL	0.99
A0G0628-07RE1	Sediment	SM 4500-S2 D-00 (PSEP)	07/22/20 08:36	07/29/20 18:48	5.185g/100mL	5g/100mL	0.96
A0G0628-09RE1	Sediment	SM 4500-S2 D-00 (PSEP)	07/22/20 07:56	07/29/20 18:48	5.48g/100mL	5g/100mL	0.91
A0G0628-11	Sediment	SM 4500-S2 D-00 (PSEP)	07/22/20 10:02	07/29/20 18:50	5.136g/100mL	5g/100mL	0.97
A0G0628-13	Sediment	SM 4500-S2 D-00 (PSEP)	07/22/20 10:16	07/29/20 18:50	5.068g/100mL	5g/100mL	0.99
A0G0628-15RE1	Sediment	SM 4500-S2 D-00 (PSEP)	07/22/20 09:56	07/29/20 18:48	5.524g/100mL	5g/100mL	0.91
A0G0628-17RE1	Sediment	SM 4500-S2 D-00 (PSEP)	07/22/20 07:16	07/29/20 18:48	5.206g/100mL	5g/100mL	0.96
A0G0628-19RE1	Sediment	SM 4500-S2 D-00 (PSEP)	07/22/20 07:26	07/29/20 18:48	5.074g/100mL	5g/100mL	0.99

Wet Chemistry

Apex Laboratories

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Philip Nerenberg, Lab Director



Maul Foster & Alongi, INC.

3140 NE Broadway Street
 Portland, OR 97232

Project: **Seaport Tidelands**

Project Number: **1044.02.14**

Project Manager: **Emily Hess**

Report ID:

A0G0628 - 08 18 20 1544

Analytical Resources, Inc.

SAMPLE PREPARATION INFORMATION

Wet Chemistry

Prep: No Prep Wet Chem

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
<u>Batch: BIH0004</u>							
A0G0628-02	Water	SM 4500-S2 D-00	07/28/20 08:00	08/01/20 13:14	5mL/5mL	5mL/5mL	1.00
A0G0628-04	Water	SM 4500-S2 D-00	07/27/20 21:00	08/01/20 13:14	5mL/5mL	5mL/5mL	1.00
A0G0628-06	Water	SM 4500-S2 D-00	07/27/20 21:00	08/01/20 13:14	5mL/5mL	5mL/5mL	1.00
A0G0628-08	Water	SM 4500-S2 D-00	07/27/20 21:00	08/01/20 13:14	5mL/5mL	5mL/5mL	1.00
A0G0628-10	Water	SM 4500-S2 D-00	07/27/20 11:00	08/01/20 13:14	5mL/5mL	5mL/5mL	1.00
A0G0628-12	Water	SM 4500-S2 D-00	07/27/20 14:30	08/01/20 13:14	5mL/5mL	5mL/5mL	1.00
A0G0628-14	Water	SM 4500-S2 D-00	07/27/20 21:00	08/01/20 13:14	5mL/5mL	5mL/5mL	1.00
A0G0628-18	Water	SM 4500-S2 D-00	07/27/20 14:30	08/01/20 13:14	5mL/5mL	5mL/5mL	1.00
A0G0628-20	Water	SM 4500-S2 D-00	07/27/20 14:30	08/01/20 13:14	5mL/5mL	5mL/5mL	1.00
<u>Batch: BIH0034</u>							
A0G0628-02	Water	SM 2520 B-00	07/28/20 08:00	08/03/20 14:16	50mL/50mL	50mL/50mL	1.00
A0G0628-04	Water	SM 2520 B-00	07/27/20 21:00	08/03/20 14:16	50mL/50mL	50mL/50mL	1.00
A0G0628-06	Water	SM 2520 B-00	07/27/20 21:00	08/03/20 14:16	50mL/50mL	50mL/50mL	1.00
A0G0628-08	Water	SM 2520 B-00	07/27/20 21:00	08/03/20 14:16	50mL/50mL	50mL/50mL	1.00
A0G0628-10	Water	SM 2520 B-00	07/27/20 11:00	08/03/20 14:16	50mL/50mL	50mL/50mL	1.00
A0G0628-12	Water	SM 2520 B-00	07/27/20 14:30	08/03/20 14:16	50mL/50mL	50mL/50mL	1.00
A0G0628-14	Water	SM 2520 B-00	07/27/20 21:00	08/03/20 14:16	50mL/50mL	50mL/50mL	1.00
A0G0628-18	Water	SM 2520 B-00	07/27/20 14:30	08/03/20 14:16	50mL/50mL	50mL/50mL	1.00
A0G0628-20	Water	SM 2520 B-00	07/27/20 14:30	08/03/20 14:16	50mL/50mL	50mL/50mL	1.00



Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: Seaport Tidelands Project Number: 1044.02.14 Project Manager: Emily Hess	Report ID: A0G0628 - 08 18 20 1544
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QUALIFIER DEFINITIONS

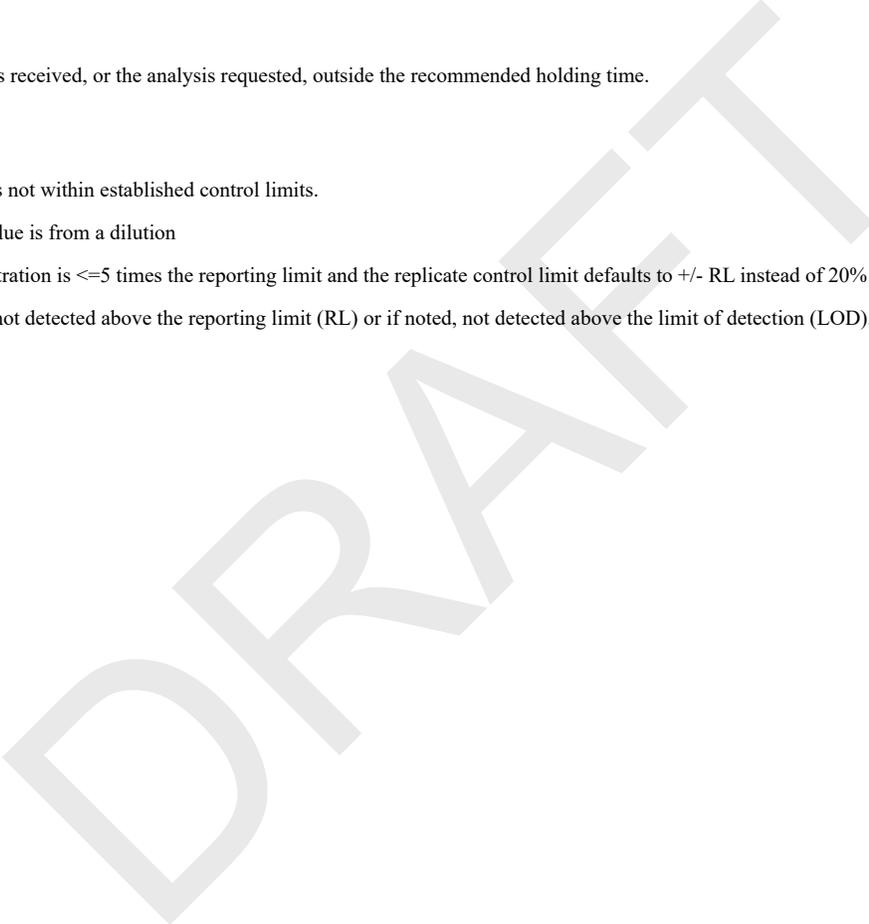
Client Sample and Quality Control (QC) Sample Qualifier Definitions:

Apex Laboratories

H-06 This sample was received, or the analysis requested, outside the recommended holding time.

Analytical Resources, Inc.

- * Flagged value is not within established control limits.
- D** The reported value is from a dilution
- L** Analyte concentration is ≤ 5 times the reporting limit and the replicate control limit defaults to +/- RL instead of 20% RPD
- U** This analyte is not detected above the reporting limit (RL) or if noted, not detected above the limit of detection (LOD).





Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: Seaport Tidelands Project Number: 1044.02.14 Project Manager: Emily Hess	Report ID: A0G0628 - 08 18 20 1544
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REPORTING NOTES AND CONVENTIONS:

Abbreviations:

- DET Analyte DETECTED at or above the detection or reporting limit.
- ND Analyte NOT DETECTED at or above the detection or reporting limit.
- NR Result Not Reported
- RPD Relative Percent Difference. RPDs for Matrix Spikes and Matrix Spike Duplicates are based on concentration, not recovery.

Detection Limits: Limit of Detection (LOD)

Limits of Detection (LODs) are normally set at a level of one half the validated Limit of Quantitation (LOQ).
If no value is listed ('-----'), then the data has not been evaluated below the Reporting Limit.

Reporting Limits: Limit of Quantitation (LOQ)

Validated Limits of Quantitation (LOQs) are reported as the Reporting Limits for all analyses where the LOQ, MRL, PQL or CRL are requested. The LOQ represents a level at or above the low point of the calibration curve, that has been validated according to Apex Laboratories' comprehensive LOQ policies and procedures.

Reporting Conventions:

- Basis: Results for soil samples are generally reported on a 100% dry weight basis. The Result Basis is listed following the units as "dry", "wet", or "" (blank) designation.
 - "dry" Sample results and Reporting Limits are reported on a dry weight basis. (i.e. "ug/kg dry")
See Percent Solids section for details of dry weight analysis.
 - "wet" Sample results and Reporting Limits for this analysis are normally dry weight corrected, but have not been modified in this case.
 - "" Results without 'wet' or 'dry' designation are not normally dry weight corrected. These results are considered 'As Received'.

QC Source:

In cases where there is insufficient sample provided for Sample Duplicates and/or Matrix Spikes, a Lab Control Sample Duplicate (LCS Dup) may be analyzed to demonstrate accuracy and precision of the extraction batch.

Non-Client Batch QC Samples (Duplicates and Matrix Spike/Duplicates) may not be included in this report. Please request a Full QC report if this data is required.

Miscellaneous Notes:

- " --- " QC results are not applicable. For example, % Recoveries for Blanks and Duplicates, % RPD for Blanks, Blank Spikes and Matrix Spikes, etc.
- " *** " Used to indicate a possible discrepancy with the Sample and Sample Duplicate results when the %RPD is not available. In this case, either the Sample or the Sample Duplicate has a reportable result for this analyte, while the other is Non Detect (ND).

Blanks:

Standard practice is to evaluate the results from Blank QC Samples down to a level equal to 1/2 the Reporting Limit (RL).
-For Blank hits falling between 1/2 the RL and the RL (J flagged hits), the associated sample and QC data will receive a 'B-02' qualifier.
-For Blank hits above the RL, the associated sample and QC data will receive a 'B' qualifier, per Apex Laboratories' Blank Policy.
For further details, please request a copy of this document.



Maul Foster & Alongi, INC.

3140 NE Broadway Street
Portland, OR 97232

Project: **Seaport Tidelands**

Project Number: **1044.02.14**

Project Manager: **Emily Hess**

Report ID:

A0G0628 - 08 18 20 1544

REPORTING NOTES AND CONVENTIONS (Cont.):

Blanks (Cont.):

Sample results flagged with a 'B' or 'B-02' qualifier are potentially biased high if the sample results are less than ten times the level found in the blank for inorganic analyses, or less than five times the level found in the blank for organic analyses.

'B' and 'B-02' qualifications are only applied to sample results detected above the Reporting Level.

Preparation Notes:

Mixed Matrix Samples:

Water Samples:

Water samples containing significant amounts of sediment are decanted or separated prior to extraction, and only the water portion analyzed, unless otherwise directed by the client.

Soil and Sediment Samples:

Soil and Sediment samples containing significant amounts of water are decanted prior to extraction, and only the solid portion analyzed, unless otherwise directed by the client.

Sampling and Preservation Notes:

Certain regulatory programs, such as National Pollutant Discharge Elimination System (NPDES), require that activities such as sample filtration (for dissolved metals, orthophosphate, hexavalent chromium, etc.) and testing of short hold analytes (pH, Dissolved Oxygen, etc.) be performed in the field (on-site) within a short time window. In addition, sample matrix spikes are required for some analyses, and sufficient volume must be provided, and billable site specific QC requested, if this is required. All regulatory permits should be reviewed to ensure that these requirements are being met.

Data users should be aware of which regulations pertain to the samples they submit for testing. If related sample collection activities are not approved for a particular regulatory program, results should be considered estimates. Apex Laboratories will qualify these analytes according to the most stringent requirements, however results for samples that are for non-regulatory purposes may be acceptable.

Samples that have been filtered and preserved at Apex Laboratories per client request are listed in the preparation section of the report with the date and time of filtration listed.

Apex Laboratories maintains detailed records on sample receipt, including client label verification, cooler temperature, sample preservation, hold time compliance and field filtration. Data is qualified as necessary, and the lack of qualification indicates compliance with required parameters.



Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC.

3140 NE Broadway Street
Portland, OR 97232

Project: **Seaport Tidelands**

Project Number: **1044.02.14**

Project Manager: **Emily Hess**

Report ID:

A0G0628 - 08 18 20 1544

LABORATORY ACCREDITATION INFORMATION

ORELAP Certification ID: OR100062 (Primary Accreditation) -

EPA ID: OR01039

All methods and analytes reported from work performed at Apex Laboratories are included on Apex Laboratories' ORELAP Scope of Certification, with the exception of any analyte(s) listed below:

Apex Laboratories

Matrix	Analysis	TNI_ID	Analyte	TNI_ID	Accreditation
<u>All reported analytes are included in Apex Laboratories' current ORELAP scope.</u>					

Secondary Accreditations

Apex Laboratories also maintains reciprocal accreditation with non-TNI states (Washington DOE), as well as other state specific accreditations not listed here.

Subcontract Laboratory Accreditations

Subcontracted data falls outside of Apex Laboratories' Scope of Accreditation. Please see the Subcontract Laboratory report for full details, or contact your Project Manager for more information.

Field Testing Parameters

Results for Field Tested data are provided by the client or sampler, and fall outside of Apex Laboratories' Scope of Accreditation.

Apex Laboratories

Philip Nerenberg, Lab Director

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Maul Foster & Alongi, INC.

3140 NE Broadway Street
Portland, OR 97232

Project: Seaport Tidelands

Project Number: 1044.02.14

Project Manager: Emily Hess

Report ID:

A0G0628 - 08 18 20 1544

A0G0628

Cameron O'Brien

From: Philip Nerenberg
Sent: Thursday, July 30, 2020 11:36 AM
To: AddOns
Subject: FW: A0G0628 - add TVS

See below

-----Original Message-----
From: Mary Benzinger [mailto:mbenzinger@maulfoster.com]
Sent: Thursday, July 30, 2020 9:08 AM
To: Philip Nerenberg
Cc: Phil Wiescher; Emily Hess; Meaghan Pollock
Subject: A0G0628 - add TVS

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Hi Philip,

Could we add analysis of Total Volatile Solids (TVS) by PSEP 1986 to all sediment samples in A0G0628?

- SE-32
- SE-33
- SE-34
- SE-35
- SE-36
- SE-37
- SE-38
- SE-39
- SE-40
- SE-41

Thank you,

MARY BENZINGER | MAUL FOSTER & ALONGI, INC.
m. 503 319 7132

I'm working from home in response to COVID-19. Maul Foster & Alongi, Inc. is fully operational and responsive to all projects. Please note there may be a delay if you send hard copy mail to our offices. We are happy to connect with you via email, phone, or videoconference at this time.

-----Original Message-----
From: Emily Hess <ehess@maulfoster.com>
Sent: Wednesday, July 29, 2020 2:33 PM
To: Mary Benzinger <mbenzinger@maulfoster.com>
Cc: Meaghan Pollock <mpollock@maulfoster.com>; Phil Wiescher <pwiescher@maulfoster.com>
Subject: FW: Apex Laboratories Login Notification: A0G0628



Maul Foster & Alongi, INC.
3140 NE Broadway Street
Portland, OR 97232

Project: **Seaport Tidelands**
Project Number: **1044.02.14**
Project Manager: **Emily Hess**

Report ID:
A0G0628 - 08 18 20 1544

APEX LABS COOLER RECEIPT FORM

Client: MFA - Vanc Element WO#: A0 gpl628

Project/Project #: Seaport In-water RI 1044.02.14

Delivery Info:

Date/time received: 7/23/20 @ 926 By: EJ

Delivered by: Apex Client ESS FedEx UPS Swift Senvoy SDS Other

Cooler Inspection Date/time inspected: 7/23/20 @ 1030 By: EJ

Chain of Custody included? Yes No Custody seals? Yes No

Signed/dated by client? Yes No

Signed/dated by Apex? Yes No

	Cooler #1	Cooler #2	Cooler #3	Cooler #4	Cooler #5	Cooler #6	Cooler #7
Temperature (°C)	<u>1.1</u>	<u>3.1</u>					
Received on ice? (Y/N)	<u>Y</u>	<u>Y</u>					
Temp. blanks? (Y/N)	<u>Y</u>	<u>Y</u>					
Ice type: (Gel/Real/Other)	<u>gel/Real</u>	<u>GC</u>					
Condition:	<u>Good</u>	<u>Good</u>					

Cooler out of temp? (Y/N) Possible reason why: _____

If some coolers are in temp and some out, were green dots applied to out of temperature samples? Yes/No NA

Out of temperature samples form initiated? Yes/No NA

Samples Inspection: Date/time inspected: 7/23/20 @ 1406 By: SC

All samples intact? Yes No Comments: _____

Bottle labels/COCs agree? Yes No Comments: _____

COC/container discrepancies form initiated? Yes No

Containers/volumes received appropriate for analysis? Yes No Comments: _____

Do VOA vials have visible headspace? Yes No NA

Comments: _____

Water samples: pH checked: Yes No NA pH appropriate? Yes No

Comments: _____

Additional information: _____

Labeled by: [Signature] Witness: [Signature] Cooler Inspected by: [Signature] See Project Contact Form: Y

Philip Nerenberg

Interpretation of Pb-210, Ra-226 and Cs-137 Results

Flett Research Ltd.

440 DeSalaberry Ave. Winnipeg, MB R2L 0Y7

Fax/Phone: (204) 667-2505

Email: flett@flettresearch.ca Webpage: <http://www.flettresearch.ca>

Client: Paulik, Blair

Address: 2001 NW 19th Avenue, Suite 200, Portland, OR 97209
Core ID: SE-08B
Transaction ID: 918
PO/Contract No.: Contract signed Oct 24-19
Date Received: 10-Oct-19
Analysis Dates: October 25, 2019 - January 15, 2020
Analysts: L. Hesketh-Jost; X. Hu
Sampling Date: 24-Sep-19
Date Issued: 20-Jan-20

Results authorized by Dr. Robert J. Flett, Chief Scientist

INTERPRETATION

Observations:

The Pb-210 activities in this core are low. The maximum activity of 1.40 DPM/g observed in section 3 (extrapolated depth 1.5 - 3.5 cm) is about 1.5 times the lowest activity of 0.93 DPM/g in section 32 (extrapolated depth 42.5 - 55 cm) (Pages 2 & 3). Below section 25 (extrapolated depth 27 - 31 cm), the shape of the Pb-210 profile is nearly vertical.

The dry bulk densities vary between 0.596 - 0.852 g/cm³ (Pages 2 & 4).

Ra-226 was measured at 0.58, 0.60 and 0.60 DPM/g in section 10 (depth 9 - 10 cm), section 25 (depth 28 - 30 cm) and section 37 (depth 70 - 75 cm), respectively (Pages 5 - 8). The nearly identical Ra-226 activities suggest that the composition of sediments may be consistent throughout the core.

The Pb-210 activities are significantly higher than the Ra-226 activities, indicating that the background Pb-210 activity level has not been achieved at the bottom of this core (depth 75 cm), and these sediments are probably less than 45 years old, the maximum age that can be estimated in this core.

Trace amount of Cs-137 was found in all four sections measured in the core interval of 32 - 75 cm, as well as a few sections above 32 cm (Pages 9 - 13), indicating that the sediments deposited at this sampling site are all more modern than 1963 (Pages 9 - 13). The Cs-137 in some sections is below the detection limit, which is likely a result of dilution due to the extremely high sediment accumulation rates.

Regression model of Unsupported Pb-210 activity vs. Cumulative Dry Weight (g/cm²):

When applying the linear regression model, it is assumed that the input of Pb-210 and the sediment accumulation rate are constant. Although some variation in the sediment accumulation rate is apparent, the linear regression model was initially applied to the core interval of 0 - 31 cm (extrapolated depth), because it appears that the average sediment accumulation rate in this core interval may be reasonably estimated.

However, due to the extremely low unsupported Pb-210 and the irregular shape of the Pb-210 profile, R² of the model is poor (R² = 0.4328). Therefore, the average sediment accumulation rate in this core interval cannot be reliably estimated by the regression model.

CRS model of Age at bottom of Extrapolated section in years vs. Depth of bottom edge of current section in cm:

The CRS model assumes constant input of Pb-210 and a core that is long enough to include all of the measurable atmospheric source Pb-210, i.e. it contains a complete Pb-210 inventory. These assumptions are not satisfied, and therefore the model cannot be applied to the core.

Conclusion:

The irregular shape of Pb-210 profile in the upper 25 sections (extrapolated depth 0 - 31 cm) may indicate variable sediment accumulation rates at this sampling site. Below 31 cm (extrapolated depth), the vertical shape of both Pb-210 and Cs-137 profiles may suggest that the sediments (extrapolated depth 31 - 75 cm) were deposited in a very short period of time. The overall sediment accumulation rate is high.

It is impossible to confidently determine the date of deposition of any of the sediments, other than to say all sediments appear to be deposited after 1963.

Overall, the analytical quality of radioisotope data (based upon the recovery of spike, the recovery of CRM, the results of repeat analyses and blanks) is considered good.

Results of Pb-210 by Po-210 Analysis

Flett Research Ltd.

440 DeSalaberry Ave. Winnipeg, MB R2L 0Y7

Fax/Phone: (204) 667-2505

E-mail: flett@flettresearch.ca Webpage: <http://www.flettresearch.ca>

Client: Paulik, Blair

Address: 2001 NW 19th Avenue, Suite 200, Portland, OR 97209

Core ID: SE-08B

Date Received: 10-Oct-19

Sampling Date: 24-Sep-19

Date Issued: 17-Jan-20

Transaction ID: 918

PO/Contract No.: Contract signed Oct 24-19

Analysis Dates: October 25 - December 25, 2019

Analysts: L. Hesketh-Jost

Salt correction applied? **No**

Analytical Method: N20110 Determination of Lead-210 in Sediment, Soil and Peat by Alpha Spectrometry (Version 5)

Deviations from Method:

Comments:

Detection Limit: The method detection limit (MDL) for 0.25 - 0.5 g (dry wt.) sample is between 0.05 - 0.1 DPM Po-210/g dry sample at a 95% confidence level for 60,000 second counting time, and is based on greater than 20 method blanks. This can vary slightly and depends upon the amount of sample, detector and recovery efficiency of each sample.

Estimated Uncertainty: The estimated uncertainty for samples analyzed by this method (acid extraction) has been determined to be ± 11% at concentrations between 0.6 and 40 DPM/g at 95% confidence.

Results authorized by Dr. Robert J. Flett, Chief Scientist

Section Number	Sample ID	Upper Depth (cm)	Lower Depth (cm)	Extrapolated Upper Section Depth (cm)	Extrapolated Lower Section Depth (cm)	Dry Bulk Density (Dry wt./Wet vol.) (g/cm3)	% Loss on Drying	Mass in Extrapolated Section (g/cm2)	Cumulative Mass to Bottom of Current Section (g/cm2)	Plot-point of Cumulative Mass in Current Section (g/cm2)	Po-209 Counts Less Detector Back-ground	Po-210 Counts Less Detector Back-ground and Po-209 Spike Standard Blank	Weight of Sample Counted (g)	Count Time (sec)	Po-210 Total Activity (DPM/g)	Error Po-210 +/- 1 S.D. (DPM/g)	Po-210 Unsupported Activity (DPM/g)	Age at Bottom of Extrapolated Section in Years (CRS Model Estimate)	Depth of Bottom Edge of Current Section (cm)	DPM/cm ² in Section- Unsupported	CRS Sediment Accumulation Rate (g/cm ² /yr)	Age at Bottom of Extrapolated Section in Years (Linear Regression Model Estimate)	Ra-226 Activity (DPM/g dry wt.)	Error Ra-226 +/- 1 S.D. (DPM/g dry wt.)	Comments Code for Pb-210 Analysis		
1	SE-08B-0.000-0.033	0.0	1.0	0.00	1.50	0.805	46.51%	1.208	1.208	0.403	2023	161	0.639	60000	1.21	0.10											
3	SE-08B-0.066-0.099	2.0	3.0	1.50	3.50	0.730	49.90%	1.460	2.668	1.938	2444	167	0.476	60000	1.40	0.11											
5	SE-08B-0.131-0.164	4.0	5.0	3.50	7.00	0.758	48.72%	2.652	5.321	3.426					1.24	0.10											
10	SE-08B-0.295-0.328	9.0	10.0	7.00	10.00	0.755	48.83%	2.266	7.587	7.209	2140	118	0.475	60000	1.13	0.11							0.58	0.03			
11	SE-08B-0.328-0.361	10.0	11.0	10.00	11.50	0.852	44.84%	1.278	8.865	8.013	1705	120	0.586	60000	1.17	0.11											
13	SE-08B-0.394-0.427	12.0	13.0	11.50	13.50	0.779	47.79%	1.558	10.423	9.644	1775	129	0.533	60000	1.32	0.12											
15	SE-08B-0.459-0.492	14.0	15.0	13.50	15.50	0.721	50.38%	1.441	11.865	11.144	2394	145	0.489	60000	1.21	0.10											
17	SE-08B-0.525-0.558	16.0	17.0	15.50	17.50	0.740	49.57%	1.481	13.345	12.605					1.13	0.12											
19	SE-08B-0.591-0.623	18.0	19.0	17.50	19.50	0.770	48.35%	1.540	14.886	14.115	1713	94	0.543	60000	0.98	0.10											
21	SE-08B-0.656-0.722	20.0	22.0	19.50	23.00	0.709	50.53%	2.481	17.366	15.949	1680	122	0.549	60000	1.28	0.12											
23	SE-08B-0.787-0.853	24.0	26.0	23.00	27.00	0.774	48.09%	3.094	20.461	18.913	1908	101	0.518	60000	0.99	0.10											
25	SE-08B-0.919-0.984	28.0	30.0	27.00	31.00	0.714	50.70%	2.857	23.318	21.889	2131	115	0.501	60000	1.05	0.10							0.60	0.03			
27	SE-08B-1.050-1.115	32.0	34.0	31.00	36.00	0.707	51.09%	3.533	26.851	24.731	1798	94	0.491	60000	1.03	0.11											
30	SE-08B-1.247-1.312	38.0	40.0	36.00	42.50	0.596	57.22%	3.876	30.727	28.640	1973	98	0.502	60000	0.96	0.10											
32	SE-08B-1.476-1.640	45.0	50.0	42.50	55.00	0.669	53.33%	8.358	39.085	34.070	1479	72	0.509	60000	0.93	0.13											
35	SE-08B-1.969-2.133	60.0	65.0	55.00	67.50	0.718	50.59%	8.972	48.056	44.468	1731	85	0.489	60000	0.97	0.11											
37	SE-08B-2.297-2.461	70.0	75.0	67.50	75.00	0.684	52.15%	5.130	53.187	51.477	2624	126	0.480	60000	0.97	0.09							0.60	0.03			
Blank	Blank w/o Po-209 spike										0	-4															
Blank	Blank w/ Po-209 spike										2934	0															
Blank	Blank w/o Po-209 spike										-3	-3															
Blank	Blank w/ Po-209 spike										2131	1															
5	SE-08B-0.131-0.164	4.0	5.0			0.754	48.79%				2422	174	0.521	60000	1.34	0.10											
5 Dup	SE-08B-0.131-0.164 Duplicate	4.0	5.0			0.762	48.64%				2269	129	0.490	60000	1.13	0.10											
17	SE-08B-0.525-0.558	16.0	17.0			0.736	49.65%				1956	109	0.540	60000	1.00	0.10											
17 Dup	SE-08B-0.525-0.558 Duplicate	16.0	17.0			0.744	49.49%				1633	113	0.531	60000	1.26	0.13											
CRM	IAEA 447										2608	1443	0.330	60000	16.32	0.43			Po-210 in CRM on counting date (DPM/g):			18.60	Recovery:	87.76%			
CRM	IAEA 447										1939	1159	0.352	60000	16.48	0.49						18.53		88.93%			

Dup (duplicate): Two subsamples of the same sample were carried through the analytical procedure in an identical manner. Rep (replicate): Three or more subsamples of the same sample were carried through the analytical procedure in an identical manner.

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Note: Results relate only to the items tested.

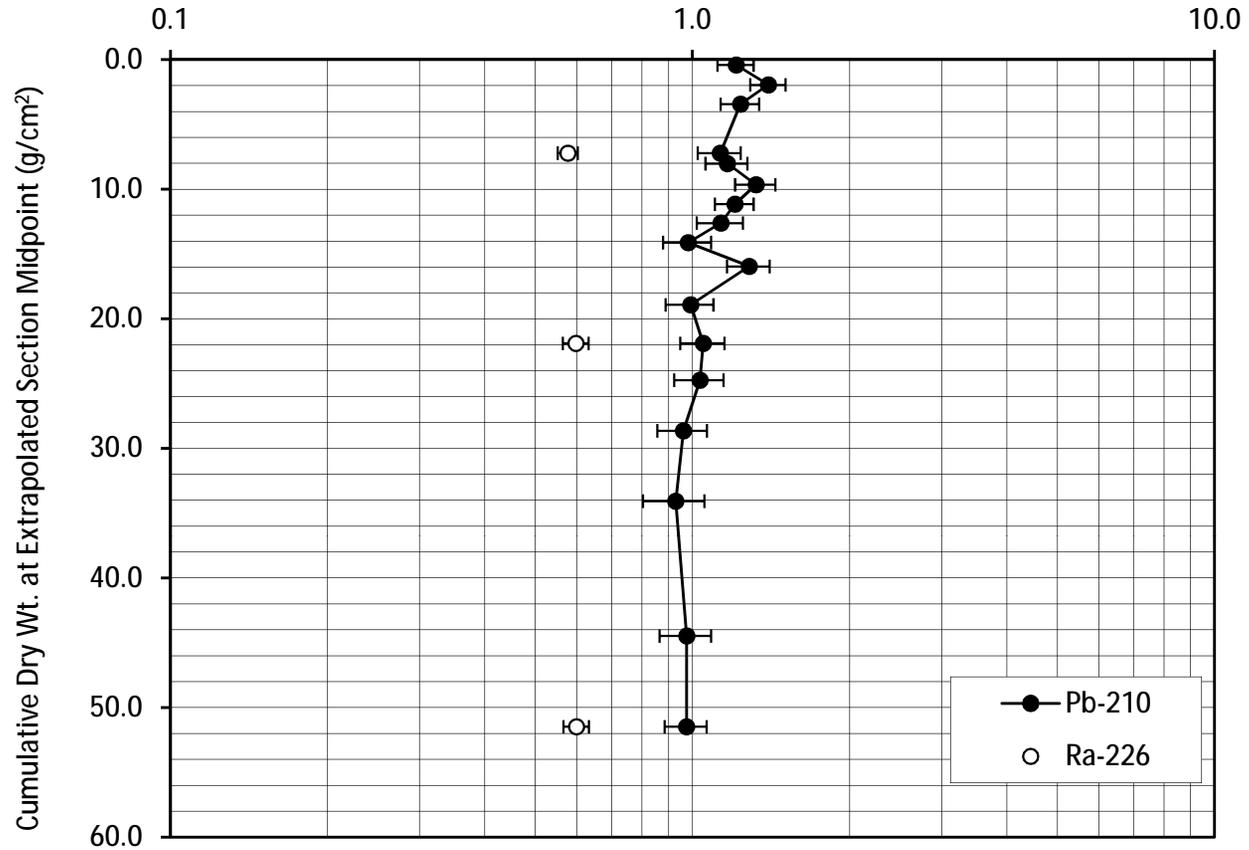
ISO / IEC 17025:2005 Accredited with the Canadian Association for Laboratory Accreditation (CALA Accreditation No. A3306)

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Total Pb-210 Activity vs. Accumulated Sediment

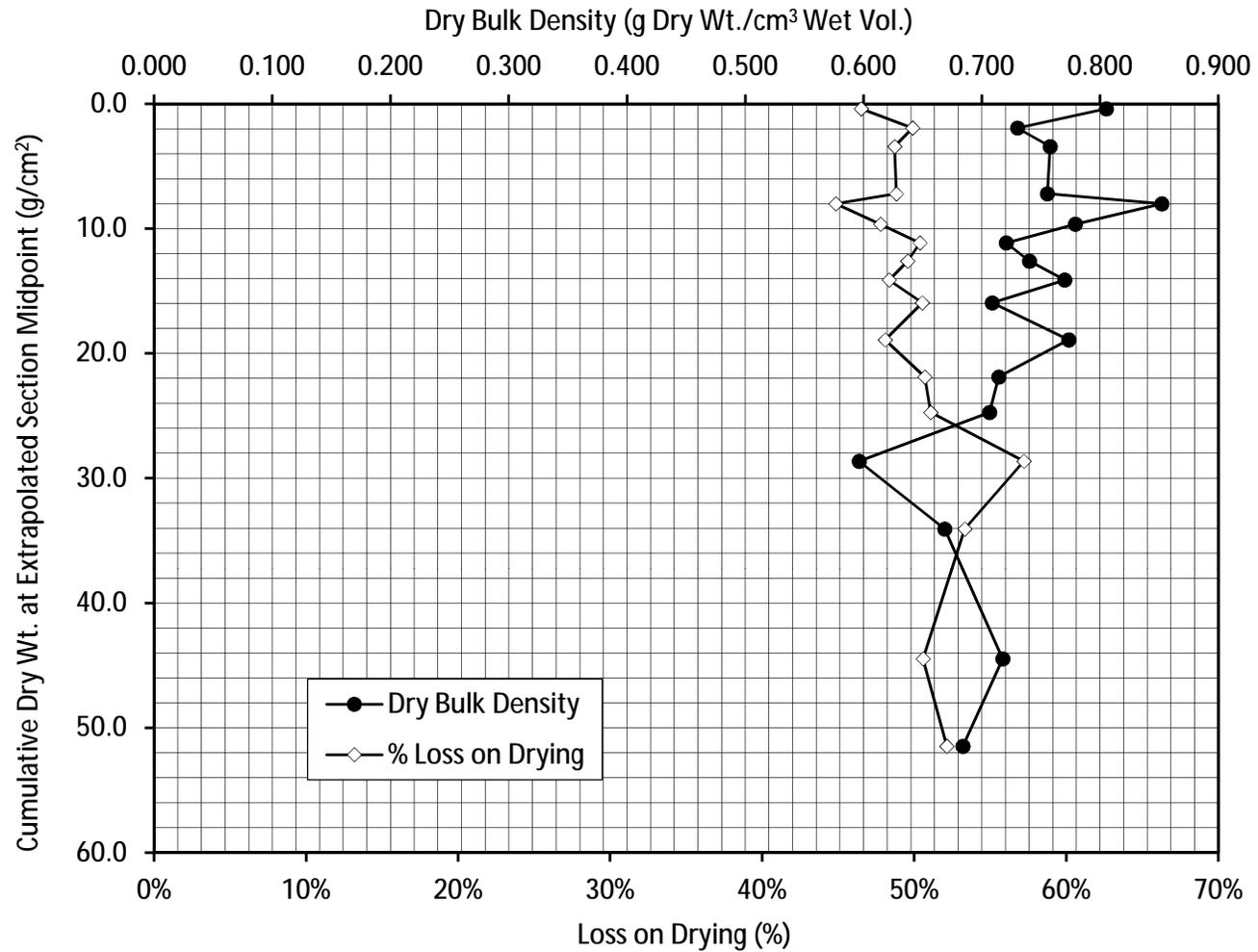
SE-08B

Total Pb-210 Activity (DPM/g Dry Wt.)



Dry Bulk Density and % Loss on Drying
vs. Accumulated Sediment

SE-08B



Results of Ra-226 Analysis by Rn-222 Emanation

Flett Research Ltd.

440 DeSalaberry Ave., Winnipeg, MB R2L 0Y7

Fax/Phone: (204) 667-2505

Email: flett@flettresearch.ca Webpage: <http://www.flettresearch.ca>

Client: Paulik, Blair

Address: 2001 NW 19th Avenue, Suite 200, Portland, OR 97209

Core ID: SE-08B

Date Received: 10-Oct-19

Sampling Date: 24-Sep-19

Date Issued: 17-Jan-20

Transaction ID: 918

PO/Contract No.: Contract signed Oct 24-19

Analysis Dates: November 23 - December 27, 2019

Analysts: L. Hesketh-Jost

Salt Correction Applied? No

Analytical Method: N40110 Determination of Radium-226 in Sediment, Soil and Peat by Radon-222 Emanation (Version 3)

Comments:

Detection Limit: The method detection limit (MDL) is dependent on the amount of sample analyzed. For a 60,000 second counting time the MDL at 95% confidence for 2 g of dry sample is 0.1 DPM/g and for 0.5 g of dry sample is 0.5 DPM/g.

Estimated Uncertainty: The estimate of uncertainty of measurement for this method in this laboratory is approximately $\pm 12\%$ at 95% confidence level (approximately 40,000 counts in 60,000 seconds).

Results authorized by Dr. Robert J. Flett, Chief Scientist

Core ID	Sample ID	Ra-226 Activity (DPM/g Dry Wt.)	Combined Error: 1 SD (DPM/g Dry Wt.)	Comments Code for Ra-226 Analysis
SE-08B	SE-08B-0.295-0.328	0.58	0.03	
SE-08B	SE-08B-0.919-0.984	0.60	0.03	
SE-08B	SE-08B-2.297-2.461	0.60	0.03	

Q:\Clients M-Z\Paulik, Blair - Maul Foster & Alongi Inc\2019(918)\Radioisotopes\SE-08B\Pb-210, Ra-226 and Cs-137 Paulik SE-08B Jan 16-20 Final.xlsm

Duplicate: Two subsamples of the same sample were carried through the analytical procedure in an identical manner.

Re-count: The sample bottle was re-sealed after the initial analysis, and was re-counted after 11 or more days of Rn-222 ingrowth. Repeat counting was chosen over duplicate analysis due to insufficient sample material provided.

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Note: Results relate only to the items tested.

27-Dec-19

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Radium Analysis by Rn-222 Emanation

Core ID	SE-08B
Sample ID	SE-08B-0.295-0.328
Lucas Cell No.	3
Number of days since Rn board last run	1
Dry weight of sample counted (g)	1.476
Total count in period	2652
Total count in period (carryover corrected)	2646
Cell Blank count (CPM)	0.516
System Blank (DPM)	0.398
System Efficiency	0.837
Count duration (minutes)	1000

Typical carryover is about 1 - 2 % of the net counts (gross counts less system background) of the sample counted on the previous day. The carryover is subtracted from the gross counts of current sample. This correction is not required if the sample is run after a blank.

Carryover correction?	Yes		
Gross counts of previous sample	1542	Mean of last 10 carryover measurements	0.84%
Counts carried over from previous sample	6	Mean of last 6 system background measurements	837

	Year	Month	Day	Hour	Minute	Second	Ingrowth time (Days)	Ingrowth factor	Decay correction
When sample last stripped	2019	11	26	14	39	0	14.02	0.92117	0.92490
When cell filled	2019	12	10	15	6	55			
Beginning time of count	2019	12	10	17	7	18			

Counts per minute	2.65
Gross CPM less Cell Blank (CPM)	2.13
CPM (decay during count corrected)	2.30
DPM Sample +System (efficiency corrected)	2.75
DPM sample	2.55
DPM/g	1.73
Ra-226 DPM/g	0.58
Ra-226 pCi/g	0.26

Error ± 1 SD 0.1116 DPM

Error ± 1 SD 0.0252 DPM/g

Error % = 4.4

Chemist	XH
PMT High Voltage +ve	770
HV Power supply	Spectrum Technologies
Alpha Counter	Spectrum Technologies
Region of Interest Ch.#s	28-1022
PMT	6655A - #1
Preamp	Canberra 2007P tube base
Amp Gain	1

Radium Analysis by Rn-222 Emanation

Core ID	SE-08B
Sample ID	SE-08B-0.919-0.984
Lucas Cell No.	3
Number of days since Rn board last run	1
Dry weight of sample counted (g)	1.063
Total count in period	2102
Total count in period (carryover corrected)	n/a
Cell Blank count (CPM)	0.516
System Blank (DPM)	0.398
System Efficiency	0.837
Count duration (minutes)	1000

Typical carryover is about 1 - 2 % of the net counts (gross counts less system background) of the sample counted on the previous day. The carryover is subtracted from the gross counts of current sample. This correction is not required if the sample is run after a blank.	
Carryover correction?	No

	Year	Month	Day	Hour	Minute	Second	Ingrowth time (Days)	Ingrowth factor	Decay correction
When sample last stripped	2019	12	14	16	31	0	11.08	0.86579	0.92494
When cell filled	2019	12	25	18	30	0			
Beginning time of count	2019	12	25	20	30	0			

Counts per minute	2.10
Gross CPM less Cell Blank (CPM)	1.59
CPM (decay during count corrected)	1.71
DPM Sample +System (efficiency corrected)	2.05
DPM sample	1.91
DPM/g	1.79
Ra-226 DPM/g	0.60
Ra-226 pCi/g	0.27

Error ± 1 SD 0.1083 DPM

Error ± 1 SD 0.0340 DPM/g

Error % = 5.7

Chemist	RF
PMT High Voltage +ve	770
HV Power supply	Spectrum Technologies
Alpha Counter	Spectrum Technologies
Region of Interest Ch.#s	28-1022
PMT	6655A - #1
Preamp	Canberra 2007P tube base
Amp Gain	1

Radium Analysis by Rn-222 Emanation

Core ID	SE-08B
Sample ID	SE-08B-2.297-2.461
Lucas Cell No.	3
Number of days since Rn board last run	1
Dry weight of sample counted (g)	1.087
Total count in period	2178
Total count in period (carryover corrected)	2167
Cell Blank count (CPM)	0.516
System Blank (DPM)	0.398
System Efficiency	0.837
Count duration (minutes)	1000

Typical carryover is about 1 - 2 % of the net counts (gross counts less system background) of the sample counted on the previous day. The carryover is subtracted from the gross counts of current sample. This correction is not required if the sample is run after a blank.

Carryover correction?	Yes		
Gross counts of previous sample	2102	Mean of last 10 carryover measurements	0.84%
Counts carried over from previous sample	11	Mean of last 6 system background measurements	837

	Year	Month	Day	Hour	Minute	Second	Ingrowth time (Days)	Ingrowth factor	Decay correction
When sample last stripped	2019	12	14	16	30	0	12.07	0.88786	0.92494
When cell filled	2019	12	26	18	17	0			
Beginning time of count	2019	12	26	20	17	0			

Counts per minute	2.17
Gross CPM less Cell Blank (CPM)	1.65
CPM (decay during count corrected)	1.79
DPM Sample +System (efficiency corrected)	2.13
DPM sample	1.95
DPM/g	1.80
Ra-226 DPM/g	0.60
Ra-226 pCi/g	0.27

Error ± 1 SD 0.1084 DPM

Error ± 1 SD 0.0332 DPM/g

Error % = 5.5

Chemist	RF
PMT High Voltage +ve	770
HV Power supply	Spectrum Technologies
Alpha Counter	Spectrum Technologies
Region of Interest Ch.#s	28-1022
PMT	6655A - #1
Preamp	Canberra 2007P tube base
Amp Gain	1

Results of Cs-137 Analysis

Flett Research Ltd.

440 DeSalaberry Ave. Winnipeg, MB R2L 0Y7

Fax / Phone: (204) 667-2505

Email: flett@flettresearch.ca Webpage: http://www.flettresearch.ca

Client: Paulik, Blair

Address: 2001 NW 19th Avenue, Suite 200, Portland, OR 97209

Core ID: SE-08B
Date Received: 10-Oct-19
Sampling Date: 24-Sep-19
Date Issued: 17-Jan-20

Transaction ID: 918
PO/Contract No.: Contract signed Oct 24-19
Analysis Dates: December 9, 2019 - January 15, 2020
Analysts: X. Hu

Salt Correction?	No
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Analytical Method: N30120 Measurement of Gamma-Ray Emitting Radionuclides in Sediment/Soil Samples by Gamma Spectrometry Using HPGe Detectors (Version 2)

Deviation from Method:

Comments: <2SD: The measured Cs-137 activity is less than 2 counting errors (i.e. 2 SD), suggesting no significant presence of Cs-137 in this sample.

trace: There is an apparent peak properly positioned at the known energy level of 661.6 KeV of Cs-137, suggesting possible presence of trace amount of Cs-137.

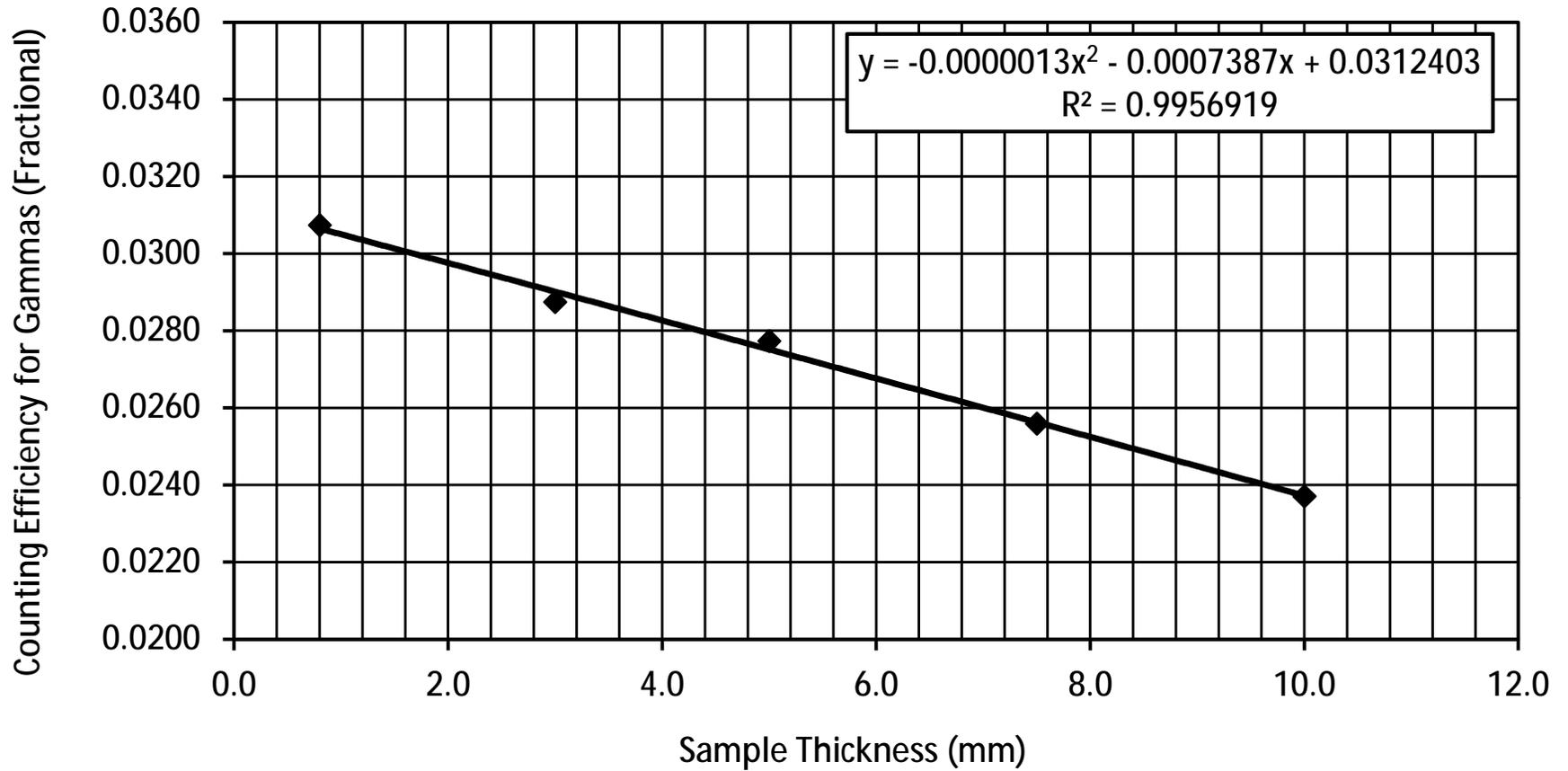
Detection Limit: The method detection limit (MDL) is 0.3 DPM/g for an 80,000 seconds counting period when measuring a 9 g of dry sample at a 95% confidence level. The method detection limit can be decreased to 0.1 DPM/g if 32 g of sample is used.

Estimated Uncertainty: The estimated uncertainty of this method has been determined to be ± 10% at 95% confidence for samples with activities between 0.5 and 20 DPM/g, counting time 80,000 seconds and sample weights ranging from 9 to 32 grams. Method uncertainty can increase to 85% for samples with activities near detection limit (0.1 - 0.3 DPM/g).

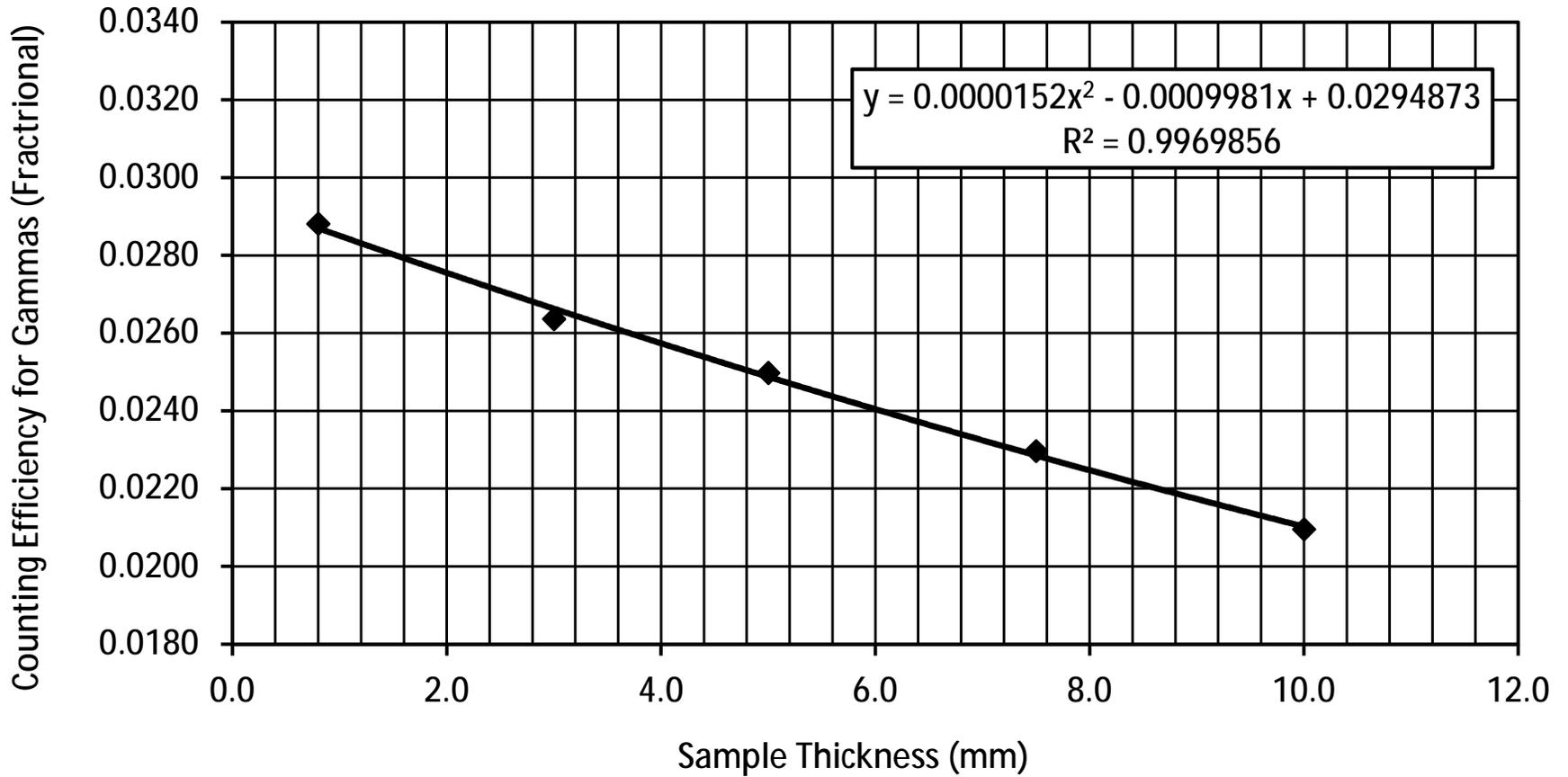
Results authorized by Dr. Robert J. Flett, Chief Scientist

Sample ID	Upper Depth (cm)	Lower Depth (cm)	Day Sample Counted	Month Sample Counted	Year Sample Counted	Integral NET Cs-137 Peak	Counting Error 1 SD (Counts)	Count Time (seconds)	Dry Sample Weight (g)	Sample Thickness (mm)	CPM/g	Efficiency for Gammas Fractional	Gammas per min. per gram	Activity DPM/g (dry wt.) on Counting Date	Approx. Error DPM/g	Activity DPM/g (dry wt.) on Sampling Date	Approx. Error DPM/g	Activity pCi/g (dry wt.) on Sampling Date	Approx. Error pCi/g	Activity mBq/g (dry wt.) on Sampling Date	Approx. Error mBq/g	Detector Used	Comments Code for Cs-137 Analysis
SE-08B-0.000-0.033	0	1	9	12	2019	62	40	80000	15.584	4.10	0.0030	0.0282	0.1058	0.12	0.08	0.12	0.08	0.06	0.04	2.08	1.34	GMX	<2SD
SE-08B-0.033-0.066	1	2	10	12	2019	29	38	80000	13.784	3.95	0.0016	0.0258	0.0612	0.07	0.09	0.07	0.09	0.03	0.04	1.20	1.58	GEM	<2SD
SE-08B-0.131-0.164	4	5	10	12	2019	26	42	80000	13.641	3.50	0.0014	0.0286	0.0499	0.06	0.09	0.06	0.10	0.03	0.04	0.98	1.58	GMX	<2SD
SE-08B-0.197-0.230	6	7	13	12	2019	36	38	80000	12.513	3.68	0.0022	0.0285	0.0757	0.09	0.09	0.09	0.09	0.04	0.04	1.49	1.57	GMX	<2SD
SE-08B-0.295-0.328	9	10	11	12	2019	86	39	80000	12.313	3.60	0.0052	0.0286	0.1834	0.22	0.10	0.22	0.10	0.10	0.04	3.61	1.63	GMX	trace
SE-08B-0.394-0.427	12	13	3	1	2020	34	44	80000	15.288	4.18	0.0017	0.0281	0.0593	0.07	0.09	0.07	0.09	0.03	0.04	1.17	1.51	GMX	<2SD
SE-08B-0.525-0.558	16	17	3	1	2020	87	38	80000	9.488	2.73	0.0069	0.0430	0.1599	0.19	0.08	0.19	0.08	0.09	0.04	3.15	1.36	Canberra	
SE-08B-0.656-0.722	20	22	3	1	2020	45	36	80000	18.801	5.30	0.0018	0.0246	0.0729	0.09	0.07	0.09	0.07	0.04	0.03	1.44	1.15	GEM	<2SD; trace
SE-08B-0.787-0.853	24	26	13	1	2020	60	35	80000	20.002	5.30	0.0022	0.0246	0.0914	0.11	0.06	0.11	0.06	0.05	0.03	1.80	1.05	GEM	<2SD
SE-08B-0.919-0.984	28	30	13	1	2020	55	43	80000	13.752	4.43	0.0030	0.0279	0.1073	0.13	0.10	0.13	0.10	0.06	0.04	2.11	1.65	GMX	<2SD
SE-08B-1.050-1.115	32	34												0.26	0.06	0.26	0.06	0.12	0.03	4.29	1.06	Canberra	
SE-08B-1.476-1.640	45	50	6	1	2020	115	45	80000	13.245	4.13	0.0065	0.0282	0.2312	0.27	0.11	0.27	0.11	0.12	0.05	4.55	1.78	GMX	trace
SE-08B-1.969-2.133	60	65	6	1	2019	122	36	80000	17.175	5.10	0.0053	0.0248	0.2149	0.25	0.07	0.25	0.07	0.11	0.03	4.13	1.22	GEM	
SE-08B-2.297-2.461	70	75	14	1	2020	107	34	80000	15.491	4.33	0.0052	0.0255	0.2035	0.24	0.08	0.24	0.08	0.11	0.03	4.01	1.27	GEM	
Re-count																							
SE-08B-1.050-1.115	32	34	6	1	2020	149	36	80000	11.966	3.50	0.0093	0.0420	0.2225	0.26	0.06	0.26	0.06	0.12	0.03	4.38	1.05	Canberra	
SE-08B-1.050-1.115 Re-count	32	34	14	1	2020	143	36	80000	11.966	3.50	0.0090	0.0420	0.2135	0.25	0.06	0.25	0.06	0.11	0.03	4.21	1.06	Canberra	
Cs-137 Standards																							
GMX 32g 10 mm			11	10	2019	19725	142	5000	32.00	10.0	7.3969	0.0237	311.9975	366.19	2.64	957.04							
GMX 24g 7.5mm			10	10	2019	15972	128	5000	24.00	7.5	7.9860	0.0256	312.0171	366.22	2.93	957.04							
GMX 15g 5mm			10	10	2019	10817	105	5000	15.00	5.0	8.6536	0.0277	312.0171	366.22	3.55	957.04							
GMX 9g 3mm			10	10	2019	6727	83	5000	9.00	3.0	8.9693	0.0287	312.0171	366.22	4.52	957.04							
GMX 2.85g 0.8mm			11	10	2019	2281	49	5000	2.854	0.8	9.5907	0.0307	311.9975	366.19	7.87	957.04							
GEM 32g 10 mm			10	10	2019	17437	135	5000	32.00	10.0	6.5389	0.0210	312.0171	366.22	2.84	957.04							
GEM 24g 7.5mm			10	10	2019	14334	123	5000	24.00	7.5	7.1670	0.0230	312.0171	366.22	3.14	957.04							
GEM 15g 5mm			10	10	2019	9742	102	5000	15.00	5.0	7.7936	0.0250	312.0171	366.22	3.83	957.04							
GEM 9g 3mm			15	10	2019	6168	81	5000	9.00	3.0	8.2240	0.0264	311.9187	366.10	4.81	957.04							

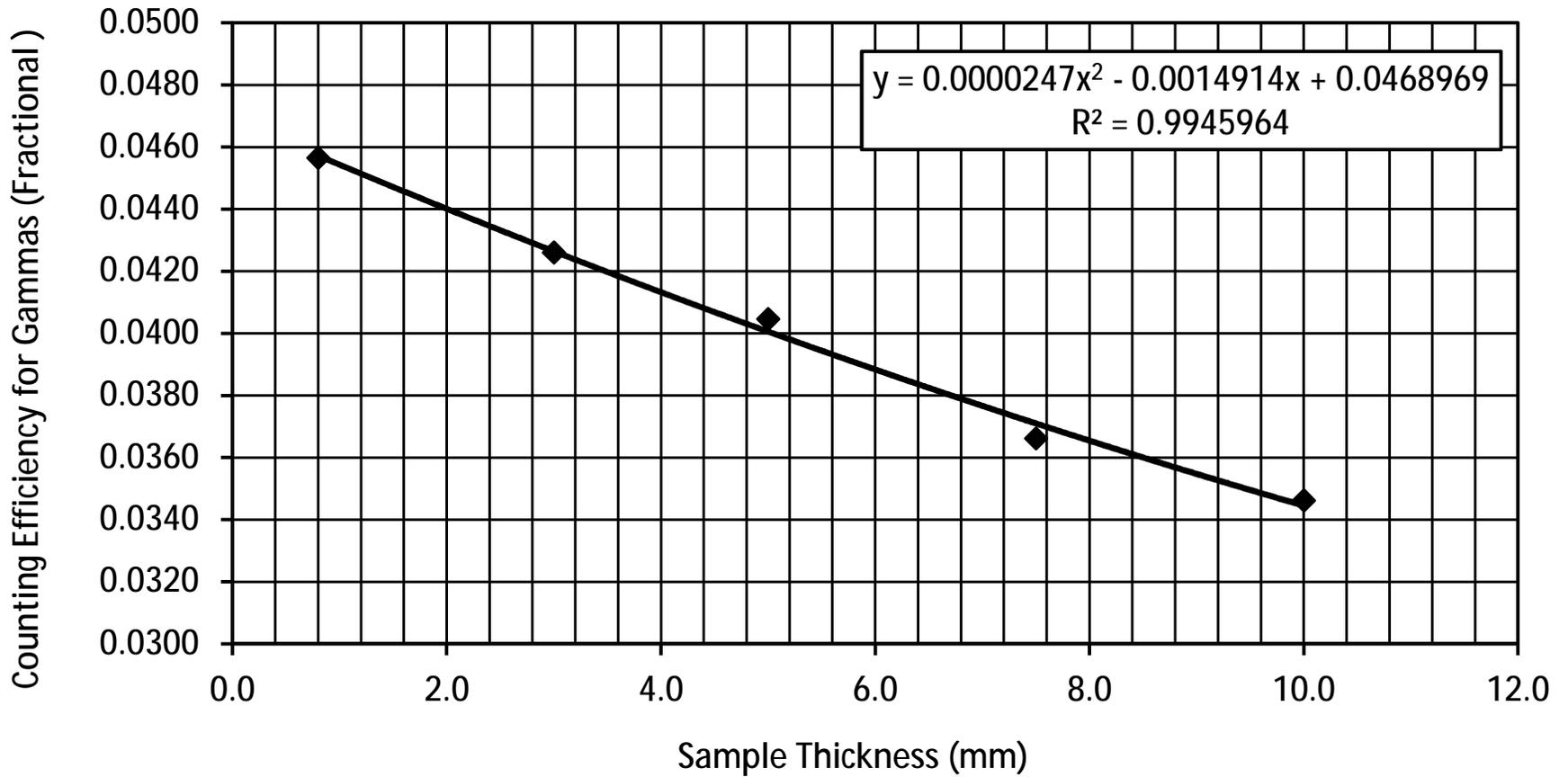
Cs-137 Counting Efficiency of Gammas vs. Sample Thickness (mm) GMX 25% Detector (Oct 10-11, 2019)



Cs-137 Counting Efficiency of Gammas vs. Sample Thickness (mm) GEM 19% Detector (Oct 10-15, 2019)

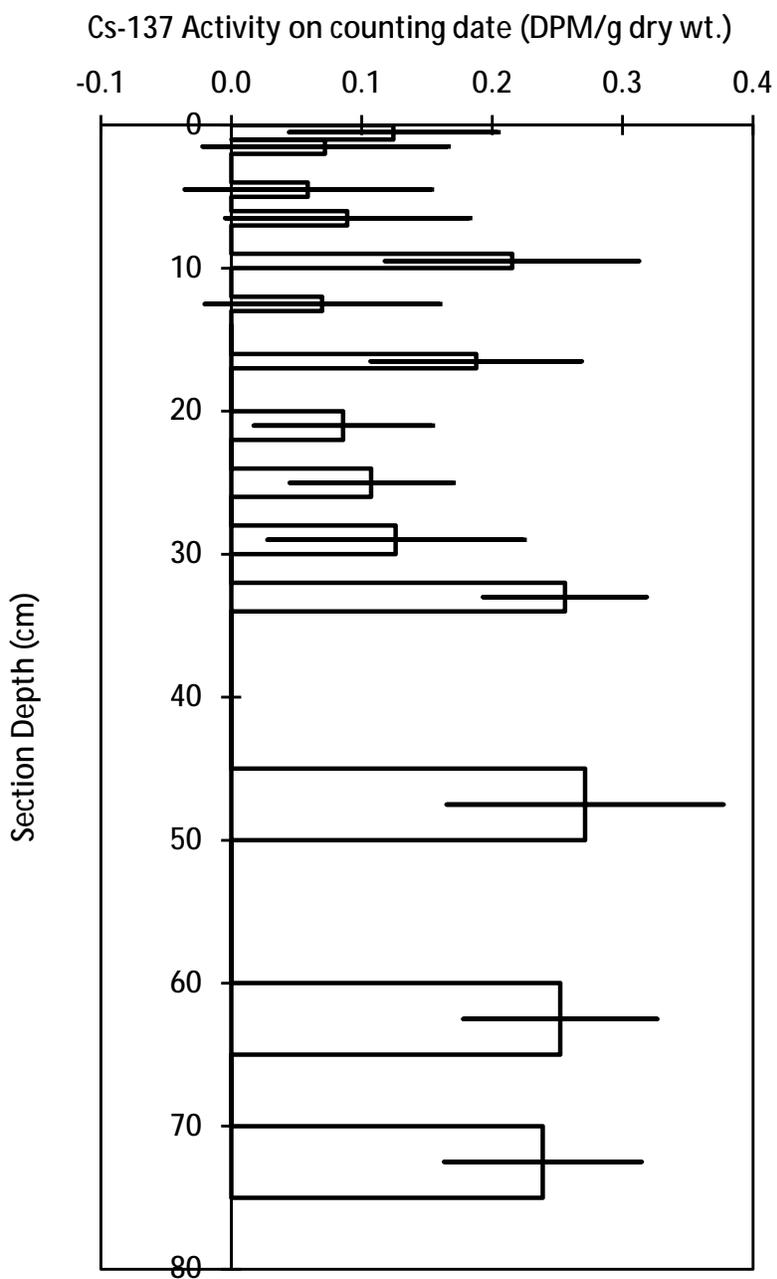


Cs-137 Counting Efficiency of Gammas vs. Sample Thickness (mm) Canberra 29% Detector (Oct 10-11, 2019)



Cs-137 in Sediments

SE-08B



Note: The bar plotted at the midpoint depth of each section represents +/- 1 standard deviation of the Cs-137 counting error.

Interpretation of Pb-210, Ra-226 and Cs-137 Results

Flett Research Ltd.

440 DeSalaberry Ave. Winnipeg, MB R2L 0Y7

Fax/Phone: (204) 667-2505

Email: flett@flettresearch.ca Webpage: <http://www.flettresearch.ca>

Client: Paulik, Blair

Address: 2001 NW 19th Avenue, Suite 200, Portland, OR 97209
Core ID: SE-12
Transaction ID: 918
PO/Contract No.: Contract signed Oct 24-19
Date Received: 10-Oct-19
Analysis Dates: October 31, 2019 - January 15, 2020
Analysts: L. Hesketh-Jost; X. Hu
Sampling Date: 25-Sep-19
Date Issued: 17-Jan-20

Results authorized by Dr. Robert J. Flett, Chief Scientist

INTERPRETATION

Observations:

The Pb-210 activities in this core are low, varying between 0.49 - 0.88 DPM/g. The shape of the Pb-210 profile is irregular, showing no consistent pattern (Pages 2 & 3).

Plenty of vegetation was mixed with sediment throughout the core. The dry bulk densities vary between 0.360 - 0.699 g/cm³ (Pages 2 & 4).

Ra-226 was measured at 0.28, 0.46 and 0.48 DPM/g in section 10 (depth 9 - 10 cm), section 25 (depth 28 - 30 cm) and section 33 (depth 55 - 60 cm), respectively (Pages 5 - 8). The Pb-210 activities are significantly higher than the Ra-226 activities, indicating that the background Pb-210 activity level has not been achieved at the bottom of this core (depth 60 cm), and these sediments are probably less than 45 years old, the maximum age that can be estimated in this core.

Significant presence of Cs-137 was found in the bottom section (depth 55 - 60 cm) as well as all sections above, indicating that the sediments deposited at this sampling site are all more modern than 1963 (Pages 9 - 13).

Regression model of Unsupported Pb-210 activity vs. Cumulative Dry Weight (g/cm²):

When applying the linear regression model, it is assumed that the input of Pb-210 and the sediment accumulation rate are constant. These assumptions are not satisfied, and therefore the model cannot be applied to the core.

CRS model of Age at bottom of Extrapolated section in years vs. Depth of bottom edge of current section in cm:

The CRS model assumes constant input of Pb-210 and a core that is long enough to include all of the measurable atmospheric source Pb-210, i.e. it contains a complete Pb-210 inventory. These assumptions are not satisfied, and therefore the model cannot be applied to the core.

Conclusion:

The irregular shape of Pb-210 profile may indicate highly variable sediment accumulation rates at this sampling site, and the overall sediment accumulation rate is high.

It is impossible to confidently determine the date of deposition of any of the sediments, other than to say all sediments appear to be deposited after 1963.

Overall, the analytical quality of radioisotope data (based upon the recovery of spike, the recovery of CRM, the results of repeat analyses and blanks) is considered good.

Results of Pb-210 by Po-210 Analysis

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Client: Paulik, Blair

Address: 2001 NW 19th Avenue, Suite 200, Portland, OR 97209

Core ID: SE-12

Date Received: 10-Oct-19

Sampling Date: 25-Sep-19

Date issued: 17-Jan-20

Transaction ID: 918

PO/Contract No.: Contract signed Oct 24-19

Analysis Dates: October 31 - December 25, 2019

Analysts: L. Hesketh-Jost

Salt correction applied? No

Analytical Method: N20110 Determination of Lead-210 in Sediment, Soil and Peat by Alpha Spectrometry (Version 5)

Deviations from Method:

Comments:

Detection Limit: The method detection limit (MDL) for 0.25 - 0.5 g (dry wt.) sample is between 0.05 - 0.1 DPM Po-210/g dry sample at a 95% confidence level for 60,000 second counting time, and is based on greater than 20 method blanks. This can vary slightly and depends upon the amount of sample, detector and recovery efficiency of each sample.

Estimated Uncertainty: The estimated uncertainty for samples analyzed by this method (acid extraction) has been determined to be ± 11% at concentrations between 0.6 and 40 DPM/g at 95% confidence.

Results authorized by Dr. Robert J. Flett, Chief Scientist

Section Number	Sample ID	Upper Depth (cm)	Lower Depth (cm)	Extrapolated Upper Section Depth (cm)	Extrapolated Lower Section Depth (cm)	Dry Bulk Density (Dry wt./Wet vol.) (g/cm3)	% Loss on Drying	Mass in Extrapolated Section (g/cm2)	Cumulative Mass to Bottom of Current Section (g/cm2)	Plot-point of Cumulative Mass in Current Section (g/cm2)	Po-209 Counts Less Detector Background	Po-210 Counts Less Detector Background and Po-209 Spike Standard Blank	Weight of Sample Counted (g)	Count Time (sec)	Po-210 Total Activity (DPM/g)	Error Po-210 +/- 1 S.D. (DPM/g)	Po-210 Unsupported Activity (DPM/g)	Age at Bottom of Extrapolated Section in Years (CRS Model Estimate)	Depth of Bottom Edge of Current Section (cm)	DPM/cm ² in Section - Unsupported	CRS Sediment Accumulation Rate (g/cm ² /yr)	Age at Bottom of Extrapolated Section in Years (Linear Regression Model Estimate)	Ra-226 Activity (DPM/g dry wt.)	Error Ra-226 +/- 1 S.D. (DPM/g dry wt.)	Comments Code for Pb-210 Analysis	
1	SE-12-0.000-0.033	0.0	1.0	0.00	1.50	0.545	59.43%	0.817	0.817	0.272					0.82	0.09										
3	SE-12-0.066-0.099	2.0	3.0	1.50	3.00	0.569	58.02%	0.853	1.670	1.386	2014	86	0.507	60000	0.82	0.09										
4	SE-12-0.099-0.131	3.0	4.0	3.00	4.50	0.570	57.83%	1.997	3.667	1.956	2481	107	0.528	60000	0.80	0.08										
10	SE-12-0.295-0.328	9.0	10.0	6.50	10.50	0.360	70.20%	1.440	5.107	4.747	2241	102	0.501	60000	0.88	0.09						0.28	0.03			
12	SE-12-0.361-0.394	11.0	12.0	10.50	12.50	0.565	58.55%	1.130	6.237	5.672	1753	63	0.529	60000	0.66	0.09										
14	SE-12-0.427-0.459	13.0	14.0	12.50	14.00	0.546	59.03%	0.819	7.056	6.783	1800	64	0.504	60000	0.68	0.09										
15	SE-12-0.459-0.492	14.0	15.0	14.00	15.50	0.536	59.65%	0.804	7.860	7.324	2418	88	0.508	60000	0.70	0.08										
17	SE-12-0.525-0.558	16.0	17.0	15.50	17.50	0.459	64.89%	0.918	8.778	8.319	1597	42	0.516	60000	0.49	0.08										
19	SE-12-0.591-0.623	18.0	19.0	17.50	19.50	0.409	67.32%	0.818	9.595	9.187	1632	62	0.522	60000	0.71	0.09										
21	SE-12-0.656-0.722	20.0	22.0	19.50	23.00	0.457	64.50%	1.601	11.196	10.281	1449	55	0.599	60000	0.62	0.08										
23	SE-12-0.787-0.853	24.0	26.0	23.00	27.00	0.577	57.62%	2.306	13.502	12.349	1754	84	0.532	60000	0.87	0.10										
25	SE-12-0.919-0.984	28.0	30.0	27.00	31.00	0.697	52.25%	2.789	16.291	14.897	2264	91	0.500	60000	0.78	0.08						0.46	0.03			
27	SE-12-1.050-1.115	32.0	34.0	31.00	35.00	0.595	56.60%	2.381	18.672	17.482	3552	60	0.513	60000	0.64	0.09										
29	SE-12-1.181-1.247	36.0	38.0	35.00	39.00	0.570	57.94%	2.279	20.951	19.812	3359	57	0.532	60000	0.62	0.09										
31	SE-12-1.312-1.476	40.0	45.0	39.00	50.00	0.643	54.34%	7.075	28.026	23.202					0.60	0.09										
33	SE-12-1.804-1.969	55.0	60.0	50.00	60.00	0.699	51.69%	6.995	35.021	33.272	1995	80	0.534	60000	0.73	0.08							0.48	0.03		
Blank	Blank w/o Po-209 spike										0	-4														
Blank	Blank w/ Po-209 spike										2934	0														
Blank	Blank w/o Po-209 spike										-3	-3														
Blank	Blank w/ Po-209 spike										2131	1														
1	SE-12-0.000-0.033	0.0	1.0			0.548	59.36%				1752	83	0.607	60000	0.76	0.09										
1 Dup	SE-12-0.000-0.033 Duplicate	0.0	1.0			0.542	59.50%				2313	102	0.485	60000	0.89	0.09										
31	SE-12-1.312-1.476	40.0	45.0			0.645	54.36%				1548	45	0.508	60000	0.56	0.09										
31 Dup	SE-12-1.312-1.476 Duplicate	40.0	45.0			0.642	54.32%				1553	55	0.531	60000	0.65	0.09										
CRM	IAEA 447										2608	1443	0.330	60000	16.32	0.43										
CRM	IAEA 447										1939	1159	0.352	60000	16.48	0.49										

Dup (duplicate): Two subsamples of the same sample were carried through the analytical procedure in an identical manner. Rep (replicate): Three or more subsamples of the same sample were carried through the analytical procedure in an identical manner.

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Note: Results relate only to the items tested.

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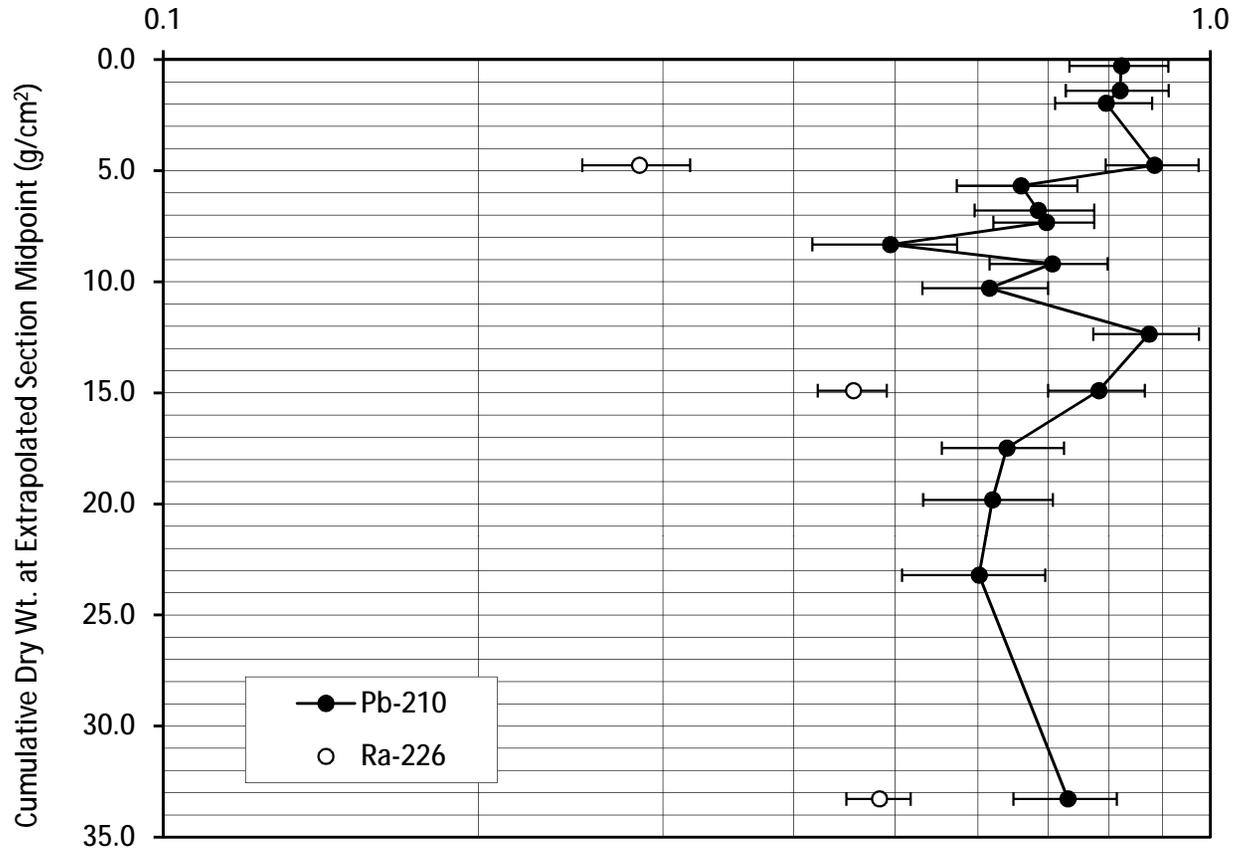
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Total Pb-210 Activity vs. Accumulated Sediment

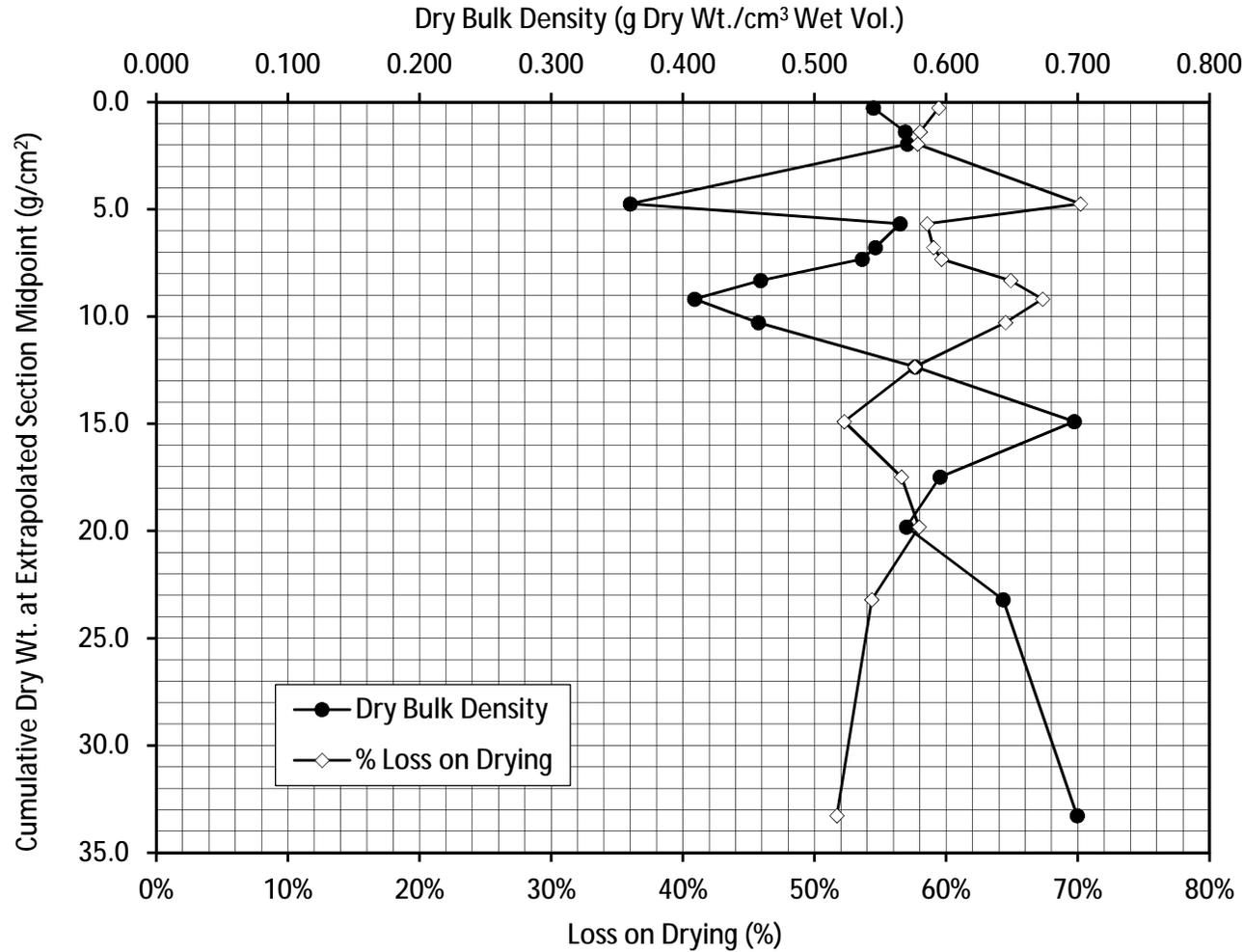
SE-12

Total Pb-210 Activity (DPM/g Dry Wt.)



Dry Bulk Density and % Loss on Drying
vs. Accumulated Sediment

SE-12



Results of Ra-226 Analysis by Rn-222 Emanation

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Client: Paulik, Blair

Address: 2001 NW 19th Avenue, Suite 200, Portland, OR 97209

Core ID: SE-12

Date Received: 10-Oct-19

Sampling Date: 25-Sep-19

Date Issued: 17-Jan-20

Transaction ID: 918

PO/Contract No.: Contract signed Oct 24-19

Analysis Dates: November 23 - December 29, 2019

Analysts: L. Hesketh-Jost; X. Hu

Salt Correction Applied? No

Analytical Method: N40110 Determination of Radium-226 in Sediment, Soil and Peat by Radon-222 Emanation (Version 3)

Comments:

Detection Limit: The method detection limit (MDL) is dependent on the amount of sample analyzed. For a 60,000 second counting time the MDL at 95% confidence for 2 g of dry sample is 0.1 DPM/g and for 0.5 g of dry sample is 0.5 DPM/g.

Estimated Uncertainty: The estimate of uncertainty of measurement for this method in this laboratory is approximately $\pm 12\%$ at 95% confidence level (approximately 40,000 counts in 60,000 seconds).

Results authorized by Dr. Robert J. Flett, Chief Scientist

Core ID	Sample ID	Ra-226 Activity (DPM/g Dry Wt.)	Combined Error: 1 SD (DPM/g Dry Wt.)	Comments Code for Ra-226 Analysis
SE-12	SE-12-0.295-0.328	0.28	0.03	
SE-12	SE-12-0.919-0.984	0.46	0.03	
SE-12	SE-12-1.804-1.969	0.48	0.03	

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Duplicate: Two subsamples of the same sample were carried through the analytical procedure in an identical manner.

Re-count: The sample bottle was re-sealed after the initial analysis, and was re-counted after 11 or more days of Rn-222 ingrowth. Repeat counting was chosen over duplicate analysis due to insufficient sample material provided.

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Note: Results relate only to the items tested.

29-Dec-19

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Radium Analysis by Rn-222 Emanation

Core ID	SE-12
Sample ID	SE-12-0.295-0.328
Lucas Cell No.	3
Number of days since Rn board last run	1
Dry weight of sample counted (g)	1.016
Total count in period	1459
Total count in period (carryover corrected)	1444
Cell Blank count (CPM)	0.516
System Blank (DPM)	0.398
System Efficiency	0.837
Count duration (minutes)	1000

Typical carryover is about 1 - 2 % of the net counts (gross counts less system background) of the sample counted on the previous day. The carryover is subtracted from the gross counts of current sample. This correction is not required if the sample is run after a blank.			
Carryover correction?	Yes		
Gross counts of previous sample	2652	Mean of last 10 carryover measurements	0.84%
Counts carried over from previous sample	15	Mean of last 6 system background measurements	837

	Year	Month	Day	Hour	Minute	Second	Ingrowth time (Days)	Ingrowth factor	Decay correction
When sample last stripped	2019	11	27	12	8	0	14.05	0.92166	0.92490
When cell filled	2019	12	11	13	24	41			
Beginning time of count	2019	12	11	15	25	4			

Counts per minute	1.44
Gross CPM less Cell Blank (CPM)	0.93
CPM (decay during count corrected)	1.00
DPM Sample +System (efficiency corrected)	1.20
DPM sample	0.87
DPM/g	0.85
Ra-226 DPM/g	0.28
Ra-226 pCi/g	0.13

Error ± 1 SD 0.1026 DPM

Error ± 1 SD 0.0336 DPM/g

Error % = 11.8

Chemist	XH
PMT High Voltage +ve	770
HV Power supply	Spectrum Technologies
Alpha Counter	Spectrum Technologies
Region of Interest Ch.#s	28-1022
PMT	6655A - #1
Preamp	Canberra 2007P tube base
Amp Gain	1

Radium Analysis by Rn-222 Emanation

Core ID	SE-12
Sample ID	SE-12-0.919-0.984
Lucas Cell No.	3
Number of days since Rn board last run	1
Dry weight of sample counted (g)	1.015
Total count in period	1809
Total count in period (carryover corrected)	1798
Cell Blank count (CPM)	0.516
System Blank (DPM)	0.398
System Efficiency	0.837
Count duration (minutes)	1000

Typical carryover is about 1 - 2 % of the net counts (gross counts less system background) of the sample counted on the previous day. The carryover is subtracted from the gross counts of current sample. This correction is not required if the sample is run after a blank.

Carryover correction?	Yes		
Gross counts of previous sample	2178	Mean of last 10 carryover measurements	0.84%
Counts carried over from previous sample	11	Mean of last 6 system background measurements	837

	Year	Month	Day	Hour	Minute	Second	Ingrowth time (Days)	Ingrowth factor	Decay correction
When sample last stripped	2019	12	14	16	30	0	13.01	0.90543	0.92494
When cell filled	2019	12	27	16	51	0			
Beginning time of count	2019	12	27	18	51	0			

Counts per minute	1.80
Gross CPM less Cell Blank (CPM)	1.28
CPM (decay during count corrected)	1.39
DPM Sample +System (efficiency corrected)	1.66
DPM sample	1.39
DPM/g	1.37
Ra-226 DPM/g	0.46
Ra-226 pCi/g	0.21

Error ± 1 SD 0.1052 DPM

Error ± 1 SD 0.0345 DPM/g

Error % = 7.6

Chemist	RF
PMT High Voltage +ve	770
HV Power supply	Spectrum Technologies
Alpha Counter	Spectrum Technologies
Region of Interest Ch.#s	28-1022
PMT	6655A - #1
Preamp	Canberra 2007P tube base
Amp Gain	1

Radium Analysis by Rn-222 Emanation

Core ID	SE-12
Sample ID	SE-12-1.804-1.969
Lucas Cell No.	3
Number of days since Rn board last run	1
Dry weight of sample counted (g)	1.034
Total count in period	1863
Total count in period (carryover corrected)	1855
Cell Blank count (CPM)	0.516
System Blank (DPM)	0.398
System Efficiency	0.837
Count duration (minutes)	1000

Typical carryover is about 1 - 2 % of the net counts (gross counts less system background) of the sample counted on the previous day. The carryover is subtracted from the gross counts of current sample. This correction is not required if the sample is run after a blank.

Carryover correction?	Yes		
Gross counts of previous sample	1809	Mean of last 10 carryover measurements	0.84%
Counts carried over from previous sample	8	Mean of last 6 system background measurements	837

	Year	Month	Day	Hour	Minute	Second	Ingrowth time (Days)	Ingrowth factor	Decay correction
When sample last stripped	2019	12	16	15	6	0	12.11	0.88854	0.92494
When cell filled	2019	12	28	17	41	0			
Beginning time of count	2019	12	28	19	41	0			

Counts per minute	1.85
Gross CPM less Cell Blank (CPM)	1.34
CPM (decay during count corrected)	1.45
DPM Sample +System (efficiency corrected)	1.73
DPM sample	1.50
DPM/g	1.45
Ra-226 DPM/g	0.48
Ra-226 pCi/g	0.22

Error ± 1 SD 0.1059 DPM

Error ± 1 SD 0.0341 DPM/g

Error % = 7.1

Chemist	RF
PMT High Voltage +ve	770
HV Power supply	Spectrum Technologies
Alpha Counter	Spectrum Technologies
Region of Interest Ch.#s	28-1022
PMT	6655A - #1
Preamp	Canberra 2007P tube base
Amp Gain	1

Results of Cs-137 Analysis

Flett Research Ltd.

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Date Received: 10-Oct-19
Sampling Date: 25-Sep-19
Date Issued: 17-Jan-20

Transaction ID: 918
PO/Contract No.: Contract signed Oct 24-19
Analysis Dates: December 11, 2019 - January 15, 2020
Analysts: X. Hu

Salt Correction? No

Analytical Method: N30120 Measurement of Gamma-Ray Emitting Radionuclides in Sediment/Soil Samples by Gamma Spectrometry Using HPGe Detectors (Version 2)
Deviation from Method:

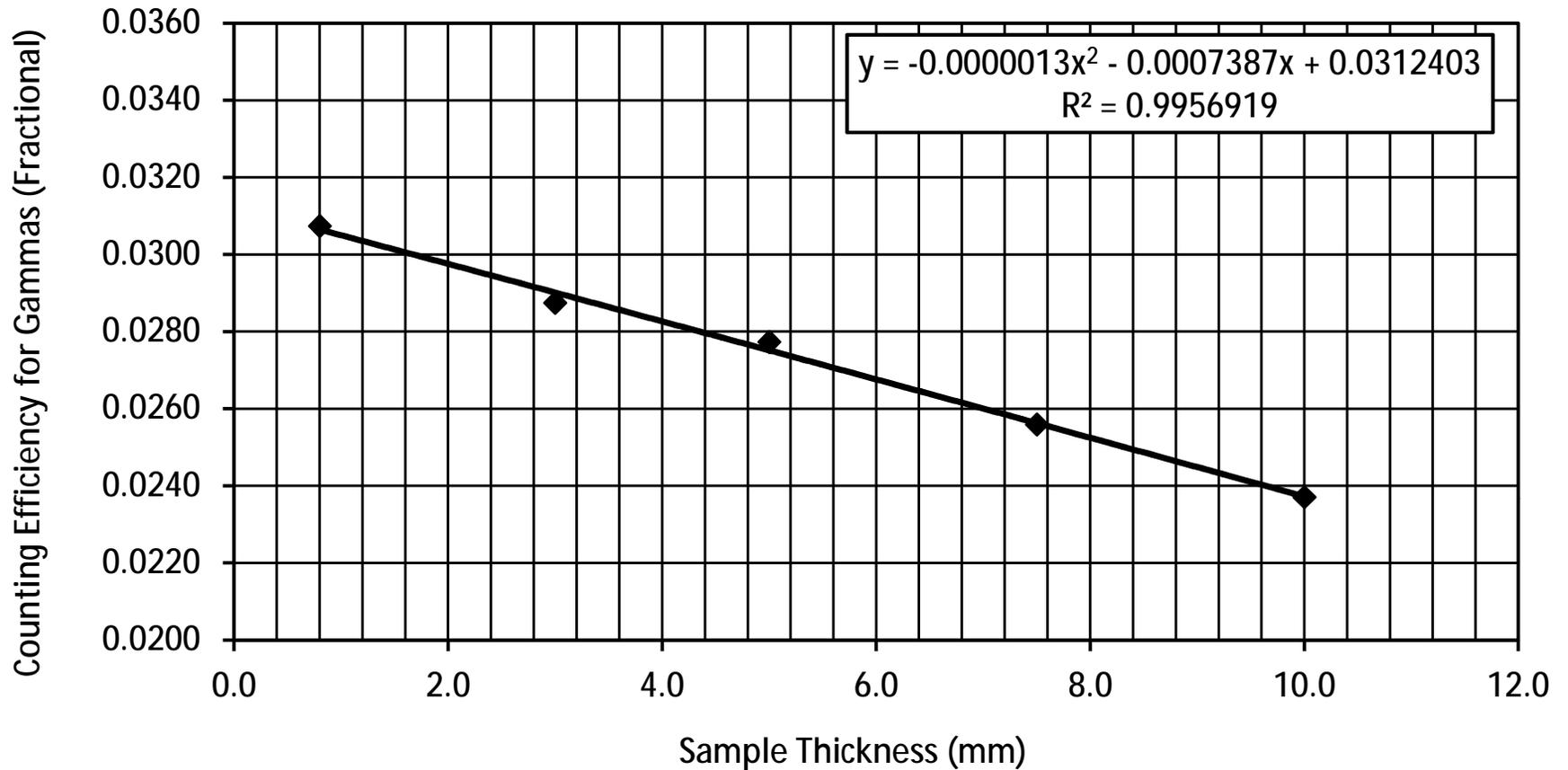
Comments:

Detection Limit: The method detection limit (MDL) is 0.3 DPM/g for an 80,000 seconds counting period when measuring a 9 g of dry sample at a 95% confidence level. The method detection limit can be decreased to 0.1 DPM/g if 32 g of sample is used.
Estimated Uncertainty: The estimated uncertainty of this method has been determined to be ± 10% at 95% confidence for samples with activities between 0.5 and 20 DPM/g, counting time 80,000 seconds and sample weights ranging from 9 to 32 grams. Method uncertainty can increase to 85% for samples with activities near detection limit (0.1 - 0.3 DPM/g).

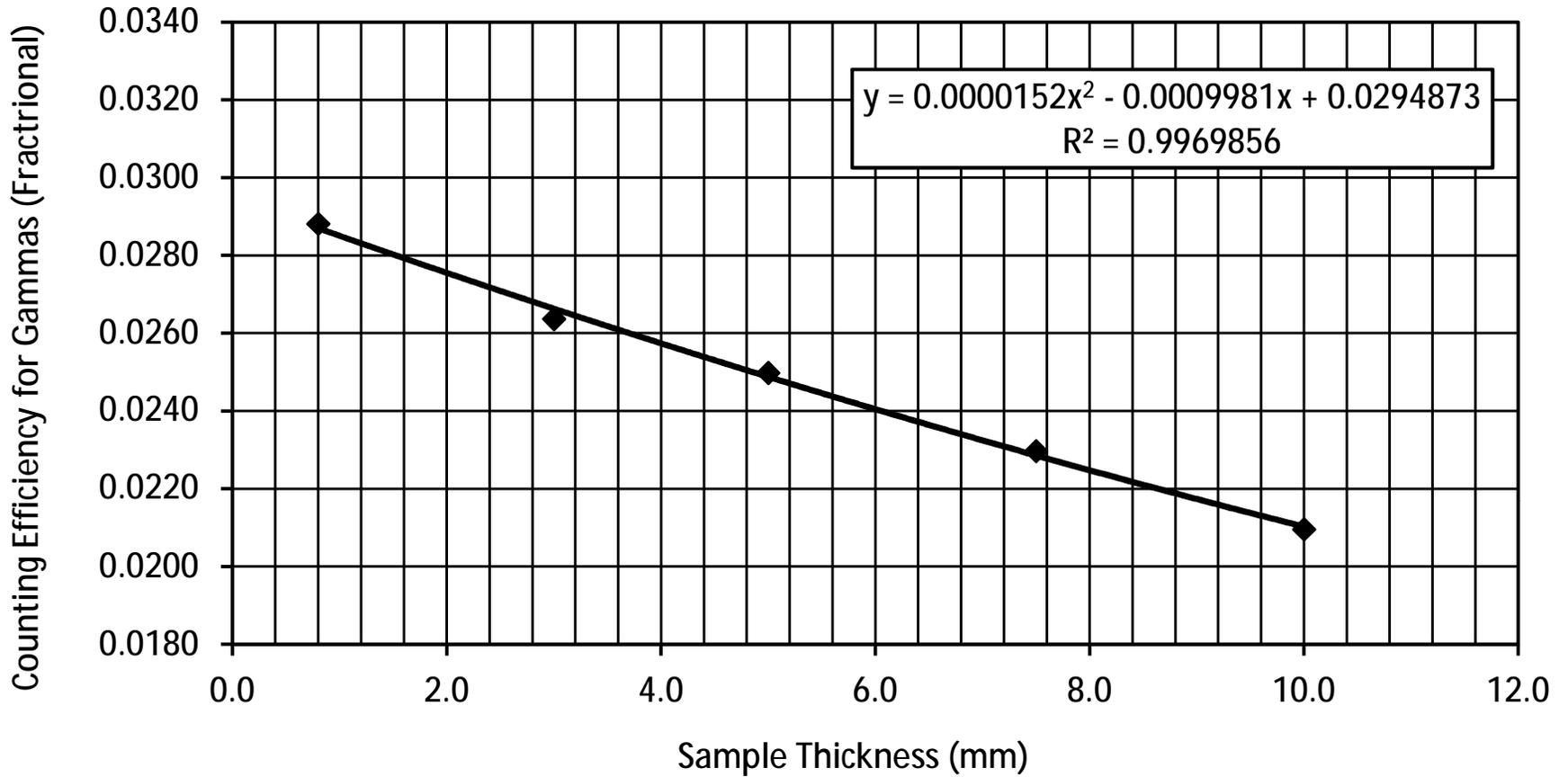
Results authorized by Dr. Robert J. Flett, Chief Scientist

Sample ID	Upper Depth (cm)	Lower Depth (cm)	Day Sample Counted	Month Sample Counted	Year Sample Counted	Integral NET Cs-137 Peak	Counting Error 1 SD (Counts)	Count Time (seconds)	Dry Sample Weight (g)	Sample Thickness (mm)	CPM/g	Efficiency for Gammas Fractional	Gammas per min. per gram	Activity DPM/g (dry wt.) on Counting Date	Approx. Error DPM/g	Activity DPM/g (dry wt.) on Sampling Date	Approx. Error DPM/g	Activity pCi/g (dry wt.) on Sampling Date	Approx. Error pCi/g	Activity mBq/g (dry wt.) on Sampling Date	Approx. Error mBq/g	Detector Used	Comments Code for Cs-137 Analysis
SE-12-0.000-0.033	0	1	11	12	2019	221	39	80000	13.087	3.60	0.0127	0.0261	0.4854	0.57	0.10	0.57	0.10	0.26	0.05	9.54	1.68	GEM	
SE-12-0.066-0.099	2	3	12	12	2019	264	42	80000	18.558	5.03	0.0107	0.0275	0.3880	0.46	0.07	0.46	0.07	0.21	0.03	7.63	1.21	GMX	
SE-12-0.131-0.164	4	5	12	12	2019	254	43	80000	24.148	6.60	0.0079	0.0236	0.3348	0.39	0.07	0.39	0.07	0.18	0.03	6.58	1.11	GEM	
SE-12-0.197-0.230	6	7	12	12	2019	327	40	80000	17.042	5.53	0.0144	0.0394	0.3652	0.43	0.05	0.43	0.05	0.19	0.02	7.18	0.87	Canberra	
SE-12-0.295-0.328	9	10	7	1	2020	89	35	80000	5.351	1.80	0.0125	0.0443	0.2816	0.33	0.13	0.33	0.13	0.15	0.06	5.55	2.18	Canberra	
SE-12-0.427-0.459	13	14	7	1	2020	200	36	80000	15.259	4.53	0.0098	0.0253	0.3888	0.46	0.08	0.46	0.08	0.21	0.04	7.66	1.38	GEM	
SE-12-0.591-0.623	18	19	7	1	2020	201	42	80000	10.939	3.80	0.0138	0.0284	0.4850	0.57	0.12	0.57	0.12	0.26	0.05	9.55	2.00	GMX	
SE-12-0.787-0.853	24	26	8	1	2020	151	35	80000	15.424	4.53	0.0073	0.0253	0.2904	0.34	0.08	0.34	0.08	0.15	0.04	5.72	1.33	GEM	
SE-12-1.050-1.115	32	34						80000						0.54	0.10	0.54	0.10	0.24	0.05	8.99	1.74		
SE-12-1.312-1.476	40	45	8	1	2020	280	45	80000	15.504	4.63	0.0135	0.0278	0.4873	0.57	0.09	0.58	0.09	0.26	0.04	9.60	1.54	GMX	
SE-12-1.804-1.969	55	60	14	1	2020	391	44	80000	13.990	3.93	0.0210	0.0283	0.7401	0.87	0.10	0.87	0.10	0.39	0.04	14.58	1.64	GMX	
Duplicates																							
SE-12-1.050-1.115	32	34	9	1	2020	228	36	80000	14.154	4.10	0.0121	0.0257	0.4710	0.55	0.09	0.56	0.09	0.25	0.04	9.28	1.46	GEM	
SE-12-1.050-1.115 Duplicate	32	34	9	1	2020	185	43	80000	10.931	3.38	0.0127	0.0287	0.4418	0.52	0.12	0.52	0.12	0.24	0.05	8.70	2.02	GMX	
Cs-137 Standards																							
GMX 32g 10 mm			11	10	2019	19725	142	5000	32.00	10.0	7.3969	0.0237	311.9975	366.19	2.64	957.04							
GMX 24g 7.5mm			10	10	2019	15972	128	5000	24.00	7.5	7.9860	0.0256	312.0171	366.22	2.93	957.04							
GMX 15g 5mm			10	10	2019	10817	105	5000	15.00	5.0	8.6536	0.0277	312.0171	366.22	3.55	957.04							
GMX 9g 3mm			10	10	2019	6727	83	5000	9.00	3.0	8.9693	0.0287	312.0171	366.22	4.52	957.04							
GMX 2.85g 0.8mm			11	10	2019	2281	49	5000	2.854	0.8	9.5907	0.0307	311.9975	366.19	7.87	957.04							
GEM 32g 10 mm			10	10	2019	17437	135	5000	32.00	10.0	6.5389	0.0210	312.0171	366.22	2.84	957.04							
GEM 24g 7.5mm			10	10	2019	14334	123	5000	24.00	7.5	7.1670	0.0230	312.0171	366.22	3.14	957.04							
GEM 15g 5mm			10	10	2019	9742	102	5000	15.00	5.0	7.7936	0.0250	312.0171	366.22	3.83	957.04							
GEM 9g 3mm			15	10	2019	6168	81	5000	9.00	3.0	8.2240	0.0264	311.9187	366.10	4.81	957.04							
GEM 2.85g 0.8mm			11	10	2019	2138	48	5000	2.854	0.8	8.9895	0.0288	311.9975	366.19	8.22	957.04							
Canberra 32g 10 mm			11	10	2019	28805	173	5000	32.00	10.0	10.8019	0.0346	311.9975	366.19	2.20	957.04							

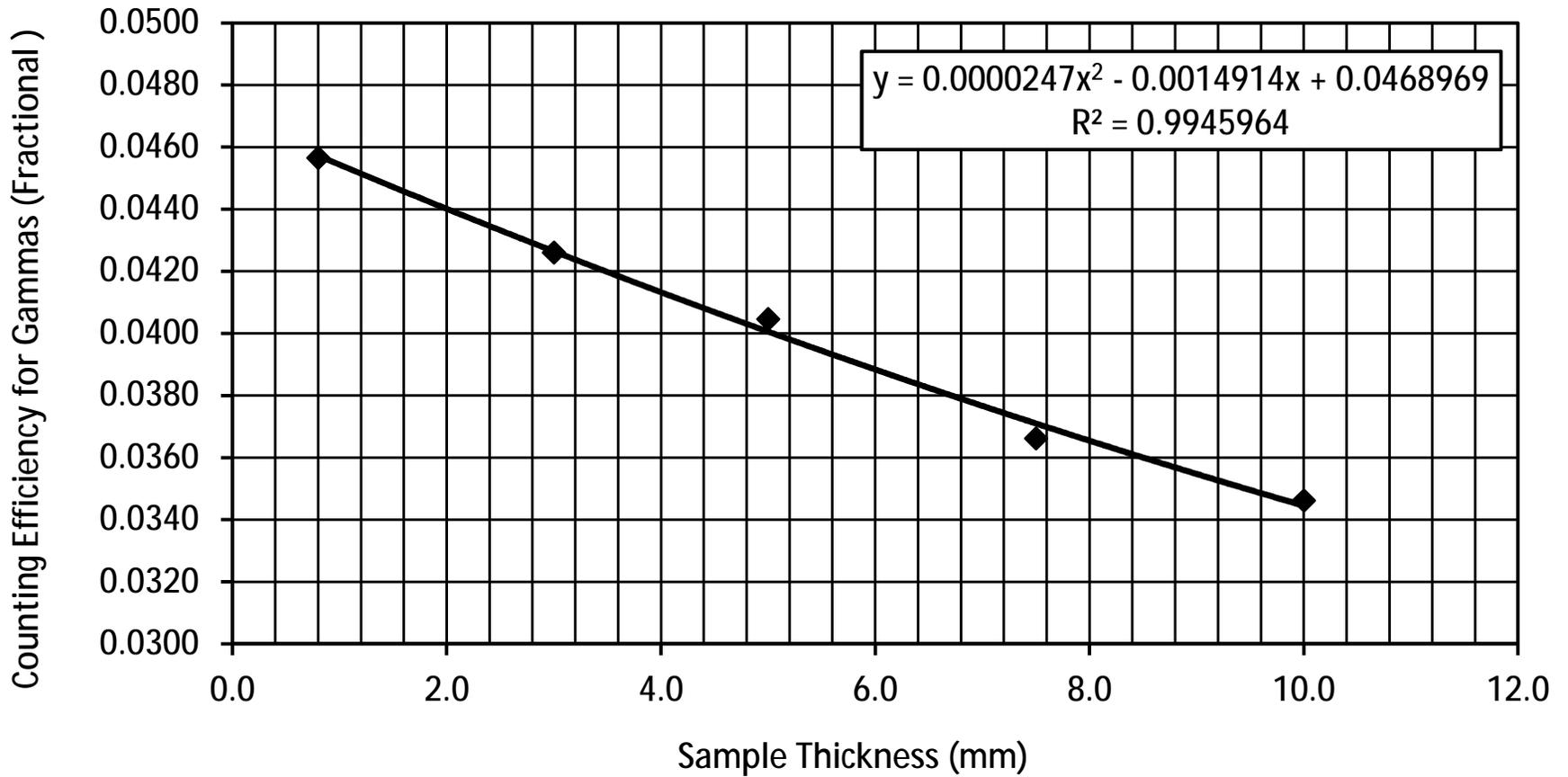
Cs-137 Counting Efficiency of Gammas vs. Sample Thickness (mm) GMX 25% Detector (Oct 10-11, 2019)



Cs-137 Counting Efficiency of Gammas vs. Sample Thickness (mm) GEM 19% Detector (Oct 10-15, 2019)

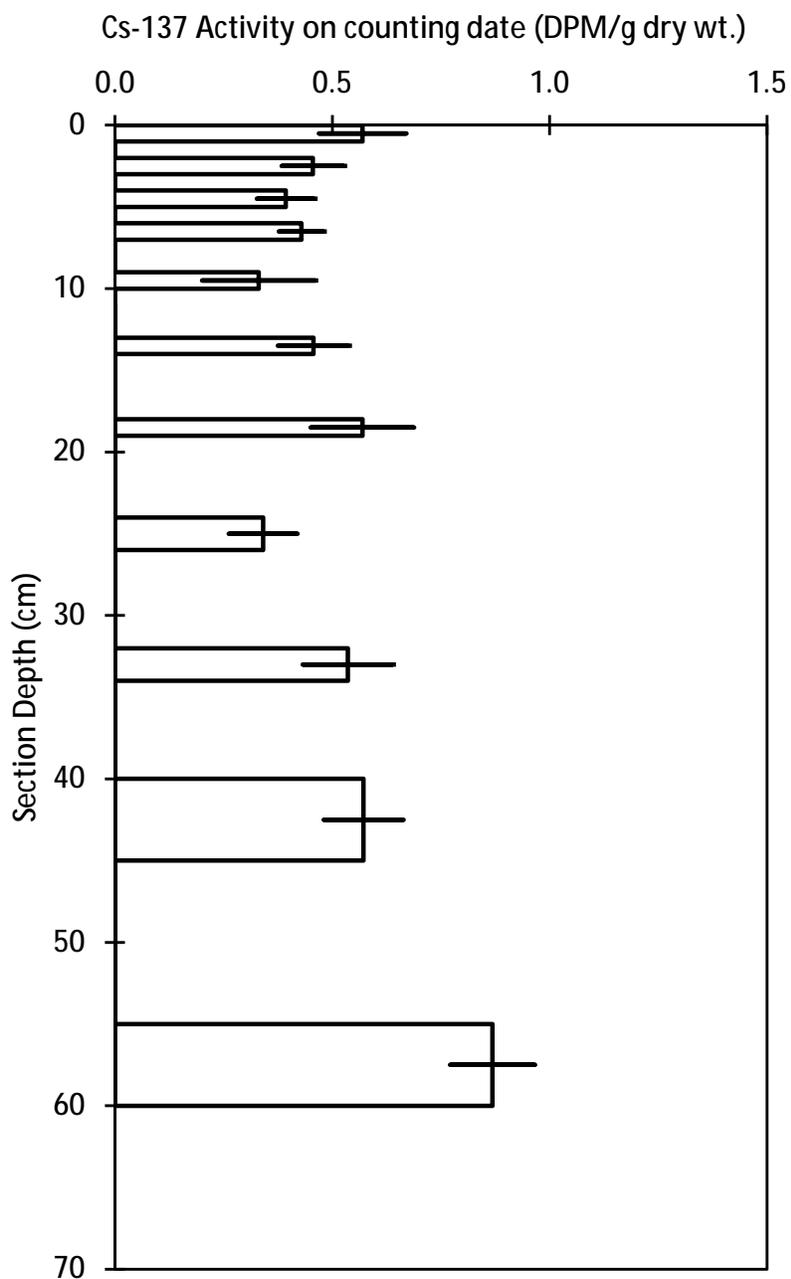


Cs-137 Counting Efficiency of Gammas vs. Sample Thickness (mm) Canberra 29% Detector (Oct 10-11, 2019)



Cs-137 in Sediments

SE-12



Note: The bar plotted at the midpoint depth of each section represents +/- 1 standard deviation of the Cs-137 counting error.

BIOASSAY TESTING RESULTS

SEDIMENT QUALITY ANALYSIS: SEAPORT LANDING SITE ABERDEEN, WASHINGTON

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All testing reported herein was performed consistent with our laboratory's quality assurance program. All results are intended to be considered in their entirety, and EcoAnalysts is not responsible for use of less than the complete report. The test results summarized in this report apply only to the sample(s) evaluated.

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DRAFT

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APPENDICES

Appendix A: Test Data, Statistical Comparisons, and Reference-Toxicant Test Results

Appendix B: Chain of Custody Forms, Logs, and Pre-Test Documents

ACRONYMS AND ABBREVIATIONS

AFDW:	Ash-free dry weight
cm:	Centimeter
CSL:	Cleanup Screening Level
°C:	Degrees Celsius
EC ₅₀ :	Effective Concentration that results in a 50% reduction in a sub-lethal endpoint
g:	Grams
LC ₅₀ :	Lethal Concentration that results in a 50% reduction in survival
L:	Liter
µm:	Micrometer
MFA:	Maul Foster & Alongi, Inc
mg:	Milligram
mg/L:	Milligrams per liter
mL:	Milliliter
mm:	Millimeter
NOEC:	No Observed Effect Concentration
OR:	Oregon
ppt:	parts per thousand
PSEP:	Puget Sound Estuary Protocols (PSEP 1995)
SCO:	Sediment Cleanup Objective
SCUM II:	Sediment Cleanup User's Manual II
SMS:	Sediment Management Standards
SOP:	Standard operation procedure
SMARM:	Sediment Management Annual Review Meeting
UIA:	Un-ionized ammonia
USACE:	United States Army Corps of Engineers
USEPA:	United States Environmental Protection Agency
WA:	Washington State
WAC:	Washington Administrative Code
WDOE:	Washington (State) Department of Ecology

1. INTRODUCTION

EcoAnalysts conducted biological toxicity testing with sediment samples collected by Maul Foster & Alongi, Inc (MFA) as part of the remedial investigation at the in-water portion of the Weyerhaeuser Sawmill Aberdeen/Seaport Landing site located in Aberdeen, WA. Sediments were evaluated for biological effects following guidance provided by the Washington State Department of Ecology (WDOE) Sediment Management Standards (SMS) under the Washington Administrative Code (WAC) 173-204-315. This report presents the results of the bioassay testing portion of the sediment investigation.

2. METHODS

This section summarizes the test methods followed for this biological characterization. Test methods followed guidance provided by the Puget Sound Estuary Program (PSEP 1995), the Sediment Cleanup User's Manual (SCUM; WDOE 2019), and the various updates presented during the Sediment Management Annual Review Meeting (SMARM). Sediment toxicity was evaluated using three standard PSEP bioassays; the 10-day amphipod test, the 20-day juvenile polychaete survival and growth test, and the benthic larval development test. Under SCUM guidance, this suite of tests was chosen to best represent the range of species and sensitive life stages that best comprise a benthic community. Together these bioassays are considered to be protective of benthic community organisms and, to a certain extent, other receptor groups that may interact with sediment-borne contaminants (WDOE 2019).

2.1 Sample Collection

Eight test sediments were collected via pneumatic power grab by MFA personnel on September 25 and 27, 2019 and were received at EcoAnalysts on September 28, 2019. Reference sediments from Carr Inlet, WA (CARR 14, 47, and 68) were collected by EcoAnalysts on October 11, 2019 and received on the same day. Sediment samples were stored in a walk-in cold room at $4 \pm 2^{\circ}\text{C}$ in the dark. The test sediment was not sieved prior to testing, with the exception of SE-15 and SE-20 for a re-test of the 20-day juvenile polychaete growth test (see section 2.5 for more details). Reference sediments were press-sieved to 2mm to remove the presence of native macrofauna that may have interfered with the testing process. Tests were conducted within the eight-week holding time with the exception of the 20-day polychaete growth re-test of samples SE-15 and SE-20, when SE-20 surpassed the expiration by one day. This test was initiated as per client approval.

Native *Eohaustorius estuarius* sediment from Yaquina Bay, Oregon was provided by Northwest Amphipod for use as control sediment treatments for the amphipod and juvenile polychaete tests.

2.2 Sample Grain Size and Reference Comparison

Sediment grain size is one of the characteristics used in selecting the appropriate reference sediment(s) to compare the chemical and biological responses of project sediments. The percent fines value is defined as the amount of sediment that passes through a 62.5- μm sieve, expressed as a percentage of the total sample analyzed. This is also the sum of the silt and clay fraction of sediment. Wet-sieve grain size results for the reference sample was conducted in the field (at the time of collection) and after receipt at the EcoAnalysts laboratory. The percent-fines determination of the project sediments is summarized in Table 2-1.

Table 2-1. Sample and Reference Grain Size Comparison

Treatment	Compared To	Percent Fines ¹
CARR 14		14
CARR 47		47
CARR 68		68
SE-15	CARR 47	38
SE-16	CARR 47	54
SE-17	CARR 68	78
SE-18	CARR 68	62
SE-20	CARR 68	60
SE-24	CARR 47	32
SE-26	CARR 14	0
SE-31	CARR 47	38

¹ Wet sieve results

For the purposes of evaluating the sediment under the sediment management standards, the project samples were compared to one of three Carr Inlet reference samples that most closely resembled the sample percent fines: CARR 14, CARR 47, or CARR 68. These samples were labelled as “CR21-West (14)”, “Carr20 (47)”, and CR02-South (68)” on all datasheets for clarity purposes.

Station coordinates for the reference samples are summarize in Table 2-2.

Table 2-2. Reference Station Coordinates

Station	Sample	Latitude	Longitude
CR21-West	CARR 14	47.33109	-122.67967
Carr20	CARR 47	47.33295	-122.66986
CR02-South	CARR 68	47.33429	-122.66425

2.3 Bulk Sample Porewater Ammonia, Sulfides, and Water Quality Measurements

Bulk sediment porewater ammonia and sulfides concentrations as well as interstitial salinity and pH were measured to determine whether any methods modifications or supplemental testing would be required (Table 2-3). Bulk sediments are homogenized test samples that have not been further processed for bioassay testing. Total ammonia measurements include both the amount of unionized ammonia (NH₃) and the ammonium ion (NH₄⁺), while unionized ammonia concentrations are derived from total ammonia measurements. While most of the total ammonia encountered in a marine environment is in the ionized NH₄⁺ form, it is unionized ammonia that usually causes greater toxicity (Greenstein et al. 1996). Both forms are presented to inform testing modification decisions, if needed. Ammonia and sulfide values were below what would be expected to cause toxicity upon preparation of the sediment for testing. No method modifications and/or supplemental testing were thus performed.

Table 2-3: Bulk Sediment Porewater Measurements

Sample	Matrix: Bulk Porewater					
	Total Ammonia (mg/L)	Unionized Ammonia (mg/L)	Salinity (ppt)	pH	Total Sulfides (mg/L Total)	Hydrogen Sulfide (mg/L)
SE-15	1.52	0.010	14	7.4	0.001	0.000
SE-16	2.98	0.019	16	7.4	0.027	0.006
SE-17	2.44	0.009	20	7.2	0.002	0.001
SE-18	4.07	0.025	21	7.4	0.375	0.085
SE-20	1.40	0.014	15	7.6	0.002	0.000
SE-24	1.61	0.002	15	6.7	ND	ND
SE-26	1.56	0.002	17	6.8	ND	ND
SE-31	2.66	0.016	20	7.4	ND	ND

2.4 10-day Amphipod Bioassay

The 10-day amphipod acute toxicity test was conducted with *Eohaustorius estuarius*. Test organisms were supplied by Northwest Amphipod in Newport, OR and held in native sediment at $15 \pm 2^\circ\text{C}$ prior to test initiation. Native sediment from Yaquina Bay, OR was provided by the organism supplier for use as the control treatment sediment in the test. This matrix has been used successfully in prior tests with this species and is known to support positive organism health and survival.

The amphipod bioassay was conducted as a 10-day static exposures with five replicates for each test treatment, reference treatment, and control. Two centimeters of sediment (approximately 175 mL) were placed into each 1-L glass chamber with 775 mL of overlying water. Trickle-flow aeration was provided through glass pipettes, and care was taken to avoid disturbing the sediment surface. Test chambers were placed into randomly assigned positions and allowed to equilibrate to test conditions overnight.

Prior to the test initiation, water quality measurements were taken in all replicates for each test treatment and included dissolved oxygen, temperature, salinity, and pH. Ammonia and sulfide concentrations were measured in both interstitial (porewater) and overlying water at initiation and termination. These measurements were made from a sacrificial surrogate chamber for each test treatment. Sediment porewater was extracted via centrifugation. During the test, water quality was monitored daily in one surrogate replicate per treatment. All water quality instruments were calibrated daily or on their recommended schedule. Records of instrument calibration were retained in the laboratory logs.

To initiate the test, organisms were randomly allocated to each of the test chambers. Initial stocking densities were 20 organisms per test chamber. Amphipods that did not bury within approximately one hour were replaced with healthy amphipods. No food was provided during the 10-day exposure for the amphipod test.

At test termination, sediment from each test chamber was sieved through a 0.5-mm screen to recover all organisms. The number of surviving and dead amphipods was then enumerated.

2.5 20-day Juvenile Polychaete Bioassay

The 20-day polychaete survival and growth test was conducted with juvenile polychaete worms (*Neanthes arenaceodentata*). Test organisms were obtained from Aquatic Toxicology Support in Bremerton, WA and held in seawater at 20°C (*Neanthes* were cultured in water-only and were not held in sediment prior to testing). Native sediment of the amphipod *Eohaustorius estuarius* from Yaquina Bay, OR was provided by Northwestern Aquatic Sciences for use as the control treatment sediment for the test. This coarse sand control sediment has been routinely tested in conjunction with this species at this laboratory and results from historical testing have demonstrated acceptable organism health and sediment quality.

The polychaete bioassay was conducted as a 20-day static-renewal test, with overlying exchanges of 300 mL of water occurring every third day. Each test treatment, reference treatment, and control consisted of five replicates of 1-L glass chambers, which were filled with two centimeters of sediment (approximately 175 mL) and 775 mL of overlying water. Trickle-flow aeration was provided through glass pipettes, and care was taken to avoid disturbing the sediment surface. Test chambers were then randomly assigned positions and allowed to equilibrate to test conditions overnight.

Prior to the test initiation, water quality measurements were taken in a surrogate chamber for each test treatment and included dissolved oxygen, temperature, salinity, and pH. Ammonia and sulfide concentrations were measured in both interstitial (porewater) and overlying water at initiation and termination. These measurements were made from a sacrificial surrogate chamber for each test treatment. Sediment porewater was extracted via centrifugation. During the test, water quality was monitored daily in one surrogate replicate per treatment. All water quality instruments were calibrated daily or on their recommended schedule. Records of instrument calibration were retained in the laboratory logs.

To initiate the test, organisms were randomly allocated to each of the test chambers. Initial stocking densities were five worms per test chamber. During the test, organisms were fed a diet of 40-mg of TetraMarin® slurry every other day (approximately 8-mg dry weight per worm). Pre-test initial biomass was determined by taking dry weight and ash-free dry weight (AFDW) measurements of three replicates of five worms each on Day 0.

At test termination, sediment from each test chamber was sieved through a 0.5-mm screen. All worms were recovered, enumerated, rinsed in deionized water (to remove salt), and transferred to pre-weighed aluminum foil weigh boats. After drying in an oven at 60°C for approximately 24 hours, each weigh-boat was removed, cooled in a desiccator and weighed to obtain dry weight measurements. They were then heated to 550°C for 2 hours to determine the ashed weight. AFDW were calculated to correct for the influence on weight of sediment grain size differences in the guts of the worms between treatments:

$$\text{AFDW} = \text{Dry weight} - \text{Ashed weight}$$

Both dry weight and AFDW were used to determine individual worm weight and growth rates. The dry weight growth rate is calculated using the following equation:

$$G = (\text{DWT}_{t_2} - \text{DWT}_{t_1}) \div (t_2 - t_1)$$

Where: DWT_{t₂} = individual dry weight of surviving adults at test termination

DWT_{t₁} = mean individual dry weight of organisms at test initiation

t₂ - t₁ = duration of test (e.g. days)

The ash-free dry weight (AFDW) growth rate is calculated using the following equations:

$$\text{AFDW} = (\text{Final Dry Weight} - \text{Final Ashed Weight}) \div \#\text{Survivors}$$

$$G = (\text{AFDW}_{t_2} - \text{AFDW}_{t_1}) \div (t_2 - t_1)$$

Where: AFDW_{t₂} = individual ash-free dry weight of surviving adults at test termination

AFDW_{t₁} = mean individual ash-free dry weight of organisms at test initiation

t₂ - t₁ = duration of test (e.g. days)

The juvenile polychaete test was run a second time with samples SE-15 and SE-20 due to presence of native polychaetes within the sediment samples that may have affected growth of the test organisms. Samples SE-15 and SE-20 were press-sieved through a 2mm screen to obliterate any native fauna. The high amount of woody debris within these two samples required that material remaining on the 2mm screen be reintroduced into the sieved sediment and retested alongside their representative reference samples. Both the un-sieved and sieved sample results are included in the report appendix. However, analyses are only conducted on the sieved, re-tested material. Throughout the testing, results were communicated to representatives from MFA and WDOE. Both parties agreed that a re-test was warranted.

2.6 Larval Developmental Bioassay

The bivalve larval development test was conducted with the mussel, *Mytilus galloprovincialis*. Adult organisms were obtained from Taylor Shellfish in Shelton, WA and were held under flowing natural seawater at 15°C ± 2°C prior to spawning induction. Adult mussels were fed during the holding period a marine algal suspension ad libitum. The control treatment consisted of clean seawater only without the addition of any sediment.

The larval development bioassay was conducted as a static exposure with five replicates for each test treatment, reference treatment, and control. Approximately 18 g (±1 g) of sediment was placed into each 1-L glass chamber with 900 mL of overlying water. Test chambers were then shaken for 10 seconds and placed into randomly assigned positions. The larval test was performed without aeration unless dissolved oxygen levels fell below threshold levels for action. If required, trickle-flow aeration was provided through glass pipettes, and care was taken to avoid disturbing the sediment surface.

Prior to the test initiation, water quality measurements were taken in the surrogate chamber for each test treatment and included dissolved oxygen, temperature, salinity, and pH. Ammonia and sulfide concentrations were measured in the overlying water at initiation and termination. These measurements were made from a sacrificial surrogate chamber for each test treatment. During the test, water quality was monitored daily in one surrogate replicate per treatment. All water quality instruments were calibrated daily or on their recommended schedule. Records of instrument calibration were retained in the laboratory logs.

To obtain gametes for testing, adult mussels to be spawned were placed in clean seawater at 16°C (culture temperature) for approximately 30 - 60 minutes in the presence of dense marine algal suspension. The mussels were then transferred to containers with culture water adjusted to 20 -23°C for the purpose of inducing the release of gametes. The animals were held at the shocking temperature and were monitored for spawning individuals. Spawning females and males were removed from the water bath and placed in individual containers with seawater. These individuals were allowed to spawn until sufficient gametes were available to initiate the test. After the spawning period, eggs were transferred to fresh seawater and filtered through a 0.5 mm Nitex® mesh screen to remove large debris, feces, and excess gonadal matter. A composite was made of the sperm and diluted with fresh seawater. The fertilization process was initiated by adding sperm to the isolated egg containers. Egg-sperm solutions were periodically homogenized with a perforated plunger during the fertilization process and sub-

samples observed under the microscope for egg and sperm viability. Approximately one to one and a half hours after fertilization, embryo solutions were checked for fertilization rate. Only those embryo stocks with >90% fertilization were used to initiate the tests. Embryo solutions were rinsed free of excess sperm and then combined to create one embryo stock solution. Density of the embryo stock solution was determined by counting the number of embryos in a subsample of homogenized stock solution. This was used to determine the volume of embryo stock solution to deliver approximately 27,000 embryos to each test chamber.

The protocol calls for test termination when 95% of the embryos in the control have reached the prodissoconch I stage (approximately 48-60 hours). Six hours prior to termination, the larvae within each chamber were resuspended in the overlying water with a perforated plunger. At termination, the overlying seawater was decanted into a clean 1-L jar and mixed with a perforated plunger. From this container, a 10 mL subsample was transferred to a scintillation vial and preserved in 10% buffered formalin. Larvae were subsequently stained with a dilute solution of Rose Bengal in 70% alcohol to help visualization of larvae. The number of normal and abnormal larvae was enumerated on an inverted microscope. Normal larvae included all D-shaped prodissoconch I stage larvae. Abnormal larvae included abnormally shaped prodissoconch I larvae and all early stage larvae.

2.7 Data Analysis and QA/QC

All water quality and endpoint data were entered into Excel spreadsheets. Water quality parameters were summarized by calculating the mean, minimum, and maximum values for each test treatment. Endpoint data were calculated for each replicate and the mean values and standard deviations were determined for each test treatment.

All hand-entered data was reviewed for data entry errors, which were corrected prior to summary calculations. A minimum of 10% of all calculations and data sorting were reviewed for errors. Review counts were conducted on any apparent outliers.

For Sediment Cleanup Objective (SCO) and Cleanup Screening Level (CSL) suitability determinations, comparisons were made according to the Sediment Cleanup User's Manual (SCUM; WDOE 2019) and Fox et al. (2007), using BioStat software. Data reported as percent mortality or survival were transformed using an arcsine square root transformation prior to statistical analysis. All data were tested for normality using the Shapiro-Wilk test and equality of variance using Levene's test. Determinations of statistical significance were based on one-tailed Student's t-tests with an alpha of 0.05. A comparison of the larval endpoint relative to the reference was made using an alpha level of 0.10. For samples failing to meet assumptions of normality, a Mann-Whitney test was conducted to determine significance. For those samples failing to meet the assumptions of normality and equality of variance, a t-test on rankits was used.

To evaluate the relative sensitivity of the organisms, reference toxicity tests were performed using standard reference toxicants (Lee 1980). A water-only reference-toxicant test was conducted concurrently with the sediment tests using ammonium chloride. The ammonium chloride reference-toxicant test was used to ensure animals used in the test were healthy and of similar sensitivity to prior tests. This test also provided information on the sensitivity to ammonia concentrations that would possibly be present in the sediments.

Statistical analyses of all dose-response tests were performed using CETIS Comprehensive Toxicity Data Analysis and Database Software version 1.9.4.3. Comparisons between the lab control and each test concentration were performed following recommended USEPA decision matrices (USEPA 2002).

3. RESULTS

The results of the sediment testing, including a summary of test results and water quality observations are presented in this section. All data, laboratory bench sheets, and statistical analyses are provided in Appendix A while chain of custody forms and pre-test documents are supplied in Appendix B.

3.1 10-day Amphipod Bioassay

The bioassay test with *E. estuarius* was validated with 2% mortality in the native sediment control, which met the performance criterion of $\leq 10\%$ mortality for SMS evaluations. This result indicates that the test conditions were suitable for adequate amphipod survival. Mean mortality in the reference treatments was 1-4%, which met the performance criteria ($\leq 25\%$ mortality) and indicated that all three reference sediments were acceptable for suitability determination. All endpoint results are summarized in Table 3-1. Summaries of water quality measurements, ammonia and sulfide concentrations, and test conditions are presented in Table 3-2 through Table 3-5.

Mean mortality in the project samples ranged from 2 to 50%. During test termination, it was noted that multiple test samples contained native Nereid polychaetes within the test chambers that coincided with poor survival. Two of these samples (SE-15 and SE-20) had mortality within test chambers that ranged between 0 and 100%. Upon discovery, test results were immediately conveyed to the client and WDOE personnel. Collectively it was decided that due to the presence of predatory native fauna, chambers exhibiting 95-100% mortality should be dropped from statistical analyses.

Water quality parameters were within the acceptable limits throughout the duration of the test (Table 3-2) with the exception of salinity which fell below the recommended parameter of 28 ± 1 ppt. It was still within the test organism's acceptable range, however, and is not expected to have affected test results.

A reference-toxicant test (positive control) was performed on the batch of test organisms utilized for this study. The LC_{50} value was within ± 2 standard deviations from the laboratory historical mean. This result indicates that the test organisms used in this study were of similar sensitivity to those previously tested at EcoAnalysts.

Ammonia concentrations observed in the *E. estuarius* test were below the No Observed Effect Concentration (NOEC) value derived from the concurrent ammonia reference-toxicant test (Table 3-3; compare to NOEC of 78 mg/L). Values were also below the published threshold concentration of 15 mg/L total ammonia (Barton 2002). Therefore, ammonia concentrations within the sediment samples should not have been a contributor to any adverse biological effects observed in the test treatments. Initial and final sulfide concentrations within the overlying water and porewater were below the trigger value of 1.9 mg/L total sulfides (Inouye 2015).

Table 3-1. Test Results for *Eohaustorius estuarius*

Treatment	Replicate	Number Initiated	Number Surviving	Number Missing or Dead	Percentage Mortality	Mean Percentage Mortality	SD
Control	1	20	20	0	0	2	2.7
	2	20	19	1	5		
	3	20	19	1	5		
	4	20	20	0	0		
	5	20	20	0	0		
CARR 14	1	20	19	1	5	1	2.2
	2	20	20	0	0		
	3	20	20	0	0		
	4	20	20	0	0		
	5	20	20	0	0		
CARR 47	1	20	20	0	0	3	4.5
	2	20	20	0	0		
	3	20	19	1	5		
	4	20	20	0	0		
	5	20	18	2	10		
CARR 68	1	20	20	0	0	4	4.2
	2	20	20	0	0		
	3	20	19	1	5		
	4	20	18	2	10		
	5	20	19	1	5		
SE-15	1	20	13	7	35	17 ¹	16.1 ¹
	2	20	18	2	10		
	3	20	0	20	100		
	4	20	0	20	100		
	5	20	19	1	5		
SE-16	1	20	17	3	15	4	6.5
	2	20	20	0	0		
	3	20	19	1	5		
	4	20	20	0	0		
	5	20	20	0	0		
SE-17	1	20	19	1	5	21	19.8
	2	20	18	2	10		
	3	20	19	1	5		
	4	20	12	8	40		
	5	20	11	9	45		
SE-18	1	20	20	0	0	4	2.2
	2	20	19	1	5		
	3	20	19	1	5		
	4	20	19	1	5		
	5	20	19	1	5		
SE-20	1	20	20	0	0	13 ¹	12.6 ¹
	2	20	15	5	25		
	3	20	1	19	95		
	4	20	0	20	100		
	5	20	17	3	15		

Bioassay Testing Results
Sediment Quality Analysis: Seaport Landing Site
Aberdeen, Washington

Treatment	Replicate	Number Initiated	Number Surviving	Number Missing or Dead	Percentage Mortality	Mean Percentage Mortality	SD
SE-24	1	20	17	3	15	15	23.2
	2	20	20	0	0		
	3	20	20	0	0		
	4	20	19	1	5		
	5	20	9	11	55		
SE-26	1	20	20	0	0	2	2.7
	2	20	20	0	0		
	3	20	19	1	5		
	4	20	20	0	0		
	5	20	19	1	5		
SE-31	1	20	20	0	0	7	8.4
	2	20	16	4	20		
	3	20	19	1	5		
	4	20	20	0	0		
	5	20	18	2	10		

¹ Replicates with 95-100% mortality not included in mean results due to presence of predatory native fauna

Table 3-2. Water Quality Summary for *Eohaustorius estuarius*

Treatment	Dissolved Oxygen (mg/L) ≥5.1 mg/L			Temperature (°C) 15 ± 1°C			Salinity (ppt) 28 ± 1 ppt			pH 7 - 9 units		
	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max
Control	8.0	7.0	8.6	14.9	14.7	15.2	28	28	28	8.0	7.8	8.1
CARR 14	8.3	8.0	8.5	14.8	14.6	15.4	28	28	29	8.1	8.0	8.2
CARR 47	8.3	8.0	8.5	14.9	14.6	15.6	28	27	29	8.0	7.1	8.2
CARR 68	8.3	8.0	8.6	14.8	14.7	15.1	28	28	29	8.0	8.0	8.1
SE-15	8.4	8.2	8.6	14.8	14.6	15.2	26	26	27	7.8	7.6	7.9
SE-16	8.4	8.1	8.6	14.7	14.5	15.1	26	26	27	7.9	7.8	7.9
SE-17	8.4	8.1	8.6	14.8	14.7	15.2	27	27	27	8.0	7.9	8.0
SE-18	8.3	8.0	8.5	14.9	14.7	15.3	27	26	27	7.9	7.8	7.9
SE-20	8.4	8.0	8.6	14.8	14.6	15.1	27	26	27	7.8	7.6	8.0
SE-24	8.4	8.2	8.6	14.8	14.5	15.1	27	26	27	7.6	7.4	7.8
SE-26	8.2	6.3	8.5	15.2	14.8	16.1	27	27	27	7.4	7.2	7.7
SE-31	8.3	7.8	8.6	14.9	14.7	15.4	27	27	28	7.8	7.7	7.9

BOLD = value outside of recommended range

Table 3-3. Ammonia Summary for *Eohaustorius estuarius*

Treatment	Overlying				Interstitial			
	Total Ammonia (mg/L Total) NOEC = 78 mg/L ¹		Unionized Ammonia (mg/L) NOEC = 1.403 ²		Total Ammonia (mg/L Total) NOEC = 78 mg/L ¹		Unionized Ammonia (mg/L) NOEC = 1.403 ²	
	Day 0	Day 10	Day 0	Day 10	Day 0	Day 10	Day 0	Day 10
Control	0.218	0.176	0.004	0.005	0.440	0.110	0.004	0.001
CARR 14	0.420	1.62	0.010	0.055	3.36	3.14	0.019	0.028
CARR 47	0.723	0.403	0.016	0.014	5.94	1.86	0.068	0.013
CARR 68	0.298	0.171	0.007	0.004	1.78	1.01	0.016	0.009
SE-15	0.272	0.0328	0.005	0.000	1.24	0.637	0.005	0.001
SE-16	0.375	0.000	0.007	0.000	2.47	0.304	0.023	0.001
SE-17	0.693	0.0151	0.016	0.000	2.71	0.329	0.013	0.001
SE-18	0.773	0.0920	0.014	0.002	1.82	0.531	0.005	0.002
SE-20	0.906	0.000	0.021	0.000	2.26	0.281	0.017	0.001
SE-24	0.535	1.23	0.008	0.007	1.72	1.73	0.001	0.002
SE-26	0.227	0.573	0.002	0.002	0.672	0.988	0.000	0.000
SE-31	0.412	0.000	0.007	0.000	1.31	0.359	0.005	0.001

¹NOEC (concurrent reference-toxicant test derived) = 78 mg/L total ammonia

²NOEC (concurrent reference-toxicant test derived) = 1.403 mg/L unionized ammonia

Table 3-4. Sulfide Summary for *Eohaustorius estuarius*

Treatment	Overlying				Interstitial			
	Total Sulfides (mg/L Total) Trigger Value = 1.9 mg/L ¹		Hydrogen Sulfide (mg/L)		Total Sulfides (mg/L Total) Trigger Value = 1.9 mg/L ¹		Hydrogen Sulfide (mg/L)	
	Day 0	Day 10	Day 0	Day 10	Day 0	Day 10	Day 0	Day 10
Control	ND	ND	ND	ND	0.015	ND	0.003	ND
CARR 14	0.004	0.000	0.000	0.000	0.159	0.115	0.041	0.021
CARR 47	ND	ND	ND	ND	0.016	0.161	0.002	0.035
CARR 68	0.001	ND	0.000	ND	0.072	0.003	0.013	0.001
SE-15	0.005	ND	0.000	ND	ND	0.004	ND	0.002
SE-16	0.007	ND	0.001	ND	ND	0.007	ND	0.002
SE-17	0.000	ND	0.000	ND	0.008	ND	0.003	ND
SE-18	0.003	ND	0.000	ND	ND	ND	ND	ND
SE-20	0.004	0.016	0.000	0.003	ND	ND	ND	ND
SE-24	0.001	ND	0.000	ND	0.083	0.001	0.064	0.001
SE-26	ND	ND	ND	ND	0.157	0.004	0.148	0.004
SE-31	0.006	ND	0.001	ND	ND	ND	ND	ND

¹Inouye 2015: Total sulfide value 1.9 mg/L derived from hydrogen sulfide dissociation (0.122 mg/L H₂S @ 15°C, 28 ppt, and 8.1 pH)
ND = not detected; measurement below detection limit

Table 3-5. Test Condition Summary for *Eohaustorius estuarius*

Test Conditions: PSEP <i>E. estuarius</i>		
Date Sampled	September 25 and 27, 2019; October 11, 2019 (Ref Sed)	
Date Received	September 28 and October 11, 2019	
Test Dates	October 18 – 28, 2019	
Sample Storage Conditions	4°C, dark	
Days of Holding Recommended: ≤8 weeks (56 days)	23 Days	
Source of Control Sediment	Yaquina Bay, OR	
Test Species	<i>Eohaustorius estuarius</i>	
Supplier	Northwest Amphipod, Newport, OR	
Date Acquired	October 15, 2019	
Age Class	Mature adult, 3-5 mm	
Test Procedures	PSEP 1995 with SMARM revisions, SCUM (2019) SOP No. SED002.09	
Test Location	EcoAnalysts Port Gamble Laboratory	
Test Type/Duration	10-Day static	
Control Water	North Hood Canal seawater, 0.45µm filtered	
Test Lighting	50 – 100 foot candles (ambient and constant)	
Test Chamber	1-Liter Glass Chamber	
Replicates per Treatment	5 + 2 surrogates (one used for WQ measurements throughout the test)	
Organisms per Replicate	20	
Exposure Volume	175 mL sediment/ 775 mL water	
Feeding	None	
Water Renewal	None	
Test Dissolved Oxygen	Recommended: > 5.1 mg/L	Observed: 6.3 – 8.6 mg/L
Test Temperature	Recommended: 15 ± 1°C	Observed: 14.5 – 16.1°C
Test Salinity	Recommended: 28 ± 1 ppt	Observed: 26 – 29 ppt
Test pH	Recommended: 7 - 9	Observed: 7.1 – 8.2
Control Performance Standard SMS	Recommended: Control ≤ 10% mortality	Observed: 2% mortality; Pass
Reference Performance Standard SMS	Recommended: Reference ≤ 25% mortality	Observed mortality: 1-4%; Pass
Reference Toxicant LC ₅₀ (total ammonia)	LC ₅₀ = 206.9 mg/L	
Mean; Acceptable Range (total ammonia)	155.7; 81.45 – 297.4 mg/L	
NOEC (total ammonia)	78 mg/L	
NOEC (unionized ammonia)	1.403 mg /L	
Deviations from Test Protocol	Salinity	

3.2 20-day Juvenile Polychaete Bioassay

No mortality was observed in the *N. arenaceodentata* control sediment. Mean individual growth (MIG) in the control was 0.827 mg/ind/day (dry weight) and 0.536 mg/ind/day (AFDW). These values all fall within the test acceptability criteria of $\leq 10\%$ mean mortality and ≥ 0.38 mg/ind/day AFDW (WDOE 2019), indicating that the test conditions were suitable for adequate polychaete survival and growth. A summary of the test results is shown in Table 3-6. Summaries of water quality measurements, ammonia and sulfide concentrations, and test conditions are presented in Table 3-8, Table 3-10, Table 3-12, and Table 3-14.

Mean mortality in the reference treatments was 0 and 8%, meeting the reference performance standard of $\leq 10\%$ (WDOE 2019). Mean individual growth was 0.668-0.738 mg/ind/day (dry weight) and 0.429-0.479 mg/ind/day (AFDW). CARR 68 Rep 2 not included in mean results due to abnormal test organism growth. When compared to the control, MIG expressed as AFDW for the reference treatments was 0.80-0.89, which met the reference performance standard of ≥ 0.80 (WDOE 2019).

Mortality in the project sediments was 0-40%. Mean individual growth (as dry weight) was 0.201-0.694 mg/ind/day. Mean individual growth in the AFDW assessment, which removes variability caused by gut contents, was 0.156-0.526 mg/ind/day.

All water quality parameters were within the acceptable limits throughout the duration of the test (Table 3-8). Initial mean individual biomass (pretest) of the test organisms met the recommended criterion of 0.25 – 1.0 mg/individual at 0.721 mg/ind dry weight and 0.415 mg/ind AFDW.

A reference-toxicant test (positive control) was performed on the batch of test organisms utilized for this study. The LC_{50} value was within control chart limits (± 2 standard deviations from the laboratory historical mean). This result indicates that the test organisms used in this study were of similar sensitivity to those previously tested at EcoAnalysts.

Ammonia concentrations observed in the *N. arenaceodentata* test were below the NOEC value derived from the concurrent ammonia reference-toxicant test (Table 3-10; compare to NOEC of 180 mg/L total ammonia). Initial and final sulfide concentrations in the interstitial and overlying water were below the trigger value of 3.4 mg/L total sulfides (Kendall and Barton 2004) for all samples (Table 3-12).

3.2.1 Re-Test of Samples SE-15 and SE-20

During test termination, it was noted that multiple test samples contained native Nereid polychaetes within the test chambers that coincided with poor survival and/or growth of test organisms. Upon discovery, test results were immediately conveyed to the client and WDOE personnel. Collectively it was decided that due to the presence of predatory native fauna that may have competed with or preyed upon test organisms, samples SE-15 and SE-20 should be press-sieved to remove native fauna and re-tested. Due to the high percentage of woody debris in these samples, “mashed” material that remained on the 2.0mm screen was re-introduced with the sieved material to create a homogenized, sieved sample free of native fauna. The results of these re-tested samples are presented in separate tables alongside the first test results. All statistical analyses were performed on the re-tested results for these two samples (see section 4.2).

In the re-test, 4% mortality was observed in the *N. arenaceodentata* control sediment. MIG in the control was 0.945 mg/ind/day (dry weight) and 0.552 mg/ind/day (AFDW). These values all fall within the test acceptability criteria of $\leq 10\%$ mean mortality and ≥ 0.38 mg/ind/day AFDW (WDOE 2019), indicating that the test conditions were suitable for adequate polychaete survival and growth. A summary of the test results is shown in Table 3-7. Summaries of water quality measurements, ammonia

and sulfide concentrations, and test conditions are presented in Table 3-9, Table 3-11, Table 3-13, and Table 3-15.

Mean mortality in the reference treatments was 0%, meeting the reference performance standard of $\leq 10\%$ (WDOE 2019). Mean individual growth was 0.929 and 0.900 mg/ind/day (dry weight) and 0.597 and 0.612 mg/ind/day (AFDW). When compared to the control, MIG expressed as AFDW for the reference treatment was 1.08 and 1.11, which met the reference performance standard of ≥ 0.80 (WDOE 2019).

Mortality in the sieved project sediments was 0%. Mean individual growth (as dry weight) was 0.724 and 0.674 mg/ind/day for SE-15 and SE-20, respectively. Mean individual growth in the AFDW assessment, which removes variability caused by gut contents, was 0.575 and 0.528 mg/ind/day.

All water quality parameters were within the acceptable limits throughout the duration of the test (Table 3-9). Initial mean individual biomass (pretest) of the test organisms met the recommended criterion of 0.25 – 1.0 mg/individual at 0.699 mg/ind dry weight and 0.445 mg/ind AFDW.

A separate reference-toxicant test (positive control) was performed on the batch of test organisms utilized for the re-test. The LC50 value was within control chart limits (± 2 standard deviations from the laboratory historical mean). This result indicates that the test organisms used in this study were of similar sensitivity to those previously tested at EcoAnalysts.

Ammonia concentrations observed in the re-test were below the NOEC value derived from the concurrent ammonia reference-toxicant test (Table 3-11; compare to NOEC of 216 mg/L total ammonia). Initial and final sulfide concentrations in the interstitial and overlying water were below the trigger value of 3.4 mg/L total sulfides (Kendall and Barton 2004) for all samples (Table 3-13).

Table 3-6. Test Results for *Neanthes arenaceodentata*

Treatment	Rep	Number Initiated	Survivors	Mean Mortality (%)	Individual Growth (mg/ind/day)					
					Dry Weight	Mean	Std Dev	AFDW	Mean	Std Dev
Control	1	5	5	0	0.779	0.827	0.09	0.437	0.536	0.09
	2	5	5		0.740			0.470		
	3	5	5		0.940			0.646		
	4	5	5		0.899			0.587		
	5	5	5		0.776			0.540		
CARR 14	1	5	5	8	0.754	0.680	0.19	0.540	0.479	0.12
	2	5	4		0.555			0.473		
	3	5	5		0.855			0.594		
	4	5	5		0.818			0.501		
	5	5	4		0.418			0.288		
CARR 47	1	5	5	0	0.871	0.668	0.17	0.530	0.429	0.10
	2	5	5		0.504			0.380		
	3	5	5		0.806			0.529		
	4	8	8		0.522			0.313		
	5	6	6		0.637			0.390		
CARR 68 ¹	1	5	5	0	0.770	0.738 ¹	0.10	0.541	0.472 ¹	0.06
	2	5	5		0.392 ¹			0.049 ¹		
	3	5	5		0.777			0.480		
	4	5	5		0.592			0.401		
	5	5	5		0.813			0.468		
SE-15 ²	1	5	0	40	--	0.433	0.14	--	0.315	0.10
	2	5	5		0.593			0.422		
	3	5	0		--			--		
	4	5	5		0.313			0.238		
	5	5	5		0.394			0.284		
SE-16	1	5	5	4	0.605	0.694	0.16	0.464	0.500	0.13
	2	5	5		0.810			0.541		
	3	5	5		0.485			0.360		
	4	5	4		0.900			0.624		
	5	5	5		0.671			0.509		
SE-17	1	5	5	4	0.591	0.503	0.17	0.429	0.366	0.06
	2	5	5		0.546			0.386		
	3	5	4		0.489			0.373		
	4	5	5		0.670			0.489		
	5	5	5		0.220			0.151		
SE-18	1	5	5	4	0.446	0.540	0.08	0.331	0.417	0.08
	2	5	5		0.527			0.402		
	3	5	5		0.656			0.507		
	4	5	4		0.520			0.416		
	5	5	5		0.551			0.430		

Bioassay Testing Results
Sediment Quality Analysis: Seaport Landing Site
Aberdeen, Washington

Treatment	Rep	Number Initiated	Survivors	Mean Mortality (%)	Individual Growth (mg/ind/day)					
					Dry Weight	Mean	Std Dev	AFDW	Mean	Std Dev
SE-20 ²	1	5	4	24	0.088	0.201	0.26	0.067	0.156	0.19
	2	6	6		0.154			0.127		
	3	5	3		0.021			0.018		
	4	5	3		0.088			0.070		
	5	5	4		0.653			0.497		
SE-24	1	5	5	4	0.545	0.434	0.09	0.436	0.341	0.08
	2	5	5		0.438			0.348		
	3	5	5		0.340			0.260		
	4	5	5		0.497			0.394		
	5	5	4		0.348			0.265		
SE-26	1	5	5	4	0.612	0.646	0.05	0.506	0.526	0.04
	2	5	5		0.731			0.589		
	3	5	5		0.650			0.526		
	4	5	5		0.638			0.511		
	5	5	4		0.598			0.500		
SE-31	1	5	5	0	0.574	0.642	0.10	0.429	0.465	0.06
	2	5	5		0.599			0.445		
	3	5	5		0.543			0.404		
	4	5	5		0.782			0.522		
	5	5	5		0.715			0.526		

¹CARR 68 Rep 2 not included in mean results due to abnormal test organism growth

²Due to presence/abundance of predatory native fauna, samples SE-15 and SE-20 were re-tested with press-sieved test sediment (results in Table 3-7). Only re-tested results are included in further statistical analyses (section 4.2)

Table 3-7. Test Results for *Neanthes arenaceodentata*: Re-Test of Samples SE-15 and SE-20

Treatment	Rep	Number Initiated	Survivors	Mean Mortality (%)	Individual Growth (mg/ind/day)					
					Dry Weight	Mean	Std Dev	AFDW	Mean	Std Dev
Control	1	5	4	4	1.098	0.945	0.13	0.659	0.552	0.08
	2	5	5	0	0.899			0.534		
	3	5	5	0	0.791			0.499		
	4	5	5	0	0.873			0.471		
	5	5	5	0	1.065			0.596		
CARR 47	1	5	5	0	1.068	0.929	0.16	0.719	0.597	0.08
	2	5	5	0	0.869			0.611		
	3	5	5	0	1.091			0.614		
	4	5	5	0	0.924			0.542		
	5	5	5	0	0.694			0.497		
CARR 68	1	5	5	0	0.935	0.900	0.11	0.589	0.612	0.09
	2	5	5	0	0.994			0.711		
	3	5	5	0	0.709			0.480		
	4	5	5	0	0.936			0.617		
	5	5	5	0	0.927			0.661		
SE-15	1	5	5	0	0.628	0.724	0.12	0.478	0.575	0.09
	2	5	5	0	0.701			0.586		
	3	5	5	0	0.735			0.584		
	4	5	5	0	0.918			0.713		
	5	5	5	0	0.639			0.512		
SE-20	1	5	5	0	0.598	0.674	0.08	0.490	0.528	0.05
	2	5	5	0	0.794			0.593		
	3	5	5	0	0.718			0.567		
	4	5	5	0	0.615			0.465		
	5	5	5	0	0.646			0.523		

Table 3-8. Water Quality Summary for *Neanthes arenaceodentata*

Treatment	Dissolved Oxygen (mg/L) ≥4.6 mg/L			Temperature (°C) 20 ± 1°C			Salinity (ppt) 28 ± 2 ppt			pH 7 - 9 units		
	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max
Control	7.4	7.2	7.7	19.8	19.2	20.3	28	27	28	7.8	7.0	8.0
CARR 14	7.3	6.6	7.7	19.7	19.1	20.2	28	27	29	7.9	7.0	8.2
CARR 47	7.4	7.0	7.7	20.0	19.3	20.6	28	27	29	8.0	7.9	8.1
CARR 68	7.4	6.7	7.7	19.8	19.3	20.3	28	27	28	7.9	7.6	8.0
SE-15	7.5	7.1	7.8	20.1	19.4	20.8	27	26	28	7.7	7.5	7.9
SE-16	7.4	7.1	7.8	20.1	19.4	20.7	27	26	28	7.8	7.7	8.0
SE-17	7.2	6.3	7.8	19.9	19.2	20.5	27	26	28	7.7	7.4	7.9
SE-18	7.5	7.1	7.7	19.8	19.3	20.3	27	26	28	7.9	7.2	8.0
SE-20	7.5	6.9	7.8	19.9	19.4	20.4	27	26	28	7.8	7.6	7.9
SE-24	7.5	7.1	7.8	20.1	19.5	20.7	27	26	28	7.7	7.4	7.8
SE-26	7.4	6.5	7.7	20.1	19.5	20.7	27	26	29	7.6	7.4	7.8
SE-31	7.3	6.6	7.7	19.9	19.2	20.6	28	26	29	7.7	7.2	7.9

Table 3-9. Water Quality Summary for *Neanthes arenaceodentata*: Re-Test of Samples SE-15 and SE-20

Treatment	Dissolved Oxygen (mg/L) ≥4.6 mg/L			Temperature (°C) 20 ± 1°C			Salinity (ppt) 28 ± 2 ppt			pH 7 - 9 units		
	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max
Control	7.3	6.5	7.6	20.9	20.5	21.2	28	28	29	7.9	7.8	8.0
CARR 47	7.2	6.7	7.5	20.8	20.5	21.2	28	28	28	8.0	7.7	8.3
CARR 68	7.2	6.9	7.5	20.7	20.3	21.0	28	28	28	8.0	7.8	8.1
SE-15	7.2	6.9	7.5	20.7	20.0	21.2	27	26	28	7.7	7.6	7.8
SE-20	6.9	5.4	7.4	20.8	19.9	21.1	27	26	28	7.6	7.3	7.8

Table 3-10. Ammonia Summary for *Neanthes arenaceodentata*

Treatment	Overlying				Interstitial			
	Total Ammonia (mg/L Total) NOEC = 180 mg/L ¹		Unionized Ammonia (mg/L) NOEC = 2.2 ²		Total Ammonia (mg/L Total) NOEC = 180 mg/L ¹		Unionized Ammonia (mg/L) NOEC = 2.2 ²	
	Day 0	Day 20	Day 0	Day 20	Day 0	Day 20	Day 0	Day 20
Control	0.005	6.61	0.000	0.175	0.220	6.890	0.002	0.047
CARR 14	0.295	0.654	0.009	0.017	2.41	1.57	0.020	0.005
CARR 47	0.544	0.513	0.014	0.014	3.02	0.873	0.040	0.003
CARR 68	0.108	0.608	0.003	0.016	3.12	0.760	0.032	0.003
SE-15	0.381	0.338	0.010	0.007	0.937	1.08	0.004	0.002
SE-16	0.361	0.448	0.012	0.010	1.27	0.619	0.007	0.003
SE-17	0.582	0.487	0.015	0.007	1.86	1.22	0.006	0.003
SE-18	0.362	0.393	0.007	0.010	1.39	0.798	0.007	0.004
SE-20	0.475	0.279	0.012	0.006	1.44	0.567	0.006	0.002
SE-24	0.322	0.332	0.007	0.007	1.53	1.68	0.002	0.004
SE-26	0.115	4.05	0.001	0.056	0.703	4.10	0.000	0.011
SE-31	0.309	0.406	0.008	0.007	1.19	0.860	0.006	0.003

¹NOEC (concurrent reference-toxicant test derived) = 180 mg/L total ammonia

²NOEC (concurrent reference-toxicant test derived) = 2.2 mg/L unionized ammonia

Table 3-11. Ammonia Summary for *Neanthes arenaceodentata*: Re-Test of Samples SE-15 and SE-20

Treatment	Overlying				Interstitial			
	Total Ammonia (mg/L Total) NOEC = 216 mg/L ¹		Unionized Ammonia (mg/L) NOEC = 2.2 ²		Total Ammonia (mg/L Total) NOEC = 216 mg/L ¹		Unionized Ammonia (mg/L) NOEC = 2.2 ²	
	Day 0	Day 20	Day 0	Day 20	Day 0	Day 20	Day 0	Day 20
Control	0.0785	0.820	0.003	0.018	0.213	1.18	0.002	0.010
CARR 47	1.45	0.212	0.049	0.006	4.77	1.82	0.041	0.003
CARR 68	0.216	0.339	0.006	0.012	1.22	0.742	0.007	0.003
SE-15	0.688	0.0641	0.015	0.001	1.84	1.57	0.005	0.003
SE-20	0.881	0.227	0.019	0.004	3.61	0.996	0.016	0.004

¹NOEC (concurrent reference-toxicant test derived) = 216 mg/L total ammonia

²NOEC (concurrent reference-toxicant test derived) = 2.2 mg/L unionized ammonia

Table 3-12. Sulfide Summary for *Neanthes arenaceodentata*

Treatment	Overlying				Interstitial			
	Total Sulfides (mg/L Total) Trigger Value = 3.4 mg/L ¹		Hydrogen Sulfide (mg/L)		Total Sulfides (mg/L Total) Trigger Value = 3.4 mg/L ¹		Hydrogen Sulfide (mg/L)	
	Day 0	Day 20	Day 0	Day 20	Day 0	Day 20	Day 0	Day 20
Control	0.001	ND	0.000	ND	0.008	ND	0.002	ND
CARR 14	ND	0.002	ND	0.000	0.000	0.021	0.000	0.009
CARR 47	ND	ND	ND	ND	0.016	0.001	0.002	0.000
CARR 68	0.003	0.000	0.000	0.000	0.022	ND	0.004	ND
SE-15	0.000	ND	0.000	ND	ND	0.014	ND	0.008
SE-16	0.003	0.000	0.000	0.000	ND	ND	ND	ND
SE-17	0.000	ND	0.000	ND	ND	ND	ND	ND
SE-18	ND	ND	ND	ND	ND	ND	ND	ND
SE-20	0.000	ND	0.000	ND	ND	ND	ND	ND
SE-24	0.000	0.001	0.000	0.000	0.005	0.010	0.003	0.005
SE-26	0.000	ND	0.000	ND	ND	0.001	ND	0.000
SE-31	ND	ND	ND	ND	ND	ND	ND	ND

¹Kendall and Barton 2004

ND = not detected; measurement below detection limit

Table 3-13. Sulfide Summary for *Neanthes arenaceodentata*: Re-Test of Samples SE-15 and SE-20

Treatment	Overlying				Interstitial			
	Total Sulfides (mg/L Total) Trigger Value = 3.4 mg/L ¹		Hydrogen Sulfide (mg/L)		Total Sulfides (mg/L Total) Trigger Value = 3.4 mg/L ¹		Hydrogen Sulfide (mg/L)	
	Day 0	Day 20	Day 0	Day 20	Day 0	Day 20	Day 0	Day 20
Control	0.017	0.016	0.001	0.002	0.029	ND	0.006	ND
CARR 47	0.027	0.012	0.002	0.001	ND	0.288	ND	0.190
CARR 68	0.014	0.024	0.001	0.002	ND	0.018	ND	0.008
SE-15	0.008	0.015	0.001	0.002	ND	0.070	ND	0.042
SE-20	0.013	0.034	0.001	0.004	ND	0.006	ND	0.003

¹Kendall and Barton 2004

ND = not detected; measurement below detection limit

Table 3-14. Test Condition Summary for *Neanthes arenaceodentata*

Test Conditions: PSEP <i>N. arenaceodentata</i>		
Date Sampled	September 25 and 27, 2019; October 11, 2019 (Ref Sed)	
Date Received	September 28 and October 11, 2019	
Test Dates	October 17 – November 6, 2019	
Sample Storage Conditions	4°C, dark	
Days of Holding Recommended: ≤8 weeks (56 days)	22 Days	
Source of Control Sediment	Yaquina Bay, OR	
Test Species	<i>Neanthes arenaceodentata</i>	
Supplier	Aquatic Toxicology Support	
Date Acquired	October 17, 2019	
Age Class	Juvenile; 17 days post-emergence	
Test Procedures	PSEP 1995 with SMARM revisions, SCUM (2019) SOP No. SED009.08	
Test Location	EcoAnalysts Port Gamble Laboratory	
Test Type/Duration	20-Day static renewal	
Control Water	North Hood Canal seawater, 0.45µm filtered	
Test Lighting	50 – 100 foot candles	
Test Chamber	1-Liter Glass Chamber	
Replicates per Treatment	5 + 4 surrogates (one used for WQ measurements throughout the test)	
Organisms per Replicate	5	
Exposure Volume	175 mL sediment/ 775 mL water	
Feeding	40 mg/jar every other day (8 mg/ind every other day)	
Water Renewal	Water renewed every third day (1/3 volume of exposure chamber)	
Test Dissolved Oxygen	Recommended: > 4.6 mg/L	Observed: 6.3 – 7.8 mg/L
Test Temperature	Recommended: 20 ± 1 °C	Observed: 19.1 – 20.8 °C
Test Salinity	Recommended: 28 ± 2 ppt	Observed: 26 – 29 ppt
Test pH	Recommended: 7 - 9	Observed: 7.0 – 8.2
Initial Biomass	Recommended: 0.5 - 1.0 mg Minimum: 0.25 mg (dry weight)	0.721 mg (dry weight) 0.415 mg (AFDW)
Control Performance Standard	Recommended: Control ≤ 10% mortality	Observed: 0%; Pass
	Recommended: ≥ 0.38 mg/ind/day (as AFDW)	Observed: 0.536 mg/ind/day; Pass
Reference Performance Standard (SMS)	Recommended: Mortality ≤20% MIG _{Reference} /MIG _{Control} ≥ 0.80 (as AFDW)	0-8%; Pass 0.80-0.89; Pass
Reference Toxicant LC ₅₀ (total ammonia)	LC ₅₀ = 211.7 mg/L	
Mean; Acceptable Range (total ammonia)	189; 135 – 264.6 mg/L	
NOEC (total ammonia)	180 mg/L	
NOEC (unionized ammonia)	2.2 mg/L	
Deviations from Test Protocol	None	

Table 3-15. Test Condition Summary for *Neanthes arenaceodentata*: (Re-Test of Samples SE-15 and SE-20)

Test Conditions: PSEP <i>N. arenaceodentata</i>		
Date Sampled	September 25 and 27, 2019; October 11, 2019 (Ref Sed)	
Date Received	September 28 and October 11, 2019	
Test Dates	November 21 – December 11, 2019	
Sample Storage Conditions	4°C, dark	
Days of Holding Recommended: ≤8 weeks (56 days)	57 Days (SE-20)	
Source of Control Sediment	Yaquina Bay, OR	
Test Species	<i>Neanthes arenaceodentata</i>	
Supplier	Aquatic Toxicology Support	
Date Acquired	November 21, 2019	
Age Class	Juvenile; 17 days post-emergence	
Test Procedures	PSEP 1995 with SMARM revisions, SCUM (2019) SOP No. SED009.08	
Test Location	EcoAnalysts Port Gamble Laboratory	
Test Type/Duration	20-Day static renewal	
Control Water	North Hood Canal seawater, 0.45µm filtered	
Test Lighting	50 – 100 foot candles	
Test Chamber	1-Liter Glass Chamber	
Replicates per Treatment	5 + 4 surrogates (one used for WQ measurements throughout the test)	
Organisms per Replicate	5	
Exposure Volume	175 mL sediment/ 775 mL water	
Feeding	40 mg/jar every other day (8 mg/ind every other day)	
Water Renewal	Water renewed every third day (1/3 volume of exposure chamber)	
Test Dissolved Oxygen	Recommended: > 4.6 mg/L	Observed: 5.4 – 7.6 mg/L
Test Temperature	Recommended: 20 ± 1 °C	Observed: 19.9 – 21.2 °C
Test Salinity	Recommended: 28 ± 2 ppt	Observed: 26 – 29 ppt
Test pH	Recommended: 7 - 9	Observed: 7.3 – 8.3
Initial Biomass	Recommended: 0.5 - 1.0 mg Minimum: 0.25 mg (dry weight)	0.699 mg (dry weight) 0.445 mg (AFDW)
Control Performance Standard	Recommended: Control ≤ 10% mortality	Observed: 4%; Pass
	Recommended: ≥ 0.38 mg/ind/day (as AFDW)	Observed: 0.552 mg/ind/day; Pass
Reference Performance Standard (SMS)	Recommended: Mortality ≤20% MIG _{Reference} /MIG _{Control} ≥ 0.80 (as AFDW)	0%; Pass 1.08 and 1.11; Pass
Reference Toxicant LC ₅₀ (total ammonia)	LC ₅₀ = 255.4 mg/L	
Mean; Acceptable Range (total ammonia)	192.5; 140.4 – 264.1 mg/L	
NOEC (total ammonia)	216 mg/L	
NOEC (unionized ammonia)	2.2 mg/L	
Deviations from Test Protocol	SE-20 one day past expiration	

3.3 Larval Development Bioassay

The larval development test with *M. galloprovincialis* was validated by 1.056 proportion normal survivorship, defined as the mean number of normal larvae within the seawater control divided by the stocking density. These values were within the SMS control acceptability criterion of ≥ 0.70 . A summary of the test results for all samples is shown in Table 3-16. Summaries of water quality measurements, ammonia and sulfide concentrations, and test conditions are presented in Table 3-17 through Table 3-19.

Mean number normal of the reference sediments was 0.88-90 of the control response, which met the SMS reference acceptability criteria (N_R/N_C) of ≥ 0.65 . This is defined as the number of normal larvae in the reference sample(s) divided by the number of normal larvae in the control. The test mean chamber stocking density (measured at test initiation) was 23.24 embryos/mL and was within the test objective of 20 – 40 embryos/mL.

Water quality parameters were within acceptable limits throughout the duration of the test (Table 3-17) with the exception of dissolved oxygen in several treatments on Day 1. Upon discovery, aeration was initiated on all test chambers for the remainder of the test.

A reference-toxicant test (positive control) was performed on the batch of test organisms utilized for this study. The LC_{50} value was within control chart limits (± 2 standard deviations from the laboratory historical mean). This result indicates that the test organisms used in this study were of similar sensitivity to those previously tested at EcoAnalysts.

Ammonia concentrations observed in the *M. galloprovincialis* test were below the NOEC value derived from the concurrent ammonia reference-toxicant test (3.52 mg/L total ammonia; Table 3-18), with the exception of CARR 47 on Day 2 (5.77 mg/L total ammonia). Ammonia may have contributed to larval development in this reference sample; however, it still met test performance criteria. Initial total sulfide concentrations for the reference CARR 68 and test samples SE-15, SE-16, and SE-26 were above the trigger value of 0.009 mg/L; however, the undissociated hydrogen sulfide measurements were below the hydrogen sulfide trigger value of 0.003 mg/L (Inouye 2015) with the exception of sample SE-26. Sulfides may have contributed to larval development in this treatment. Final sulfide measurements on Day 2 were below the respective trigger values in all samples except SE-20, which contained total sulfides measuring 0.016 mg/L. Hydrogen sulfide in this sample was below the 0.003 mg/L trigger value.

Table 3-16. Test Results for *Mytilus galloprovincialis*

Treatment	Rep	Number Normal	Number Abnormal	Mean # Normal (N)	Std. Dev.	Control Normal Survival N _c /I	Reference Normal Survival Relative to Control N _R /N _C	Performance Standard
Seawater Control	1	262	5	245.4	15.9	1.056		≥0.70; Meets Criterion
	2	220	4					
	3	245	4					
	4	255	3					
	5	245	4					
CARR 14	1	224	3	219.4	19.5		219.4/245.4 = 0.89	≥0.65; Meets Criterion
	2	233	7					
	3	213	6					
	4	238	5					
	5	189	2					
CARR 47	1	233	7	215.4	13.0		215.4/245.4 = 0.88	≥0.65; Meets Criterion
	2	201	6					
	3	224	13					
	4	212	6					
	5	207	3					
CARR 68	1	213	15	221.8	18.2		221.8/245.4 = 0.90	≥0.65; Meets Criterion
	2	198	1					
	3	218	4					
	4	241	6					
	5	239	8					
SE-15	1	199	8	197.6	9.6			
	2	195	6					
	3	202	5					
	4	183	7					
	5	209	1					
SE-16	1	177	2	198.6	16.0			
	2	222	1					
	3	196	4					
	4	198	14					
	5	200	5					
SE-17	1	187	16	198.4	10.0			
	2	204	14					
	3	198	12					
	4	191	14					
	5	212	15					
SE-18	1	232	4	209.2	19.8			
	2	193	16					
	3	213	6					
	4	223	6					
	5	185	17					
SE-20	1	201	8	196.4	15.0			
	2	208	3					
	3	202	6					
	4	170	4					
	5	201	14					

See Section 4.3 for Larval Test Suitability Determination

Bioassay Testing Results
Sediment Quality Analysis: Seaport Landing Site
Aberdeen, Washington

Treatment	Rep	Number Normal	Number Abnormal	Mean # Normal (N)	Std. Dev.	Control Normal Survival N _c /I	Reference Normal Survival Relative to Control N _R /N _c	Performance Standard
SE-24	1	119	69	109.0	15.5	See Section 4.3 for Larval Test Suitability Determination		
	2	88	97					
	3	123	66					
	4	118	47					
	5	97	65					
SE-26	1	172	30	184.0	17.3			
	2	197	25					
	3	207	17					
	4	166	21					
	5	178	36					
SE-31	1	194	9	192.6	12.6			
	2	211	10					
	3	196	28					
	4	178	25					
	5	184	15					

I = Mean Initial count (Stocking density); 232.4

N_c = Mean Control Normal

N_R = Mean Reference Normal

Table 3-17. Water Quality Summary for *Mytilus galloprovincialis*

Treatment	Dissolved Oxygen (mg/L)			Temperature (°C)			Salinity (ppt)			pH		
	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max
Seawater Control	7.5	7.2	7.8	16.5	15.7	17.0	29	29	29	8.0	7.9	8.0
CARR 14	7.3	6.6	7.9	16.6	15.9	17.0	29	29	29	7.9	7.9	8.0
CARR 47	7.1	5.9	8.1	16.5	15.6	17.0	29	29	29	7.9	7.9	8.0
CARR 68	7.1	6.2	8.0	16.6	15.8	17.0	29	29	29	7.9	7.9	7.9
SE-15	6.5	5.9	6.9	16.7	16.1	17.0	29	29	29	7.8	7.7	7.9
SE-16	6.6	6.0	7.4	17.0	17.0	17.0	29	28	29	7.8	7.8	7.8
SE-17	6.9	6.1	7.9	16.4	15.8	16.9	29	29	29	7.8	7.7	7.9
SE-18	7.7	7.6	7.7	16.4	15.7	16.9	29	29	29	7.8	7.7	7.9
SE-20	7.0	6.3	8.1	16.4	15.6	17.0	29	29	29	7.8	7.7	7.9
SE-24	7.5	7.0	7.8	16.7	16.3	17.0	29	29	29	7.5	7.4	7.8
SE-26	7.3	6.4	8.0	16.4	15.6	16.9	29	29	29	7.6	7.4	7.8
SE-31	6.6	5.4	7.8	16.7	16.4	17.0	29	29	29	7.7	7.7	7.8

BOLD=value outside of recommended range

Table 3-18. Ammonia and Sulfide Summary for *Mytilus galloprovincialis*

Treatment	Total Ammonia (mg/L Total) NOEC = 3.52 mg/L ¹		Unionized Ammonia (mg/L) NOEC = 0.058 mg/L ²		Total Sulfides (mg/L Total) Trigger Value = 0.009 mg/L ³		Hydrogen Sulfide (mg/L) Trigger Value = 0.003 mg/L ⁴	
	Day 0	Final (Day 2)	Day 0	Final (Day 2)	Day 0	Final (Day 2)	Day 0	Final (Day 2)
Seawater Control	0.000	0.000	0.000	0.000	0.001	0.003	0.000	0.000
CARR 14	0.000	1.46	0.000	0.035	ND	0.008	ND	0.001
CARR 47	0.000	5.77	0.000	0.135	0.009	0.009	0.001	0.001
CARR 68	0.000	0.102	0.000	0.002	0.016	0.006	0.001	0.001
SE-15	0.000	0.0813	0.000	0.001	0.011	0.004	0.001	0.000
SE-16	0.000	0.202	0.000	0.003	0.015	0.001	0.002	0.000
SE-17	0.000	0.000	0.000	0.000	ND	ND	ND	ND
SE-18	0.000	0.0252	0.000	0.000	0.006	0.006	0.001	0.001
SE-20	0.000	0.000	0.000	0.000	0.007	0.016	0.001	0.002
SE-24	0.000	0.0179	0.000	0.000	ND	0.003	ND	0.000
SE-26	0.000	0.0377	0.000	0.001	0.027	0.009	0.006	0.001
SE-31	0.000	0.000	0.000	0.000	0.002	0.005	0.000	0.001

¹NOEC (concurrent reference-toxicant test derived) = 3.52 mg/L total ammonia

²NOEC (concurrent reference-toxicant test derived) = 0.058 mg/L unionized ammonia

³Inouye 2015: Total sulfide value 0.009 mg/L derived from hydrogen sulfide dissociation (0.0025 mg/L H₂S @ 16°C, 28 ppt, and 7.7 pH)

⁴Inouye 2015: Hydrogen sulfide value 0.0025 mg/L

ND = Non-detect

BOLD = value above trigger value

Table 3-19. Test Condition Summary for *Mytilus galloprovincialis*

Test Conditions: PSEP <i>M. galloprovincialis</i>		
Date Sampled	September 25 and 27, 2019; October 11, 2019 (Ref Sed)	
Date Received	September 28 and October 11, 2019	
Test Dates	October 16 – 18, 2019	
Sample Storage Conditions	4°C, dark	
Holding Time Recommended: < 8 weeks (56 days)	21 Days	
Test Species	<i>Mytilus galloprovincialis</i>	
Supplier	Taylor Shellfish, Shelton, WA	
Date Acquired	October 4, August 27, and July 31, 2019	
Age Class	<4-h old embryos	
Test Procedures	PSEP 1995 with SMARM revisions, SCUM (2019) SOP No. SED005.06	
Test Location	EcoAnalysts Port Gamble Laboratory	
Test Type/Duration	48-60 Hour static test	
Control Water	North Hood Canal sea water, 0.45µm filtered	
Test Lighting	50 – 100 foot candles	
Test Chamber	1-Liter Glass Chamber	
Replicates per Treatment	5 + 1 surrogate (used for WQ measurements throughout the test)	
Exposure Volume	18 g sediment/ 900 mL water	
Feeding	None	
Water Renewal	None	
Test Dissolved Oxygen	Recommended: >6.0 mg/L	Observed: 5.4 – 8.1 mg/L
Test Temperature	Recommended: 16 ± 1 °C	Observed: 15.6 – 17.0 °C
Test Salinity	Recommended: 28 ± 1 ppt	Observed: 28 – 29 ppt
Test pH	Recommended: 7 – 9	Observed: 7.4 – 8.0
Stocking Density	Recommended: 20 – 40 embryos/mL	Observed: 23.24 embryos/mL
Control Performance Standard (SMS)	Recommended: Control normal survival ≥ 0.70	Observed: 1.056; Pass
Reference Performance Standard (SMS)	Recommended: Reference normal survival relative to sediment control ≥ 0.65	Observed: 0.88-90; Pass
Reference Toxicant Endpoint	Total Ammonia	Unionized Ammonia
Reference Toxicant EC ₅₀	EC ₅₀ = 9.74 mg/L	EC ₅₀ = 0.192 mg/L
Mean; Acceptable Range	7.52; 3.92 – 14.45 mg/L	0.113; 0.050 – 0.256 mg/L
NOEC Combined Proportion Normal	3.52 mg/L	0.058 mg/L
Deviations from Test Protocol	Dissolved oxygen	

4. DISCUSSION

Sediments were evaluated based on SMS criteria. The biological criteria are based on both statistical significance (a statistical comparison) and the degree of biological response (a numerical comparison). The SMS criteria are derived from the Washington Department of Ecology’s Sediment Cleanup User’s Manual (SCUM; WDOE 2019). Comparisons were made for each treatment against the reference sample using BioStat software. Two numerical comparisons were made under SMS: the SCO and the CSL.

4.1 Amphipod Test Suitability Determination

Under the SMS program, a treatment will fail SCO if mean mortality in the test sediment is >25% and the difference between mean mortality in the treatment compared to mean mortality in the reference is statistically significant ($p < 0.05$). Treatments fail the CSL if mean mortality in the test treatment $\geq 30\%$ relative to the reference sediment and the difference is statistically significant.

The mortality observed in all but one project sediment (SE-17) was not statistically different than that of the applicable reference treatment. Sample SE-17 was statistically different than its comparable reference (CARR 68); however, its mean mortality was 21%, which met SCO and CSL criteria. None of the project sediment fail the SCO and CSL criteria for the amphipod test as shown in Table 4-1.

Table 4-1. SMS Comparison for *Eohaustorius estuarius*

Treatment	Mean Mortality (%)	Compared To:	Statistically Different than Reference? (P<0.05)	Mortality Comparison to Reference $M_T - M_R$ (%)	Fails SCO? ¹ > 25 % (Absolute)	Fails CSL? ² $\geq 30\%$ ($M_T - M_R$)
Control	2					
CARR 14	1					
CARR 47	3					
CARR 68	4					
SE-15 ³	17	CARR 47	No	14	No	No
SE-16	4	CARR 47	No	1	No	No
SE-17	21	CARR 68	Yes	17	No	No
SE-18	4	CARR 68	No	0	No	No
SE-20 ³	13	CARR 68	No	9	No	No
SE-24	15	CARR 47	No	12	No	No
SE-26	2	CARR 14	No	1	No	No
SE-31	7	CARR 47	No	4	No	No

¹SCO: Statistical Significance and $M_T > 25\%$

²CSL: Statistical Significance and $M_T - M_R > 30\%$

³Outlier reps with 95-100% mortality due to native fauna are not included in analysis

M_T = Treatment Mortality

M_R = Reference Mortality

4.2 Juvenile Polychaete Test Suitability Determination

Suitability determinations for the juvenile polychaete test were based on MIG as AFDW. A test treatment fails SCO criteria if MIG is statistically lower in the test treatment, relative to the reference, and the ratio of the MIG in the test treatment is <0.70 that of the reference. The treatments will fail CSL criteria if the MIG is significantly lower than the reference treatment and the ratio between the MIG of the treatment and the MIG of the reference is <0.50.

All project sediments pass the SCO and CSL criteria when evaluated on a dry weight and AFDW basis (Table 4-2 and Table 4-3).

Table 4-2. SMS Comparison for *Neanthes arenaceodentata*

Treatment	MIG (mg/ind/day) AFDW	Comparison To:	Statistically Less than Reference? (p<0.05)	MIG Relative to Reference MIG _T /MIG _R	Fails SCO? ¹ < 0.70	Fails CSL? ² < 0.50
Control	0.536					
CARR 14	0.479					
CARR 47	0.429					
CARR 68	0.472					
SE-16	0.500	CARR 47	No	1.17	No	No
SE-17	0.366	CARR 68	No	0.775	No	No
SE-18	0.417	CARR 68	No	0.883	No	No
SE-24	0.341	CARR 47	No	0.795	No	No
SE-26	0.526	CARR 14	No	1.10	No	No
SE-31	0.465	CARR 47	No	1.08	No	No

¹SCO: Statistical Significance and MIG_T/MIG_R<0.70

²CSL: Statistical Significance and MIG_T/MIG_R<0.50

MIG_T = Treatment Mean Individual Growth

MIG_R = Reference Mean Individual Growth

Table 4-3. SMS Comparison for *Neanthes arenaceodentata*: Samples SE-15 and SE-20

Treatment	MIG (mg/ind/day) AFDW	Comparison To:	Statistically Less than Reference? (p<0.05)	MIG Relative to Reference MIG _T /MIG _R	Fails SCO? ¹ < 0.70	Fails CSL? ² < 0.50
Control	0.552					
CARR 47	0.597					
CARR 68	0.612					
SE-15 ³	0.575	CARR 47	No	0.96	No	No
SE-20 ³	0.528	CARR 68	No	0.86	No	No

¹SCO: Statistical Significance and MIG_T/MIG_R<0.70

²CSL: Statistical Significance and MIG_T/MIG_R<0.50

³Sample sieved to remove native fauna and re-tested alongside appropriate reference sample

MIG_T = Treatment Mean Individual Growth

MIG_R = Reference Mean Individual Growth

4.3 Larval Test Suitability Determination

Larval test treatments fail SCO criteria if the number of normal larvae in the test treatment is significantly lower ($p < 0.10$) than that of the reference and if the ratio between the normal larval development in the test treatment is less than 0.85 of the normal development in the reference. Treatments fail CSL criteria if the number of normal larvae in the test treatment is significantly lower ($p < 0.10$) than that of the reference and if the ratio between the normal larval development in the test treatment is less than 0.70 of the normal development in the reference.

The project sediments passed both the SCO and CSL criteria for larval bivalve development evaluation, except for sample SE-24 (which failed SCO and CSL criteria) and sample SE-26 (which failed SCO criteria but not CSL) (Table 4-4). Relative species sensitivity often varies among contaminants. Of the suite of bioassays conducted, the larval development test is the most sensitive endpoint. Water quality, as well as ammonia and sulfides concentrations, were below threshold values within the test, indicating a different source may have contributed to toxicity for SE-24. Chemistry results for that sample have indicated elevated concentrations of nickel may have been present, measured at 40.2 mg/kg (Phil Wiescher, Per. Comm.). Given the sample percent solids and bioassay exposure conditions, the estimated maximum possible dissolved nickel concentration within the larval test was 0.2854 mg/L for SE-24. This value is above the larval EC₅₀ value of 0.15 mg/L dissolved nickel from the USEPA ECOTOX database (<https://cfpub.epa.gov/ecotox/>), indicating that nickel may have contributed to the observed toxicity. However, as metals were not measured in the actual bioassay exposure, this correlation can not be confirmed with certainty.

Table 4-4. SMS Comparison for *Mytilus galloprovincialis*

Treatment	Mean Number Normal	Compared To:	Statistically Less than Reference? ($p < 0.10$)	Normal Survival to Reference N_T/N_R	Fails SCO? ¹ < 0.85	Fails CSL? ² < 0.70
Seawater Control	245.4					
CARR 14	219.4					
CARR 47	215.4					
CARR 68	221.8					
SE-15	197.6	CARR 47	Yes	0.917	No	No
SE-16	198.6	CARR 47	Yes	0.922	No	No
SE-17	198.4	CARR 68	Yes	0.894	No	No
SE-18	209.2	CARR 68	No	0.943	No	No
SE-20	196.4	CARR 68	Yes	0.885	No	No
SE-24	109.0	CARR 47	Yes	0.506	Yes	Yes
SE-26	184.0	CARR 14	Yes	0.839	Yes	No
SE-31	192.6	CARR 47	Yes	0.894	No	No

¹ SCO: Statistical Significance and $(N_T/N_R) < 0.85$

² CSL: Statistical Significance and $(N_T/N_R) < 0.70$

N_T = Treatment Mean Number Normal

N_R = Reference Mean Number Normal

5. SUMMARY

A summary of the biological tests conducted on the sediments evaluated under the SMS sediment quality criteria (Table 5-1) are provided below.

The project sediments that pass the SCO and CSL performance criteria for all tests performed are SE-15, SE-16, SE-17, SE-18, SE-20, and SE-31. One project sample (SE-26) failed SCO criteria for the larval test but passed larval Cleanup Screening Levels. Sample SE-24 failed both SCO and CSL criteria for the larval assessment. Preliminary chemistry results indicate that nickel may have contributed to toxicity in SE-24 for the larval test, however this correlation can not be confirmed with certainty.

Table 5-1. Summary of SMS Evaluation

Treatment	Sediment Cleanup Objectives			Cleanup Screening Levels		
	Amphipod	Polychaete	Larval	Amphipod	Polychaete	Larval
SE-15	Pass	Pass	Pass	Pass	Pass	Pass
SE-16	Pass	Pass	Pass	Pass	Pass	Pass
SE-17	Pass	Pass	Pass	Pass	Pass	Pass
SE-18	Pass	Pass	Pass	Pass	Pass	Pass
SE-20	Pass	Pass	Pass	Pass	Pass	Pass
SE-24	Pass	Pass	Fail	Pass	Pass	Fail
SE-26	Pass	Pass	Fail	Pass	Pass	Pass
SE-31	Pass	Pass	Pass	Pass	Pass	Pass

6. REFERENCES

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- CETIS. 2016. CETIS™ Comprehensive Environmental Toxicity Information System User's Guide. Tidepool Scientific Software. McKinleyville, CA.
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- Greenstein, D.J., S. Alzadjali, S.M. Bay. 1996. Toxicity of ammonia to purple sea urchin (*Strongylocentrotus purpuratus*) embryos. in: M.J. Allen, C. Francisco, D. Hallock (eds.), Southern California Coastal Water Research Project 1994-95 Annual Report pp. 72-77. Southern California Coastal Water Research Project. Westminster, CA.
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- PSEP 1995. Puget Sound Protocols and Guidelines. Puget Sound Estuary Program. Puget Sound Water Quality Action Team, Olympia, Washington.
- USEPA. 2002. Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms, Fifth Edition. EPA-821-R-02-012
- WDOE 2019. Sediment Cleanup User's Manual (SCUM). Guidance for Implementing the Cleanup Provisions of the Sediment Management Standards, Chapter 173-204 WAC. Toxics Cleanup Program. Washington State Department of Ecology. Olympia, Washington. Publication No. 12-09-057. December 2019.

APPENDIX A. TEST DATA, STATISTICAL ANALYSES, AND REFERENCE TOXICANT TEST RESULTS

1. *EOHAUSTORIUS ESTUARIUS* 10-DAY TEST

- 1.1 *EOHAUSTORIUS ESTUARIUS* TEST DATA
- 1.2 *EOHAUSTORIUS ESTUARIUS* STATISTICAL RESULTS
- 1.3 *EOHAUSTORIUS ESTUARIUS* REFERENCE TOXICANT TEST RESULTS

2. *NEANTHES ARENACEODENTATA* SOLID-PHASE TEST

- 2.1 *NEANTHES ARENACEODENTATA* TEST DATA
- 2.2 *NEANTHES ARENACEODENTATA* STATISTICAL RESULTS
- 2.3 *NEANTHES ARENACEODENTATA* REFERENCE TOXICANT TEST RESULTS
- 2.4 *NEANTHES ARENACEODENTATA* TEST DATA: RE-TEST OF SAMPLES SE-15 AND SE-20
- 2.5 *NEANTHES ARENACEODENTATA* STATISTICAL RESULTS: RE-TEST OF SAMPLES SE-15 AND SE-20
- 2.6 *NEANTHES ARENACEODENTATA* REFERENCE TOXICANT TEST RESULTS: RE-TEST OF SAMPLES SE-15 AND SE-20

3. *MYTILUS GALLOPROVINCIALIS* WATER-COLUMN TEST

- 3.1 *MYTILUS GALLOPROVINCIALIS* TEST DATA
- 3.2 *MYTILUS GALLOPROVINCIALIS* STATISTICAL RESULTS
- 3.3 *MYTILUS GALLOPROVINCIALIS* REFERENCE TOXICANT TEST RESULTS

APPENDIX B. CHAIN-OF-CUSTODY FORMS, LOGS, AND PRE-TEST DOCUMENTS

**APPENDIX A. TEST DATA, STATISTICAL ANALYSES, AND REFERENCE
TOXICANT TEST RESULTS**

DRAFT

1. ***Eohaustorius estuarius*** 10-day Test

DRAFT

1.1 *Eohaustorius estuarius* Test Data

DRAFT

10 DAY SOLID PHASE TEST DATA

CLIENT MFA	SPECIES <i>Eohaustorius estuarius</i>	LABORATORY Port Gamble	LOCATION Bath 8	TEST START DATE 18Oct19
PROJECT Seaport	PROJECT MANAGER Julia Baum	PROTOCOL PSEP 1995	TEST END DATE 28Oct19	

TEST CONDITIONS				WATER QUALITY DATA								TECH.	Date
SAMPLE ID	DAY	REP	JAR	D.O. (mg/L)		TEMP (°C)		SALINITY (ppt)		pH (pH units)			
				meter	mg/L	meter	°C	meter	ppt	meter	unit		
Control /	0	Surr		9	7.5	9	15.1	9	28	9	7.9	DM	10/18/19
Control /	1	Surr		9	7.4	9	15.1	9	28	9	7.8	DM	10/19/19
Control /	2	Surr		8	8.3	8	15.0	8	28	8	8.0	NR	10/20/19
Control /	3	Surr		9	8.3	9	15.2	9	28	9	8.0	NR	10/21/19
Control /	4	Surr		8	8.6	8	14.9	8	28	8	8.0	MS	10/22
Control /	5	Surr		9	6.0	9	14.9	9	28	9	8.0	DM	10/23
Control /	6	Surr		9	7.0	9	15.1	9	28	9	7.8	DM	10/24
Control /	7	Surr		8	8.2	8	14.8	8	28	8	8.0	MS	10/25
Control /	8	Surr		9	8.1	9	14.8	9	28	9	7.9	DM	10/26
Control /	9	Surr		8	8.5	8	14.7	8	28	8	8.1	MS	10/27
Control /	10	Surr		8	8.4	8	14.7	8	28	8	8.1	MS	10/28
CR21-West (14) /	0	Surr		9	8.1	9	15.2	9	29	9	8.0	DM	10/18/19
CR21-West (14) /	1	Surr		9	8.0	9	15.0	9	29	9	8.1	DM	10/19/19
CR21-West (14) /	2	Surr		8	8.3	8	14.6	8	28	8	8.1	NR	10/20/19
CR21-West (14) /	3	Surr		9	8.3	9	14.8	9	28	9	8.1	NR	10/21/19
CR21-West (14) /	4	Surr		8	8.4	8	15.4	8	28	8	8.1	MS	10/22
CR21-West (14) /	5	Surr		9	8.5	9	14.7	9	28	9	8.1	DM	10/23
CR21-West (14) /	6	Surr		9	8.4	9	14.7	9	28	9	8.0	DM	10/24
CR21-West (14) /	7	Surr		8	8.4	8	14.9	8	28	8	8.1	MS	10/25
CR21-West (14) /	8	Surr		9	8.4	9	14.7	9	29	9	8.2	DM	10/26
CR21-West (14) /	9	Surr		8	8.5	8	14.6	8	28	8	8.2	MS	10/27
CR21-West (14) /	10	Surr		8	8.4	8	14.7	8	29	8	8.2	MS	10/28

10 DAY SOLID PHASE TEST DATA

CLIENT MFA	SPECIES <i>Eohaustorius estuarius</i>	LABORATORY Port Gamble	LOCATION Bath 8	TEST START DATE 18Oct19
PROJECT Seaport		PROJECT MANAGER Julia Baum	PROTOCOL PSEP 1995	TEST END DATE 28Oct19

TEST CONDITIONS				WATER QUALITY DATA								TECH.	Date
SAMPLE ID	DAY	REP	JAR	D.O. (mg/L) > 5.1		TEMP (°C) 15 ± 1		SALINITY (ppt) 28 ± 1		pH (pH units) 7-9			
				meter	mg/L	meter	°C	meter	ppt	meter	unit		
Carr20 (47) /	0	Surr		9	8.2	9	15.1	9	29	9	8.0	DM	10/18/19
Carr20 (47) /	1	Surr		9	8.0	9	15.0	9	29	9	8.0	DM	10/19/19
Carr20 (47) /	2	Surr		8	8.3	8	14.6	8	28	8	8.1	NR	10/20/19
Carr20 (47) /	3	Surr		9	8.4	9	14.7	9	28	9	8.1	NR	10/21
Carr20 (47) /	4	Surr		8	8.3	8	15.6	8	27	8	8.1	MS	10/22
Carr20 (47) /	5	Surr		9	8.5	9	14.8	9	28	9	8.1	DM	10/22
Carr20 (47) /	6	Surr		9	8.3	9	15.0	9	28	9	7.1	DM	10/24
Carr20 (47) /	7	Surr		8	8.3	8	14.8	8	28	8	8.1	MS	10/25
Carr20 (47) /	8	Surr	②	8	8.5 ^{8.3}	8	14.8 ^{14.6}	8	26 ²⁸	8	7.8 ^{8.2}	DM	10/26
Carr20 (47) /	9	Surr		8	8.0	8	14.9	8	28	8	8.1	MS	10/27
Carr20 (47) /	10	Surr		8	8.5	8	14.7	8	28	8	8.2	MS	10/28
CR02-South (68) /	0	Surr		9	8.2	9	15.1	9	29	9	8.0	DM	10/18/19
CR02-South (68) /	1	Surr		9	8.0	9	14.9	9	29	9	8.0	DM	10/19/19
CR02-South (68) /	2	Surr		8	8.3	8	14.7	8	29	8	8.0	NR	10/20/19
CR02-South (68) /	3	Surr		9	8.4	9	14.8	9	28	9	8.0	NR	10/21
CR02-South (68) /	4	Surr		8	8.4	8	15.0	8	28	8	8.0	MS	10/22
CR02-South (68) /	5	Surr		9	8.5	9	14.9	9	28	9	8.0	DM	10/23
CR02-South (68) /	6	Surr		9	8.3	9	14.8	9	28	9	8.0	DM	10/24
CR02-South (68) /	7	Surr		8	8.3	8	14.8	8	28	8	8.0	MS	10/25
CR02-South (68) /	8	Surr		9	8.3	9	14.7	9	28	9	8.1	DM	10/26
CR02-South (68) /	9	Surr		8	8.6	8	14.7	8	28	8	8.0	MS	10/27
CR02-South (68) /	10	Surr		8	8.4	8	14.7	8	29	8	8.0	MS	10/28

① MR-Actual = 29 ppt - DM - 10/19/19 ② WP - MS 10/25

10 DAY SOLID PHASE TEST DATA

CLIENT MFA	SPECIES <i>Eohaustorius estuarius</i>	LABORATORY Port Gamble	LOCATION Bath 8	TEST START DATE 18Oct19
PROJECT Seaport		PROJECT MANAGER Julia Baum	PROTOCOL PSEP 1995	TEST END DATE 28Oct19

TEST CONDITIONS				WATER QUALITY DATA								TECH.	Date
SAMPLE ID	DAY	REP	JAR	D.O. (mg/L)		TEMP (°C)		SALINITY (ppt)		pH (pH units)			
				meter	mg/L	meter	°C	meter	ppt	meter	unit		
SE 15 /	0	Surr		9	8.2	9	15.2	9	27	9	7.9	DM	10/18/19
SE 15 /	1	Surr		9	8.2	9	14.7	9	26	9	7.9	DM	10/19/19
SE 15 /	2	Surr		8	8.5	8	14.7	8	26	8	7.9	NR	10/20/19
SE 15 /	3	Surr		9	8.4	9	14.8	9	26	9	7.8	NR	10/21
SE 15 /	4	Surr		8	8.6	8	15.0	8	26	8	7.8	MS	10/22
SE 15 /	5	Surr		9	8.5	9	14.9	9	26	9	7.7	DM	10/23
SE 15 /	6	Surr		9	8.4	9	14.8	9	26	9	7.8	DM	10/24
SE 15 /	7	Surr		8	8.4	8	14.9	8	26	8	7.7	MS	10/25
SE 15 /	8	Surr		9	8.4	9	14.8	9	26	9	7.7	DM	10/26
SE 15 /	9	Surr		8	8.6	8	14.6	8	26	8	7.6	MS	10/27
SE 15 /	10	Surr		8	8.4 ^{8.5}	8	14.7	8	26	8	7.6	MS	10/28
SE 16 /	0	Surr		9	8.2	9	15.1	9	27	9	7.9	DM	10/18/19
SE 16 /	1	Surr		9	8.2	9	14.8	9	26	9	7.9	DM	10/19/19
SE 16 /	2	Surr		8	8.3	8	14.7	8	26	8	7.9	NR	10/20/19
SE 16 /	3	Surr		9	8.4	9	14.7	9	26	9	7.9	NR	10/21
SE 16 /	4	Surr		8	8.6	8	14.8	8	26	8	7.9	MS	10/22
SE 16 /	5	Surr		9	8.6	9	14.7	9	26	9	7.9	DM	10/23
SE 16 /	6	Surr		9	8.3	9	14.7	9	26	9	7.9	DM	10/24
SE 16 /	7	Surr		8	8.5	8	14.8	8	26	8	7.8	MS	10/25
SE 16 /	8	Surr		9	8.1	9	14.7	9	26	9	7.9	DM	10/26
SE 16 /	9	Surr		8	8.5	8	14.6	8	26	8	7.9	MS	10/27
SE 16 /	10	Surr		8	8.6	8	14.5	8	26	8	7.8	MS	10/28

①MR-MS 10/28

10 DAY SOLID PHASE TEST DATA

CLIENT MFA	SPECIES <i>Eohaustorius estuarius</i>	LABORATORY Port Gamble	LOCATION Bath 8	TEST START DATE 18Oct19
PROJECT Seaport		PROJECT MANAGER Julia Baum	PROTOCOL PSEP 1995	TEST END DATE 28Oct19

WATER QUALITY DATA

TEST CONDITIONS				D.O. (mg/L) > 5.1		TEMP (°C) 15 ± 1		SALINITY (ppt) 28 ± 1		pH (pH units) 7-9		TECH.	Date
SAMPLE ID	DAY	REP	JAR	D.O.		TEMP		SALINITY		pH			
				meter	mg/L	meter	°C	meter	ppt	meter	unit		
SE 17 /	0	Surr		9	8.2	9	15.2	9	27	9	8.0	DM	10/18/19
SE 17 /	1	Surr		9	8.1	9	14.8	9	27	9	8.0	DM	10/19/19
SE 17 /	2	Surr		8	8.4	8	14.7	8	27	8	8.0	NR	10/20/19
SE 17 /	3	Surr		9	8.4	9	14.8	9	27	9	8.0	NR	10/21
SE 17 /	4	Surr		8	8.6	8	15.0	8	26 [Ⓢ] 27	8	7.9 [Ⓢ] 8.0	MS	10/22
SE 17 /	5	Surr		9	8.0	9	14.7	9	27	9	7.9	DM	10/23
SE 17 /	6	Surr		9	8.4	9	14.7	9	27	9	8.0	DM	10/24
SE 17 /	7	Surr		8	8.5	8	14.7	8	27	8	7.9	MS	10/25
SE 17 /	8	Surr		9	8.3	9	14.8	9	27	9	7.9	DM	10/26
SE 17 /	9	Surr		8	8.6	8	14.7	8	27	8	7.9	MS	10/27
SE 17 /	10	Surr		8	8.5	8	14.9	8	27	8	7.9	MS	10/28
SE 18 /	0	Surr		9	8.0	9	15.3	9	27	9	7.9	DM	10/18/19
SE 18 /	1	Surr		9	8.0	9	14.8	9	27	9	7.9	DM	10/19/19
SE 18 /	2	Surr		8	8.3	8	14.9	8	27	8	7.9	NR	10/20/19
SE 18 /	3	Surr		9	8.3	9	14.9	9	27	9	7.8	NR	10/21
SE 18 /	4	Surr		8	8.5	8	14.9	8	26	8	7.9	MS	10/22
SE 18 /	5	Surr		9	8.5	9	15.0	9	27	9	7.8	DM	10/23
SE 18 /	6	Surr		9	8.4	9	14.7	9	27	9	7.9	DM	10/24
SE 18 /	7	Surr		8	8.5	8	14.8	8	26	8	7.8	MS	10/25
SE 18 /	8	Surr		9	8.3	9	14.8	9	27	9	7.9	DM	10/26
SE 18 /	9	Surr		8	8.5	8	14.7	8	26	8	7.9	MS	10/27
SE 18 /	10	Surr		8	8.5	8	15.0	8	27	8	7.9	MS	10/28

①WN-MS 10/22

10 DAY SOLID PHASE TEST DATA

CLIENT MFA	SPECIES <i>Eohaustorius estuarius</i>	LABORATORY Port Gamble	LOCATION Bath 8	TEST START DATE 18Oct19
PROJECT Seaport	PROJECT MANAGER Julia Baum	PROTOCOL PSEP 1995	TEST END DATE 28Oct19	

TEST CONDITIONS				WATER QUALITY DATA								TECH.	Date
SAMPLE ID	DAY	REP	JAR	D.O. (mg/L)		TEMP (°C)		SALINITY (ppt)		pH (pH units)			
				meter	mg/L	meter	°C	meter	ppt	meter	unit		
SE 20 /	0	Surr		9	8.3	9	15.1	9	27	9	8.0	DM	10/18/19
SE 20 /	1	Surr		9	8.0	9	14.8	9	27	9	7.9	DM	10/19/19
SE 20 /	2	Surr		8	8.3	8	14.6	8	27	8	7.9	NR	10/20/19
SE 20 /	3	Surr		9	8.4	9	14.8	9	27	9	7.9	NR	10/21/19
SE 20 /	4	Surr		8	8.5	8	15.0	8	26	8	7.9	MS	10/22
SE 20 /	5	Surr		9	8.6	9	14.8	9	27	9	7.8	DM	10/23
SE 20 /	6	Surr		9	8.5	9	14.7	9	27	9	7.8	DM	10/24
SE 20 /	7	Surr		8	8.5	8	14.7	8	26	8	7.8	MS	10/25
SE 20 /	8	Surr		9	8.4	9	14.7	9	27	9	7.7	DM	10/26
SE 20 /	9	Surr		8	8.6	8	14.7	8	26	8	7.7	MS	10/27
SE 20 /	10	Surr		8	8.6	8	14.6	8	27	8	7.6	MS	10/28
SE 24 /	0	Surr		9	8.2	9	15.1	9	27	9	7.8	DM	10/18/19
SE 24 /	1	Surr		9	8.2	9	15.1	9	27	9	7.8	DM	10/19/19
SE 24 /	2	Surr		8	8.4	8	14.9	8	26	8	7.8	NR	10/20/19
SE 24 /	3	Surr		9	8.4	9	14.8	9	27	9	7.8	NR	10/21
SE 24 /	4	Surr		8	8.6	8	14.8	8	26	8	7.7	MS	10/22
SE 24 /	5	Surr		9	8.6	9	14.7	9	27	9	7.6	DM	10/23
SE 24 /	6	Surr		9	8.4	9	14.7	9	27	9	7.6	DM	10/24
SE 24 /	7	Surr		8	8.4	8	15.1	8	26	8	7.5	MS	10/25
SE 24 /	8	Surr		9	8.3	9	14.7	9	27	9	7.6	DM	10/26
SE 24 /	9	Surr		8	8.6	8	14.5	8	26	8	7.4	MS	10/27
SE 24 /	10	Surr		8	8.5	8	14.5	8	27	8	7.4	MS	10/28

① All replicates renewed prior to test initiation. W@ remeasured. JB 10/18/19.

10 DAY SOLID PHASE TEST DATA

CLIENT MFA	SPECIES <i>Eohaustorius estuarius</i>	LABORATORY Port Gamble	LOCATION Bath 8	TEST START DATE 18Oct19
PROJECT Seaport		PROJECT MANAGER Julia Baum	PROTOCOL PSEP 1995	TEST END DATE 28Oct19

WATER QUALITY DATA

TEST CONDITIONS SAMPLE ID	DAY	REP	JAR	D.O. (mg/L)		TEMP (°C)		SALINITY (ppt)		pH (pH units)		TECH.	Date
				> 5.1		15 ± 1		28 ± 1		7-9			
				D.O.	TEMP	SALINITY	pH						
meter	mg/L	meter	°C	meter	ppt	meter	unit						
SE 26 /	0	Surr		9	8.2	9	15.2	9	27	9	7.5	DM	10/18/19
SE 26 /	1	Surr		9	8.1	9	15.2	9	27	9	7.4	DM	10/19/19
SE 26 /	2	Surr		8	8.5	8	15.9	8	27	8	7.7	NR	10/20/19
SE 26 /	3	Surr		9	8.3	9	16.1	9	27	9	7.7	NR	10/21
SE 26 /	4	Surr		8	6.3 ^①	8	15.7	8	27	8	7.3	MS	10/22
SE 26 /	5	Surr		9	8.5	9	15.1	9	27	9	7.4	DM	10/23
SE 26 /	6	Surr		9	8.4	9	15.0	9	27	9	7.5	DM	10/24
SE 26 /	7	Surr		8	8.4	8	15.0	8	27	8	7.3	MS	10/25
SE 26 /	8	Surr		9	8.4	9	14.9	9	27	9	7.4	DM	10/26
SE 26 /	9	Surr		8	8.5	8	14.8	8	27	8	7.2	MS	10/27
SE 26 /	10	Surr		8	8.5	8	14.8	8	27	8	7.2	MS	10/28
SE 31 / .	0	Surr		9	8.1	9	15.1	9	28	9	7.9	DM	10/18/19
SE 31 / .	1	Surr		9	7.8	9	15.4	9	28	9	7.8	DM	10/19/19
SE 31 / .	2	Surr		8	8.3	8	14.8	8	27	8	7.9	NR	10/20/19
SE 31 / .	3	Surr		9	8.3	9	14.9	9	27	9	7.9	NR	10/21
SE 31 / .	4	Surr		8	8.5	8	14.8	8	27	8	7.8	MS	10/22
SE 31 / .	5	Surr		9	8.5	9	14.9	9	27	9	7.8	DM	10/23
SE 31 / .	6	Surr		9	8.4	9	14.8	9	27	9	7.8	DM	10/24
SE 31 / .	7	Surr		8	8.5	8	15.0	8	27	8	7.8	MS	10/25
SE 31 / .	8	Surr		9	8.2	9	14.9	9	27	9	7.7	DM	10/26
SE 31 / .	9	Surr		8	8.6	8	14.7	8	27	8	7.7	MS	10/27
SE 31 / .	10	Surr		8	8.5	8	14.8	8	27	8	7.7	MS	10/28

① Airline not connected; connected after reading - MS 10/22
 ↳ remeasured, DO = 7.9

10 DAY SOLID PHASE TEST DATA

CLIENT MFA	PROJECT Seaport	PROJECT NO. PG1313	PROJECT MAN. Julia Baum	LAB Port Gamble Bath 8	PROTOCOL PSEP 1995	SPECIES <i>Eohaustorius estuarius</i>
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ENDPOINT DATA & OBSERVATIONS

SAMPLE ID	REP	JAR #	INITIAL #	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7	DAY 8	DAY 9	DAY 10	NUMBER REMAINING	# Dead or Comments	
				DATE			DATE									
				TECHNICIAN			TECHNICIAN									
Control /	1			N	N	N	N	N	N	N	N	N	N	20		
	2			N	N	N	1 M	N	N	N	N	N	N	19		
	3			N	N	N	N	N	N	N	N	N	N	19		
	4			N	N	N	N	N	N	N	N	N	N	20		
	5			N	N	N	N	N	N	N	N	N	N	20		
CR21-West (14) /	1			N	N	N	N	G	G	1 S	G	N	G	19		
	2			N	N	N	N	G	G	G	G	N	G	20		
	3			N	N	N	N	G	G	G	G	N	G	20		
	4			N	N	N	N	G	G	G	N	N	N	20		
	5			N	N	N	N	G	G	N	N	N	N	20		
Carr20 (47) /	1			N	N	N	N	N	N	1 FOS	N	N	G	20		
	2			N	N	N	N	N	N	N	N	N	N	20		
	3			N	N	N	N	N	N	N	N	N	N	19		
	4			N	N	N	N	N	N	N	N	N	N	20		
	5			N	N	N	N	N	N	N	N	N	N	20		
CR02-South (68) /	1			N	N	N	1 FOS	N	N	N	N	N	N	18		
	2			N	N	N	N	N	N	N	N	N	N	20		
	3			N	N	N	N	N	N	N	N	N	N	20		
	4			N	1 FOS	N	N	N	N	N	N	N	N	19		
	5			N	N	N	1 M	N	N	N	N	N	N	18		

#S= Number on the Surface
 #M= Number of Mortality
 G=Growth (fungal,bacterial)
 D=No Air Flow (DO?)
 N=Normal
 B=No Burrows
 #FOS=Floating on Surface
 #E=Emergent
 C=Too cloudy to observe

INITIAL # OF ORGANISMS
 20

10 DAY SOLID PHASE TEST DATA

CLIENT MFA	PROJECT Seaport	PROJECT NO. PG1313	PROJECT MAN. Julia Baum	LAB Port Gamble Bath 8	PROTOCOL PSEP 1995	SPECIES <i>Eohaustorius estuarius</i>
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ENDPOINT DATA & OBSERVATIONS

SAMPLE ID	REP	JAR #	INITIAL #	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7	DAY 8	DAY 9	DAY 10	NUMBER REMAINING	# Dead or Comments	
				DATE			DATE									
				TECHNICIAN			TECHNICIAN									
SE 15 /	1			N	N	N	N	N	N	N	N	N	N	13	GG	
	2			N	3 FOS	3 FOS	N	3 FOS	N	N	N	1 FOS	N	18		
	3			N	N	N	N	N	N	N	N	N	N	0		
	4			N	N	N	N	N	N	N	N	N	N	0		
	5			N	N	N	N	N	G	N	N	N	N	19		
SE 16 /	1			N	N	N	N	N	N	N	N	N	N	17		
	2			N	N	N	N	N	N	N	N	N	N	20		
	3			N	N	N	N	N	N	N	N	N	N	19		
	4			N	N	N	N	N	G	N	N	N	N	20		
	5			N	N	1 FOS	N	N	G	N	N	N	N	20		
SE 17 /	1			2 FOS	N	N	1 FOS	1 FOS	N	N	N	1 FOS	N	19	C	
	2			1 FOS	N	N	N	N	N	N	2	2	N	18		
	3			N	N	N	N	N	N	N	2	2	N	19		
	4			N	N	N	N	N	N	N	2	2	N	12		
	5			N	N	N	N	N	N	N	2	2	N	11		
SE 18 /	1			N	N	N	N	1 FOS	N	N	N	N	N	20		
	2			N	N	N	N	N	N	N	N	N	N	19		
	3			N	N	2 FOS	1 FOS	N	N	N	2	2	N	19		
	4			N	N	N	N	N	N	N	2	2	N	19		
	5			N	N	N	N	N	G	N	N	2	N	19		

INITIAL # OF ORGANISMS
20

① Nereid polychaete present (2" long). mk 10/28.

10 DAY SOLID PHASE TEST DATA

CLIENT MFA	PROJECT Seaport	PROJECT NO. PG1313	PROJECT MAN. Julia Baum	LAB Port Gamble Bath 8	PROTOCOL PSEP 1995	SPECIES <i>Eohaustorius estuarius</i>
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ENDPOINT DATA & OBSERVATIONS

SAMPLE ID	REP	JAR #	INITIAL #	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7	DAY 8	DAY 9	DAY 10	NUMBER REMAINING	# Dead or Comments	
				DATE			DATE									
				TECHNICIAN			TECHNICIAN									
SE 20 /	1			DM	NR	NR	MS	DM	DM	MS	DM	MS	mk	20		
	2													15		
	3													1	IM (1)	
	4													0		
	5													17		
SE 24 /	1													17		
	2													20		
	3													20		
	4													19		
	5													9	(1)	
SE 26 /	1													20		
	2													20		
	3													19		
	4													20		
	5													19		
SE 31 /	1													20		
	2													16		
	3													19		
	4													20		
	5													18	IM	

INITIAL # OF ORGANISMS
20

#S= Number on the Surface
#M= Number of Mortality
G=Growth (fungal,bacterial)
D=No Air Flow (DO?)
N=Normal
B=No Burrows
#FOS=Floating on Surface
#E=Emergent
C=Too cloudy to observe

(1) nereid polychaete(s) present. mk 10/28

Ammonia and Sulfide Analysis Record

Client/Project: <u>MFA</u> <u>Herra Seaport</u>	Organism: <u>E.ohs</u>	Test Duration (days): <u>10 days</u>
PRETEST / <u>INITIAL</u> / <u>FINAL</u> / OTHER (circle one) <u>OVERLYING (OV)</u> / <u>POREWATER (PW)</u> (circle one) / Comments: _____		DAY of TEST: <u>0</u>

Calibration Standards Temperature	
Date: <u>10/18/19</u>	Temperature: <u>22.4</u>
Sample temperature should be within $\pm 1^\circ\text{C}$ of standards temperature at time and date of analysis.	

Sample ID or Description	Conc. or Rep	Date of Sampling and Initials	Ammonia Value (mg/L)	Meter #/Temp (°C)	Date of Reading and Initials	Sample Preserved (Y/N)	pH	Sal (ppt)	Sample Volume (mL)	Measured Sulf. (µg/L)	Multiplier	Calculated Sulf. (µg/L)
<u>OV SE ⊕</u>	<u>SUFF</u>	<u>10/18/19 MS/DM</u>	<u>0.218</u>	<u>T1 @ 20.4</u>	<u>10/18/19 DM/MS</u>	<u>N</u>			<u>10</u>	<u>ND</u>		
<u>CR20-WST-14/</u>			<u>0.920</u>	<u>21.4</u>						<u>4</u>		
<u>CR20-47/</u>			<u>0.723</u>	<u>22.0</u>						<u>ND</u>		
<u>CR02-68/</u>			<u>0.298</u>	<u>23.4</u>						<u>1</u>		
<u>SE-15</u>			<u>0.272</u>	<u>21.4</u>						<u>5</u>		
<u>-16</u>			<u>0.375</u>	<u>21.4</u>						<u>7</u>		
<u>-17</u>			<u>0.1093</u>	<u>21.4</u>						<u>0</u>		
<u>-18</u>			<u>0.773</u>	<u>21.4</u>						<u>3</u>		
<u>-20</u>			<u>0.906</u>	<u>21.4</u>						<u>4</u>		
<u>-24</u>			<u>0.535</u>	<u>21.4</u>						<u>1</u>		
<u>-26</u>			<u>0.227</u>	<u>21.4</u>						<u>ND</u>		
<u>-31</u>			<u>0.412</u>	<u>21.4</u>						<u>6</u>		
<u>PW SE ⊕</u>			<u>0.440</u>	<u>22.0</u>			<u>7.6</u>	<u>30</u>		<u>315</u>		
<u>CR20-WST-14/</u>			<u>3.36</u>	<u>22.3</u>			<u>7.4</u>	<u>29</u>		<u>159</u>		
<u>CR20-47/</u>			<u>5.94</u>	<u>22.4</u>			<u>7.7</u>	<u>29</u>		<u>716</u>		
<u>CR02-68/</u>			<u>1.78</u>	<u>22.4</u>			<u>7.6</u>	<u>29</u>		<u>72</u>		
<u>SE-15</u>			<u>1.24</u>	<u>22.1</u>			<u>7.2</u>	<u>24</u>		<u>ND</u>		
<u>-16</u>			<u>2.47</u>	<u>22.2</u>			<u>7.6</u>	<u>24</u>		<u>ND</u>		
<u>-17</u>			<u>2.71</u>	<u>22.0</u>			<u>7.3</u>	<u>22</u>		<u>8</u>		
<u>-18</u>			<u>1.82</u>	<u>22.4</u>			<u>7.1</u>	<u>25</u>		<u>ND</u>		
<u>-19-200</u>			<u>2.26</u>	<u>22.2</u>			<u>7.5</u>	<u>24</u>		<u>ND</u>		
<u>-24</u>			<u>1.72</u>	<u>21.7</u>			<u>6.5</u>	<u>26-23</u>		<u>83</u>		

① IE-MS 10/18/19 ② warmed up to 22.0 - DM-10/18/19

③ MR-MS 10/18/19

Ammonia and Sulfide Analysis Record

Client/Project: MFA / Seaport	Organism: Eohs	Test Duration (days): 10
PRETEST / INITIAL / FINAL / OTHER (circle one) OVERLYING (OV) / POREWATER (PW) (circle one) / Comments:		DAY of TEST: <u>10</u>

Calibration Standards Temperature	
Date: <u>10/28/19</u>	Temperature: <u>22.4</u>
Sample temperature should be within $\pm 1^\circ\text{C}$ of standards temperature at time and date of analysis.	

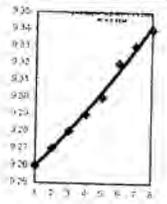
Sample ID or Description	Conc. or Rep	Date of Sampling and Initials	Ammonia Value (mg/L)	Meter #/ Temp ($^\circ\text{C}$)	Date of Reading and Initials	Sample Preserved (Y/N)	pH	Sal (ppt)	Sample Volume (mL)	Measured Sulf. ($\mu\text{g/L}$)	Multiplier	Calculated Sulf. ($\mu\text{g/L}$)
OV \oplus	SURR.	10/28/19 MS	0.176	T1 22.4	10/28/19 MS	Y (1)			10	ND		
CR21-West (14)			1.62	22.4						0		
Carr 20 (47)			0.403	22.4						ND		
CR-02 SOUTH (68)			0.171	22.4						ND		
SE-15			0.0328	22.4						ND		
-16			0.00	22.4						ND		
-17			0.0151	22.4						ND		
-18			0.0920	22.4						ND		
-20			0.00	22.4						ND		
-24			1.23	22.4						16		
-26			0.573	22.4						ND		
\downarrow -31			0.00	22.4						ND		
PW \oplus			0.110	22.2			7.4	28		ND		
CR21-West (14)			3.14	22.2			7.6	29		115		
Carr 20 (47)			1.86	22.2			7.5	29		161		
CR-02 SOUTH (68)			1.01	22.4			7.6	29		3		
SE-15			0.637	22.4			6.9	26		4		
-16			0.304	22.2			7.3	27		7		
-17			0.329	22.4			7.2	27		ND		
-18			0.531	22.4			7.3	27		ND		
-20			0.281	22.4			7.0	27		ND		
\downarrow -24			1.73	22.4			6.6	27		1		

S^{2-} preserved on 10/28

CLIENT:	MFA	Test Date:	18-Oct-19
PROJECT:	Seaport	Test Type:	Eoh SP
COMMENTS:	Initial Ammonia		

To convert Total Ammonia (mg/L) to Free (un-ionized) Ammonia (mg/L) enter the corresponding total ammonia, salinity, temperature, and pH.

Integer: I-factor	
1	9.26
2	9.27
3	9.28
4	9.29
5	9.30
6	9.32
7	9.33
	9.34



Sample	Mod NH3T (mg/L)	salinity (ppt)	pH	temp (C)	temp (K)	i-factor	Mod NH3U (mg/L)
Target / Sample Name	Actual	22.9	8.0	24.1	297.26	9.3053	#VALUE!
Example 3.5	2.000	10.0	7.5	5.0	278.16	9.2750	0.008
1 Control	0.218	28	7.90	15.1	288.26	9.3187	0.004
2 CR21-West (14%)	0.420	29	8.00	15.2	288.36	9.3214	0.010
3 Carr20 (47%)	0.723	29	8.00	15.1	288.26	9.3214	0.016
4 CR02-South (68%)	0.298	29	8.00	15.1	288.26	9.3214	0.007
5 SE-15	0.272	27	7.90	15.2	288.36	9.3160	0.005
6 SE-16	0.375	27	7.90	15.1	288.26	9.3160	0.007
7 SE-17	0.693	27	8.0	15.2	288.36	9.3160	0.016
8 SE-18	0.773	27	7.9	15.3	288.46	9.3160	0.014
9 SE-20	0.906	27	8.0	15.1	288.26	9.3160	0.021
10 SE-24	0.535	27	7.8	15.1	288.26	9.3160	0.008
11 SE-26	0.227	27	7.50	15.2	288.36	9.3160	0.002
12 SE-31	0.412	28	7.9	15.1	288.26	9.3187	0.007
13 Control	0.440	30	7.6	15.1	288.26	9.3242	0.004
14 CR21-West (14%)	3.36	29	7.4	15.2	288.36	9.3214	0.019
15 Carr20 (47%)	5.94	29	7.7	15.1	288.26	9.3214	0.068
16 CR02-South (68%)	1.78	29	7.6	15.1	288.26	9.3214	0.016
17 SE-15	1.24	24	7.2	15.2	288.36	9.3081	0.005
18 SE-16	2.47	24	7.6	15.1	288.26	9.3081	0.023
19 SE-17	2.71	22	7.3	15.2	288.36	9.3030	0.013
20 SE-18	1.82	25	7.1	15.3	288.46	9.3107	0.005
21 SE-20	2.26	24	7.5	15.1	288.26	9.3081	0.017
22 SE-24	1.72	23	6.5	15.1	288.26	9.3055	0.001
23 SE-26	0.672	27	6.0	15.2	288.36	9.3160	0.000
24 SE-31	1.31	27	7.2	15.1	288.26	9.3160	0.005
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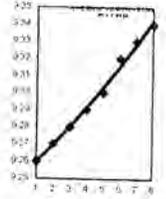
OV Day 0

PW Day 0

CLIENT:	MFA	Test Date:	18-Oct-19
PROJECT:	Seaport	Test Type:	Eoh SP
COMMENTS:	Final Ammonia		

To convert Total Ammonia (mg/L) to Free (un-ionized) Ammonia (mg/L) enter the corresponding total ammonia, salinity, temperature, and pH.

Integer: I-factor	
1	9.26
2	9.27
3	9.28
4	9.29
5	9.30
6	9.32
7	9.33
	9.34



Sample	Mod NH3T (mg/L)	salinity (ppt)	pH	temp (C)	temp (K)	i-factor	Mod NH3U (mg/L)
Target / Sample Name	Actual	22.9	8.0	24.1	297.26	9.3053	#VALUE!
Example 3.5	2.000	10.0	7.5	5.0	278.16	9.2750	0.008
1 Control	0.176	28	8.10	14.7	287.86	9.3187	0.005
2 CR21-West (14%)	1.62	29	8.20	14.7	287.86	9.3214	0.055
3 Carr20 (47%)	0.403	28	8.20	14.7	287.86	9.3187	0.014
4 CR02-South (68%)	0.171	29	8.00	14.7	287.86	9.3214	0.004
5 SE-15	0.0328	26	7.60	14.7	287.86	9.3133	0.000
6 SE-16	0.000	26	7.80	14.5	287.66	9.3133	0.000
7 SE-17	0.0151	27	7.9	14.9	288.06	9.3160	0.000
8 SE-18	0.0920	27	7.9	15.0	288.16	9.3160	0.002
9 SE-20	0.000	27	7.6	14.6	287.76	9.3160	0.000
10 SE-24	1.23	27	7.4	14.5	287.66	9.3160	0.007
11 SE-26	0.573	27	7.20	14.8	287.96	9.3160	0.002
12 SE-31	0.000	27	7.7	14.8	287.96	9.3160	0.000
13 Control	0.110	28	7.4	14.7	287.86	9.3187	0.001
14 CR21-West (14%)	3.14	29	7.6	14.7	287.86	9.3214	0.028
15 Carr20 (47%)	1.86	29	7.5	14.7	287.86	9.3214	0.013
16 CR02-South (68%)	1.01	29	7.6	14.7	287.86	9.3214	0.009
17 SE-15	0.637	26	6.9	14.7	287.86	9.3133	0.001
18 SE-16	0.304	27	7.3	14.5	287.66	9.3160	0.001
19 SE-17	0.329	27	7.2	14.9	288.06	9.3160	0.001
20 SE-18	0.531	27	7.3	15.0	288.16	9.3160	0.002
21 SE-20	0.281	27	7.0	14.6	287.76	9.3160	0.001
22 SE-24	1.73	27	6.6	14.5	287.66	9.3160	0.002
23 SE-26	0.988	27	6.2	14.8	287.96	9.3160	0.000
24 SE-31	0.359	28	7.1	14.8	287.96	9.3187	0.001
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OV Day 10

PW Day 10

Seaport : EOH Sulfides

		Input				Output		
	Sample ID	Total Dissolved Sulfide (µg/L as S)	Temperature (°C)	Salinity (‰)	pH	Undissociated H2S (µg/L as H2S)	Weight Fraction (H2S/Total S)	
OV	Day 0							
		Control	ND	15.1	28	7.9	#VALUE!	#VALUE!
		CR21-West (14)	4	15.2	29	8.0	0.31	7.87%
		Carr20 (47)	ND	15.1	29	8.0	#VALUE!	#VALUE!
		CR02-South (68)	1	15.1	29	8.0	0.08	7.90%
		SE-15	5	15.2	27	7.9	0.49	9.81%
		SE-16	7	15.1	27	7.9	0.69	9.84%
		SE-17	0	15.2	27	8.0	0.00	#DIV/0!
		SE-18	3	15.3	27	7.9	0.29	9.77%
		SE-20	4	15.1	27	8.0	0.3187	7.97%
		SE-24	1	15.1	27	7.8	0.12	12.10%
	SE-26	ND	15.2	27	7.5	#VALUE!	#VALUE!	
	SE-31	6	15.1	28	7.9	0.59	9.80%	
PW	Day 0							
		Control	15	15.1	30	7.6	2.67	17.77%
		CR21-West (14)	159	15.2	29	7.4	40.80	25.66%
		Carr20 (47)	16	15.1	29	7.7	2.35	14.67%
		CR02-South (68)	72	15.1	29	7.6	12.84	17.83%
		SE-15	ND	15.2	24	7.2	#VALUE!	#VALUE!
		SE-16	ND	15.1	24	7.6	#VALUE!	#VALUE!
		SE-17	8	15.2	22	7.3	#VALUE!	#VALUE!
		SE-18	ND	15.3	25	7.1	2.50	31.27%
		SE-20	ND	15.1	24	7.5	#VALUE!	#VALUE!
		SE-24	83	15.1	23	6.5	63.87	76.95%
	SE-26	157	15.2	27	6.0	148.48	94.57%	
	SE-31	ND	15.1	27	7.2	#VALUE!	#VALUE!	
OV	Day 10							
		Control	ND	14.7	28	8.1	#VALUE!	#VALUE!
		CR21-West (14)	0	14.7	29	8.2	0.00	#DIV/0!
		Carr20 (47)	ND	14.7	28	8.2	#VALUE!	#VALUE!
		CR02-South (68)	ND	14.7	29	8.0	#VALUE!	#VALUE!
		SE-15	ND	14.7	26	7.6	#VALUE!	#VALUE!
		SE-16	ND	14.5	26	7.8	#VALUE!	#VALUE!
		SE-17	ND	14.9	27	7.9	#VALUE!	#VALUE!
		SE-18	ND	15.0	27	7.9	#VALUE!	#VALUE!
		SE-20	16	14.6	27	7.6	#VALUE!	#VALUE!
		SE-24	ND	14.5	27	7.4	2.92	18.27%
	SE-26	ND	14.8	27	7.4	#VALUE!	#VALUE!	
	SE-31	ND	14.8	27	7.2	#VALUE!	#VALUE!	
PW	Day 10							
		Control	ND	14.7	28	7.4	#VALUE!	#VALUE!
		CR21-West (14)	115	14.7	29	7.6	20.77	18.06%
		Carr20 (47)	161	14.7	29	7.5	35.07	21.78%
		CR02-South (68)	3	14.7	29	7.6	0.54	18.06%
		SE-15	4	14.7	26	6.9	2.17	54.22%
		SE-16	7	14.5	27	7.3	2.18	31.21%
		SE-17	ND	14.9	27	7.2	#VALUE!	#VALUE!
		SE-18	ND	15.0	27	7.3	#VALUE!	#VALUE!
		SE-20	ND	14.6	27	7.0	#VALUE!	#VALUE!
		SE-24	1	14.5	27	6.6	#VALUE!	#VALUE!
	SE-26	4	14.8	27	6.2	0.72	71.81%	
	SE-31	ND	14.8	28	7.1	3.56	89.07%	
						#VALUE!	#VALUE!	

1.2 *Eohaustorius estuarius* Statistical Results

DRAFT

Project Name: Seaport Eohs % Mortality

Sample: x1
 Samp ID: SE-15
 Alias:
 Replicates: 3
 Mean: 0.167
 SD: 0.161
 Tr Mean: N/A
 Trans SD: N/A

Ref Samp: x2
 Ref ID: Carr20 (47% fines)
 Alias:
 Replicates: 5
 Mean: 0.03
 SD: 0.045
 Tr Mean: N/A
 Trans SD: N/A

Shapiro-Wilk Results:	Levene's Results:	Test Results:
Residual Mean: 0 Residual SD: 0.534 SS: 5.422 K: 4 b: 2.089 Alpha Level: 0.1 Calculated Value: 0.8049 Critical Value: ≤ 0.851 Normally Distributed: No Override Option: Not Invoked	Test Residual Mean: 0.82 Test Residual SD: 0.443 Ref. Residual Mean: 0.742 Ref. Residual SD: 0.253 Deg. of Freedom: 6 Alpha Level: 0.1 Calculated Value: 0.3229 Critical Value: ≥ 1.943 Variances Homogeneous: Yes	Statistic: Mann-Whitney Balanced Design: Yes Transformation: rank-order Experimental Hypothesis Null: $x1 \leq x2$ Alternate: $x1 > x2$ Mann-Whitney N1: 3 Mann-Whitney N2: 5 Degrees of Freedom: Experimental Alpha Level: 0.05 Calculated Value: 13 Critical Value: ≥ 14.000 Accept Null Hypothesis: Yes Power: Min. Difference for Power:

Replicate Number	Test Data	Trans. Test Data	Reference Data	Trans. Reference Data	Levene's Test Residuals	Levene's Reference Residuals	Mann-Whitney Ranks	Rankits	Shapiro-Wilk Residuals
1	0.35	8	0	2	1.23	0.619	2		-0.88
2	0.1	6.5	0	2	0.35	0.619	2		-0.619
3	0.05	4.5	0.05	4.5	0.88	0.663	2		-0.619
4			0	2		0.619	4.5		-0.619
5			0.1	6.5		1.193	4.5		-0.35
6							6.5		0.663
7							6.5		1.193
8							8		1.23
9							0		0
10							0		0

Project Name: Seaport Eohs % Mortality

Sample: x1
 Samp ID: SE-16
 Alias:
 Replicates: 5
 Mean: 0.04
 SD: 0.065
 Tr Mean: N/A
 Trans SD: N/A

Ref Samp: x2
 Ref ID: Carr20 (47% fines)
 Alias:
 Replicates: 5
 Mean: 0.03
 SD: 0.045
 Tr Mean: N/A
 Trans SD: N/A

Shapiro-Wilk Results:	Levene's Results:	Test Results:
Residual Mean: 0 Residual SD: 0.613 SS: 7.129 K: 5 b: 2.336 Alpha Level: 0.05 Calculated Value: 0.7652 Critical Value: ≤ 0.842 Normally Distributed: No Override Option: Not Invoked	Test Residual Mean: 0.84 Test Residual SD: 0.383 Ref. Residual Mean: 0.742 Ref. Residual SD: 0.253 Deg. of Freedom: 8 Alpha Level: 0.1 Calculated Value: 0.4763 Critical Value: ≥ 1.860 Variances Homogeneous: Yes	Statistic: Mann-Whitney Balanced Design: Yes Transformation: rank-order Experimental Hypothesis Null: $x1 \leq x2$ Alternate: $x1 > x2$ Mann-Whitney N1: 5 Mann-Whitney N2: 5 Degrees of Freedom: Experimental Alpha Level: 0.05 Calculated Value: 13 Critical Value: ≥ 21.000 Accept Null Hypothesis: Yes Power: Min. Difference for Power:

Replicate Number	Test Data	Trans. Test Data	Reference Data	Trans. Reference Data	Levene's Test Residuals	Levene's Reference Residuals	Mann-Whitney Ranks	Rankits	Shapiro-Wilk Residuals
1	0.15	10	0	3.5	1.519	0.619	3.5		-0.7
2	0	3.5	0	3.5	0.7	0.619	3.5		-0.7
3	0.05	7.5	0.05	7.5	0.581	0.663	3.5		-0.7
4	0	3.5	0	3.5	0.7	0.619	3.5		-0.619
5	0	3.5	0.1	9	0.7	1.193	3.5		-0.619
6							3.5		-0.619
7							7.5		0.581
8							7.5		0.663
9							9		1.193
10							10		1.519

Project Name: Seaport Eohs % Mortality

Sample: x1
 Samp ID: SE-18
 Alias:
 Replicates: 5
 Mean: 0.04
 SD: 0.022
 Tr Mean: N/A
 Trans SD: N/A

Ref Samp: x2
 Ref ID: CR02-South (68% fines)
 Alias:
 Replicates: 5
 Mean: 0.04
 SD: 0.042
 Tr Mean: N/A
 Trans SD: N/A

Shapiro-Wilk Results:	Levene's Results:	Test Results:
Residual Mean: 0 Residual SD: 0.462 SS: 4.053 K: 5 b: 1.822 Alpha Level: 0.05 Calculated Value: 0.8192 Critical Value: ≤ 0.842 Normally Distributed: No Override Option: Not Invoked	Test Residual Mean: 0.41 Test Residual SD: 0.344 Ref. Residual Mean: 0.7 Ref. Residual SD: 0.269 Deg. of Freedom: 8 Alpha Level: 0.1 Calculated Value: 1.4847 Critical Value: ≥ 1.860 Variances Homogeneous: Yes	Statistic: Mann-Whitney Balanced Design: Yes Transformation: rank-order Experimental Hypothesis Null: $x1 \leq x2$ Alternate: $x1 > x2$ Mann-Whitney N1: 5 Mann-Whitney N2: 5 Degrees of Freedom: Experimental Alpha Level: 0.05 Calculated Value: 13 Critical Value: ≥ 21.000 Accept Null Hypothesis: Yes Power: Min. Difference for Power:

Replicate Number	Test Data	Trans. Test Data	Reference Data	Trans. Reference Data	Levene's Test Residuals	Levene's Reference Residuals	Mann-Whitney Ranks	Rankits	Shapiro-Wilk Residuals
1	0	2	0	2	1.025	0.875	2		-1.025
2	0.05	6.5	0	2	0.256	0.875	2		-0.875
3	0.05	6.5	0.05	6.5	0.256	0.406	2		-0.875
4	0.05	6.5	0.1	10	0.256	0.937	6.5		0.256
5	0.05	6.5	0.05	6.5	0.256	0.406	6.5		0.256
6							6.5		0.256
7							6.5		0.256
8							6.5		0.406
9							6.5		0.406
10							10		0.937

Project Name: Seaport Eohs % Mortality

Sample: x1
 Samp ID: SE-26
 Alias:
 Replicates: 5
 Mean: 0.02
 SD: 0.027
 Tr Mean: N/A
 Trans SD: N/A

Ref Samp: x2
 Ref ID: CR21-West (14% fines)
 Alias:
 Replicates: 5
 Mean: 0.01
 SD: 0.022
 Tr Mean: N/A
 Trans SD: N/A

Shapiro-Wilk Results:	Levene's Results:	Test Results:
Residual Mean: 0 Residual SD: 0.416 SS: 3.283 K: 5 b: 1.578 Alpha Level: 0.05 Calculated Value: 0.7588 Critical Value: ≤ 0.842 Normally Distributed: No Override Option: Not Invoked	Test Residual Mean: 0.615 Test Residual SD: 0.14 Ref. Residual Mean: 0.41 Ref. Residual SD: 0.344 Deg. of Freedom: 8 Alpha Level: 0.1 Calculated Value: 1.2344 Critical Value: ≥ 1.860 Variances Homogeneous: Yes	Statistic: Mann-Whitney Balanced Design: Yes Transformation: rank-order Experimental Hypothesis Null: $x_1 \leq x_2$ Alternate: $x_1 > x_2$ Mann-Whitney N1: 5 Mann-Whitney N2: 5 Degrees of Freedom: Experimental Alpha Level: 0.05 Calculated Value: 15 Critical Value: ≥ 21.000 Accept Null Hypothesis: Yes Power: Min. Difference for Power:

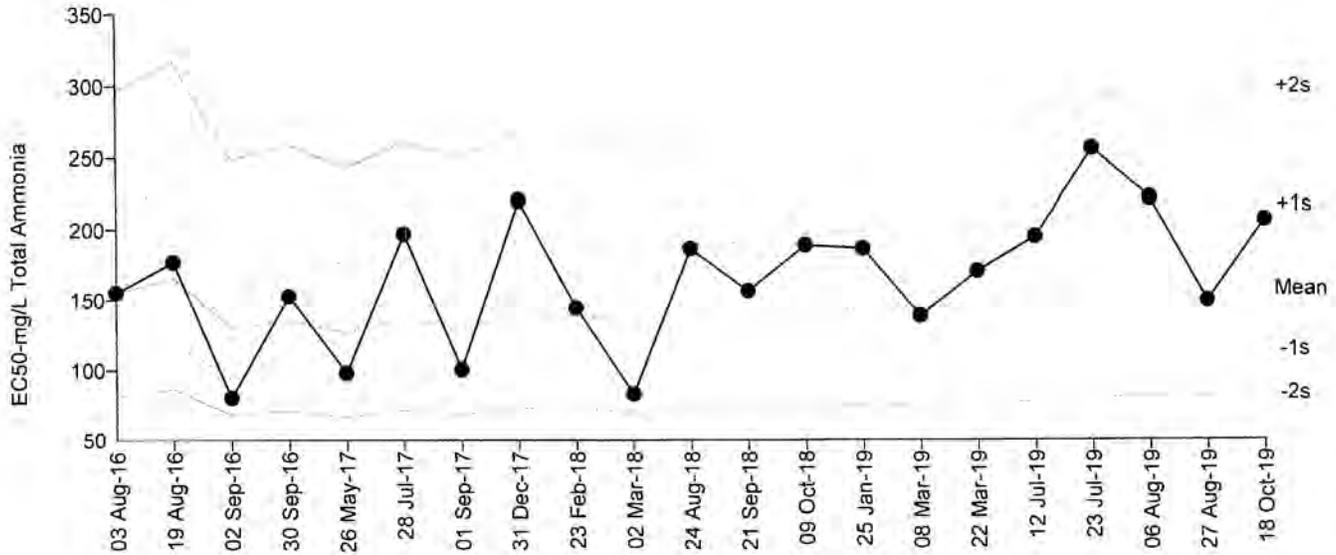
Replicate Number	Test Data	Trans. Test Data	Reference Data	Trans. Reference Data	Levene's Test Residuals	Levene's Reference Residuals	Mann-Whitney Ranks	Rankits	Shapiro-Wilk Residuals
1	0	4	0.05	9	0.513	1.025	4		-0.513
2	0	4	0	4	0.513	0.256	4		-0.513
3	0.05	9	0	4	0.769	0.256	4		-0.513
4	0	4	0	4	0.513	0.256	4		-0.256
5	0.05	9	0	4	0.769	0.256	4		-0.256
6							4		-0.256
7							4		-0.256
8							9		0.769
9							9		0.769
10							9		1.025

1.3 *Eohaustorius estuarius* Reference Toxicant Test Results

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Reference Toxicant 96-h Acute Survival Test		All Matching Labs	
Test Type: Survival	Organism: Eohaustorius estuarius (Amphipod)	Material: Total Ammonia	
Protocol: EPA/600/R-94/025 (1994)	Endpoint: Proportion Survived	Source: Reference Toxicant-REF	

Reference Toxicant 96-h Acute Survival Test



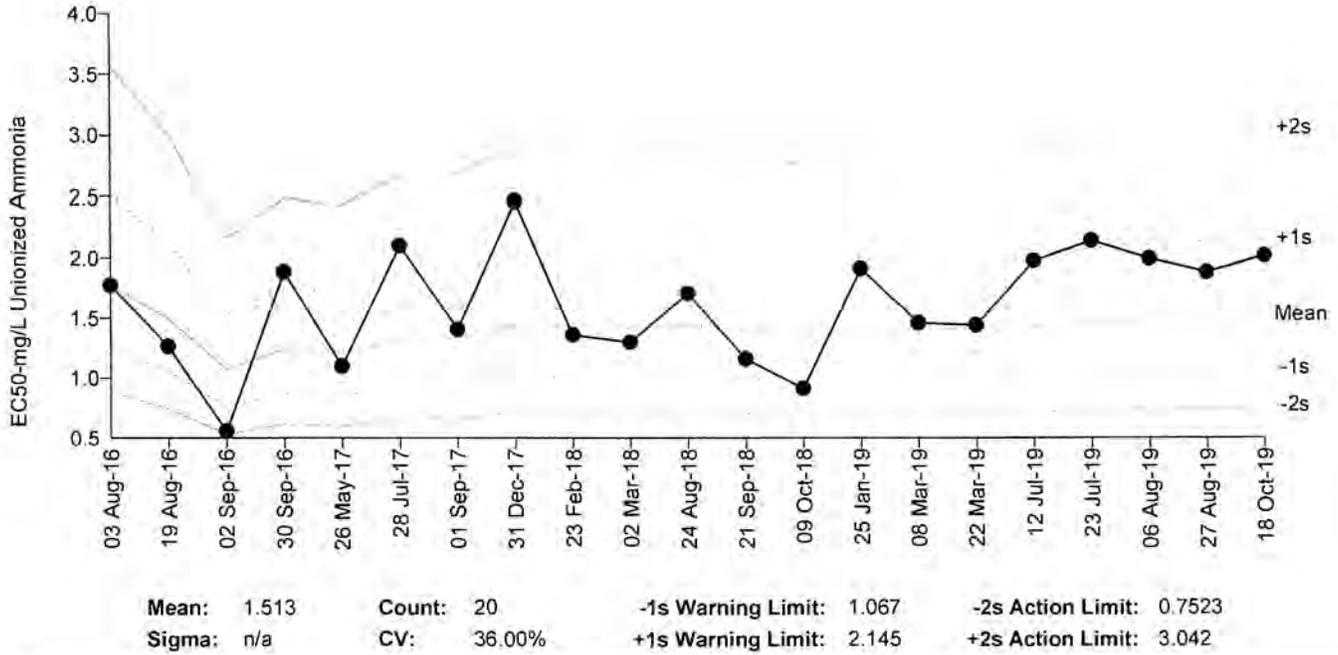
Mean: 155.7 Count: 20 -1s Warning Limit: 112.6 -2s Action Limit: 81.45
 Sigma: n/a CV: 33.20% +1s Warning Limit: 215.2 +2s Action Limit: 297.4

Quality Control Data

Point	Year	Month	Day	Time	QC Data	Delta	Sigma	Warning	Action	Test ID	Analysis ID	Laboratory
1	2016	Aug	3	16:55	155	-0.6748	-0.01341			15-5854-7986	14-0317-8212	ENVIRON
2			19	14:25	177	21.25	0.3951			10-0746-9736	13-2092-5186	ENVIRON
3		Sep	2	16:25	80.2	-75.51	-2.049	(-)	(-)	06-2389-4542	16-8119-8926	ENVIRON
4			30	15:00	152.6	-3.063	-0.06135			16-2341-4864	11-2277-7148	ENVIRON
5	2017	May	26	13:00	97.99	-57.72	-1.43	(-)		06-2743-8362	04-6967-6524	EcoAnalysts
6		Jul	28	14:20	196.9	41.14	0.7241			14-8451-4586	00-9100-0373	EcoAnalysts
7		Sep	1	15:45	100.5	-55.24	-1.353	(-)		02-8963-0820	06-1020-6763	EcoAnalysts
8		Dec	31	15:47	220.3	64.6	1.072	(+)		09-7306-1854	08-4856-6308	EcoAnalysts
9	2018	Feb	23	13:35	144.3	-11.39	-0.2346			21-0530-3984	12-8139-0101	EcoAnalysts
10		Mar	2	11:45	83.01	-72.7	-1.943	(-)		11-4485-4691	17-1248-6929	EcoAnalysts
11		Aug	24	15:55	186.5	30.84	0.558			16-5739-3244	17-2559-2384	EcoAnalysts
12		Sep	21	14:35	156.5	0.8183	0.01619			04-4036-5270	08-2459-0313	EcoAnalysts
13		Oct	9	15:00	189.1	33.43	0.6007			20-4720-6933	11-3401-1593	EcoAnalysts
14	2019	Jan	25	13:35	186.7	31.04	0.5613			11-7689-4812	16-8013-2403	EcoAnalysts
15		Mar	8	15:05	138.7	-17.05	-0.3581			13-2397-9481	18-8307-3890	EcoAnalysts
16			22	14:35	170.7	15	0.2841			01-8305-5138	03-7924-8286	EcoAnalysts
17		Jul	12	15:00	195.3	39.55	0.699			11-8021-4502	08-1650-3490	EcoAnalysts
18			23	15:15	256.2	100.4	1.537	(+)		17-6815-2027	16-9000-1675	EcoAnalysts
19		Aug	6	15:55	221.9	66.18	1.094	(+)		04-7165-8948	01-3458-4366	EcoAnalysts
20			27	14:25	149.5	-6.218	-0.1259			16-1141-7710	18-3800-2446	EcoAnalysts
21		Oct	18	14:40	206.9	51.24	0.8785			10-1139-9672	04-6029-5418	EcoAnalysts

Reference Toxicant 96-h Acute Survival Test		All Matching Labs	
Test Type: Survival	Organism: Eohaustorius estuarius (Amphipod)	Material: Unionized Ammonia	
Protocol: EPA/600/R-94/025 (1994)	Endpoint: Proportion Survived	Source: Reference Toxicant-REF	

Reference Toxicant 96-h Acute Survival Test

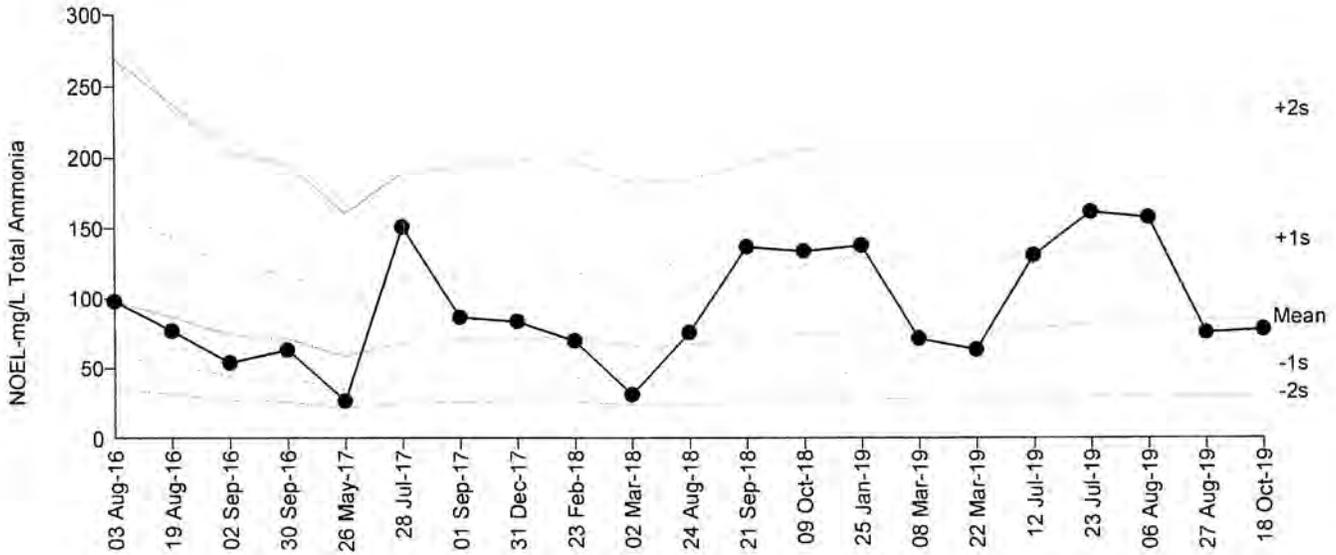


Quality Control Data

Point	Year	Month	Day	Time	QC Data	Delta	Sigma	Warning	Action	Test ID	Analysis ID	Laboratory
1	2016	Aug	3	16:55	1.775	0.2617	0.4568			15-5470-2613	20-0153-1348	ENVIRON
2			19	14:25	1.264	-0.2492	-0.5152			11-7594-3529	18-2266-1841	ENVIRON
3		Sep	2	16:25	0.5558	-0.957	-2.867	(-)	(-)	20-2236-1025	01-7459-0032	ENVIRON
4			30	15:00	1.885	0.372	0.6294			12-0597-8760	12-1436-9613	ENVIRON
5	2017	May	26	13:00	1.101	-0.4123	-0.9108			15-8049-8093	00-1911-6893	EcoAnalysts
6		Jul	28	14:20	2.103	0.59	0.9427			11-4327-6237	03-7130-7368	EcoAnalysts
7		Sep	1	15:45	1.407	-0.1056	-0.2072			18-6405-8290	07-0280-8863	EcoAnalysts
8		Dec	31	15:47	2.466	0.9528	1.398	(+)		16-6781-4604	13-3844-2137	EcoAnalysts
9	2018	Feb	23	13:35	1.361	-0.152	-0.3032			00-2027-3508	17-9124-7622	EcoAnalysts
10		Mar	2	11:45	1.301	-0.212	-0.4321			02-5827-5523	13-4470-6509	EcoAnalysts
11		Aug	24	15:55	1.708	0.1953	0.3476			17-5739-4878	03-7944-2577	EcoAnalysts
12		Sep	21	14:35	1.16	-0.3526	-0.7597			06-8965-7235	18-4808-5804	EcoAnalysts
13		Oct	9	15:00	0.9139	-0.5989	-1.443	(-)		17-3069-9320	16-8151-1630	EcoAnalysts
14	2019	Jan	25	13:35	1.915	0.402	0.6746			00-5848-5748	19-2133-1629	EcoAnalysts
15		Mar	8	15:05	1.463	-0.0502	-0.0966			06-0570-4350	17-2978-1796	EcoAnalysts
16			22	14:35	1.444	-0.06853	-0.1327			08-8020-3971	15-7045-5745	EcoAnalysts
17		Jul	12	15:00	1.982	0.4689	0.7729			01-3966-5124	15-4747-7341	EcoAnalysts
18			23	15:15	2.151	0.6385	1.008	(+)		08-1022-0183	07-0772-7892	EcoAnalysts
19		Aug	6	15:55	2.002	0.4891	0.802			10-1925-5694	08-4274-3725	EcoAnalysts
20			27	14:25	1.888	0.375	0.634			18-5396-1387	02-7188-5010	EcoAnalysts
21		Oct	18	14:40	2.025	0.5117	0.8341			01-8678-8913	10-6861-7593	EcoAnalysts

Reference Toxicant 96-h Acute Survival Test		All Matching Labs	
Test Type: Survival	Organism: Eohaustorius estuarius (Amphipod)	Material: Total Ammonia	
Protocol: EPA/600/R-94/025 (1994)	Endpoint: Proportion Survived	Source: Reference Toxicant-REF	

Reference Toxicant 96-h Acute Survival Test



Mean: 84.69 Count: 20 -1s Warning Limit: 51.1 -2s Action Limit: 30.84
 Sigma: n/a CV: 53.90% +1s Warning Limit: 140.3 +2s Action Limit: 232.5

Quality Control Data

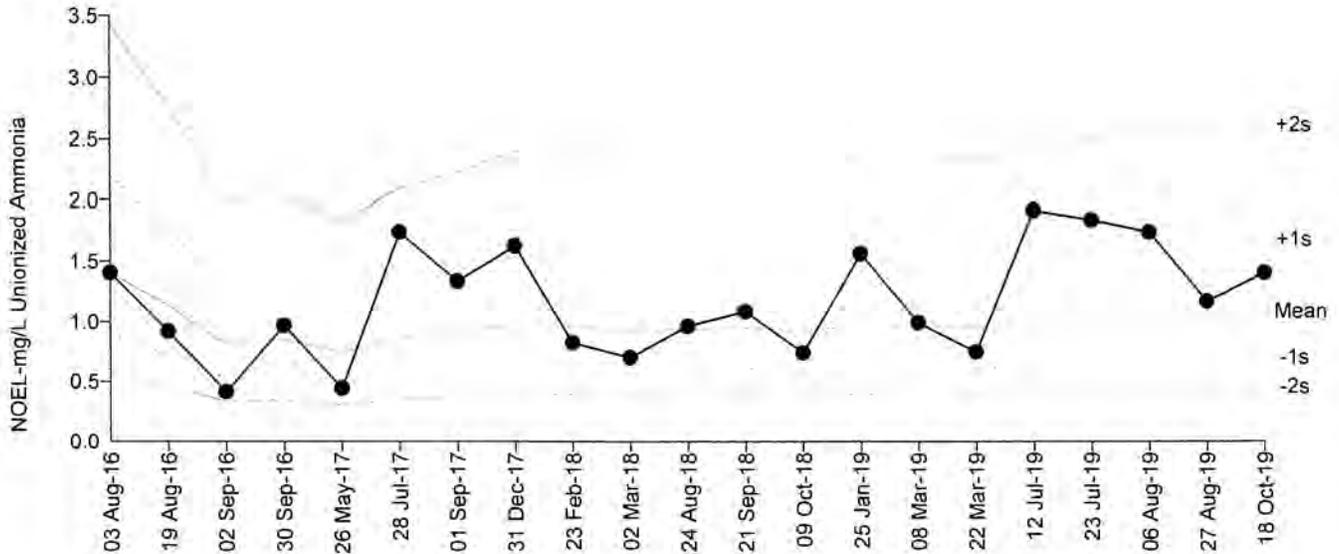
Point	Year	Month	Day	Time	QC Data	Delta	Sigma	Warning	Action	Test ID	Analysis ID	Laboratory
1	2016	Aug	3	16:55	98	13.31	0.289			15-5854-7986	05-8855-9934	ENVIRON
2			19	14:25	76.9	-7.79	-0.1911			10-0746-9736	12-8850-4495	ENVIRON
3		Sep	2	16:25	54.1	-30.59	-0.8875			06-2389-4542	18-8647-7799	ENVIRON
4			30	15:00	63.2	-21.49	-0.5796			16-2341-4864	17-9345-6065	ENVIRON
5	2017	May	26	13:00	26.6	-58.09	-2.293	(-)	(-)	06-2743-8362	12-3565-7845	EcoAnalysts
6		Jul	28	14:20	151	66.31	1.145	(+)		14-8451-4586	09-8418-8824	EcoAnalysts
7		Sep	1	15:45	86.5	1.81	0.04187			02-8963-0820	17-0422-4621	EcoAnalysts
8		Dec	31	15:47	83.6	-1.09	-0.02566			09-7306-1854	06-1883-5465	EcoAnalysts
9	2018	Feb	23	13:35	69.7	-14.99	-0.3857			21-0530-3984	16-8514-1800	EcoAnalysts
10		Mar	2	11:45	31.2	-53.49	-1.977	(-)		11-4485-4691	15-7110-1336	EcoAnalysts
11		Aug	24	15:55	75.6	-9.09	-0.2248			16-5739-3244	15-9917-9528	EcoAnalysts
12		Sep	21	14:35	137	52.31	0.9524			04-4036-5270	14-1680-7805	EcoAnalysts
13		Oct	9	15:00	134	49.31	0.9086			20-4720-6933	14-7074-1873	EcoAnalysts
14	2019	Jan	25	13:35	138	53.31	0.9668			11-7689-4812	07-3953-2151	EcoAnalysts
15		Mar	8	15:05	71.3	-13.39	-0.3408			13-2397-9481	07-4616-8731	EcoAnalysts
16			22	14:35	63.6	-21.09	-0.5671			01-8305-5138	01-5094-6419	EcoAnalysts
17		Jul	12	15:00	131	46.31	0.8638			11-8021-4502	11-6723-5493	EcoAnalysts
18			23	15:15	162	77.31	1.284	(+)		17-6815-2027	16-9478-2247	EcoAnalysts
19		Aug	6	15:55	158	73.31	1.235	(+)		04-7165-8948	03-2243-7067	EcoAnalysts
20			27	14:25	75.8	-8.89	-0.2196			16-1141-7710	12-2316-3444	EcoAnalysts
21		Oct	18	14:40	78	-6.69	-0.163			10-1139-9672	05-2006-4501	EcoAnalysts

Reference Toxicant 96-h Acute Survival Test

All Matching Labs

Test Type: Survival Organism: Eohaustorius estuarius (Amphipod) Material: Unionized Ammonia
 Protocol: EPA/600/R-94/025 (1994) Endpoint: Proportion Survived Source: Reference Toxicant-REF

Reference Toxicant 96-h Acute Survival Test



Mean: 1.061 Count: 20 -1s Warning Limit: 0.679 -2s Action Limit: 0.4347
 Sigma: n/a CV: 46.90% +1s Warning Limit: 1.657 +2s Action Limit: 2.588

Quality Control Data

Point	Year	Month	Day	Time	QC Data	Delta	Sigma	Warning	Action	Test ID	Analysis ID	Laboratory
1	2016	Aug	3	16:55	1.404	0.3434	0.629			15-5470-2613	11-2111-0216	ENVIRON
2			19	14:25	0.919	-0.1416	-0.3213			11-7594-3529	06-9525-3086	ENVIRON
3		Sep	2	16:25	0.415	-0.6456	-2.104	(-)	(-)	20-2236-1025	20-1525-6837	ENVIRON
4			30	15:00	0.967	-0.09357	-0.2071			12-0597-8760	06-8089-0740	ENVIRON
5	2017	May	26	13:00	0.445	-0.6156	-1.947	(-)		15-8049-8093	18-0229-5291	EcoAnalysts
6		Jul	28	14:20	1.738	0.6774	1.107	(+)		11-4327-6237	11-4496-1419	EcoAnalysts
7		Sep	1	15:45	1.334	0.2734	0.5143			18-6405-8290	16-4129-3608	EcoAnalysts
8		Dec	31	15:47	1.626	0.5654	0.9581			16-6781-4604	02-2467-9837	EcoAnalysts
9	2018	Feb	23	13:35	0.825	-0.2356	-0.5632			00-2027-3508	11-7925-6381	EcoAnalysts
10		Mar	2	11:45	0.703	-0.3576	-0.922			02-5827-5523	14-9941-7186	EcoAnalysts
11		Aug	24	15:55	0.962	-0.09857	-0.2187			17-5739-4878	10-4999-0518	EcoAnalysts
12		Sep	21	14:35	1.086	0.02543	0.05312			06-8965-7235	16-3470-0349	EcoAnalysts
13		Oct	9	15:00	0.74	-0.3206	-0.807			17-3069-9320	05-9114-6332	EcoAnalysts
14	2019	Jan	25	13:35	1.561	0.5004	0.8666			00-5848-5748	04-1670-4578	EcoAnalysts
15		Mar	8	15:05	0.992	-0.06857	-0.1499			06-0570-4350	05-4558-3875	EcoAnalysts
16			22	14:35	0.748	-0.3126	-0.7829			08-8020-3971	02-0863-1050	EcoAnalysts
17		Jul	12	15:00	1.919	0.8584	1.33	(+)		01-3966-5124	09-4580-1187	EcoAnalysts
18			23	15:15	1.841	0.7804	1.237	(+)		08-1022-0183	07-2627-9819	EcoAnalysts
19		Aug	6	15:55	1.74	0.6794	1.11	(+)		10-1925-5694	11-7110-4221	EcoAnalysts
20			27	14:25	1.169	0.1084	0.2182			18-5396-1387	17-3719-5174	EcoAnalysts
21		Oct	18	14:40	1.403	0.3424	0.6274			01-8678-8913	18-9446-3335	EcoAnalysts

CETIS Summary Report

Report Date: 24 Oct-19 10:28 (p 1 of 1)
 Test Code/ID: 3C48BBF8 / 10-1139-9672

Reference Toxicant 96-h Acute Survival Test

EcoAnalysts

Batch ID: 04-8751-7158	Test Type: Survival	Analyst:
Start Date: 18 Oct-19 14:40	Protocol: EPA/600/R-94/025 (1994)	Diluent: Laboratory Seawater
Ending Date: 22 Oct-19 12:55	Species: Eohaustorius estuarius	Brine: Not Applicable
Test Length: 94h	Taxon: Malacostraca	Source: Northwestern Aquatic Scien Age:
Sample ID: 04-6043-4638	Code: 1B71ACCE	Project: Reference Toxicant
Sample Date: 12 Jun-19	Material: Total Ammonia	Source: Reference Toxicant
Receipt Date:	CAS (PC):	Station: P190612.48
Sample Age: 128d 15h	Client: Internal Lab	

Multiple Comparison Summary

Analysis ID	Endpoint	Comparison Method	✓ NOEL	LOEL	TOEL	TU	PMSD	S
05-2006-4501	Proportion Survived	Fisher Exact Test	78	165	113.4		n/a	1

Point Estimate Summary

Analysis ID	Endpoint	Point Estimate Method	✓ Level	mg/L	95% LCL	95% UCL	TU	S
04-6029-5418	Proportion Survived	Linear Interpolation (ICPIN)	EC5	67.67	48.81	111.2		1
			EC10	88.41	66.55	249.3		
			EC15	106.6	68.35	243.2		
			EC20	128.6	68.93	233.6		
			EC25	155	67.84	219.6		
			EC40	187.8	139.9	232.7		
EC50	206.9	162.5	247.8					

Proportion Survived Summary

Conc-mg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	D	3	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.00%
19.8		3	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.00%
44.1		3	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.00%
78		3	0.9333	0.7899	1.0000	0.9000	1.0000	0.0333	0.0577	6.19%	6.67%
165		3	0.7333	0.2162	1.0000	0.5000	0.9000	0.1202	0.2082	28.39%	26.67%
336		3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		100.00%

Proportion Survived Detail

Conc-mg/L	Code	Rep 1	Rep 2	Rep 3
0	D	1.0000	1.0000	1.0000
19.8		1.0000	1.0000	1.0000
44.1		1.0000	1.0000	1.0000
78		0.9000	1.0000	0.9000
165		0.5000	0.9000	0.8000
336		0.0000	0.0000	0.0000

Proportion Survived Binomials

Conc-mg/L	Code	Rep 1	Rep 2	Rep 3
0	D	10/10	10/10	10/10
19.8		10/10	10/10	10/10
44.1		10/10	10/10	10/10
78		9/10	10/10	9/10
165		5/10	9/10	8/10
336		0/10	0/10	0/10

CETIS Test Data Worksheet

Report Date: 24 Oct-19 10:27 (p 1 of 1)
 Test Code/ID: 3C48BBF8 / 10-1139-9672

Reference Toxicant 96-h Acute Survival Test			EcoAnalysts
Start Date: 18 Oct-19 14:40	Species: Eohaustorius estuarius	Sample Code: 1B71ACCE	
End Date: 22 Oct-19 12:55	Protocol: EPA/600/R-94/025 (1994)	Sample Source: Reference Toxicant	
Sample Date: 12 Jun-19	Material: Total Ammonia	Sample Station: P190612.48	

Conc-mg/L	Code	Rep	Pos	# Exposed	# Survived	Notes
0	D	1	13	10	10	
0	D	2	15	10	10	
0	D	3	17	10	10	
19.8		1	5	10	10	
19.8		2	11	10	10	
19.8		3	7	10	10	
44.1		1	9	10	10	
44.1		2	3	10	10	
44.1		3	4	10	10	
78		1	18	10	9	
78		2	12	10	10	
78		3	2	10	9	
165		1	1	10	5	
165		2	10	10	9	
165		3	16	10	8	
336		1	14	10	0	
336		2	8	10	0	
336		3	6	10	0	

CETIS Summary Report

Report Date: 24 Oct-19 10:32 (p 1 of 1)
 Test Code/ID: B222C31 / 01-8678-8913

Reference Toxicant 96-h Acute Survival Test

EcoAnalysts

Batch ID: 04-8751-7158	Test Type: Survival	Analyst:
Start Date: 18 Oct-19 14:40	Protocol: EPA/600/R-94/025 (1994)	Diluent: Laboratory Seawater
Ending Date: 22 Oct-19 12:55	Species: Eohaustorius estuarius	Brine: Not Applicable
Test Length: 94h	Taxon: Malacostraca	Source: Northwestern Aquatic Scien Age:
Sample ID: 03-7212-7228	Code: 162E35FC	Project: Reference Toxicant
Sample Date: 12 Jun-19	Material: Unionized Ammonia	Source: Reference Toxicant
Receipt Date:	CAS (PC):	Station: P190612.48
Sample Age: 128d 15h	Client: Internal Lab	

Multiple Comparison Summary

Analysis ID	Endpoint	Comparison Method	✓ NOEL	LOEL	TOEL	TU	PMSD	S
18-9446-3335	Proportion Survived	Fisher Exact Test	1.403	1.858	1.615		n/a	1

Point Estimate Summary

Analysis ID	Endpoint	Point Estimate Method	✓ Level	mg/L	95% LCL	95% UCL	TU	S
10-6861-7593	Proportion Survived	Linear Interpolation (ICPIN)	EC5	1.235	0.9075	1.779		1
			EC10	1.473	1.325	2.281		
			EC15	1.583	1.353	2.22		
			EC20	1.697	1.379	2.154		
			EC25	1.817	1.371	2.084		
			EC40	1.952	1.536	2.122		
			EC50	2.025	1.675	2.169		

Proportion Survived Summary

Conc-mg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	D	3	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.00%
0.44		3	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.00%
0.799		3	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.00%
1.403		3	0.9333	0.7899	1.0000	0.9000	1.0000	0.0333	0.0577	6.19%	6.67%
1.858		3	0.7333	0.2162	1.0000	0.5000	0.9000	0.1202	0.2082	28.39%	26.67%
2.415		3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		100.00%

Proportion Survived Detail

Conc-mg/L	Code	Rep 1	Rep 2	Rep 3
0	D	1.0000	1.0000	1.0000
0.44		1.0000	1.0000	1.0000
0.799		1.0000	1.0000	1.0000
1.403		0.9000	1.0000	0.9000
1.858		0.5000	0.9000	0.8000
2.415		0.0000	0.0000	0.0000

Proportion Survived Binomials

Conc-mg/L	Code	Rep 1	Rep 2	Rep 3
0	D	10/10	10/10	10/10
0.44		10/10	10/10	10/10
0.799		10/10	10/10	10/10
1.403		9/10	10/10	9/10
1.858		5/10	9/10	8/10
2.415		0/10	0/10	0/10

CETIS Test Data Worksheet

Report Date: 24 Oct-19 10:32 (p 1 of 1)
 Test Code/ID: B222C31 / 01-8678-8913

Reference Toxicant 96-h Acute Survival Test				EcoAnalysts	
Start Date:	18 Oct-19 14:40	Species:	Eohaustorius estuarius	Sample Code:	162E35FC
End Date:	22 Oct-19 12:55	Protocol:	EPA/600/R-94/025 (1994)	Sample Source:	Reference Toxicant
Sample Date:	12 Jun-19	Material:	Unionized Ammonia	Sample Station:	P190612.48

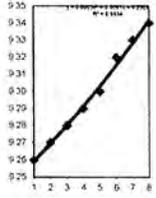
Conc-mg/L	Code	Rep	Pos	# Exposed	# Survived	Notes
0	D	1	13	10	10	
0	D	2	5	10	10	
0	D	3	17	10	10	
0.44		1	15	10	10	
0.44		2	8	10	10	
0.44		3	12	10	10	
0.799		1	16	10	10	
0.799		2	10	10	10	
0.799		3	11	10	10	
1.403		1	2	10	9	
1.403		2	1	10	10	
1.403		3	9	10	9	
1.858		1	14	10	5	
1.858		2	7	10	9	
1.858		3	18	10	8	
2.415		1	6	10	0	
2.415		2	4	10	0	
2.415		3	3	10	0	

CLIENT:		Test Date:	18-Oct-19
PROJECT:		Test Type:	Eoh RT
COMMENTS:			

To convert Total Ammonia (mg/L) to Free (un-ionized) Ammonia (mg/L) enter the corresponding total ammonia, salinity, temperature, and pH.

Sample	Mod NH3T (mg/L)	salinity (ppt)	pH	temp (C)	temp (K)	i-factor	Mod NH3U (mg/L)
Target / Sample Name	Actual	22.9	8.0	24.1	297.26	9.3053	#VALUE!
Example 3.5	2.000	10.0	7.5	5.0	278.16	9.2750	0.008
1	0	29	8.10	15.0	288.16	9.3214	0.000
2	20	29	8.00	14.9	288.06	9.3214	0.440
3	40	29	7.90	15.2	288.36	9.3214	0.799
4	80	29	7.90	15.1	288.26	9.3214	1.403
5	160	29	7.70	14.9	288.06	9.3214	1.858
6	320	29	7.50	15.0	288.16	9.3214	2.415
7							
8							
9							
10							
11							
12							
13							
14							
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46							

Integer: i-factor	
1	9.26
2	9.27
3	9.28
4	9.29
5	9.30
6	9.32
7	9.33
	9.34



Ammonia Reference Toxicant Test Water Quality Data Sheet

CLIENT —	PROJECT —	Eohaustorius estuarius			Laboratory Port Gamble .	PROTOCOL PSEP 1995
TEST ID P190612.48	LOT #: 18H1356763	DILUTION PREP INITIALS: MK				
CHAMBER SIZE/TYPE 250 ml beaker	EXPOSURE VOLUME 250 ml	TEST START DATE 18Oct19	INITIALS MK RE	TIME 1440	TEST END DATE 22Oct19	TIME 1255

WATER QUALITY DATA

TEST CONDITIONS				DO (mg/L)		TEMP(C)		SAL (ppt)		pH		TECHNICIAN	AMMONIA					
				> 5.1		15 ± 1		28 ± 1		7.8 ± 0.5								
SAMPLE ID	CONCENTRATION		DAY	REP	D.O.		TEMP.		SALINITY		pH		WQ TECH/ DATE	AMMONIA		Tech		
	value	units			meter	mg/L	meter	°C	meter	ppt	meter	unit		METER	mg/L			
Ref.Tox.-ammonia	0	mg/L	0	Stock	8	7.5	8	15.0	8	29	8	8.1	JB 10/18	10	0.00	MK		
			4	1	8	7.4	8	14.9		28	8	7.9	NR 10/22					
Ref.Tox.-ammonia	20	mg/L	0	Stock	8	7.7	8	14.9	8	29	8	8.0	JB 10/18	10	19.8	MK		
			4	1	8	7.8	8	14.6	8	28	8	7.9	NR 10/22					
Ref.Tox.-ammonia	40	mg/L	0	Stock	8	7.7	8	15.2	8	29	8	7.9	JB 10/18	10	44.1	MK		
			4	1	8	7.7	8	14.7	8	28	8	7.9	NR 10/22					
Ref.Tox.-ammonia	80	mg/L	0	Stock	8	7.7	8	15.1	8	29	8	7.9	JB 10/18	10	78.0	MK		
			4	1	8	7.9	8	14.7	8	28	8	7.9	NR 10/22					
Ref.Tox.-ammonia	160	mg/L	0	Stock	8	7.7	8	14.9	8	29	8	7.7	JB 10/18	10	165	MK		
			4	1	8	8.0	8	15.0	8	28	8	7.9	NR 10/22					
Ref.Tox.-ammonia	320	mg/L	0	Stock	8	7.7	8	15.0	8	29	8	7.5	JB 10/18	10	336	MK		
			4	1	8	—	8	—	8	—	8	—	NR 10/22					

CLIENT		PROJECT		SPECIES <i>Eohaustorius estuarius</i>		
				PROJECT MANAGER B. Hester	LABORATORY Port Gamble	PROTOCOL PSEP 1995

SURVIVAL & BEHAVIOR DATA

OBSERVATION KEY N = Normal LOE = Loss of equilibrium Q = Quinscent DC = Discoloration NB = No body F = Floating on surface				DAY 1			DAY 2			DAY 3			DAY 4		
				DATE	TECHNICIAN	INITIAL # OF ORGANISMS	DATE	TECHNICIAN	INITIAL # OF ORGANISMS	DATE	TECHNICIAN	INITIAL # OF ORGANISMS	DATE	TECHNICIAN	INITIAL # OF ORGANISMS
Ref.Tox. - Ammonia	0 mg/L	1	10	10/19/19	DM	10	10/20/19	NR	10	10/21/19	NR	10	10/22/19	NR	
				2	10	10	10	10	10	10	10	10	10		
				3	10	10	10	10	10	10	10	10			
Ref.Tox. - Ammonia	20 mg/L	1	10	10/19/19	DM	10	10/20/19	NR	10	10/21/19	NR	10	10/22/19	NR	
				2	10	10	10	10	10	10	10	10			
				3	10	10	10	10	10	10	10	10			
Ref.Tox. - Ammonia	40 mg/L	1	10	10/19/19	DM	10	10/20/19	NR	10	10/21/19	NR	10	10/22/19	NR	
				2	10	10	10	10	10	10	10	10			
				3	10	10	10	10	10	10	10	10			
Ref.Tox. - Ammonia	80 mg/L	1	10	10/19/19	DM	10	10/20/19	NR	10	10/21/19	NR	10	10/22/19	NR	
				2	10	10	10	10	10	10	10	10			
				3	10	10	10	10	10	10	10	10			
Ref.Tox. - Ammonia	160 mg/L	1	10	10/19/19	DM	10	10/20/19	NR	10	10/21/19	NR	10	10/22/19	NR	
				2	10	10	10	10	10	10	10	10			
				3	10	10	10	10	10	10	10	10			
Ref.Tox. - Ammonia	320 mg/L	1	10	10/19/19	DM	10	10/20/19	NR	10	10/21/19	NR	10	10/22/19	NR	
				2	10	10	10	10	10	10	10	10			
				3	10	10	10	10	10	10	10	10			

① 1E-10Q - DM - 10/19/19

② babies present - NR 10/22

2. *Neanthes arenaceodentata* Solid-Phase Test

DRAFT

2.1 *Neanthes arenaceodentata* Test Data

DRAFT

CLIENT	PROJECT	JOB NO.	PROJECT MANAGER	LABORATORY / LOCATION	PROTOCOL	SPECIES
MFA	Seaport	PG1313	Julia Baum	Port Gamble / Bath 9	PSEP 1995	<i>Neanthes arenaceodentata</i>

CLIENT / ENVIRON ID		REP	JAR	INITIAL # (if differs)	ENDPOINT DATA & OBSERVATIONS																				NUMBER REMAINING	TARE WEIGHT (mg)	TOTAL WEIGHT (mg)	ASHED WEIGHT (mg)
					1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20				
Control /	1			5	U	U	2E	N	U	U	G	U	G	U	N	U	G	G	IE	IE	U	N	U	N	5	191.50	272.97	227.23
	2																								5	195.12	272.75	223.68
	3																								5	227.46	325.07	258.38
	4																								5	207.70	301.17	240.41
	5																								5	224.15	305.38	249.26
CR21-West (14) /	1				U	U	G	U	U	G	U	G	G	U	G	G	U	G	G	U	G	G	G	5	201.81	280.85	224.77	
	2				5E, U	5G, U	N	5E, U	U	G	U	U		N	U	G	U	G	G	U	G	G		4	185.90	233.21	193.70	
	3				U	U		U	U	U	U	U		U	U	N	N	U	U	N	N			5	205.03	294.17	232.67	
	4																								5	185.51	270.95	218.78
	5																								4	200.31	236.64	211.92
Carr20 (47) /	1				U	U	U	U	U	U	U	U	G	U	N	U	G	U	G	U	G	G	G	5	355.59	446.32	391.23	
	2																							5	333.10	387.06	347.01	
	3																							5	331.27	415.48	360.47	
	4			8																				8	327.21	416.50	363.06	
	5			6																				6	298.26	378.99	329.69	

Rep	Number	Tare Weight (mg)	Dry Weight (mg)	Ashed Weight (mg)
1	5	174.62	178.30	176.23
2	5	230.51	233.92	232.01
3	5	148.15	151.87	149.63

- ① entire bottom top sediment layer black -ms } increased air flow to chamber. NB 10/22/19.
- ② smell when taking off lid -ms
- ③ we NB 10/22/19.
- ④ IE - Actual = G, -DM - 10/31/19
- ⑤ no air flow, replaced pipette NR 11/3
- ⑥ one worm very small compared to others.
- ⑦ chamber initiated w/ 8 worms.

⑤ IE, actual total weight 428.63 mg - NR 11/11

CLIENT		PROJECT		JOB NO.		PROJECT MANAGER		LABORATORY / LOCATION		PROTOCOL		SPECIES														
MFA		Seaport		PG1313		Julia Baum		Port Gamble / Bath 9		PSEP 1995		Neanthes arenaceodentata														
ENDPOINT DATA & OBSERVATIONS																										
CLIENT / ENVIRON ID	REP	JAR	INITIAL # (if differs)	Date and Initials																NUMBER REMAINING	TARE WEIGHT (mg)	TOTAL WEIGHT (mg)	ASHED WEIGHT (mg)			
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16					17	18	19
CR02-South (68) /	1			U	U	U	G	U,G	U,G	U,G	U,G	U,G	N	U	N	U	N	U,G	N	N	U	G	5	¹⁶ 287.34	367.93	311.77
	2						G	U,G	U,G	U,G	U,G	U,G					N	N	N				5	¹⁷ 336.19	379.01	372.05
	3						U	U,G	U,G	U,G	U	U				G	G	U,G	③				5	¹⁸ 342.30	361.92	373.56
	4						N	U	U,G	U,G	U,G	U				N	N	U,G	③				5	¹⁹ 336.38	399.23	357.02
	5						N	U	U,G	U,G	U,G	U				U,G	G	③	③				5	²⁰ 301.62	386.53	337.70
SE 15 /	1						U	U	N	U	U	U,G	U,G	U,G	N	N	N	U	N	N	U	G	0	²¹ 378.96	—	—
	2								N	U,G	U,G	U,G	U,G		U,IE		U						5	²² 315.51	378.45	334.13
	3						N	U	U	U,G	U	U			N		U,G						0	²³ 307.34	—	—
	4						U				U		U,G		U	G	U,G						5	²⁴ 326.26	361.15	335.31
	5						N				U		U,G		U	C	N	U,G	U				5	²⁵ 324.33	367.31	334.82
SE 16 /	1						U	U	N	U,G	U,G	U,G	U,G	U,G	U,G	G	U	G	G	U,G	G	G	5	²⁶ 318.20	382.26	333.74
	2								U	U	U	U	U	N	U	N		N	N	N	N	U	5	²⁷ 306.28	390.87	334.66
	3						N						U		U								5	²⁸ 290.96	343.06	305.00
	4						N						U,G		U				IE				4	²⁹ 295.45	370.37	⑤ 319.79
	5						N						U,G	U,G		U,G	G	③	G	G		G	5	³⁰ 302.32	373.02	326.09
SE 17 /	1						U	U	U	U,G	U,G	U,G	U,G	N	U	N	U,G	G	U,G	G	G	G	5	³¹ 303.09	365.82	320.88
	2						U	U	U	U	U	U			U,G		U,G	G					5	³² 310.15	368.33	327.65
	3						U,G	U,G	N	U,G	U,G	U,G			U		U,G	U,G					4	³³ 325.80	367.81	336.35
	4						U	U	N	U	U	U			U		U	N	N	N	N		5	³⁴ 383.62	454.20	403.21
	5						U	U	N	U	U	U			U		U	N	M	U,G	N		5	³⁵ 386.40	412.05	394.84

① IE-Actual = U,G - DM - 11/2/19

④ exc - NR 11/17

② IE - NR 11/4

③ native nereid polychaete present. MK U/G. 2 some 3" length.

CLIENT MFA	PROJECT Seaport	JOB NO. PG1313	PROJECT MANAGER Julia Baum	LABORATORY / LOCATION Port Gamble / Bath 9	PROTOCOL PSEP 1995	SPECIES <i>Neanthes arenaceodentata</i>
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ENDPOINT DATA & OBSERVATIONS

CLIENT / ENVIRON ID	REP	JAR	INITIAL # OF ORGANISMS	Date and Initials	OBSERVATIONS																				NUMBER REMAINING	TARE WEIGHT (mg)	TOTAL WEIGHT (mg)	ASHED WEIGHT (mg)	
					1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20					
SE 18 /	1		5	MK 10/18	U	W	U	N	U	U,G	U,G	U,G	U,G	U,G	N	U,G	N	U	N	N	U,G	N	N	G	G	5	395.51	443.71	408.55
	2			DM 10/19					U	U,G	U,G	U,G	U,G		G	U,G	G	U,G	U,G	G	U,G	G	G			5	377.85	434.19	391.89
	3			NR 10/20					U	U	U,G	U,G	U,G		N	U	N	U	U,G		U,G					5	385.28	454.19	401.71
	4			MS 10/21					U	U	U	U,G	U			U,G	U,G	U,G	G		U,G					5	360.42	404.89	369.93
	5			10/22/MS					U	U,G	U,G	U,G	U			U	N	U	N	N	U,G	U				5	341.14	399.87	354.78
SE 24 /	1				U,G	U,G	G	U,G	U,G	U,G	U,G	U,G	G	U,G	G	U,G	G	G	U,G	G	G	G	G	G	5	329.26	387.37	341.65	
	2				U	U,G	N	U	U,G	U,G	U,G		G		G	U,G	N	N	U,G	G					5	331.62	379.00	3342.17	
	3								U	U,G	U,G	U,G		U,G		N	U,G	G	G	N	G				5	322.96	360.60	332.53	
	4								N	U,G	U,G	U,G		N		G	U,G	G	G	U,G	G				5	361.69	414.96	373.51	
	5								N	U	U,G	U,G	U,G	U	N		G	U,G	N	N	U	G				5	355.00	385.70	362.84
SE 26 /	1				U	U,G	G	U,G	U,G	U,G	U,G	U,G	G	G	G	U,G	U,G	G	U,G	G	G	U	G	G	5	367.29	432.11	379.44	
	2				U	U	N	U	U,G	U,G	U,G		G		G	U,G	G		U,G						5	332.06	408.72	347.74	
	3				U,G	U,G	G	U	U,G	U,G	U,G		N		G	U,G	U,G		U,G						5	326.01	394.60	389.93	
	4				U	U	G	U,G	U,G	U,G	U,G		G		G	U,G	G		U,G						5	340.30	407.73	354.56	
	5				U	U,G	N	U	U,G	U,G	U,G		G		G	U,G	G		U,G						4	337.97	388.73	347.08	
SE 31 /	1				U,G	U		U	U	U,G	U,G		N	U	N	U	N	N	U	U	N	U	G	5	332.17	393.13	348.11		
	2				U			U,G	U	U	U								N	N				5	383.55	447.07	400.54		
	3								U	U,G	U,G	U,G							U,G	N				5	348.42	406.28	363.78		
	4								U	U,G	U,G	U,G							U,G	G	G			5	363.16	444.93	390.63		
	5								U	U,G	U,G	U,G							U	N	N			5	364.69	439.76	385.05		

② one worm very small compared to others. MK 11/6.

③ Native nereid polychaete(s) present RE 11/6

① WN RE 11/6

④ IE RE 11/6-4

⑤ IE, NR 11/17

CLIENT		PROJECT		JOB NO.		PROJECT MANAGER		LABORATORY / LOCATION		PROTOCOL		SPECIES															
MFA		Seaport		PG1313		Julia Baum		Port Gamble / Bath 9		PSEP 1995		Neanthes arenaceodentata															
ENDPOINT DATA & OBSERVATIONS																											
CLIENT/ ENVIRON ID	REP	JAR	INITIAL # (U differs)	Date and Initials																				NUMBER REMAINING	TARE WEIGHT (mg)	TOTAL WEIGHT (mg)	ASHED WEIGHT (mg)
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20				
SE 20 /	1		②					N	U	U		U		N	N	U	N	N	N	N	U	U	4	⁵⁶ 344.47	354.43	347.45	
	2		6					U		U, G		U, G						U, G					6	⁵⁷ 346.34	369.14	351.37	
	3							N		U	U, G	U						N					3	⁵⁸ 355.32	358.75	356.42	
	4							N				U							N				3	⁵⁹ 311.64	319.10	313.63	
	5							U			U, G	U, G							U, G	G	G			4	⁶⁰ 318.59	373.74	332.31

①

② we mk w/g.

③ many Native nereid polychaetes present. mk w/g. ~~Surviving~~ Surviving neanthes very small in comparison to other treatments.

① days 1-4 no obs. sheet printed. discovered on 10/22 - MS

CLIENT MFA	PROJECT Seaport	START TIME/ END TIME 1350, 0900	DILUTION WATER BATCH FSW101519.01	PROTOCOL PSEP 1995	TEST START DATE 17-Oct-2019
JOB NUMBER PG1313	PROJECT MANAGER Julia Baum	LABORATORY / LOCATION Port Gamble / Bath 9	ORGANISM BATCH ATS101719	TEST SPECIES <i>Neanthes arenaceodentata</i>	TEST END DATE 6-Nov-2019

WATER QUALITY DATA

TEST CONDITIONS			DO (mg/L)	TEMP (C)	SALINITY (ppt)	pH	WATER RENEWAL	Feeding	TECH/DATE
SAMPLE ID	DAY	REP	> 4.6	20 ± 1	28 ± 2	8.0 ± 1.0			
			D.O.	TEMP	SALINITY	pH			
			meter mg/L	meter °C	meter ppt	meter unit			
Control /	0	Surr	9 7.6	9 19.6	9 28	9 8.0		MR	MR 10/17/19
Control /	1	Surr	8 7.7	8 19.2	8 28	8 7.8			MR 10/18
Control /	2	Surr	9 7.4	9 19.9	9 28	9 7.9		DM	DM 10/19
Control /	3	Surr	8 7.3	8 20.1	8 27	8 7.8	NR		NR 10/20
Control /	4	Surr	8 ① 7.4 7.6	8 19.4	8 ① 26 27	8 ① 7.8 8.0		MS	MS 10/21
Control /	5	Surr	8 7.4	8 19.9	8 27	8 7.8			MS 10/22
Control /	6	Surr	9 ③ 7.4 7.5	9 19.9	9 ② 24 28	9 7.9	DM/MS	MS	DM 10/23
Control /	7	Surr	9 7.4	9 19.4	9 27	9 7.0			DM 10/24
Control /	8	Surr	9 ④ 7.3 7.4	9 ④ 19.8 20.2	9 ④ 28 27	9 ④ 7.0 7.3		MS	DM 10/25
Control /	9	Surr	9 7.3	9 20.3	9 28	9 7.8	DM		DM 10/26
Control /	10	Surr	8 7.7	8 19.4	8 27	8 7.9		MS	MS 10/27
Control /	11	Surr	8 7.5	8 19.8	8 28	8 7.9			MS 10/28
Control /	12	Surr	8 7.6	8 19.8	8 28	8 8.0	DM/MS	DM	MS 10/29
Control /	13	Surr	8 7.6	8 19.4	8 28	8 7.9			MS 10/30
Control /	14	Surr	9 7.4	9 19.6	9 28	9 7.9		DM	DM 10/31
Control /	15	Surr	9 7.4	9 20.3	9 28	9 7.9	NR		NR 11/1
Control /	16	Surr	9 7.4	9 19.6	9 28	9 7.9		DM	DM 11/2
Control /	17	Surr	8 7.3	8 19.8	8 28	8 7.8			NR 11/3
Control /	18	Surr	9 7.4	9 20.2	9 28	9 7.9	JB/RE	NR	JB 11/04
Control /	19	Surr	8 7.3	8 19.5	8 28	8 7.8			MR 11/5
Control /	20	Surr	8 7.2	8 20.3	8 28	8 7.9			NR 11/6

① WP - MS 10/21
 ② WC - DM - 10/23/19
 ③ WC - DM - 10/23/19
 ④ WC - DM - 10/25/19

CLIENT MFA	PROJECT Seaport	START TIME/ END TIME 	DILUTION WATER BATCH FSW101519.01	PROTOCOL PSEP 1995	TEST START DATE 17-Oct-2019
JOB NUMBER PG1313	PROJECT MANAGER Julia Baum	LABORATORY / LOCATION Port Gamble / Bath 9	ORGANISM BATCH ATS101719	TEST SPECIES <i>Neanthes arenaceodentata</i>	TEST END DATE 6-Nov-2019

WATER QUALITY DATA

TEST CONDITIONS				DO (mg/L)		TEMP (C)		SALINITY (ppt)		pH		WATER RENEWAL	Feeding	TECH/DATE
SAMPLE ID	DAY	REP	JAR	> 4.6		20 ± 1		28 ± 2		8.0 ± 1.0				
				meter	mg/L	meter	°C	meter	ppt	meter	unit			
CR21-West (14) /	0	Surr		9	7.4	9	19.7	9	28	9	8.0		NR	NR 10/17
CR21-West (14) /	1	Surr		8	7.5	8	19.6	8	28	8	7.7			NR 10/18
CR21-West (14) /	2	Surr		9	7.0	9	19.9	9	28	9	7.7		DM	DM 10/19
CR21-West (14) /	3	Surr		8	6.6	8	20.2	8	27	8	7.7	NR		NR 10/20
CR21-West (14) /	4	Surr		8	7.4	8	19.5	8	27	8	7.9		MS	MS 10/21
CR21-West (14) /	5	Surr		8	7.4	8	20.0	8	27	8	7.8			MS 10/22
CR21-West (14) /	6	Surr		9	7.2	9	19.5	9	27	9	8.0	MS/DM	MS	DM 10/23
CR21-West (14) /	7	Surr		9	7.1	9	19.2	9	28	9	8.0			DM 10/24
CR21-West (14) /	8	Surr		9	7.3	9	19.8	9	28	9	7.0		MS	DM 10/25
CR21-West (14) /	9	Surr		9	7.4	9	19.9	9	28	9	8.0	DM		DM 10/26
CR21-West (14) /	10	Surr		8	7.5	8	19.1	8	28	8	8.1		MS	MS 10/27
CR21-West (14) /	11	Surr		8	7.6	8	19.4	8	28	8	8.2			MS 10/28
CR21-West (14) /	12	Surr		8	7.7	8	19.4	8	29	8	8.2	DM/MS	DM	MS 10/29
CR21-West (14) /	13	Surr		8	7.7	8	19.1	8	29	8	8.1			MS 10/30
CR21-West (14) /	14	Surr		9	7.5	9	19.3	9	29	9	8.1		DM	DM 10/31
CR21-West (14) /	15	Surr		9	7.5	9	20.0	9	29	9	8.1	NR		NR 11/1
CR21-West (14) /	16	Surr		9	7.1	9	19.3	9	29	9	8.0		DM	DM 11/2
CR21-West (14) /	17	Surr		8	7.2	8	20.0	8	29	8	7.9			NR 11/3
CR21-West (14) /	18	Surr		9	7.1	9	20.2	9	29	9	7.9	JB/RE	NR	JB 11/04
CR21-West (14) /	19	Surr		8	7.5	8	19.5	8	29	8	7.9			NR 11/5
CR21-West (14) /	20	Surr		8	7.2	8	20.1	8	29	8	7.9			NR 11/6

CLIENT MFA	PROJECT Seaport	START TIME/ END TIME <u> </u>	DILUTION WATER BATCH FSW101519.01	PROTOCOL PSEP 1995	TEST START DATE 17-Oct-2019
JOB NUMBER PG1313	PROJECT MANAGER Julia Baum	LABORATORY / LOCATION Port Gamble / Bath 9	ORGANISM BATCH ATS101719	TEST SPECIES <i>Neanthes arenaceodentata</i>	TEST END DATE 6-Nov-2019

WATER QUALITY DATA

TEST CONDITIONS				DO (mg/L)		TEMP (C)		SALINITY (ppt)		pH		WATER RENEWAL	Feeding	TECH/DATE
SAMPLE ID	DAY	REP	JAR	> 4.6 D.O.		20 ± 1 TEMP		28 ± 2 SALINITY		8.0 ± 1.0 pH				
				meter	mg/L	meter	°C	meter	ppt	meter	unit			
Carr20 (47) /	0	Surr		9	7.4	9	20.1	9	28	9	7.9		MR	MR 10/17
Carr20 (47) /	1	Surr		8	7.4	8	19.9	8	28	8	7.9			MR 10/18
Carr20 (47) /	2	Surr		9	7.3	9	20.4	9	28	9	8.0		DM	DM 10/19
Carr20 (47) /	3	Surr		8	7.0	8	20.3	8	27	8	7.9	NR		NR 10/20
Carr20 (47) /	4	Surr		8	7.5	8	19.5	8	27	8	8.0		MS	MS 10/21
Carr20 (47) /	5	Surr		8	7.5	8	20.0	8	27	8	7.9			MS 10/22
Carr20 (47) /	6	Surr		9	7.6	9	19.9	9	28	9	8.1	MS/DM	MS	DM 10/23
Carr20 (47) /	7	Surr		9	7.6	9	19.4	9	28	9	8.0			DM 10/24
Carr20 (47) /	8	Surr		9	7.4	9	20.4	9	28	9	8.1		MS	DM 10/25
Carr20 (47) /	9	Surr		9	7.4	9	20.3	9	28	9	8.1	DM		DM 10/26
Carr20 (47) /	10	Surr		8	7.6	8	19.3	8	27	8	8.1		MS	MS 10/27
Carr20 (47) /	11	Surr		8	7.4	8	20.1	8	28	8	8.0			MS 10/28
Carr20 (47) /	12	Surr		8	7.7	8	20.0	8	28	8	8.1	DM/MS	DM	MS 10/29
Carr20 (47) /	13	Surr		8	7.6	8	19.7	8	28	8	8.0			MS 10/30
Carr20 (47) /	14	Surr		9	7.5	9	20.0	9	28	9	8.0		DM	DM 10/31
Carr20 (47) /	15	Surr		9	7.4	9	20.4	9	28	9	8.0	NR		NR 11/1
Carr20 (47) /	16	Surr		9	7.4	9	19.7	9	28	9	8.0		DM	DM 11/2
Carr20 (47) /	17	Surr		8	7.4	8	20.2	8	29	8	7.9			NR 11/3
Carr20 (47) /	18	Surr		9	7.4	9	20.2	9	28	9	8.0	JB/RE	NR	JB 11/04
Carr20 (47) /	19	Surr		8	7.4	8	19.9	8	28	8	7.9			MR 11/5
Carr20 (47) /	20	Surr		8	7.3	8	20.6	8	28	8	7.9			NR 11/6

CLIENT MFA	PROJECT Seaport	START TIME/ END TIME /	DILUTION WATER BATCH FSW101519.01	PROTOCOL PSEP 1995	TEST START DATE 17-Oct-2019
JOB NUMBER PG1313	PROJECT MANAGER Julia Baum	LABORATORY / LOCATION Port Gamble / Bath 9	ORGANISM BATCH ATS101719	TEST SPECIES <i>Neanthes arenaceodentata</i>	TEST END DATE 6-Nov-2019

WATER QUALITY DATA

TEST CONDITIONS				DO (mg/L)	TEMP (C)	SALINITY (ppt)	pH		WATER RENEWAL	Feeding	TECH/DATE
SAMPLE ID	DAY	REP	JAR	> 4.6	20 ± 1	28 ± 2	8.0 ± 1.0				
				D.O.	TEMP	SALINITY	pH				
				meter	meter	meter	meter	unit			
CR02-South (68) /	0	Surr		9 7.5	9 19.7	9 28	9	8.0		MR	MR 10/17
CR02-South (68) /	1	Surr		8 7.4	8 19.5	8 28	8	7.7			MR 10/18
CR02-South (68) /	2	Surr		9 7.2	9 20.2	9 28	9	7.8		DM	DM 10/19
CR02-South (68) /	3	Surr		8 6.7	8 20.3	8 27	8	7.6	NR		NR 10/20
CR02-South (68) /	4	Surr		8 7.5	8 19.5	8 27	8	7.8		MS	MS 10/21
CR02-South (68) /	5	Surr		8 7.4	8 19.9	8 27	8	7.7			MS 10/22
CR02-South (68) /	6	Surr		9 7.5	9 19.7	9 28	9	7.9	DM/MS	MS	DM 10/23
CR02-South (68) /	7	Surr		9 7.5	9 19.4	9 27	9	7.9			DM 10/24
CR02-South (68) /	8	Surr		9 7.3	9 20.3	9 27	9	8.0		MS	DM 10/25
CR02-South (68) /	9	Surr		9 7.2	9 20.3	9 27	9	7.9	DM		DM 10/26
CR02-South (68) /	10	Surr		8 7.7	8 19.3	8 27	8	8.0		MS	MS 10/27
CR02-South (68) /	11	Surr		8 7.5	8 19.8	8 28	8	8.0			MS 10/28
CR02-South (68) /	12	Surr		8 7.4	8 19.9	8 28	8	8.0	DM/MS	DM	MS 10/29
CR02-South (68) /	13	Surr		8 7.6	8 19.3	8 28	8	7.9			MS 10/30
CR02-South (68) /	14	Surr		9 7.4	9 19.7	9 28	9	7.9		DM	DM 10/31
CR02-South (68) /	15	Surr		9 7.4	9 20.3	9 28	9	7.9	NR		NR 11/1
CR02-South (68) /	16	Surr		9 7.4	9 19.5	9 28	9	7.9		DM	DM 11/2
CR02-South (68) /	17	Surr		8 7.2	8 19.8	8 28	8	7.9			NR 11/3
CR02-South (68) /	18	Surr		9 7.4	9 20.2	9 28	9	8.0	JB/RE	NR	JB 11/04
CR02-South (68) /	19	Surr		8 7.3	8 19.5	8 28	8	7.9			MR 11/5
CR02-South (68) /	20	Surr		8 7.1	8 20.2	8 28	8	7.9			NR 11/6

CLIENT MFA	PROJECT Seaport	START TIME/ END TIME /	DILUTION WATER BATCH FSW101519.01	PROTOCOL PSEP 1995	TEST START DATE 17-Oct-2019
JOB NUMBER PG1313	PROJECT MANAGER Julia Baum	LABORATORY / LOCATION Port Gamble / Bath 9	ORGANISM BATCH ATS101719	TEST SPECIES <i>Neanthes arenaceodentata</i>	TEST END DATE 6-Nov-2019

WATER QUALITY DATA

TEST CONDITIONS				DO (mg/L)		TEMP (C)		SALINITY (ppt)		pH		WATER RENEWAL	Feeding	TECH/DATE
SAMPLE ID	DAY	REP	JAR	> 4.6		20 ± 1		28 ± 2		8.0 ± 1.0				
				meter	mg/L	meter	°C	meter	ppt	meter	unit			
SE 15 /	0	Surr		9	7.5	9	20.2	9	27	9	7.9		MLC	MLC 10/17
SE 15 /	1	Surr		8	7.4	8	19.9	8	27	8	7.5			MLC 10/18
SE 15 /	2	Surr		9	7.2	9	20.5	9	26	9	7.6		DM	DM 10/19
SE 15 /	3	Surr		8	7.1	8	20.3	8	26	8	7.6	NR		NR 10/20
SE 15 /	4	Surr		8	7.6	8	19.5	8	26	8	7.6		MS	MS 10/21
SE 15 /	5	Surr		8	7.5	8	20.1	8	26	8	7.5			MS 10/22
SE 15 /	6	Surr		9	7.7	9	20.0	9	26	9	7.7	DM/MS	MS	DM 10/23
SE 15 /	7	Surr		9	7.7	9	19.5	9	27	9	7.8			DM 10/24
SE 15 /	8	Surr		9	7.5	9	20.4	9	27	9	7.8		MS	DM 10/25
SE 15 /	9	Surr		9	7.5	9	20.4	9	27	9	7.7	DM		DM 10/26
SE 15 /	10	Surr		8	7.8	8	19.4	8	27	8	7.8		MS	MS 10/27
SE 15 /	11	Surr		8	7.6	8	20.2	8	28	8	7.8			MS 10/28
SE 15 /	12	Surr		8	7.8	8	20.2 20.0	8	28	8	7.8	DM/MS	DM	MS 10/29
SE 15 /	13	Surr		8	7.6	8	19.7	8	28	8	7.8			MS 10/30
SE 15 /	14	Surr		9	7.6	9	20.0	9	28	9	7.8		DM	DM 10/31
SE 15 /	15	Surr		9	7.6	9	20.4	9	28	9	7.9	NR		NR 11/1
SE 15 /	16	Surr		9	7.6	9	19.7	9	28	9	7.9		DM	DM 11/2
SE 15 /	17	Surr		8	7.3	8	20.2	8	28	8	7.7			NR 11/3
SE 15 /	18	Surr		9	7.5	9	20.3	9	28	9	7.8	JB/RE	NR	JB 11/04
SE 15 /	19	Surr		8	7.4	8	20.1	8	28	8	7.8			MLC 11/5
SE 15 /	20	Surr		8	7.6	8	20.8	8	28	8	7.8			NR 11/6

① WN - MS 10/29

CLIENT MFA	PROJECT Seaport	START TIME/ END TIME 	DILUTION WATER BATCH FSW101519.01	PROTOCOL PSEP 1995	TEST START DATE 17-Oct-2019
JOB NUMBER PG1313	PROJECT MANAGER Julia Baum	LABORATORY / LOCATION Port Gamble / Bath 9	ORGANISM BATCH ATS101719	TEST SPECIES <i>Neanthes arenaceodentata</i>	TEST END DATE 6-Nov-2019

WATER QUALITY DATA

TEST CONDITIONS			DO (mg/L)		TEMP (C)		SALINITY (ppt)		pH		WATER RENEWAL	Feeding	TECH/DATE
SAMPLE ID	DAY	REP	> 4.6		20 ± 1		28 ± 2		8.0 ± 1.0				
			JAR	D.O.		TEMP		SALINITY		pH			
			meter	mg/L	meter	°C	meter	ppt	meter	unit			
SE 16 /	0	Surr	9	7.5	9	20.2	9	27	9	8.0		ML	ML 10/17
SE 16 /	1	Surr	8	7.4	8	20.0	8	27	8	7.7			ML 10/18
SE 16 /	2	Surr	9	7.3	9	20.3	9	26	9	7.8		DM	DM 10/19
SE 16 /	3	Surr	8	7.1	8	20.2	8	26	8	7.7	NR		NR 10/20
SE 16 /	4	Surr	8	7.5	8	19.6	8	26	8	7.9		MS	MS 10/21
SE 16 /	5	Surr	8	7.5	8	20.1	8	26	8	7.8			MS 10/22
SE 16 /	6	Surr	9	7.6	9	20.1	9	26	9	7.8	DM/MS →		DM 10/23
SE 16 /	7	Surr	9	7.5	9	19.8	9	27	9	7.8			DM 10/24
SE 16 /	8	Surr	9	7.6	9	20.2	9	27	9	7.8		MS	DM 10/25
SE 16 /	9	Surr	9	7.3	9	20.3	9	27	9	7.8	DM		DM 10/26
SE 16 /	10	Surr	8	7.8	8	19.4	8	27	8	7.8		MS	MS 10/27
SE 16 /	11	Surr	8	7.4	8	20.1	8	28	8	7.8			MS 10/28
SE 16 /	12	Surr	8	7.7	8	19.9	8	28	8	7.8	DM/MS	DM	MS 10/29
SE 16 /	13	Surr	8	7.4	8	19.8	8	28	8	7.8			MS 10/30
SE 16 /	14	Surr	9	7.2	9	20.0	9	28	9	7.8		DM	DM 10/31
SE 16 /	15	Surr	9	7.3	9	20.2	9	28	9	7.8	NR		NR 11/1
SE 16 /	16	Surr	9	7.4	9	19.8	9	28	9	7.8		DM	DM 11/2
SE 16 /	17	Surr	8	7.1	8	20.2	8	28	8	7.7			NR 11/3
SE 16 /	18	Surr	9	7.3	9	20.2	9	28	9	7.9	JB/RE	NR	JB 11/04
SE 16 /	19	Surr	8	7.1	8	20.0	8	28	8	7.8			ML 11/5
SE 16 /	20	Surr	8	7.1	8	20.7	8	28	8	7.8			NR 11/6

CLIENT MFA	PROJECT Seaport	START TIME/ END TIME <u>1</u>	DILUTION WATER BATCH FSW101519.01	PROTOCOL PSEP 1995	TEST START DATE 17-Oct-2019
JOB NUMBER PG1313	PROJECT MANAGER Julia Baum	LABORATORY / LOCATION Port Gamble / Bath 9	ORGANISM BATCH ATS101719	TEST SPECIES <i>Neanthes arenaceodentata</i>	TEST END DATE 6-Nov-2019

WATER QUALITY DATA

TEST CONDITIONS				DO (mg/L)		TEMP (C)		SALINITY (ppt)		pH		WATER RENEWAL	Feeding	TECH/DATE
SAMPLE ID	DAY	REP	JAR	> 4.6		20 ± 1		28 ± 2		8.0 ± 1.0				
				meter	mg/L	meter	°C	meter	ppt	meter	unit			
SE 17 /	0	Surr		9	7.6	9	20.2	9	27	9	7.9		MLK	MLK 10/17
SE 17 /	1	Surr		8	6.8	8	19.8	8	27	8	7.6			MLK 10/18
SE 17 /	2	Surr		9	7.3	9	20.1	9	26	9	7.7		DM	DM 10/19
SE 17 /	3	Surr		8	6.9	8	20.1	8	26	8	7.6	NR		NR 10/20
SE 17 /	4	Surr		8	7.3	8	19.4	8	26	8	7.7		MS	MS 10/21
SE 17 /	5	Surr		8	6.5	8	19.8	8	26	8	7.6			MS 10/22
SE 17 /	6	Surr		9	7.7	9	19.8	9	26	9	7.8	DM/MS →		DM 10/23
SE 17 /	7	Surr		9	7.5	9	19.5	9	27	9	7.8			DM 10/24
SE 17 /	8	Surr		9	7.5	9	20.1	9	27	9	7.9		MS	DM 10/25
SE 17 /	9	Surr		9	7.5	9	20.0	9	27	9	7.8	DM		DM 10/26
SE 17 /	10	Surr		8	7.8	8	19.2	8	27	8	7.8		MS	MS 10/27
SE 17 /	11	Surr		8	7.4	8	19.8	8	28	8	7.7			MS 10/28
SE 17 /	12	Surr		8	7.1	8	19.5	8	28	8	7.8	DM/MS	DM	MS 10/29
SE 17 /	13	Surr		8	7.1	8	19.4	8	28	8	7.8			MS 10/30
SE 17 /	14	Surr		9	7.3	9	19.7	9	28	9	7.8		DM	DM 10/31
SE 17 /	15	Surr		9	7.2	9	20.1	9	28	9	7.8	NR		NR 11/1
SE 17 /	16	Surr		9	7.5	9	19.7	9	28	9	7.8		DM	DM 11/2
SE 17 /	17	Surr		8	6.6	8	20.1	8	28	8	7.4			NR 11/3
SE 17 /	18	Surr		9	6.7	9	20.2	9	28	9	7.5	JB/IRE	NR	JB 11/04
SE 17 /	19	Surr		8	6.3	8	20.0	8	28	8	7.5			MLK 11/5
SE 17 /	20	Surr		8	7.2	8	20.5	8	28	8	7.6			NR 11/6

CLIENT MFA	PROJECT Seaport	START TIME/ END TIME — / —	DILUTION WATER BATCH FSW101519.01	PROTOCOL PSEP 1995	TEST START DATE 17-Oct-2019
JOB NUMBER PG1313	PROJECT MANAGER Julia Baum	LABORATORY / LOCATION Port Gamble / Bath 9	ORGANISM BATCH ATS101719	TEST SPECIES <i>Neanthes arenaceodentata</i>	TEST END DATE 6-Nov-2019

WATER QUALITY DATA

TEST CONDITIONS				DO (mg/L)		TEMP (C)		SALINITY (ppt)		pH		WATER RENEWAL	Feeding	TECH/DATE
SAMPLE ID	DAY	REP	JAR	> 4.6 D.O.		TEMP		SALINITY		pH				
				meter	mg/L	meter	°C	meter	ppt	meter	unit			
SE 18 /	0	Surr		9	7.5	9	19.7	9	27	9	7.8		MR	MR 10/17
SE 18 /	1	Surr		8	7.6	8	19.6	8	27	8	7.8			MR 10/18
SE 18 /	2	Surr		9	7.3	9	20.0	9	27	9	7.9		DM	DM 10/19
SE 18 /	3	Surr		8	7.1	8	20.1	8	26	8	7.7	NR		NR 10/20
SE 18 /	4	Surr		8	7.7	8	19.4	8	26	8	8.0		MS	MS 10/21
SE 18 /	5	Surr		8	7.6	8	19.9	8	26	8	7.9			MS 10/22
SE 18 /	6	Surr		9	7.7	9	19.8	9	27	9	7.9	DM/MS →		DM 10/23
SE 18 /	7	Surr		9	7.6	9	19.4	9	27	9	7.2			DM 10/24
SE 18 /	8	Surr		9	7.5	9	20.1	9	27	9	8.0		MS	DM 10/25
SE 18 /	9	Surr		9	7.5	9	20.1	9	27	9	7.9	DM		DM 10/26
SE 18 /	10	Surr		8	7.7	8	19.4	8	27	8	8.0		MS	MS 10/27
SE 18 /	11	Surr		8	7.5	8	19.6	8	28	8	7.9			MS 10/28
SE 18 /	12	Surr		8	7.7	8	19.6	8	28	8	8.0	DM/MS	DM	MS 10/29
SE 18 /	13	Surr		8	7.6	8	19.3	8	28	8	7.8			MS 10/30
SE 18 /	14	Surr		9	7.6	9	19.4	9	28	9	7.9		DM	DM 10/31
SE 18 /	15	Surr		9	7.4	9	20.2	9	28	9	7.9	NR		NR 11/1
SE 18 /	16	Surr		9	7.5	9	19.5	9	28	9	7.9		DM	DM 11/2
SE 18 /	17	Surr		8	7.3	8	19.8	8	28	8	7.8			NR 11/3
SE 18 /	18	Surr		9	7.4	9	20.1	9	28	9	7.9	JB/RE	NR	JB 11/04
SE 18 /	19	Surr		8	7.5	8	19.5	8	28	8	7.8			MR 11/5
SE 18 /	20	Surr		8	7.5	8	20.3	8	28	8	7.9			NR 11/6

CLIENT MFA	PROJECT Seaport	START TIME/ END TIME 	DILUTION WATER BATCH FSW101519.01	PROTOCOL PSEP 1995	TEST START DATE 17-Oct-2019
JOB NUMBER PG1313	PROJECT MANAGER Julia Baum	LABORATORY / LOCATION Port Gamble / Bath 9	ORGANISM BATCH ATS101719	TEST SPECIES <i>Neanthes arenaceodentata</i>	TEST END DATE 6-Nov-2019

TEST CONDITIONS				DO (mg/L)		TEMP (C)		SALINITY (ppt)		pH		WATER RENEWAL	Feeding	TECH/DATE
SAMPLE ID	DAY	REP	JAR	> 4.6		20 ± 1		28 ± 2		8.0 ± 1.0				
				meter	mg/L	meter	°C	meter	ppt	meter	unit			
SE 20 /	0	Surr		9	7.7	9	19.6	9	27	9	7.9		MK	MK 10/17
SE 20 /	1	Surr		8	7.6	8	19.7	8	27	8	7.7			MK 10/18
SE 20 /	2	Surr		9	7.3	9	20.2	9	26	9	7.7		DM	DM 10/19
SE 20 /	3	Surr		8	6.9	8	20.2	8	26	8	7.6	NR		NR 10/20
SE 20 /	4	Surr		8	7.7	8	19.6	8	26	8	7.8		MS	MS 10/21
SE 20 /	5	Surr		8	7.6	8	20.0	8	26	8	7.7			MS 10/22
SE 20 /	6	Surr		9	7.6	9	20.0	9	26	9	7.7	DM/MS →		DM 10/23
SE 20 /	7	Surr		9	7.5	9	19.4	9	27	9	7.7			DM 10/24
SE 20 /	8	Surr		9	7.5	9	20.0	9	27	9	7.7		MS	DM 10/25
SE 20 /	9	Surr		9	7.5	9	20.2	9	27	9	7.6	DM		DM 10/26
SE 20 /	10	Surr		8	7.7	8	19.4	8	27	8	7.8		MS	MS 10/27
SE 20 /	11	Surr		8	7.6	8	19.8	8	27	8	7.8			MS 10/28
SE 20 /	12	Surr		8	7.7	8	19.7	8	27	8	7.8	DM/MS	DM	MS 10/29
SE 20 /	13	Surr		8	7.8	8	19.4	8	28	8	7.8			MS 10/30
SE 20 /	14	Surr		9	7.5	9	19.8	9	28	9	7.8		DM	DM 10/31
SE 20 /	15	Surr		9	7.5	9	20.3	9	28	9	7.8	NR		NR 11/1
SE 20 /	16	Surr		9	7.4	9	19.5	9	28	9	7.8		DM	DM 11/2
SE 20 /	17	Surr		8	7.4	8	20.0	8	28	8	7.8			NR 11/3
SE 20 /	18	Surr		9	7.4	9	20.3	9	28	9	7.7	JB/RE	NR	JB 11/04
SE 20 /	19	Surr		8	7.3	8	19.7	8	28	8	7.8			MK 11/5
SE 20 /	20	Surr		8	7.4	8	20.4	8	28	8	7.8			NR 11/6

CLIENT MFA	PROJECT Seaport	START TIME/ END TIME <u> </u>	DILUTION WATER BATCH FSW101519.01	PROTOCOL PSEP 1995	TEST START DATE 17-Oct-2019
JOB NUMBER PG1313	PROJECT MANAGER Julia Baum	LABORATORY / LOCATION Port Gamble / Bath 9	ORGANISM BATCH ATS101719	TEST SPECIES <i>Neanthes arenaceodentata</i>	TEST END DATE 6-Nov-2019

WATER QUALITY DATA

TEST CONDITIONS			DO (mg/L)		TEMP (C)		SALINITY (ppt)		pH		WATER RENEWAL	Feeding	TECH/DATE	
SAMPLE ID	DAY	REP	> 4.6		20 ± 1		28 ± 2		8.0 ± 1.0					
			JAR	meter	mg/L	meter	°C	meter	ppt	meter	unit			
SE 24 /	0	Surr		9	7.4	9	20.2	9	27	9	7.8		MR	MR 10/17
SE 24 /	1	Surr		8	7.4	8	20.0	8	27	8	7.5			MR 10/18
SE 24 /	2	Surr		9	7.2	9	20.3	9	26	9	7.5		DM	DM 10/19
SE 24 /	3	Surr		8	7.1	8	20.3	8	26	8	7.5	NR		NR 10/20
SE 24 /	4	Surr		8	7.6	8	19.6	8	26	8	7.8		MS	MS 10/21
SE 24 /	5	Surr		8	7.4	8	20.1	8	26	8	7.5			MS 10/22
SE 24 /	6	Surr		9	7.8	9	20.0	9	26	9	7.7	DM/MS		DM 10/23
SE 24 /	7	Surr		9	7.6	9	19.6	9	27	9	7.7			DM 10/24
SE 24 /	8	Surr		9	7.5	9	20.5	9	27	9	7.8		MS	DM 10/25
SE 24 /	9	Surr		9	7.6	9	20.4	9	27	9	7.7	DM		DM 10/26
SE 24 /	10	Surr		8	7.8	8	19.5	8	27	8	7.8		MS	MS 10/27
SE 24 /	11	Surr		8	7.5	8	20.2	8	28	8	7.8			MS 10/28
SE 24 /	12	Surr		8	7.7	8	20.2	8	28	8	7.8	DM/MS	DM	MS 10/29
SE 24 /	13	Surr		8	7.5	8	19.9	8	28	8	7.8			MS 10/30
SE 24 /	14	Surr		9	7.5	9	20.1	9	28	9	7.7		DM	DM 10/31
SE 24 /	15	Surr		9	7.5	9	20.5	9	28	9	7.7	NR		NR 11/1
SE 24 /	16	Surr		9	7.5	9	19.8	9	28	9	7.8		DM	DM 11/2
SE 24 /	17	Surr		8	7.2	8	20.3	8	28	8	7.5			NR 11/3
SE 24 /	18	Surr		9	7.2	9	20.3	9	28	9	7.4	JB/RE	NR	JB 11/04
SE 24 /	19	Surr		8	7.2	8	19.9	8	28	8	7.8			MR 11/5
SE 24 /	20	Surr		8	7.3	8	20.7	8	28	8	7.8			NR 11/6

CLIENT MFA	PROJECT Seaport	START TIME/ END TIME T	DILUTION WATER BATCH FSW101519.01	PROTOCOL PSEP 1995	TEST START DATE 17-Oct-2019
JOB NUMBER PG1313	PROJECT MANAGER Julia Baum	LABORATORY / LOCATION Port Gamble / Bath 9	ORGANISM BATCH ATS101719	TEST SPECIES <i>Neanthes arenaceodentata</i>	TEST END DATE 6-Nov-2019

WATER QUALITY DATA

TEST CONDITIONS			DO (mg/L)		TEMP (C)		SALINITY (ppt)		pH		WATER RENEWAL	Feeding	TECH/DATE
SAMPLE ID	DAY	REP	> 4.6		20 ± 1		28 ± 2		8.0 ± 1.0				
			JAR	meter	mg/L	meter	°C	meter	ppt	meter	unit		
SE 26 /	0	Surr	9	7.5	9	20.2	9	26	9	7.5		MR	MR 10/17
SE 26 /	1	Surr	8	7.5	8	20.0	8	27	8	7.5			MR 10/18
SE 26 /	2	Surr	9	7.3	9	20.5	9	26	9	7.4		DM	DM 10/19
SE 26 /	3	Surr	8	7.0	8	20.3	8	26	8	7.4	NR		NR 10/20
SE 26 /	4	Surr	8	7.6	8	19.6	8	26	8	7.6		MS	MS 10/21
SE 26 /	5	Surr	8	7.4	8	20.2	8	26	8	7.4			MS 10/22
SE 26 /	6	Surr	9	7.6	9	20.2	9	27	9	7.5	DM/MS →		DM 10/23
SE 26 /	7	Surr	9	7.5	9	19.8	9	27	9	7.5			DM 10/24
SE 26 /	8	Surr	9	7.2	9	20.6	9	27	9	7.6		MS	DM 10/25
SE 26 /	9	Surr	9	7.5	9	20.3	9	27	9	7.6	DM		DM 10/26
SE 26 /	10	Surr	8	7.7	8	19.6	8	27	8	7.7		MS	MS 10/27
SE 26 /	11	Surr	8	7.5	8	20.1	8	28	8	7.6			MS 10/28
SE 26 /	12	Surr	8	7.6	8	20.0	8	28	8	7.7	DM/MS	DM	MS 10/29
SE 26 /	13	Surr	8	7.5	8	19.8	8	28	8	7.7			MS 10/30
SE 26 /	14	Surr	9	6.5	9	19.5	9	28	9	7.7		DM	DM 10/31
SE 26 /	15	Surr	9	7.3	9	20.4	9	28	9	7.7	NR		NR 11/1
SE 26 /	16	Surr	9	7.5	9	20.0	9	28	9	7.8		DM	DM 11/2
SE 26 /	17	Surr	8	7.3	8	20.3	8	29	8	7.7			NR 11/3
SE 26 /	18	Surr	9	7.4	9	20.3	9	28	9	7.7	JB/RG	NR	JB 11/4
SE 26 /	19	Surr	8	7.2	8	20.1	8	28	8	7.6			MR 11/5
SE 26 /	20	Surr	8	7.4	8	20.7	8	28	8	7.6			NR 11/6

CLIENT MFA	PROJECT Seaport	START TIME/ END TIME 	DILUTION WATER BATCH FSW101519.01	PROTOCOL PSEP 1995	TEST START DATE 17-Oct-2019
JOB NUMBER PG1313	PROJECT MANAGER Julia Baum	LABORATORY / LOCATION Port Gamble / Bath 9	ORGANISM BATCH ATS101719	TEST SPECIES <i>Neanthes arenaceodentata</i>	TEST END DATE 6-Nov-2019

TEST CONDITIONS				WATER QUALITY DATA											
SAMPLE ID	DAY	REP	JAR	DO (mg/L)		TEMP (C)		SALINITY (ppt)		pH		WATER RENEWAL	Feeding	TECH/DATE	
				> 4.6		20 ± 1		28 ± 2		8.0 ± 1.0					
				D.O.		TEMP		SALINITY		pH					
				meter	mg/L	meter	°C	meter	ppt	meter	unit				
SE 31 /	0	Surr		9	7.4	9	20.1	9	27	9	7.9		MK	MK 10/17	
SE 31 /	1	Surr		8	7.0	8	20.1	8	27	8	7.6			MK 10/18	
SE 31 /	2	Surr		9	7.3	9	20.2	9	27	9	7.7		DM	DM 10/19	
SE 31 /	3	Surr		8	7.0	8	20.2	8	26	8	7.6	NR		NR 10/20	
SE 31 /	4	Surr		8	7.4	8	19.5	8	26	8	7.8		MS	MS 10/21	
SE 31 /	5	Surr		8	7.2	8	19.9	8	26	8	7.7			MS 10/22	
SE 31 /	6	Surr		9	7.6	9	19.8	9	27	9	7.9	DM/MS →		DM 10/23	
SE 31 /	7	Surr		9	7.4	9	19.5	9	27	9	7.2			DM 10/24	
SE 31 /	8	Surr		9	7.4	9	20.1	9	27	9	7.9		MS	DM 10/25	
SE 31 /	9	Surr		9	7.3	9	19.9	9	28	9	7.8	DM		DM 10/26	
SE 31 /	10	Surr		8	7.1	8	19.2	8	28	8	7.9		MS	MS 10/27	
SE 31 /	11	Surr		8	7.3	8	19.8	8	28	8	7.8			MS 10/28	
SE 31 /	12	Surr		8	7.5	8	19.6	8	28	8	7.9	DM/MS	DM	MS 10/29	
SE 31 /	13	Surr		8	7.4	8	19.4	8	29	8	7.8			MS 10/30	
SE 31 /	14	Surr		9	7.2	9	19.6	9	29	9	7.8		DM	DM 10/31	
SE 31 /	15	Surr		9	7.2	9	20.0	9	29	9	7.8	NR		NR 11/1	
SE 31 /	16	Surr		9	7.3	9	19.6	9	29	9	7.9		DM	DM 11/2	
SE 31 /	17	Surr		8	7.0	8	20.1	8	29	8	7.6			NR 11/3	
SE 31 /	18	Surr		9	7.2	9	20.2	9	29	9	7.7	JB/RE	NR	JB 11/04	
SE 31 /	19	Surr		8	6.6	8	20.0	8	29	8	7.6			MK 11/5	
SE 31 /	20	Surr		8	7.2	8	20.6	8	28	8	7.7			NR 11/6	

Ammonia and Sulfide Analysis Record

Client/Project: MFA / Seaport	Organism: Neorhys	Test Duration (days): 20
PRETEST / <u>INITIAL</u> / FINAL / OTHER (circle one) OVERLYING (OV) / <u>POREWATER (PW)</u> (circle one) / Comments: _____		DAY of TEST: <u>0</u>

Calibration Standards Temperature		Sample temperature should be within $\pm 1^\circ\text{C}$ of standards temperature at time and date of analysis.
Date: 10/17/19	Temperature: 22.3	

Sample ID or Description	Conc. or Rep	Date of Sampling and Initials	Ammonia Value (mg/L)	Meter #/ Temp ($^\circ\text{C}$)		Date of Reading and Initials	Sample Preserved (Y/N)	pH	Sal (ppt)	Sample Volume (mL)	Measured Sulf. ($\mu\text{g/L}$)	Multiplier	Calculated Sulf. ($\mu\text{g/L}$)
				Meter #	Temp ($^\circ\text{C}$)								
Ø	Surr.	10/17/19 NR	0.0050	T1	22.2	10/17/19 MS	N			10	1		
14%			0.295		22.3						ND		
47%			0.544		22.3						ND		
68%			0.108		22.0						3		
SE-15			0.381		22.0						0		
-16			0.361		22.0						3		
-17			0.582		22.2						0		
-18			0.362		22.0						ND		
-20			0.475		22.0						0		
-24			0.322		22.3						0		
-26			0.115		22.4						0		
-31			0.309		22.2						ND		
Ø		10/17/19 NR	0.220		22.5	10/17/19 NR/MS		7.5	28		8		
14%			2.41		22.6			7.4	28		0		
47%			3.02		22.4			7.6	28		16		
68%			3.12		22.4			7.5	29		22		
SE-15			0.937		22.4			7.1	26		NO		
-16			1.27		22.4			7.2	24		NO		
-17			1.86		22.4			7.0	25		NO		
-18			1.39		22.4			7.2	25		NO		
-20			1.44		22.3			7.1	24		NO		
-24			1.53		22.4			6.6	24		5		

OV
 ↓
 PW

Ammonia and Sulfide Analysis Record

Client/Project: MFA/Sea Port	Organism: Nearthes	Test Duration (days): 20
PRETEST / INITIAL / <u>FINAL</u> / OTHER (circle one)		DAY of TEST: <u>20</u>
<u>OVERLYING (OV)</u> / <u>POREWATER (PW)</u> (circle one) / Comments: _____		

Calibration Standards Temperature		Sample temperature should be within $\pm 1^\circ\text{C}$ of standards temperature at time and date of analysis.
Date:	Temperature:	
11/6/19	22.4	

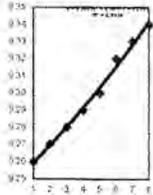
Sample ID or Description	Conc. or Rep	Date of Sampling and Initials	Ammonia Value (mg/L)	Meter #/ Temp ($^\circ\text{C}$)		Date of Reading and Initials	Sample Preserved (Y/N)	pH	Sal (ppt)	Sample Volume (mL)	Measured Sulf. ($\mu\text{g/L}$)	Multiplier	Calculated Sulf. ($\mu\text{g/L}$)
				Meter #	Temp ($^\circ\text{C}$)								
OV \emptyset	Supp	11/6/19 NR/DM	6.61	T1	21.4	11/6/19 NR/DM	N			10	ND		
REF 14%			0.654		21.4						2		
REF 47%			0.513		21.4						ND		
REF 100%			0.608		21.5						0		
SE-15			0.338		21.4						ND		
SE-16			0.448		21.4						0		
SE-17			0.487		21.4						ND		
SE-18			0.393		21.4						ND		
SE-20			0.332 ^{0.279}		21.5						ND		
SE-24			0.332		22.2						1		
SE-26			4.05		21.4						ND		
SE-31			0.406		21.5						ND		
\emptyset			6.89		21.4			7.3	28		ND		
PW REF 14%			1.57		21.4			7.0	28		21		
PW REF 47%			0.873		21.4			7.6	28		1		
PW REF 100%			0.760		21.4			7.0	28		ND		
PW SE-15			1.08		21.4			6.7	28		14		
PW SE-16			0.619		21.4			7.1	28		ND		
PW SE-17			1.22		21.4			6.9	28		ND		
PW SE-18			0.798		21.4			7.2	28		ND		
PW SE-20			0.567		21.4			6.9	28		ND		
PW SE-24			1.68		21.4			6.8	28		10		

QC - NR 11/6 (actual = 0.279)

CLIENT:	MFA	Test Date:	17-Oct-19
PROJECT:	Seaport	Test Type:	Neanthes SP
COMMENTS:	Initial Ammonia		

To convert Total Ammonia (mg/L) to Free (un-ionized) Ammonia (mg/L) enter the corresponding total ammonia, salinity, temperature, and pH.

Integer: I-factor	
1	9.26
2	9.27
3	9.28
4	9.29
5	9.30
6	9.32
7	9.33
	9.34



Sample	Mod NH3T (mg/L)	salinity (ppt)	pH	temp (C)	temp (K)	i-factor	Mod NH3U (mg/L)
Target/ Sample Name	Actual	22.9	8.0	24.1	297.26	9.3053	#VALUE!
Example 3.5	2.000	10.0	7.5	5.0	278.16	9.2750	0.008
1 Control	0.005	28	8.00	19.6	292.76	9.3187	0.000
2 CR21-West (14%)	0.295	28	8.00	19.7	292.86	9.3187	0.009
3 Carr20 (47%)	0.544	28	7.90	20.1	293.26	9.3187	0.014
4 CR02-South (68%)	0.108	28	8.00	19.7	292.86	9.3187	0.003
5 SE-15	0.381	27	7.90	20.2	293.36	9.3160	0.010
6 SE-16	0.361	27	8.00	20.2	293.36	9.3160	0.012
7 SE-17	0.582	27	7.9	20.2	293.36	9.3160	0.015
8 SE-18	0.362	27	7.8	19.7	292.86	9.3160	0.007
9 SE-20	0.475	27	7.9	19.6	292.76	9.3160	0.012
10 SE-24	0.322	27	7.8	20.2	293.36	9.3160	0.007
11 SE-26	0.115	26	7.50	20.2	293.36	9.3133	0.001
12 SE-31	0.309	27	7.9	20.1	293.26	9.3160	0.008
13 Control	0.220	28	7.5	19.6	292.76	9.3187	0.002
14 CR21-West (14%)	2.41	28	7.4	19.7	292.86	9.3187	0.020
15 Carr20 (47%)	3.02	28	7.6	20.1	293.26	9.3187	0.040
16 CR02-South (68%)	3.12	29	7.5	19.7	292.86	9.3214	0.032
17 SE-15	0.937	26	7.1	20.2	293.36	9.3133	0.004
18 SE-16	1.27	24	7.2	20.2	293.36	9.3081	0.007
19 SE-17	1.86	25	7.0	20.2	293.36	9.3107	0.006
20 SE-18	1.39	25	7.2	19.7	292.86	9.3107	0.007
21 SE-20	1.44	24	7.1	19.6	292.76	9.3081	0.006
22 SE-24	1.53	24	6.6	20.2	293.36	9.3081	0.002
23 SE-26	0.703	25	6.0	20.2	293.36	9.3107	0.000
24 SE-31	1.19	26	7.2	20.1	293.26	9.3133	0.006
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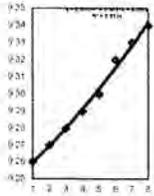
OV Day 0

PW Day 0

CLIENT:	MFA	Test Date:	17-Oct-19
PROJECT:	Seaport	Test Type:	Neanthes SP
COMMENTS:	Final Ammonia		

To convert Total Ammonia (mg/L) to Free (un-ionized) Ammonia (mg/L) enter the corresponding total ammonia, salinity, temperature, and pH.

Integer: I-factor	
1	9.26
2	9.27
3	9.28
4	9.29
5	9.30
6	9.32
7	9.33
	9.34



Sample	Mod NH3T (mg/L)	salinity (ppt)	pH	temp (C)	temp (K)	i-factor	Mod NH3U (mg/L)
Target / Sample Name	Actual	22.9	8.0	24.1	297.26	9.3053	#VALUE!
Example 3.5	2.000	10.0	7.5	5.0	278.16	9.2750	0.008
1 Control	6.61	28	7.90	20.3	293.46	9.3187	0.175
2 CR21-West (14%)	0.654	29	7.90	20.1	293.26	9.3214	0.017
3 Carr20 (47%)	0.513	28	7.90	20.6	293.76	9.3187	0.014
4 CR02-South (68%)	0.608	28	7.90	20.2	293.36	9.3187	0.016
5 SE-15	0.338	28	7.80	20.8	293.96	9.3187	0.007
6 SE-16	0.448	28	7.80	20.7	293.86	9.3187	0.010
7 SE-17	0.487	28	7.6	20.5	293.66	9.3187	0.007
8 SE-18	0.393	28	7.9	20.3	293.46	9.3187	0.010
9 SE-20	0.279	28	7.8	20.4	293.56	9.3187	0.006
10 SE-24	0.332	28	7.8	20.7	293.86	9.3187	0.007
11 SE-26	4.05	28	7.60	20.7	293.86	9.3187	0.056
12 SE-31	0.406	28	7.7	20.6	293.76	9.3187	0.007
13 Control	6.890	28	7.3	20.3	293.46	9.3187	0.047
14 CR21-West (14%)	1.57	28	7.0	20.1	293.26	9.3187	0.005
15 Carr20 (47%)	0.873	28	7.0	20.6	293.76	9.3187	0.003
16 CR02-South (68%)	0.760	28	7.0	20.2	293.36	9.3187	0.003
17 SE-15	1.08	28	6.7	20.8	293.96	9.3187	0.002
18 SE-16	0.619	28	7.1	20.7	293.86	9.3187	0.003
19 SE-17	1.22	28	6.9	20.5	293.66	9.3187	0.003
20 SE-18	0.798	28	7.2	20.3	293.46	9.3187	0.004
21 SE-20	0.567	28	6.9	20.4	293.56	9.3187	0.002
22 SE-24	1.68	28	6.8	20.7	293.86	9.3187	0.004
23 SE-26	4.10	28	6.9	20.7	293.86	9.3187	0.011
24 SE-31	0.860	29	7.0	20.6	293.76	9.3214	0.003
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OV Day 20

PW Day 20

Support: Neanthes Sulfides

		Input				Output		
	Sample ID	Total Dissolved Sulfide (µg/L as S)	Temperature (°C)	Salinity (‰)	pH	Undissociated H2S (µg/L as H2S)	Weight Fraction (H2S/Total S)	
OV	Day 0	Control	1	19.6	28	8	0.07	6.79%
		CR21-West (14)	ND	19.7	28	8.0	#VALUE!	#VALUE!
		Carr20 (47)	ND	20.1	28	7.9	#VALUE!	#VALUE!
		CR02-South (68)	3	19.7	28	8.0	0.20	6.77%
		SE-15	0	20.2	27	7.9	0.00	#DIV/0!
		SE-16	3	20.2	27	8	0.20	6.69%
		SE-17	0	20.2	27	7.9	0.00	#DIV/0!
		SE-18	ND	19.7	27	7.8	#VALUE!	#VALUE!
		SE-20	0	19.6	27	7.9	0.0000	#DIV/0!
		SE-24	0	20.2	27	7.8	0.00	#DIV/0!
	SE-26	0	20.2	26	7.5	0.00	#DIV/0!	
	SE-31	ND	20.1	27	7.9	#VALUE!	#VALUE!	
PW	Day 0	Control	8	19.6	28	7.5	1.51	18.87%
		CR21-West (14)	0	19.7	28	7.4	0.00	#DIV/0!
		Carr20 (47)	16	20.1	28	7.6	2.45	15.32%
		CR02-South (68)	22	19.7	29	7.5	4.12	18.73%
		SE-15	ND	20.2	26	7.1	#VALUE!	#VALUE!
		SE-16	ND	20.2	24	7.2	#VALUE!	#VALUE!
		SE-17	ND	20.2	25	7	#VALUE!	#VALUE!
		SE-18	ND	19.7	25	7.2	#VALUE!	#VALUE!
		SE-20	ND	19.6	24	7.1	#VALUE!	#VALUE!
		SE-24	5	20.2	24	6.6	3.36	67.18%
	SE-26	ND	20.2	25	6.0	#VALUE!	#VALUE!	
	SE-31	ND	20.1	26	7.2	#VALUE!	#VALUE!	
OV	Day 20	Control	ND	20.3	28	7.9	#VALUE!	#VALUE!
		CR21-West (14)	2	20.1	29	7.9	0.16	8.23%
		Carr20 (47)	ND	20.6	28	7.9	#VALUE!	#VALUE!
		CR02-South (68)	0	20.2	28	7.9	0.00	#DIV/0!
		SE-15	ND	20.8	28	7.8	#VALUE!	#VALUE!
		SE-16	0	20.7	28	7.8	0.00	#DIV/0!
		SE-17	ND	20.5	28	7.6	#VALUE!	#VALUE!
		SE-18	ND	20.3	28	7.9	#VALUE!	#VALUE!
		SE-20	ND	20.4	28	7.8	#VALUE!	#VALUE!
		SE-24	1	20.7	28	7.8	0.10	10.01%
	SE-26	ND	20.7	28	7.6	#VALUE!	#VALUE!	
	SE-31	ND	20.6	28	7.7	#VALUE!	#VALUE!	
PW	Day 20	Control	ND	20.3	28	7.3	#VALUE!	#VALUE!
		CR21-West (14)	21	20.1	28	7	8.96	42.66%
		Carr20 (47)	1	20.6	28	7	0.42	42.20%
		CR02-South (68)	ND	20.2	28	7	#VALUE!	#VALUE!
		SE-15	14	20.8	28	6.7	8.42	60.17%
		SE-16	ND	20.7	28	7.1	#VALUE!	#VALUE!
		SE-17	ND	20.5	28	6.9	#VALUE!	#VALUE!
		SE-18	ND	20.3	28	7.2	#VALUE!	#VALUE!
		SE-20	ND	20.4	28	6.9	#VALUE!	#VALUE!
		SE-24	10	20.7	28	6.8	5.42	54.19%
	SE-26	1	20.7	28	6.9	0.48	48.08%	
	SE-31	ND	20.6	29	7	#VALUE!	#VALUE!	

2.2 *Neanthes arenaceodentata* Statistical Results

DRAFT

2.3 *Neanthes arenaceodentata* Reference Toxicant Test Results

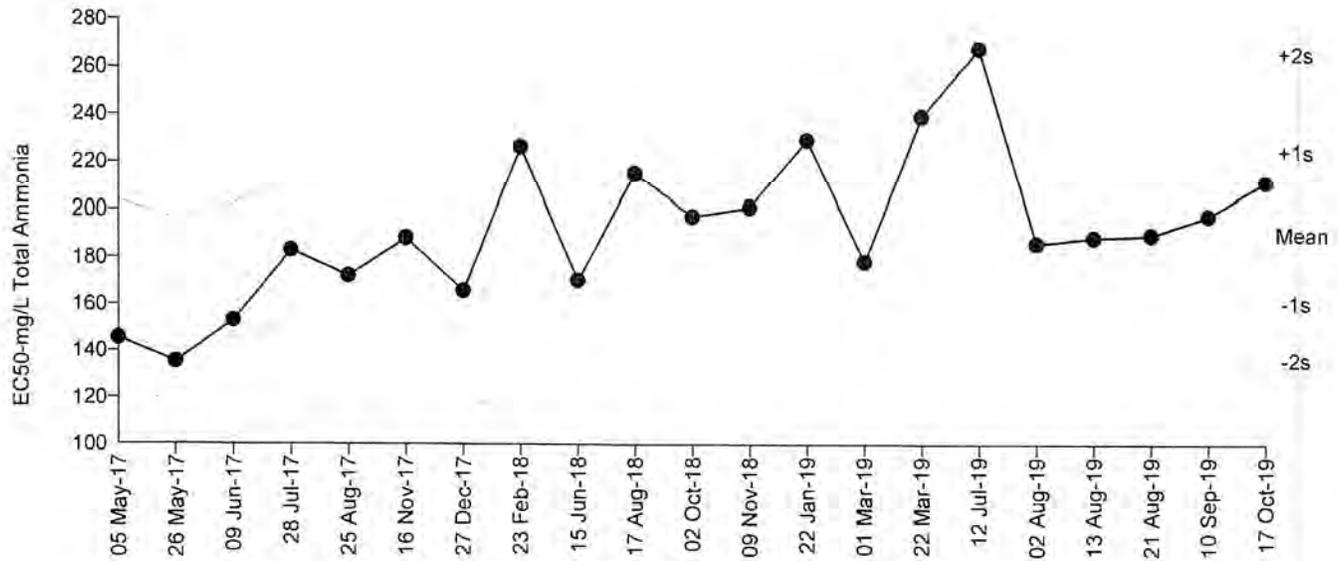
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Reference Toxicant 96-h Acute Survival Test

All Matching Labs

Test Type: Survival Organism: *Neanthes arenaceodentata* (Polycha Material: Total Ammonia
 Protocol: PSEP (1995) Endpoint: Proportion Survived Source: Reference Toxicant-REF

Reference Toxicant 96-h Acute Survival Test



Mean: 189 Count: 20 -1s Warning Limit: 159.7 -2s Action Limit: 135
 Sigma: n/a CV: 16.90% +1s Warning Limit: 223.6 +2s Action Limit: 264.6

Quality Control Data

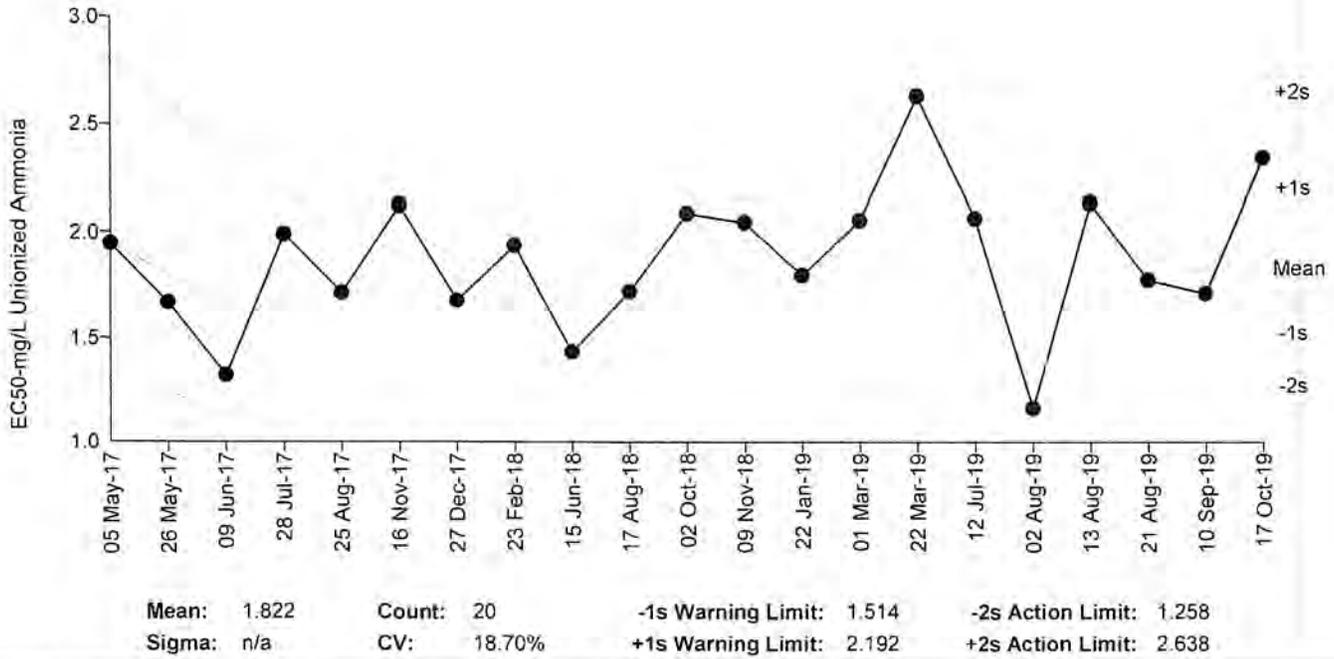
Point	Year	Month	Day	Time	QC Data	Delta	Sigma	Warning	Action	Test ID	Analysis ID	Laboratory
1	2017	May	5	11:10	145.4	-43.61	-1.559	(-)		19-9695-8635	12-9907-4132	EcoAnalysts
2			26	11:20	135.4	-53.62	-1.983	(-)		02-4398-8901	19-3251-4383	EcoAnalysts
3		Jun	9	13:12	152.9	-36.13	-1.261	(-)		06-5936-3810	21-1385-6147	EcoAnalysts
4		Jul	28	10:45	183.1	-5.964	-0.1906			04-6413-3650	06-5419-2075	EcoAnalysts
5		Aug	25	10:40	172.2	-16.82	-0.5539			03-6651-4426	03-4165-4995	EcoAnalysts
6		Nov	16	13:40	188.2	-0.8346	-0.02631			03-0415-6136	04-9955-5124	EcoAnalysts
7		Dec	27	15:35	165.8	-23.2	-0.7786			01-8821-8905	08-9204-3617	EcoAnalysts
8	2018	Feb	23	16:20	226.4	37.37	1.072	(+)		13-7905-8989	13-7098-6720	EcoAnalysts
9		Jun	15	14:35	170.5	-18.59	-0.6156			04-1274-1602	03-0642-1993	EcoAnalysts
10		Aug	17	14:15	215.3	26.21	0.7718			07-8700-6256	13-3406-4651	EcoAnalysts
11		Oct	2	14:10	197.3	8.229	0.2533			21-2226-7904	00-1709-8680	EcoAnalysts
12		Nov	9	14:15	201.1	12.08	0.3684			00-5577-1542	07-1368-3232	EcoAnalysts
13	2019	Jan	22	15:17	229.4	40.38	1.151	(+)		19-6608-0675	00-2421-4186	EcoAnalysts
14		Mar	1	13:44	178.5	-10.57	-0.3422			16-4352-7409	14-8196-0068	EcoAnalysts
15			22	15:20	239.3	50.2	1.4	(+)		12-8564-4292	03-0035-4512	EcoAnalysts
16		Jul	12	14:30	267.7	78.67	2.069	(+)	(+)	21-0917-4708	00-5307-6948	EcoAnalysts
17		Aug	2	15:20	186.2	-2.83	-0.08967			17-0846-5905	16-9911-4308	EcoAnalysts
18			13	15:55	188.8	-0.2532	-0.007968			08-6399-0477	04-6509-2576	EcoAnalysts
19			21	13:30	189.7	0.6934	0.02177			21-2736-4211	02-0545-5733	EcoAnalysts
20		Sep	10	14:45	197.8	8.74	0.2687			15-3198-9821	13-4571-7808	EcoAnalysts
21		Oct	17	15:45	211.7	22.61	0.6717			00-3306-4323	18-7634-5789	EcoAnalysts

Reference Toxicant 96-h Acute Survival Test

All Matching Labs

Test Type: Survival Organism: Neanthes arenaceodentata (Polycha Material: Unionized Ammonia
 Protocol: PSEP (1995) Endpoint: Proportion Survived Source: Reference Toxicant-REF

Reference Toxicant 96-h Acute Survival Test



Quality Control Data

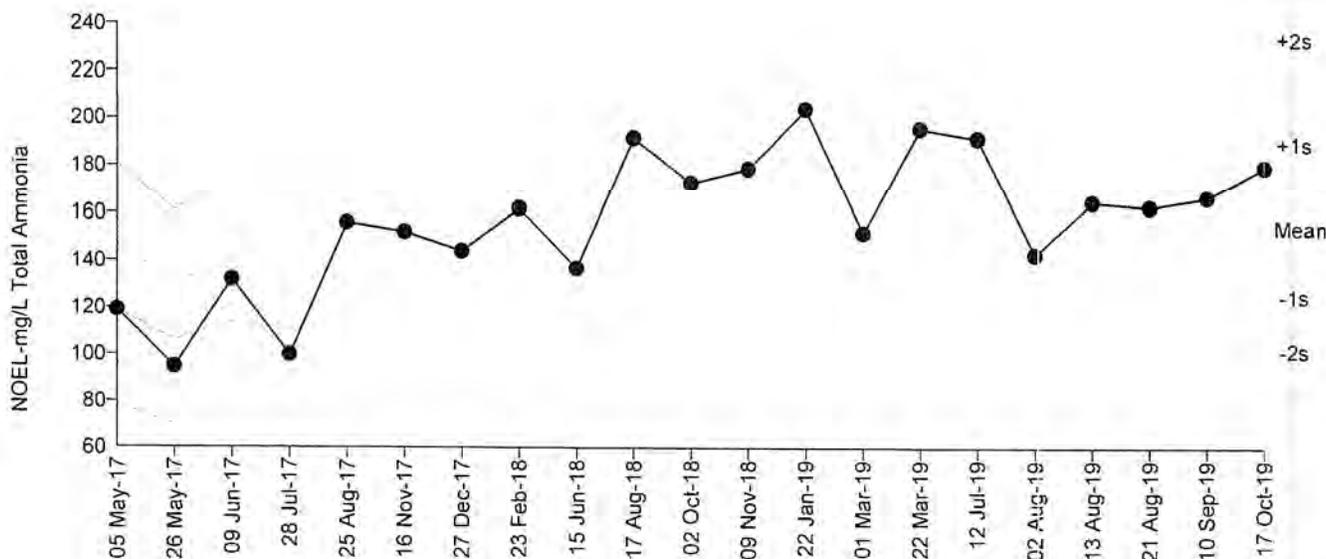
Point	Year	Month	Day	Time	QC Data	Delta	Sigma	Warning	Action	Test ID	Analysis ID	Laboratory
1	2017	May	5	11:10	1.947	0.1256	0.3601			06-1983-2716	10-6060-2702	EcoAnalysts
2			26	11:20	1.668	-0.1536	-0.4758			11-9977-1019	12-2648-7955	EcoAnalysts
3		Jun	9	13:12	1.32	-0.5013	-1.739	(-)		20-5746-1828	16-2628-9369	EcoAnalysts
4		Jul	28	10:45	1.989	0.1675	0.4753			11-9488-2902	14-7043-7154	EcoAnalysts
5		Aug	25	10:40	1.716	-0.106	-0.3238			04-3451-1040	00-3615-6317	EcoAnalysts
6		Nov	16	13:40	2.122	0.3004	0.8247			21-2485-6236	15-8866-6943	EcoAnalysts
7		Dec	27	15:35	1.678	-0.1437	-0.4439			14-3251-3795	10-3688-8341	EcoAnalysts
8	2018	Feb	23	16:20	1.939	0.117	0.3362			08-4313-9079	15-8743-9749	EcoAnalysts
9		Jun	15	14:35	1.432	-0.3895	-1.3	(-)		13-9420-2469	11-6483-4489	EcoAnalysts
10		Aug	17	14:15	1.721	-0.1005	-0.3067			16-0114-0602	19-8752-3439	EcoAnalysts
11		Oct	2	14:10	2.087	0.2657	0.7356			02-7017-5318	01-2654-4798	EcoAnalysts
12		Nov	9	14:15	2.046	0.2243	0.6272			05-1575-7697	05-2999-6855	EcoAnalysts
13	2019	Jan	22	15:17	1.799	-0.02305	-0.06881			03-5816-0405	12-4945-6418	EcoAnalysts
14		Mar	1	13:44	2.055	0.2339	0.6527			04-3242-1896	16-4131-9540	EcoAnalysts
15			22	15:20	2.63	0.8084	1.984	(+)		00-7345-5138	15-2870-1632	EcoAnalysts
16		Jul	12	14:30	2.065	0.2437	0.6783			19-1480-3456	07-7235-5107	EcoAnalysts
17		Aug	2	15:20	1.163	-0.6587	-2.425	(-)	(-)	10-1976-9391	00-8421-1808	EcoAnalysts
18			13	15:55	2.137	0.3154	0.8628			00-5853-2505	10-3089-9902	EcoAnalysts
19			21	13:30	1.779	-0.04274	-0.1283			14-7963-5363	12-5100-5995	EcoAnalysts
20		Sep	10	14:45	1.715	-0.1068	-0.3264			08-0609-5167	04-3709-1344	EcoAnalysts
21		Oct	17	15:45	2.345	0.5234	1.364	(+)		10-0475-9886	14-9451-4606	EcoAnalysts

Reference Toxicant 96-h Acute Survival Test

All Matching Labs

Test Type: Survival Organism: Neanthes arenaceodentata (Polycha Material: Total Ammonia
 Protocol: PSEP (1995) Endpoint: Proportion Survived Source: Reference Toxicant-REF

Reference Toxicant 96-h Acute Survival Test



Mean: 153.1 Count: 20 -1s Warning Limit: 124.3 -2s Action Limit: 100.9
 Sigma: n/a CV: 21.10% +1s Warning Limit: 188.6 +2s Action Limit: 232.3

Quality Control Data

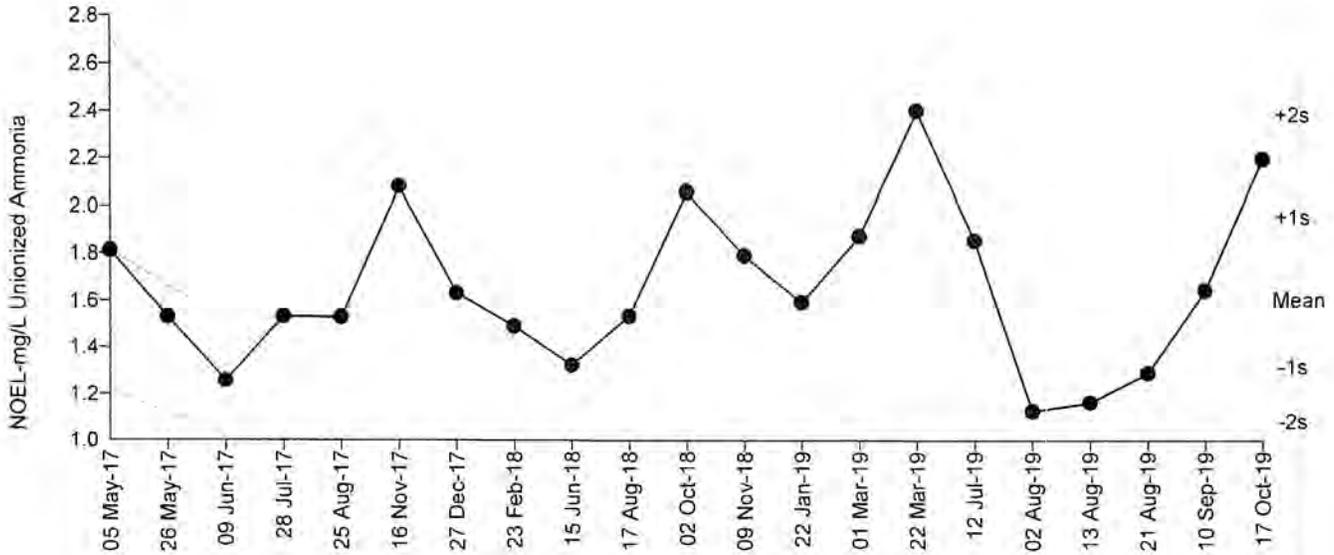
Point	Year	Month	Day	Time	QC Data	Delta	Sigma	Warning	Action	Test ID	Analysis ID	Laboratory
1	2017	May	5	11:10	119	-34.09	-1.209	(-)		19-9695-8635	08-7557-3106	EcoAnalysts
2			26	11:20	94.7	-58.39	-2.305	(-)	(-)	02-4398-8901	20-6641-5688	EcoAnalysts
3		Jun	9	13:12	132	-21.09	-0.7111			06-5936-3810	02-9842-7509	EcoAnalysts
4		Jul	28	10:45	99.9	-53.19	-2.048	(-)	(-)	04-6413-3650	18-1225-7941	EcoAnalysts
5		Aug	25	10:40	156	2.914	0.09048			03-6651-4426	09-2206-9228	EcoAnalysts
6		Nov	16	13:40	152	-1.086	-0.03416			03-0415-6136	18-4343-4696	EcoAnalysts
7		Dec	27	15:35	144	-9.086	-0.2936			01-8821-8905	01-3003-6293	EcoAnalysts
8	2018	Feb	23	16:20	162	8.914	0.2716			13-7905-8989	16-4206-5191	EcoAnalysts
9		Jun	15	14:35	137	-16.09	-0.5327			04-1274-1602	00-8204-0817	EcoAnalysts
10		Aug	17	14:15	192	38.91	1.087	(+)		07-8700-6256	00-3442-0298	EcoAnalysts
11		Oct	2	14:10	173	19.91	0.5868			21-2226-7904	05-0269-1791	EcoAnalysts
12		Nov	9	14:15	179	25.91	0.7504			00-5577-1542	13-6278-1952	EcoAnalysts
13	2019	Jan	22	15:17	204	50.91	1.378	(+)		19-6608-0675	11-6507-6917	EcoAnalysts
14		Mar	1	13:44	152	-1.086	-0.03416			16-4352-7409	00-8200-2760	EcoAnalysts
15			22	15:20	196	42.91	1.186	(+)		12-8564-4292	05-5287-2854	EcoAnalysts
16		Jul	12	14:30	192	38.91	1.087	(+)		21-0917-4708	13-0093-2104	EcoAnalysts
17		Aug	2	15:20	143	-10.09	-0.327			17-0846-5905	19-7316-2458	EcoAnalysts
18			13	15:55	165	11.91	0.3596			08-6399-0477	02-9565-0844	EcoAnalysts
19			21	13:30	163	9.914	0.3011			21-2736-4211	17-5434-7893	EcoAnalysts
20		Sep	10	14:45	167	13.91	0.4174			15-3198-9821	19-4980-7373	EcoAnalysts
21		Oct	17	15:45	180	26.91	0.7771			00-3306-4323	14-6485-5861	EcoAnalysts

Reference Toxicant 96-h Acute Survival Test

All Matching Labs

Test Type: Survival Organism: *Neanthes arenaceodentata* (Polycha Material: Unionized Ammonia
 Protocol: PSEP (1995) Endpoint: Proportion Survived Source: Reference Toxicant-REF

Reference Toxicant 96-h Acute Survival Test



Mean: 1.597 Count: 20 -1s Warning Limit: 1.309 -2s Action Limit: 1.073
 Sigma: n/a CV: 20.10% +1s Warning Limit: 1.948 +2s Action Limit: 2.376

Quality Control Data

Point	Year	Month	Day	Time	QC Data	Delta	Sigma	Warning	Action	Test ID	Analysis ID	Laboratory
1	2017	May	5	11:10	1.812	0.2154	0.6368			06-1983-2716	14-3198-2813	EcoAnalysts
2			26	11:20	1.529	-0.06764	-0.2178			11-9977-1019	08-2373-9544	EcoAnalysts
3		Jun	9	13:12	1.258	-0.3386	-1.2	(-)		20-5746-1828	13-3286-2330	EcoAnalysts
4		Jul	28	10:45	1.532	-0.06464	-0.208			11-9488-2902	00-8692-4177	EcoAnalysts
5		Aug	25	10:40	1.53	-0.06664	-0.2146			04-3451-1040	07-6966-4955	EcoAnalysts
6		Nov	16	13:40	2.079	0.4824	1.329	(+)		21-2485-6236	00-9775-4668	EcoAnalysts
7		Dec	27	15:35	1.633	0.03636	0.1133			14-3251-3795	04-4998-7500	EcoAnalysts
8	2018	Feb	23	16:20	1.491	-0.1056	-0.3445			08-4313-9079	12-5767-7210	EcoAnalysts
9		Jun	15	14:35	1.325	-0.2716	-0.9385			13-9420-2469	12-4705-5925	EcoAnalysts
10		Aug	17	14:15	1.535	-0.06164	-0.1981			16-0114-0602	03-4717-2264	EcoAnalysts
11		Oct	2	14:10	2.059	0.4624	1.28	(+)		02-7017-5318	12-2051-3096	EcoAnalysts
12		Nov	9	14:15	1.794	0.1974	0.5866			05-1575-7697	20-2944-5206	EcoAnalysts
13	2019	Jan	22	15:17	1.595	-0.001638	-0.005165			03-5816-0405	03-5029-6568	EcoAnalysts
14		Mar	1	13:44	1.875	0.2784	0.8088			04-3242-1896	17-0781-9299	EcoAnalysts
15			22	15:20	2.403	0.8064	2.057	(+)	(+)	00-7345-5138	17-9862-0450	EcoAnalysts
16		Jul	12	14:30	1.858	0.2614	0.763			19-1480-3456	01-8740-2353	EcoAnalysts
17		Aug	2	15:20	1.127	-0.4696	-1.753	(-)		10-1976-9391	08-7104-1750	EcoAnalysts
18			13	15:55	1.165	-0.4316	-1.586	(-)		00-5853-2505	06-3471-0420	EcoAnalysts
19			21	13:30	1.292	-0.3046	-1.065	(-)		14-7963-5363	20-8907-8030	EcoAnalysts
20		Sep	10	14:45	1.648	0.05136	0.1593			08-0609-5167	00-6589-3953	EcoAnalysts
21		Oct	17	15:45	2.2	0.6034	1.613	(+)		10-0475-9886	00-3718-6473	EcoAnalysts

CETIS Summary Report

Report Date: 25 Nov-19 09:56 (p 1 of 1)
 Test Code/ID: 1F88583 / 00-3306-4323

Reference Toxicant 96-h Acute Survival Test

EcoAnalysts

Batch ID: 09-9283-7335	Test Type: Survival	Analyst:
Start Date: 17 Oct-19 15:45	Protocol: PSEP (1995)	Diluent: Laboratory Seawater
Ending Date: 21 Oct-19 14:00	Species: Neanthes arenaceodentata	Brine: Not Applicable
Test Length: 94h	Taxon: Polychaeta	Source: Aquatic Toxicology Support Age:
Sample ID: 06-6583-0241	Code: 27AFC361	Project: Reference Toxicant
Sample Date: 12 Jun-19	Material: Total Ammonia	Source: Reference Toxicant
Receipt Date: 12 Jun-19	CAS (PC):	Station: P190612.46
Sample Age: 127d 16h	Client: Internal Lab	

Multiple Comparison Summary

Analysis ID	Endpoint	Comparison Method	✓ NOEL	LOEL	TOEL	TU	PMSD	S
14-6485-5861	Proportion Survived	Fisher Exact Test	180	221	199.4		n/a	1

Point Estimate Summary

Analysis ID	Endpoint	Point Estimate Method	✓ Level	mg/L	95% LCL	95% UCL	TU	S
18-7634-5789	Proportion Survived	Linear Interpolation (ICPIN)	EC5	182.9	182.3	183.3		1
			EC10	185.9	184.7	186.6		
			EC15	189	187.1	190		
			EC20	192.1	189.6	193.5		
			EC25	195.2	192	197		
			EC40	204.9	199.6	208		
			EC50	211.7	204.9	215.7		

Proportion Survived Summary

Conc-mg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	D	3	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.00%
89.4		3	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.00%
133		3	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.00%
180		3	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.00%
221		3	0.3667	0.2232	0.5101	0.3000	0.4000	0.0333	0.0577	15.75%	63.33%
265		3	0.0333	0.0000	0.1768	0.0000	0.1000	0.0333	0.0577	173.21%	96.67%

Proportion Survived Detail

Conc-mg/L	Code	Rep 1	Rep 2	Rep 3
0	D	1.0000	1.0000	1.0000
89.4		1.0000	1.0000	1.0000
133		1.0000	1.0000	1.0000
180		1.0000	1.0000	1.0000
221		0.3000	0.4000	0.4000
265		0.1000	0.0000	0.0000

Proportion Survived Binomials

Conc-mg/L	Code	Rep 1	Rep 2	Rep 3
0	D	10/10	10/10	10/10
89.4		10/10	10/10	10/10
133		10/10	10/10	10/10
180		10/10	10/10	10/10
221		3/10	4/10	4/10
265		1/10	0/10	0/10

CETIS Test Data Worksheet

Report Date: 25 Nov-19 09:52 (p 1 of 1)
 Test Code/ID: 1F88583 / 00-3306-4323

Reference Toxicant 96-h Acute Survival Test				EcoAnalysts	
Start Date: 17 Oct-19 15:45	Species: Neanthes arenaceodentata	Sample Code: 27AFC361			
End Date: 21 Oct-19 14:00	Protocol: PSEP (1995)	Sample Source: Reference Toxicant			
Sample Date: 12 Jun-19	Material: Total Ammonia	Sample Station: P190612.46			

Conc-mg/L	Code	Rep	Pos	# Exposed	# Survived	Notes
0	D	1	15	10	10	
0	D	2	4	10	10	
0	D	3	9	10	10	
89.4		1	12	10	10	
89.4		2	11	10	10	
89.4		3	7	10	10	
133		1	14	10	10	
133		2	3	10	10	
133		3	18	10	10	
180		1	16	10	10	
180		2	10	10	10	
180		3	2	10	10	
221		1	6	10	3	
221		2	8	10	4	
221		3	1	10	4	
265		1	17	10	1	
265		2	13	10	0	
265		3	5	10	0	

CETIS Summary Report

Report Date: 25 Nov-19 09:57 (p 1 of 1)
 Test Code/ID: 3BE36B4E / 10-0475-9886

Reference Toxicant 96-h Acute Survival Test

EcoAnalysts

Batch ID: 09-9283-7335	Test Type: Survival	Analyst:
Start Date: 17 Oct-19 15:45	Protocol: PSEP (1995)	Diluent: Laboratory Seawater
Ending Date: 21 Oct-19 14:00	Species: Neanthes arenaceodentata	Brine: Not Applicable
Test Length: 94h	Taxon: Polychaeta	Source: Aquatic Toxicology Support Age:
Sample ID: 07-3317-2284	Code: 2BB3523C	Project: Reference Toxicant
Sample Date: 12 Jun-19	Material: Unionized Ammonia	Source: Reference Toxicant
Receipt Date: 12 Jun-19	CAS (PC):	Station: P190612.46
Sample Age: 127d 16h	Client: Internal Lab	

Multiple Comparison Summary

Analysis ID	Endpoint	Comparison Method	✓ NOEL	LOEL	TOEL	TU	PMSD	S
00-3718-6473	Proportion Survived	Fisher Exact Test	2.2	2.356	2.277		n/a	1

Point Estimate Summary

Analysis ID	Endpoint	Point Estimate Method	✓ Level	mg/L	95% LCL	95% UCL	TU	S
14-9451-4606	Proportion Survived	Trimmed Spearman-Kärber	EC50	2.345	2.309	2.381		1

Proportion Survived Summary

Conc-mg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	D	3	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.00%
1.381		3	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.00%
1.625		3	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.00%
2.2		3	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.00%
2.356		3	0.3667	0.2232	0.5101	0.3000	0.4000	0.0333	0.0577	15.75%	63.33%
2.579		3	0.0333	0.0000	0.1768	0.0000	0.1000	0.0333	0.0577	173.21%	96.67%

Proportion Survived Detail

Conc-mg/L	Code	Rep 1	Rep 2	Rep 3
0	D	1.0000	1.0000	1.0000
1.381		1.0000	1.0000	1.0000
1.625		1.0000	1.0000	1.0000
2.2		1.0000	1.0000	1.0000
2.356		0.3000	0.4000	0.4000
2.579		0.1000	0.0000	0.0000

Proportion Survived Binomials

Conc-mg/L	Code	Rep 1	Rep 2	Rep 3
0	D	10/10	10/10	10/10
1.381		10/10	10/10	10/10
1.625		10/10	10/10	10/10
2.2		10/10	10/10	10/10
2.356		3/10	4/10	4/10
2.579		1/10	0/10	0/10

CETIS Test Data Worksheet

Report Date: 29 Oct-19 15:22 (p 1 of 1)
 Test Code/ID: 3BE36B4E / 10-0475-9886

Reference Toxicant 96-h Acute Survival Test				EcoAnalysts	
Start Date: 17 Oct-19 15:45	Species: Neanthes arenaceodentata	Sample Code: 2BB3523C			
End Date: 21 Oct-19 14:00	Protocol: PSEP (1995)	Sample Source: Reference Toxicant			
Sample Date: 12 Jun-19	Material: Unionized Ammonia	Sample Station: P190612.46			

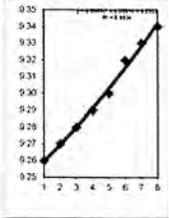
Conc-mg/L	Code	Rep	Pos	# Exposed	# Survived	Notes
0	D	1	16	10	10	
0	D	2	17	10	10	
0	D	3	3	10	10	
1.381		1	12	10	10	
1.381		2	18	10	10	
1.381		3	4	10	10	
1.625		1	5	10	10	
1.625		2	9	10	10	
1.625		3	6	10	10	
2.2		1	7	10	10	
2.2		2	8	10	10	
2.2		3	14	10	10	
2.356		1	10	10	3	
2.356		2	15	10	4	
2.356		3	11	10	4	
2.579		1	1	10	1	
2.579		2	13	10	0	
2.579		3	2	10	0	

Un-ionized Ammonia Calculator

CLIENT:	Internal	Date of Test:	October 17, 2019
PROJECT:	Ammonia RT	Test Type:	<i>Neanthes arenaceodentata</i>
COMMENTS:			

To convert Total Ammonia (mg/L) to Free (un-ionized) Ammonia (mg/L) enter the corresponding total ammonia, salinity, temperature, and pH.

Integer i-factor	
1	9.26
2	9.27
3	9.28
4	9.29
5	9.30
6	9.32
7	9.33
8	9.34



Sample	Mod NH3T (mg/L)	salinity (ppt)	pH	temp (C)	temp (K)	i-factor	Mod NH3U (mg/L)	
Target / Sample Name	Actual	22.9	8.0	24.1	297.26	9.3053	#VALUE!	
Example 3.5	2.000	10.0	7.5	5.0	278.16	9.2750	0.008	
1								
2								
3	90	89.4	29	7.7	19.2	292.36	9.3214	1.381
4	130	133	29	7.6	19.1	292.26	9.3214	1.625
5	170	180	29	7.6	19.1	292.26	9.3214	2.200
6	210	221	29	7.5	19.1	292.26	9.3214	2.356
7	250	265	29	7.5	19.1	292.26	9.3214	2.579
8								
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QA: mx

CLIENT --	PROJECT --	SPECIES <i>Neanthes arenaceodentata</i>	LABORATORY Port Gamble Bath 9		PROTOCOL PSEP 1995
JOB NUMBER 3737514A	PROJECT MANAGER M. Knowlen	TEST START DATE: 17Oct19	TIME 1545	TEST END DATE 21Oct19	TIME 1400
Test ID P190612.46	LOT #: 18H1356763				

WATER QUALITY DATA

DILTIN.WAT.BATCH		TEMP REC#		REFERENCE TOX. MATERIAL						REFERENCE TOXICANT			
FSW101519.02				ammonium chloride						ammonia - TAN			
TEST CONDITIONS				DO (mg/L)		TEMP(C)		SAL (ppt)		pH		TECHNICIAN	
				> 4.6		20 ± 1		28 ± 2		7 - 9			
CLIENT/ ENVIRON ID	CONCENTRATION		DAY	REP	D.O.		TEMP.		SALINITY		pH		WQ TECH
	value	units			meter	mg/L	meter	°C	meter	ppt	meter	unit	
Ref.Tox.- ammonia - TAN	Target:	0	0	Stock	9	7.7	9	19.2	9	29	9	8.0	MR 10/17
	Actual:		4	Rep	8	6.8	8	19.6	8	29	8	8.0	NR 10/21
Ref.Tox.- ammonia - TAN	Target:	15 90	0	Stock	9	7.7	9	19.2	9	29	9	7.7	MR 10/17
	Actual:		4	Rep	8	7.1	8	19.9	8	29	8	7.9	NR 10/21
Ref.Tox.- ammonia - TAN	Target:	30 130	0	Stock	9	7.6	9	19.1	9	29	9	7.6	MR 10/17
	Actual:		4	Rep	8	7.2	8	19.2	8	30	8	7.8	NR 10/21
Ref.Tox.- ammonia - TAN	Target:	80 170	0	Stock	9	7.6	9	19.1	9	29	9	7.6	MR 10/17
	Actual:		4	Rep	8	7.0	8	19.7	8	29	8	7.8	NR 10/21
Ref.Tox.- ammonia - TAN	Target:	120 210	0	Stock	9	7.7	9	19.1	9	29	9	7.8 7.5	MR 10/17
	Actual:		4	Rep	8	7.1	8	19.7	8	29	8	7.8	NR 10/21
Ref.Tox.- ammonia - TAN	Target:	240 250	0	Stock	9	7.7	9	19.1	9	29	9	7.5	MR 10/17
	Actual:		4	Rep	8	7.2	8	19.8	8	29	8	7.8	NR 10/21

① MR. MR 10/17.

CLIENT --		PROJECT --		JOB NUMBER		PROJECT MANAGER M. Knowlen		LABORATORY Port Gamble Bath 9		SPECIES <i>Neanthes arenaceodentata</i>		PROTOCOL PSEP 1995	
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SURVIVAL & BEHAVIOR DATA

OBSERVATIONS KEY N = normal Q = quiescent D = Discolored F = Floating on surface				DAY 1			DAY 2			DAY 3			DAY 4					
				DATE	TECHNICIAN	INITIAL # OF ORGANISMS	DATE	TECHNICIAN	DATE	TECHNICIAN	DATE	TECHNICIAN						
CLIENT/ ENVIRON ID	CONC.		REP	INITIAL # if differs	#ALIVE	#DEAD	OBS	#ALIVE	#DEAD	OBS	#ALIVE	#DEAD	OBS	#ALIVE	#DEAD	OBS		
	value	units																
Ref.Tox.- ammonia - TAN	0	mg/L	1		10	0	N	10	0	N	10	0	IF	10	0	N		
			2		10	0	↓	10	0	N	10	0	N	10	0	↓		
			3		10	0	↓	10	0	N	10	0	N	10	0	↓		
Ref.Tox.- ammonia - TAN	15 90	mg/L	1		10	0	N	10	0	N	10	0	N	10	0	N		
			2		10	0	↓	10	0	N	10	0	↓	10	0	↓		
			3		10	0	↓	10	0	N	10	0	↓	10	0	↓		
Ref.Tox.- ammonia - TAN	20 130	mg/L	1		10	0	N	10	0	N	10	0	N	10	0	N		
			2		10	0	↓	10	0	N	10	0	↓	10	0	↓		
			3		10	0	↓	10	0	N	10	0	↓	10	0	↓		
Ref.Tox.- ammonia - TAN	60 170	mg/L	1		10	0	N	10	0	N	10	0	N	10	0	N		
			2		10	0	↓	10	0	N	10	0	↓	10	0	↓		
			3		10	0	↓	10	0	N	10	0	↓	10	0	↓		
Ref.Tox.- ammonia - TAN	120 210	mg/L	1		10	0	Q	10	0	7Q	10	0	10Q	3	7	Q		
			2		10	0	↓	10	0	6Q	10	0	10Q	4	6	Q		
			3		10	0	↓	10	0	2Q	10	0	10Q	8 ⁹	2 ⁶	Q		
Ref.Tox.- ammonia - TAN	240 250	mg/L	1		10	0	Q	10	0	10Q	5	5	5Q	1	4	Q		
			2		10	0	↓	10	0	10Q	6	4	6Q	0	6	-		
			3		10	0	↓	10	0	10Q	2	8	2Q	0	2	-		

① SM - NR 10/20

② IE - NR 10/21

**Ammonia Reference Toxicant
Spiking Worksheet**

Reference Toxicant ID: P190612.46
 Date Prepared: 10/17/19
 Technician Initials: ML

Neanthes NH₃ RT

Assumptions in Model
 Stock ammonia concentration is 10,000 mg/L = 10 mg/mL

Date: 10/14/2019
 Measurement: 13766.66

Test Solutions			Volume of stock to reach desired concentration	
Measured Concentration	Desired Concentration	Volume	mL stock to increase	
mg/L	mg/L	mL	FRESH WATER (mL)	SALT WATER (mL)
89.4	90	750		7.35
133	130	750		10.62
180	170	750		13.89
221	210	750		17.16
265	250	750		20.43

2.4 *Neanthes arenaceodentata* Test Data: Re-Test of Samples SE-15 and SE-20

DRAFT

CLIENT MFA	PROJECT Seaport	START TIME/ END TIME 1045 /	DILUTION WATER BATCH FSW111819.01	PROTOCOL PSEP 1995	TEST START DATE 21-Nov-2019
JOB NUMBER PG1313	PROJECT MANAGER Julia Baum	LABORATORY / LOCATION Port Gamble / Bath 4	ORGANISM BATCH ATS112119	TEST SPECIES <i>Neanthes arenaceodentata</i>	TEST END DATE 11-Dec-2019

TEST CONDITIONS			WATER QUALITY DATA											
SAMPLE ID	DAY	REP	JAR	DO (mg/L)		TEMP (C)		SALINITY (ppt)		pH		WATER RENEWAL	Feeding	TECH/DATE
				D.O.	TEMP	SALINITY	pH							
meter	mg/L	meter	°C	meter	ppt	meter	unit							
Control /	0	Surr		9	7.6	9	20.7	9	28	9	8.0		NR	ME 11/21
Control /	1	Surr		9	7.3	9	21.0	9	28	9	7.8			DM 11/22
Control /	2	Surr		9	7.4	9	21.2	9	28	9	8.0		DM	DM 11/23
Control /	3	Surr		8	7.1	8	20.9	8	29	8	7.9	NR		NR 11/24
Control /	4	Surr		8	7.4	8	20.6	8	28	8	7.9		①	NR 11/25
Control /	5	Surr		8	7.1	8	20.7	8	28	8	7.9			MS 11/26
Control /	6	Surr		9	7.3	9	21.1	9	28	9	8.0	DM	DM	DM 11/27
Control /	7	Surr		9	7.1	9	21.1	9	28	9	7.8			DM 11/28
Control /	8	Surr		9	7.4	9	20.8	9	28	9	8.0		MS	MS 11/29
Control /	9	Surr		9	7.3	9	21.1	9	28	9	7.9	DM		DM 11/30
Control /	10	Surr		8	7.4	8	20.5	8	28	8	8.0		NR	NR 12/1
Control /	11	Surr		9	7.3	9	20.9	9	28	9	7.9			MS 12/2
Control /	12	Surr		8	7.5	8	20.9	8	28	8	7.9	MS	MS	MS 12/3
Control /	13	Surr		9	7.3	9	20.6	9	28	9	7.9			MS 12/4
Control /	14	Surr		8	7.3	8	20.8	8	28	8	7.8		NR	NR 12/5
Control /	15	Surr		9	7.2	9	21.0	9	28	9	7.8	MS		MS 12/6
Control /	16	Surr		9	7.2	9	21.0	9	28	9	7.9		DM	DM 12/7
Control /	17	Surr		8	7.2	8	21.0	8	28	8	7.8			NR 12/8
Control /	18	Surr		9	7.4	9	21.1	9	28	9	7.8	NR	MS	MS 12/9
Control /	19	Surr		8	7.3	8	20.6	8	28	8	7.8			DM 12/10
Control /	20	Surr		9	6.5	9	20.6	9	28	9	7.8			MS 12/11

① Feeding skipped due to food growth - NR 11/25

CLIENT MFA	PROJECT Seaport	START TIME/ END TIME /	DILUTION WATER BATCH FSW111819.01	PROTOCOL PSEP 1995	TEST START DATE 21-Nov-2019
JOB NUMBER PG1313	PROJECT MANAGER Julia Baum	LABORATORY / LOCATION Port Gamble / Bath 4	ORGANISM BATCH ATS112119	TEST SPECIES <i>Neanthes arenaceodentata</i>	TEST END DATE 11-Dec-2019

WATER QUALITY DATA

TEST CONDITIONS			DO (mg/L)		TEMP (C)		SALINITY (ppt)		pH		WATER RENEWAL	Feeding	TECH/DATE
SAMPLE ID	DAY	REP	> 4.6		20 ± 1		28 ± 2		8.0 ± 1.0				
			JAR	D.O.		TEMP		SALINITY		pH			
			meter	mg/L	meter	°C	meter	ppt	meter	unit			
Carr20 (47) /	0	Surr	9	7.5	9	20.6	9	28	9	8.0		NR	MK 11/21
Carr20 (47) /	1	Surr	9	7.2	9	20.8	9	28	9	7.7			DM 11/22
Carr20 (47) /	2	Surr	9	7.2	9	21.1	9	28	9	7.9		DM	DM 11/23
Carr20 (47) /	3	Surr	8	7.1	8	20.9	8	28	8	7.9	NR		NR 11/24
Carr20 (47) /	4	Surr	8	7.5	8	20.5	8	28	8	8.0		⓪	NR 11/25
Carr20 (47) /	5	Surr	8	7.3	8	20.6	8	28	8	8.2			MS 11/26
Carr20 (47) /	6	Surr	9	7.1	9	21.0	9	28	9	8.2	DM	DM	DM 11/27
Carr20 (47) /	7	Surr	9	6.9	9	21.2	9	28	9	8.1			DM 11/28
Carr20 (47) /	8	Surr	9	7.0	9	20.8	9	28	9	8.3		MS	MS 11/29
Carr20 (47) /	9	Surr	9	7.1	9	20.9	9	28	9	8.2	DM		DM 11/30
Carr20 (47) /	10	Surr	8	7.3	8	20.6	8	28	8	8.2		NR	NR 12/1
Carr20 (47) /	11	Surr	9	6.9	9	20.9	9	28	9	8.0			MS 12/2
Carr20 (47) /	12	Surr	8	7.5	8	20.8	8	28	8	8.1	MS	MS	MS 12/3
Carr20 (47) /	13	Surr	9	7.2	9	20.6	9	28	9	8.0			MS 12/4
Carr20 (47) /	14	Surr	8	7.2	8	20.6	8	28	8	8.0		NR	NR 12/5
Carr20 (47) /	15	Surr	9	6.7	9	21.0	9	28	9	8.0	MS		MS 12/6
Carr20 (47) /	16	Surr	9	7.2	9	21.1	9	28	9	8.0		DM	DM 12/7
Carr20 (47) /	17	Surr	8	7.2	8	21.0	8	28	8	7.9			NR 12/8
Carr20 (47) /	18	Surr	9	7.4	9	21.0	9	28	9	7.9	NR	MS	MS 12/9
Carr20 (47) /	19	Surr	8	7.2	8	20.6	8	28	8	7.8			DM 12/10
Carr20 (47) /	20	Surr	9	7.2	9	20.9	9	28	9	7.9			MS 12/11

⓪ Feeding skipped due to food growth -NR 11/25

CLIENT MFA	PROJECT Seaport	START TIME/ END TIME 	DILUTION WATER BATCH FSW111819.01	PROTOCOL PSEP 1995	TEST START DATE 21-Nov-2019
JOB NUMBER PG1313	PROJECT MANAGER Julia Baum	LABORATORY / LOCATION Port Gamble / Bath 4	ORGANISM BATCH ATS112119	TEST SPECIES <i>Neanthes arenaceodentata</i>	TEST END DATE 11-Dec-2019

WATER QUALITY DATA

TEST CONDITIONS				DO (mg/L)		TEMP (C)		SALINITY (ppt)		pH		WATER RENEWAL	Feeding	TECH/DATE
SAMPLE ID	DAY	REP	JAR	> 4.6 D.O.		20 ± 1 TEMP		28 ± 2 SALINITY		8.0 ± 1.0 pH				
				meter	mg/L	meter	°C	meter	ppt	meter	unit			
CR02-South (68) /	0	Surr		9	7.5	9	20.7	9	28	9	7.9		NR	MK 11/21
CR02-South (68) /	1	Surr		9	7.3	9	20.6	9	28	9	7.8			DM 11/22
CR02-South (68) /	2	Surr		9	7.2	9	20.9	9	28	9	7.9		DM	DM 11/23
CR02-South (68) /	3	Surr		8	7.1	8	20.8	8	28	8	7.9	NR		NR 11/24
CR02-South (68) /	4	Surr		8	7.3	8	20.4	8	28	8	7.9		①	NR 11/25
CR02-South (68) /	5	Surr		8	7.3	8	20.5	8	28	8	8.1			MS 11/26
CR02-South (68) /	6	Surr		9	7.1	9	20.9	9	28	9	8.1	DM	DM	DM 11/27
CR02-South (68) /	7	Surr		9	7.0	9	21.0	9	28	9	8.0			DM 11/28
CR02-South (68) /	8	Surr		9	7.3	9	20.6	9	28	9	8.1		MS	MS 11/29
CR02-South (68) /	9	Surr		9	7.1	9	20.9	9	28	9	8.1	DM		DM 11/30
CR02-South (68) /	10	Surr		8	7.4	8	20.4	8	28	8	8.1		NR	NR 12/1
CR02-South (68) /	11	Surr		9	6.9	9	20.8	9	28	9	8.0			MS 12/2
CR02-South (68) /	12	Surr		8	7.4	8	20.8	8	28	8	8.1	MS	MS	MS 12/3
CR02-South (68) /	13	Surr		9	7.2	9	20.4	9	28	9	8.0			MS 12/4
CR02-South (68) /	14	Surr		8	7.2	8	20.6	8	28	8	8.0		NR	NR 12/5
CR02-South (68) /	15	Surr		9	7.2	9	20.8	9	28	9	8.0	MS		MS 12/6
CR02-South (68) /	16	Surr		9	7.2	9	21.0	9	28	9	8.1		DM	DM 12/7
CR02-South (68) /	17	Surr		8	7.2	8	21.0	8	28	8	7.9			NR 12/8
CR02-South (68) /	18	Surr		9	7.4	9	20.9	9	28	9	8.0	NR	MS	MS 12/9
CR02-South (68) /	19	Surr		8	7.3	8	20.3	8	28	8	7.8			DM 12/10
CR02-South (68) /	20	Surr		9	7.3	9	20.8	9	28	9	8.0			MS 12/11

① Feeding skipped due to food growth - NR 11/25

CLIENT MFA	PROJECT Seaport	START TIME/ END TIME /	DILUTION WATER BATCH FSW111819.01	PROTOCOL PSEP 1995	TEST START DATE 21-Nov-2019
JOB NUMBER PG1313	PROJECT MANAGER Julia Baum	LABORATORY / LOCATION Port Gamble / Bath 4	ORGANISM BATCH ATS112119	TEST SPECIES <i>Neanthes arenaceodentata</i>	TEST END DATE 11-Dec-2019

WATER QUALITY DATA

TEST CONDITIONS			DO (mg/L)	TEMP (C)	SALINITY (ppt)	pH		WATER RENEWAL	Feeding	TECH/DATE
SAMPLE ID	DAY	REP	> 4.6 D.O.	20 ± 1 TEMP	28 ± 2 SALINITY	8.0 ± 1.0 pH				
			meter mg/L	meter °C	meter ppt	meter	unit			
SE 15 (sieved) /	0	Surr	9 7.5	9 20.8	9 27	9	7.8		NR	MV 11/21
SE 15 (sieved) /	1	Surr	9 7.1	9 20.5	9 27	9	7.6			DM 11/22
SE 15 (sieved) /	2	Surr	9 7.1	9 20.8	9 26	9	7.6		DM	DM 11/23
SE 15 (sieved) /	3	Surr	8 7.3	8 20.7	8 27	8	7.6	NR		NR 11/24
SE 15 (sieved) /	4	Surr	8 7.4	8 20.5	8 27	8	7.7		⓪	NR 11/25
SE 15 (sieved) /	5	Surr	8 7.5	8 20.6	8 27	8	7.8			MS 11/26
SE 15 (sieved) /	6	Surr	9 7.1	9 20.8	9 27	9	7.6	DM	DM	DM 11/27
SE 15 (sieved) /	7	Surr	9 7.0	9 21.2	9 27	9	7.6			DM 11/28
SE 15 (sieved) /	8	Surr	9 6.9	9 20.7	9 27	9	7.7		MS	MS 11/29
SE 15 (sieved) /	9	Surr	9 7.1	9 20.8	9 27	9	7.6	DM		DM 11/30
SE 15 (sieved) /	10	Surr	8 7.4	8 20.0	8 27	8	7.8		NR	NR 12/1
SE 15 (sieved) /	11	Surr	9 7.2	9 21.0	9 28	9	7.7			MS 12/2
SE 15 (sieved) /	12	Surr	8 7.2	8 20.6	8 28	8	7.6	MS	MS	MS 12/3
SE 15 (sieved) /	13	Surr	9 7.1	9 20.5	9 28	9	7.7			MS 12/4
SE 15 (sieved) /	14	Surr	8 7.3	8 20.6	8 28	8	7.6		NR	NR 12/5
SE 15 (sieved) /	15	Surr	9 7.2	9 20.8	9 28	9	7.7	MS		MS 12/6
SE 15 (sieved) /	16	Surr	9 7.2	9 21.1	9 28	9	7.8		DM	DM 12/7
SE 15 (sieved) /	17	Surr	8 7.2	8 21.0	8 28	8	7.6			NR 12/8
SE 15 (sieved) /	18	Surr	9 7.5-7.4	9 21.0	9 28	9	7.8	NR	MS	MS 12/9
SE 15 (sieved) /	19	Surr	8 7.2	8 20.6	8 28	8	7.7			DM 12/10
SE 15 (sieved) /	20	Surr	9 7.2	9 20.7	9 28	9	7.8			MS 12/11

⓪ Feeding skipped due to food growth -NR 11/25

⓪ MR-MS 12/9

-MS 12/11

CLIENT MFA	PROJECT Seaport	START TIME/ END TIME 	DILUTION WATER BATCH FSW111819.01	PROTOCOL PSEP 1995	TEST START DATE 21-Nov-2019
JOB NUMBER PG1313	PROJECT MANAGER Julia Baum	LABORATORY / LOCATION Port Gamble / Bath 4	ORGANISM BATCH ATS112119	TEST SPECIES <i>Neanthes arenaceodentata</i>	TEST END DATE 11-Dec-2019

WATER QUALITY DATA

TEST CONDITIONS			DO (mg/L)		TEMP (C)		SALINITY (ppt)		pH		WATER RENEWAL	Feeding	TECH/DATE	
SAMPLE ID	DAY	REP	> 4.6		20 ± 1		28 ± 2		8.0 ± 1.0					
			JAR	D.O.	meter	TEMP	meter	SALINITY	meter	pH	unit			
				mg/L		°C		ppt						
SE 20 (sieved) /	0	Surr		9	7.4	9	20.8	9	27	9	7.8		NR	MK 11/21
SE 20 (sieved) /	1	Surr		9	6.8	9	20.6	9	26	9	7.5			DM 11/22
SE 20 (sieved) /	2	Surr		9	6.8	9	21.0	9	26	9	7.6		DM	DM 11/23
SE 20 (sieved) /	3	Surr		8	7.0	8	20.9	8	26	8	7.6	NR		NR 11/24
SE 20 (sieved) /	4	Surr		8	7.2	8	20.6	8	26	8	7.6		⓪	NR 11/25
SE 20 (sieved) /	5	Surr		8	7.4	8	20.7	8	26	8	7.7			MS 11/24
SE 20 (sieved) /	6	Surr		9	6.8	9	21.0	9	26	9	7.6	DM	DM	DM 11/27
SE 20 (sieved) /	7	Surr		9	6.3	9	20.2 ^⓪	9	27	9	7.4			DM 11/28
SE 20 (sieved) /	8	Surr		9	7.0	9	20.8	9	27	9	7.7		MS	MS 11/29
SE 20 (sieved) /	9	Surr		9	6.2	9	19.9	9	27	9	7.5	DM		DM 11/30
SE 20 (sieved) /	10	Surr		8	7.3	8	20.4	8	28	8	7.8		NR	NR 12/1
SE 20 (sieved) /	11	Surr		9	5.4	9	21.0	9	27	9	7.3			MS 12/2
SE 20 (sieved) /	12	Surr		8	7.3	8	20.8	8	27	8	7.6	MS	MS	MS 12/3
SE 20 (sieved) /	13	Surr		9	7.0	9	20.6	9	28	9	7.6			MS 12/4
SE 20 (sieved) /	14	Surr		8	7.2	8	20.7	8	28	8	7.6		NR	NR 12/5
SE 20 (sieved) /	15	Surr		9	7.2	9	20.9	9	28	9	7.6	MS		MS 12/6
SE 20 (sieved) /	16	Surr		9	7.0	9	21.0	9	28	9	7.7		DM	DM 12/7
SE 20 (sieved) /	17	Surr		8	7.2	8	21.1	8	28	8	7.6			NR 12/8
SE 20 (sieved) /	18	Surr		9	7.4	9	21.0	9	28	9	7.7	NR	MS	MS 12/9
SE 20 (sieved) /	19	Surr		8	6.2	8	20.6	8	28	8	7.5			DM 12/10
SE 20 (sieved) /	20	Surr		9	7.2	9	20.9	9	28	9	7.7			MS 12/11

⓪ Feeding skipped due to food growth- NR 11/25
 ② MR-DM-11/28/19

CLIENT	PROJECT	JOB NO.	PROJECT MANAGER	LABORATORY / LOCATION	PROTOCOL	SPECIES
MFA	Seaport	PG1313	Julia Baum	Port Gamble / Bath 4	PSEP 1995	<i>Neanthes arenaceodentata</i>

CLIENT / ENVIRON ID		REP	JAR	INITIAL # (if differs)	Date and Initials	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	NUMBER REMAINING	TARE WEIGHT (mg)	TOTAL WEIGHT (mg)	ASHED WEIGHT (mg)
Control /	1					U	U	U	U	U	N	U	U	U	N	N	N	N	N	G	G	N	N	N	N	4	392.25	482.91	428.42
	2					↓	↓	↓	↓	U	↓	U	U	U	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	5	379.37	472.78	417.15
	3					↓	↓	↓	↓	U	↓	U	U	U	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	5	207.39	389.95	337.80
	4					↓	↓	↓	↓	U	↓	U	U	U	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	5	425.79	510.54	467.22
	5					↓	↓	↓	↓	U	↓	U	U	U	G	↓	G	↓	↓	↓	↓	↓	↓	↓	↓	5	442.07	552.09	490.29
Carr20 (47) /	1					U	U	U	N	G	N	U	U	U	U	U	G	U	U	G	G	G	G	G	G	5	369.70	480.00	405.92
	2					↓	↓	↓	↓	G	↓	U	U	U	N	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	5	349.13	439.52	376.20
	3					↓	↓	↓	↓	U	↓	U	U	U	G	U	↓	↓	↓	↓	↓	↓	↓	↓	↓	5	384.15	496.74	433.11
	4					↓	↓	↓	↓	U	↓	U	U	U	G	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	5	462.96	558.88	502.49
	5					↓	↓	↓	↓	G	↓	U	U	U	U	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	5	407.16	480.06	428.09
CR02-South (68) /	1					U	U	U	U	U	N	U	U	U	N	U	G	G	G	N	G	G	G	G	G	5	426.28	523.28	462.16
	2					↓	↓	↓	↓	U	↓	U	U	U	G	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	5	352.71	455.62	382.27
	3					↓	↓	↓	↓	U	↓	U	U	U	G	U	G	↓	↓	↓	↓	↓	↓	↓	↓	5	469.51	543.94	493.71
	4					↓	↓	↓	↓	U	↓	U	U	U	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	5	326.29	423.43	359.52
	5					↓	↓	↓	↓	U	↓	U	U	U	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	5	423.02	519.25	450.89

Boat #
99
121
122

Rep	Number	Tare Weight (mg)	Dry Weight (mg)	Ashed Weight (mg)
1	5	357.50	361.25	359.08
2	5	287.70	290.70	288.42
3	5	292.78	296.51	294.28

- ① coloration on surface likely from excess food. - NR 11/25
- ② anoxic-like growth MS. 11/26
- ③ orange growth on surface. DM 11/28.
- ④ increased air flow. MS 11/29
- ⑤ checked DO = 7.2 mg/L NR 12/1.

⑥ MR. Actual
= 450.93 mg
MK 12/13.

Boat #

14
21
23
33
34
35
36
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41
42
43
44

Ammonia and Sulfide Analysis Record

Client/Project: MFA / Seaport	Organism: Necithes	Test Duration (days): 20
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PRETEST / INITIAL / FINAL / OTHER (circle one)

DAY of TEST: ①

OVERLYING (OV) / POREWATER (PW) (circle one) / **Comments:** _____

Calibration Standards Temperature		Sample temperature should be within $\pm 1^\circ\text{C}$ of standards temperature at time and date of analysis.
Date:	Temperature:	
11/21/19	22.4°C	

Sample ID or Description	Conc. or Rep	Date of Sampling and Initials	Ammonia Value (mg/L)	Meter #/ Temp (°C)		Date of Reading and Initials	Sample Preserved (Y/N)	pH	Sal (ppt)	Sample Volume (mL)	Measured Sulf. (µg/L)	Multiplier	Calculated Sulf. (µg/L)
OV ↓	Ø	Surr	11/21/19 NR	0.0785	T1	21.4°	11/21/19 NR	N	/	10	17		/
	47%	↓	↓	1.45	↓	↓	↓	↓		27			
	68%	↓	↓	0.216	↓	↓	↓	↓		14			
	SE-15	↓	↓	0.688	↓	↓	↓	↓		8			
	SE-20	↓	↓	0.881	↓	↓	↓	↓		13			
PW ↓	Ø	Surr	11/21/19 NR	0.213	T1	21.4	11/21/19	N	7.4	29	10	29	
	47%	↓	↓	4.77	↓	↓	↓	↓	7.4	29	↓	ND	/
	68%	↓	↓	1.22	↓	↓	↓	↓	7.2	29	↓	ND	
	SE-15	↓	↓	1.84	↓	↓	↓	↓	6.9	29	↓	ND	
	SE-20	↓	↓	3.61	↓	↓	↓	↓	7.1	24	↓	ND	

Ammonia and Sulfide Analysis Record

Client/Project:	Organism:	Test Duration (days): <u>20</u>
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PRETEST / INITIAL / FINAL / OTHER (circle one)
OVERLYING (OV) / POREWATER (PW) (circle one) / Comments: _____

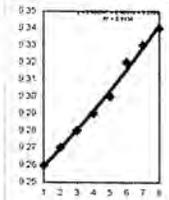
Calibration Standards Temperature		Sample temperature should be within $\pm 1^\circ\text{C}$ of standards temperature at time and date of analysis.
Date:	Temperature:	
<u>12/11/19</u>	<u>22.1</u>	

Sample ID or Description	Conc. or Rep	Date of Sampling and Initials	Ammonia Value (mg/L)		Meter #/ Temp ($^\circ\text{C}$)		Date of Reading and Initials	Sample Preserved (Y/N)	pH	Sal (ppt)	Sample Volume (mL)	Measured Sulf. ($\mu\text{g/L}$)	Multiplier	Calculated Sulf. ($\mu\text{g/L}$)
OV ↓ ↓ ↓ ↓	<u>SWR</u>	<u>12/11/19 MS/DM</u>	<u>0.820</u>	<u>21.5</u>	<u>J1</u>	<u>21.5</u>	<u>12/11/19 MS/DM</u>	<u>N</u>			<u>10</u>	<u>16</u>		
	<u>47%</u>	↓	<u>0.212</u>	<u>21.4</u>	↓	<u>21.4</u>	↓	↓			↓	<u>12</u>		
	<u>WB%</u>	↓		<u>0.339</u>	<u>21.9</u>							<u>24</u>		
	<u>SE-15</u>	↓		<u>0.0641</u>	<u>22.0</u>							<u>15</u>		
	<u>SE-20</u>	↓		<u>0.227</u>	<u>21.5</u>							<u>34</u>		
PW ↓ ↓ ↓ ↓	<u>SWR</u>	<u>12/11/19 MS/DM</u>	<u>1.18</u>	<u>22.4</u>		<u>22.4</u>			<u>7.4</u>	<u>28</u>	<u>10</u>	<u>ND</u>		
	<u>47%</u>	↓	<u>1.82</u>	<u>22.3</u>		<u>22.3</u>			<u>6.6</u>	<u>28</u>	↓	<u>288</u>		
	<u>WB%</u>	↓	<u>0.742</u>	<u>22.2</u>		<u>22.2</u>			<u>7.0</u>	<u>28</u>	↓	<u>18</u>		
	<u>SE-15</u>	↓	<u>1.57</u>	<u>22.2</u>		<u>22.2</u>			<u>6.7</u>	<u>28</u>	↓	<u>70</u>		
	<u>SE-20</u>	↓	<u>0.996</u>	<u>22.0</u>		<u>22.0</u>			<u>7.0</u>	<u>28</u>	↓	<u>6</u>		

CLIENT:	MFA	Test Date:	21-Nov-19
PROJECT:	Seaport	Test Type:	Neanthes SP
COMMENTS:	Initial Ammonia		

To convert Total Ammonia (mg/L) to Free (un-ionized) Ammonia (mg/L) enter the corresponding total ammonia, salinity, temperature, and pH.

Integer:	I-factor
1	9.26
2	9.27
3	9.28
4	9.29
5	9.30
6	9.32
7	9.33
	9.34



Sample	Mod NH3T (mg/L)	salinity (ppt)	pH	temp (C)	temp (K)	I-factor	Mod NH3U (mg/L)
Target / Sample Name	Actual	22.9	8.0	24.1	297.26	9.3053	#VALUE!
Example 3,5	2.000	10.0	7.5	5.0	278.16	9.2750	0.008
1 Control	0.0785	28	8.00	20.7	293.86	9.3187	0.003
2 Carr20 (47%)	1.450	28	8.00	20.6	293.76	9.3187	0.049
3 CR02-South (68%)	0.216	28	7.90	20.7	293.86	9.3187	0.006
4 SE-15 sieved	0.688	27	7.80	20.8	293.96	9.3160	0.015
5 SE-20 sieved	0.881	27	7.80	20.8	293.96	9.3160	0.019
6							
7							
8							
9							
10							
11							
12							
13 Control	0.213	29	7.4	20.7	293.86	9.3214	0.002
14 Carr20 (47%)	4.77	29	7.4	20.6	293.76	9.3214	0.041
15 CR02-South (68%)	1.22	29	7.2	20.7	293.86	9.3214	0.007
16 SE-15 sieved	1.84	29	6.9	20.8	293.96	9.3214	0.005
17 SE-20 sieved	3.610	24	7.1	20.8	293.96	9.3081	0.016
18							
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OV Day 0

PW Day 0

Seaport: Neantles 20 day Re-Test - Sulfides

		Input				Output	
Sample ID		Total Dissolved Sulfide (µg/L as S)	Temperature (°C)	Salinity (‰)	pH	Undissociated H2S (µg/L as H2S)	Weight Fraction (H2S/Total S)
Day 0	Control	17	20.7	28	8	1.11	6.55%
	Carr20 (47)	27	20.6	28	8.0	1.77	6.57%
	CR02-South (68)	14	20.7	28	7.9	1.14	8.11%
	SE-15	8	20.8	27	7.8	0.80	10.03%
	SE-20	13	20.8	27	7.8	1.30	10.03%
PW Day 0	Control	29	20.7	29	7.4	6.36	21.93%
	Carr20 (47)	ND	20.6	29	7.4	#VALUE!	#VALUE!
	CR02-South (68)	ND	20.7	29	7.2	#VALUE!	#VALUE!
	SE-15	ND	20.8	29	6.9	#VALUE!	#VALUE!
	SE-20	ND	20.8	24	7.1	#VALUE!	#VALUE!
Day 20	Control	16	20.6	28	7.8	1.61	10.05%
	Carr20 (47)	12	20.9	28	7.9	0.97	8.06%
	CR02-South (68)	24	20.8	28	8	1.57	6.52%
	SE-15	15	20.7	28	7.8	1.50	10.01%
	SE-20	34	20.9	28	7.7	4.16	12.23%
PW Day 20	Control	ND	20.6	28	7.4	#VALUE!	#VALUE!
	Carr20 (47)	288	20.9	28	6.6	190.01	65.98%
	CR02-South (68)	18	20.8	28	7	7.56	42.02%
	SE-15	70	20.7	28	6.7	42.18	60.26%
	SE-20	6	20.9	28	7	2.52	41.93%

2.5 *Neanthes arenaceodentata* Statistical Results: Re-Test of Samples SE-15 and SE-20

DRAFT

2.6 ***Neanthes arenaceodentata* Reference Toxicant Test Results:
Re-Test of Samples SE-15 and SE-20**

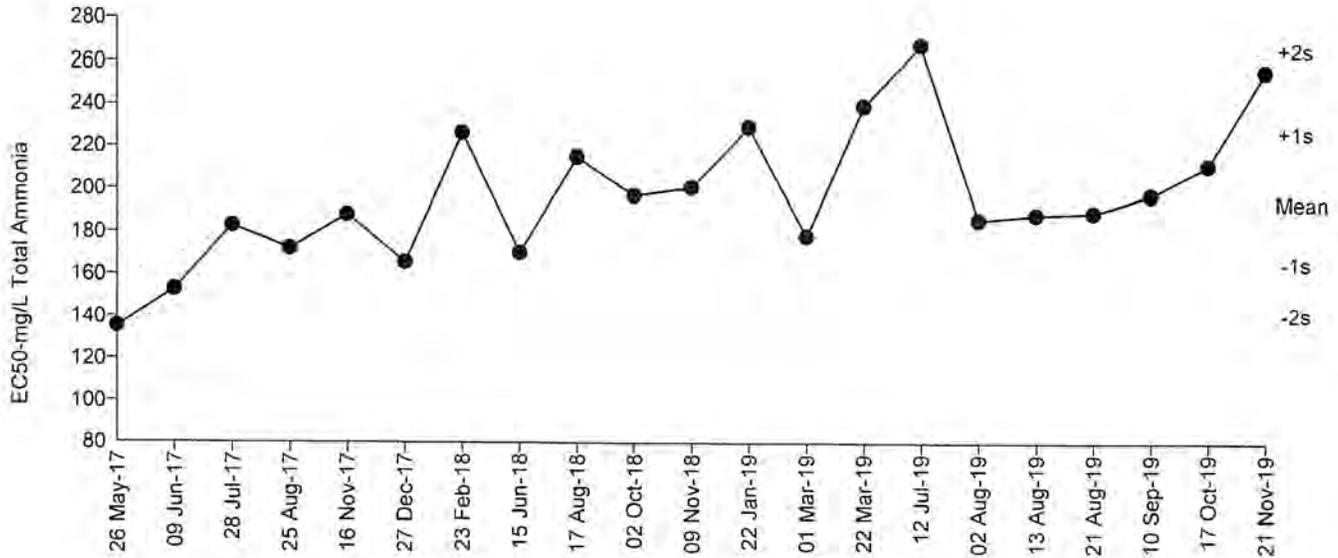
DRAFT

Reference Toxicant 96-h Acute Survival Test

All Matching Labs

Test Type: Survival Organism: *Neanthes arenaceodentata* (Polycha Material: Total Ammonia
 Protocol: PSEP (1995) Endpoint: Proportion Survived Source: Reference Toxicant-REF

Reference Toxicant 96-h Acute Survival Test



Mean: 192.5 Count: 20 -1s Warning Limit: 164.4 -2s Action Limit: 140.4
 Sigma: n/a CV: 15.90% +1s Warning Limit: 225.5 +2s Action Limit: 264.1

Quality Control Data

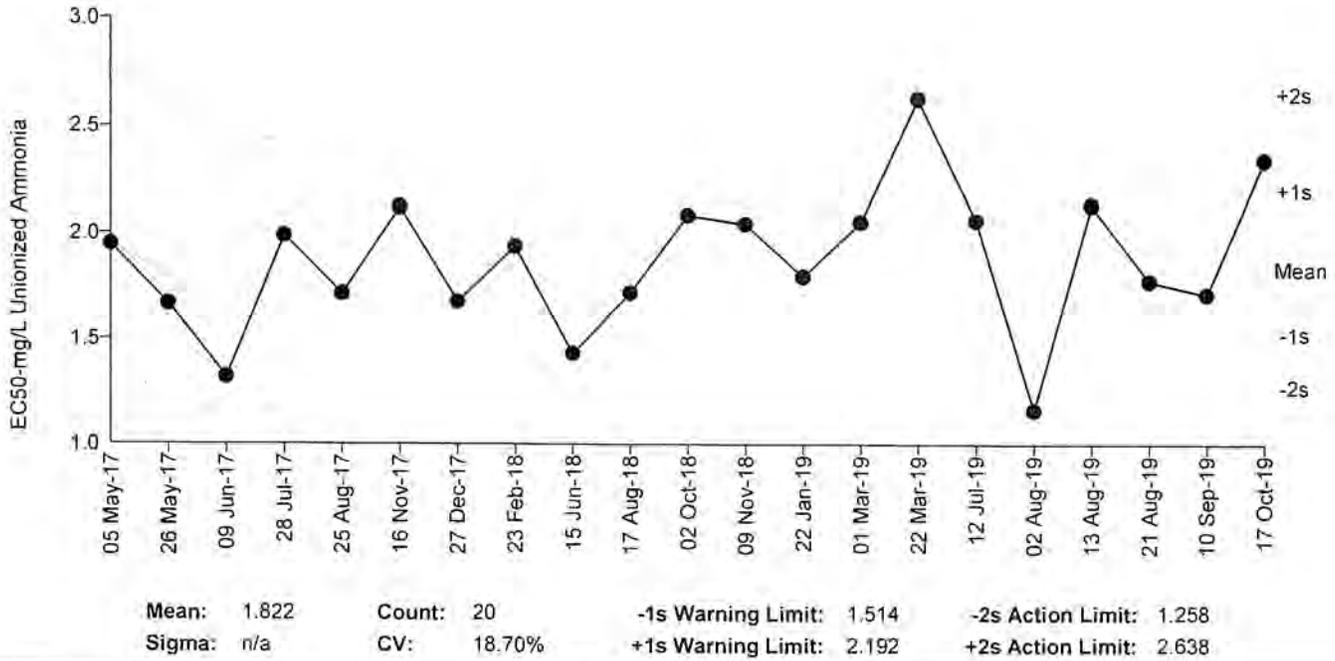
Point	Year	Month	Day	Time	QC Data	Delta	Sigma	Warning	Action	Test ID	Analysis ID	Laboratory
1	2017	May	26	11:20	135.4	-57.06	-2.225	(-)	(-)	02-4398-8901	19-3251-4383	EcoAnalysts
2		Jun	9	13:12	152.9	-39.56	-1.456	(-)		06-5936-3810	21-1385-6147	EcoAnalysts
3		Jul	28	10:45	183.1	-9.398	-0.3168			04-6413-3650	06-5419-2075	EcoAnalysts
4		Aug	25	10:40	172.2	-20.25	-0.7035			03-6651-4426	03-4165-4995	EcoAnalysts
5		Nov	16	13:40	188.2	-4.268	-0.1419			03-0415-6136	04-9955-5124	EcoAnalysts
6		Dec	27	15:35	165.8	-26.64	-0.9428			01-8821-8905	08-9204-3617	EcoAnalysts
7	2018	Feb	23	16:20	226.4	33.93	1.028	(+)		13-7905-8989	13-7098-6720	EcoAnalysts
8		Jun	15	14:35	170.5	-22.03	-0.7692			04-1274-1602	03-0642-1993	EcoAnalysts
9		Aug	17	14:15	215.3	22.77	0.7077			07-8700-6256	13-3406-4651	EcoAnalysts
10		Oct	2	14:10	197.3	4.796	0.1558			21-2226-7904	00-1709-8680	EcoAnalysts
11		Nov	9	14:15	201.1	8.65	0.2782			00-5577-1542	07-1368-3232	EcoAnalysts
12	2019	Jan	22	15:17	229.4	36.94	1.111	(+)		19-6608-0675	00-2421-4186	EcoAnalysts
13		Mar	1	13:44	178.5	-14.01	-0.4782			16-4352-7409	14-8196-0068	EcoAnalysts
14			22	15:20	239.3	46.77	1.377	(+)		12-8564-4292	03-0035-4512	EcoAnalysts
15		Jul	12	14:30	267.7	75.24	2.088	(+)	(+)	21-0917-4708	00-5307-6948	EcoAnalysts
16		Aug	2	15:20	186.2	-6.264	-0.2094			17-0846-5905	16-9911-4308	EcoAnalysts
17			13	15:55	188.8	-3.687	-0.1224			08-6399-0477	04-6509-2576	EcoAnalysts
18			21	13:30	189.7	-2.74	-0.09075			21-2736-4211	02-0545-5733	EcoAnalysts
19		Sep	10	14:45	197.8	5.307	0.1721			15-3198-9821	13-4571-7808	EcoAnalysts
20		Oct	17	15:45	211.7	19.18	0.6011			00-3306-4323	18-7634-5789	EcoAnalysts
21		Nov	21	13:15	255.4	62.87	1.789	(+)		08-1679-8006	07-2089-5036	EcoAnalysts

Reference Toxicant 96-h Acute Survival Test

All Matching Labs

Test Type: Survival Organism: *Neanthes arenaceodentata* (Polycha) Material: Unionized Ammonia
 Protocol: PSEP (1995) Endpoint: Proportion Survived Source: Reference Toxicant-REF

Reference Toxicant 96-h Acute Survival Test



Quality Control Data

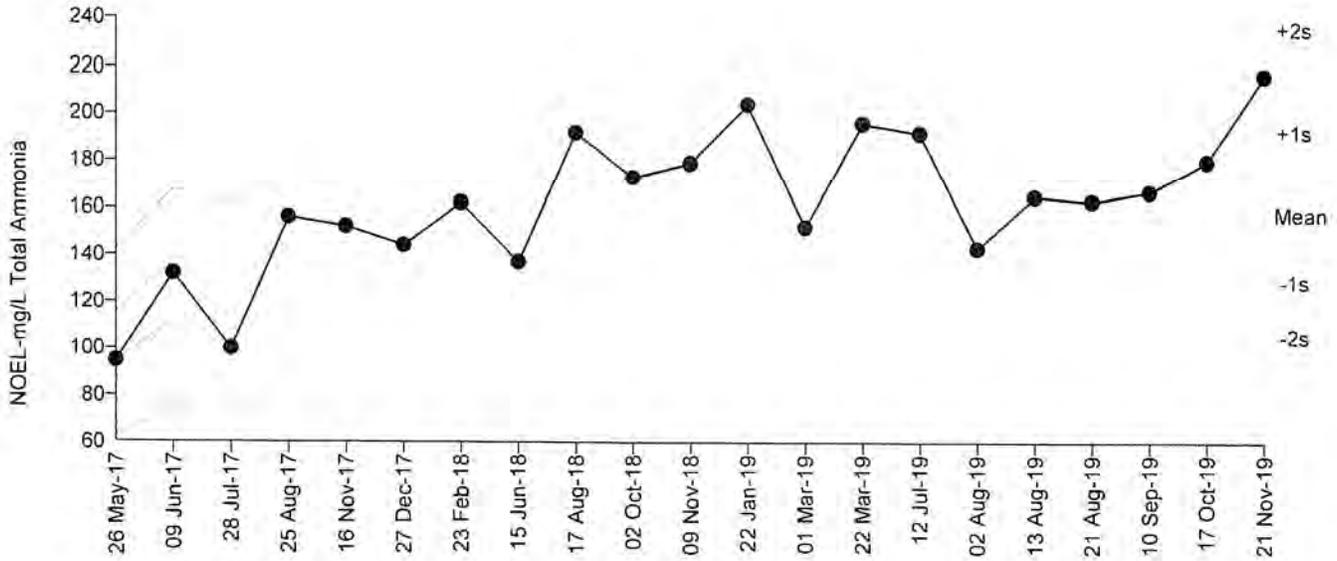
Point	Year	Month	Day	Time	QC Data	Delta	Sigma	Warning	Action	Test ID	Analysis ID	Laboratory
1	2017	May	5	11:10	1.947	0.1256	0.3601			06-1983-2716	10-6060-2702	EcoAnalysts
2			26	11:20	1.668	-0.1536	-0.4758			11-9977-1019	12-2648-7955	EcoAnalysts
3		Jun	9	13:12	1.32	-0.5013	-1.739	(-)		20-5746-1828	16-2628-9369	EcoAnalysts
4		Jul	28	10:45	1.989	0.1675	0.4753			11-9488-2902	14-7043-7154	EcoAnalysts
5		Aug	25	10:40	1.716	-0.106	-0.3238			04-3451-1040	00-3615-6317	EcoAnalysts
6		Nov	16	13:40	2.122	0.3004	0.8247			21-2485-6236	15-8866-6943	EcoAnalysts
7		Dec	27	15:35	1.678	-0.1437	-0.4439			14-3251-3795	10-3688-8341	EcoAnalysts
8	2018	Feb	23	16:20	1.939	0.117	0.3362			08-4313-9079	15-8743-9749	EcoAnalysts
9		Jun	15	14:35	1.432	-0.3895	-1.3	(-)		13-9420-2469	11-6483-4489	EcoAnalysts
10		Aug	17	14:15	1.721	-0.1005	-0.3067			16-0114-0602	19-8752-3439	EcoAnalysts
11		Oct	2	14:10	2.087	0.2657	0.7356			02-7017-5318	01-2654-4798	EcoAnalysts
12		Nov	9	14:15	2.046	0.2243	0.6272			05-1575-7697	05-2999-6855	EcoAnalysts
13	2019	Jan	22	15:17	1.799	-0.02305	-0.06881			03-5816-0405	12-4945-6418	EcoAnalysts
14		Mar	1	13:44	2.055	0.2339	0.6527			04-3242-1896	16-4131-9540	EcoAnalysts
15			22	15:20	2.63	0.8084	1.984	(+)		00-7345-5138	15-2870-1632	EcoAnalysts
16		Jul	12	14:30	2.065	0.2437	0.6783			19-1480-3456	07-7235-5107	EcoAnalysts
17		Aug	2	15:20	1.163	-0.6587	-2.425	(-)	(-)	10-1976-9391	00-8421-1808	EcoAnalysts
18			13	15:55	2.137	0.3154	0.8628			00-5853-2505	10-3089-9902	EcoAnalysts
19			21	13:30	1.779	-0.04274	-0.1283			14-7963-5363	12-5100-5995	EcoAnalysts
20		Sep	10	14:45	1.715	-0.1068	-0.3264			08-0609-5167	04-3709-1344	EcoAnalysts
21		Oct	17	15:45	2.345	0.5234	1.364	(+)		10-0475-9886	14-9451-4606	EcoAnalysts

Reference Toxicant 96-h Acute Survival Test

All Matching Labs

Test Type: Survival Organism: *Neanthes arenaceodentata* (Polycha Material: Total Ammonia
 Protocol: PSEP (1995) Endpoint: Proportion Survived Source: Reference Toxicant-REF

Reference Toxicant 96-h Acute Survival Test



Mean: 156.3 Count: 20 -1s Warning Limit: 127.7 -2s Action Limit: 104.3
 Sigma: n/a CV: 20.50% +1s Warning Limit: 191.4 +2s Action Limit: 234.4

Quality Control Data

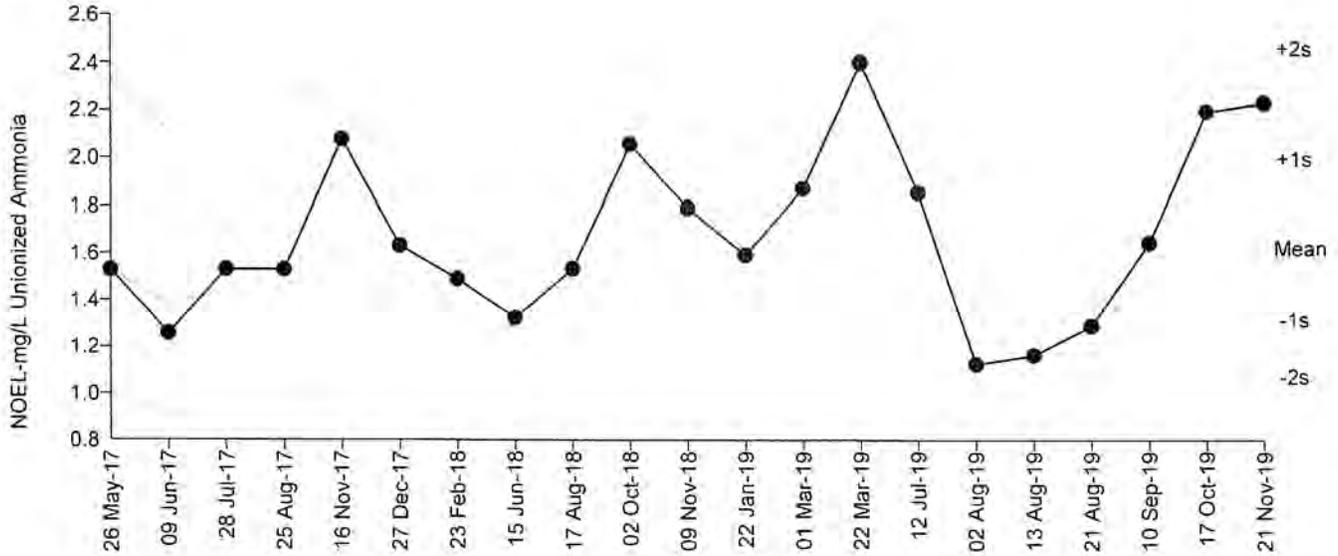
Point	Year	Month	Day	Time	QC Data	Delta	Sigma	Warning	Action	Test ID	Analysis ID	Laboratory
1	2017	May	26	11:20	94.7	-61.63	-2.475	(-)	(-)	02-4398-8901	20-6641-5688	EcoAnalysts
2		Jun	9	13:12	132	-24.33	-0.8355			06-5936-3810	02-9842-7509	EcoAnalysts
3		Jul	28	10:45	99.9	-56.43	-2.212	(-)	(-)	04-6413-3650	18-1225-7941	EcoAnalysts
4		Aug	25	10:40	156	-0.3348	-0.01059			03-6651-4426	09-2206-9228	EcoAnalysts
5		Nov	16	13:40	152	-4.335	-0.1389			03-0415-6136	18-4343-4696	EcoAnalysts
6		Dec	27	15:35	144	-12.33	-0.4059			01-8821-8905	01-3003-6293	EcoAnalysts
7	2018	Feb	23	16:20	162	5.665	0.1758			13-7905-8989	16-4206-5191	EcoAnalysts
8		Jun	15	14:35	137	-19.33	-0.6519			04-1274-1602	00-8204-0817	EcoAnalysts
9		Aug	17	14:15	192	35.67	1.015	(+)		07-8700-6256	00-3442-0298	EcoAnalysts
10		Oct	2	14:10	173	16.67	0.5002			21-2226-7904	05-0269-1791	EcoAnalysts
11		Nov	9	14:15	179	22.67	0.6686			00-5577-1542	13-6278-1952	EcoAnalysts
12	2019	Jan	22	15:17	204	47.67	1.314	(+)		19-6608-0675	11-6507-6917	EcoAnalysts
13		Mar	1	13:44	152	-4.335	-0.1389			16-4352-7409	00-8230-2760	EcoAnalysts
14			22	15:20	196	39.67	1.117	(+)		12-8564-4292	05-5287-2854	EcoAnalysts
15		Jul	12	14:30	192	35.67	1.015	(+)		21-0917-4708	13-0093-2104	EcoAnalysts
16		Aug	2	15:20	143	-13.33	-0.4403			17-0846-5905	19-7316-2458	EcoAnalysts
17			13	15:55	165	8.665	0.2664			08-6399-0477	02-9565-0844	EcoAnalysts
18			21	13:30	163	6.665	0.2062			21-2736-4211	17-5434-7893	EcoAnalysts
19		Sep	10	14:45	167	10.67	0.3259			15-3198-9821	19-4980-7373	EcoAnalysts
20		Oct	17	15:45	180	23.67	0.6961			00-3306-4323	14-6485-5861	EcoAnalysts
21		Nov	21	13:15	216	59.67	1.596	(+)		08-1679-8006	16-1846-4388	EcoAnalysts

Reference Toxicant 96-h Acute Survival Test

All Matching Labs

Test Type: Survival Organism: Neanthes arenaceodentata (Polycha Material: Unionized Ammonia
 Protocol: PSEP (1995) Endpoint: Proportion Survived Source: Reference Toxicant-REF

Reference Toxicant 96-h Acute Survival Test



Mean: 1.612 Count: 20 -1s Warning Limit: 1.307 -2s Action Limit: 1.06
 Sigma: n/a CV: 21.20% +1s Warning Limit: 1.988 +2s Action Limit: 2.452

Quality Control Data

Point	Year	Month	Day	Time	QC Data	Delta	Sigma	Warning	Action	Test ID	Analysis ID	Laboratory
1	2017	May	26	11:20	1.529	-0.0832	-0.2528			11-9977-1019	08-2373-9544	EcoAnalysts
2		Jun	9	13:12	1.258	-0.3542	-1.184	(-)		20-5746-1828	13-3286-2330	EcoAnalysts
3		Jul	28	10:45	1.532	-0.0802	-0.2434			11-9488-2902	00-8692-4177	EcoAnalysts
4		Aug	25	10:40	1.53	-0.0822	-0.2497			04-3451-1040	07-6966-4955	EcoAnalysts
5		Nov	16	13:40	2.079	0.4668	1.213	(+)		21-2485-6236	00-9775-4668	EcoAnalysts
6		Dec	27	15:35	1.633	0.0208	0.06116			14-3251-3795	04-4998-7500	EcoAnalysts
7	2018	Feb	23	16:20	1.491	-0.1212	-0.3729			08-4313-9079	12-5767-7210	EcoAnalysts
8		Jun	15	14:35	1.325	-0.2872	-0.936			13-9420-2469	12-4705-5925	EcoAnalysts
9		Aug	17	14:15	1.535	-0.0772	-0.2341			16-0114-0602	03-4717-2264	EcoAnalysts
10		Oct	2	14:10	2.059	0.4468	1.167	(+)		02-7017-5318	12-2051-3096	EcoAnalysts
11		Nov	9	14:15	1.794	0.1818	0.5098			05-1575-7697	20-2944-5206	EcoAnalysts
12	2019	Jan	22	15:17	1.595	-0.0172	-0.05117			03-5816-0405	03-5029-6568	EcoAnalysts
13		Mar	1	13:44	1.875	0.2628	0.7205			04-3242-1896	17-0781-9299	EcoAnalysts
14			22	15:20	2.403	0.7908	1.904	(+)		00-7345-5138	17-9862-0450	EcoAnalysts
15		Jul	12	14:30	1.858	0.2458	0.677			19-1480-3456	01-8740-2353	EcoAnalysts
16		Aug	2	15:20	1.127	-0.4852	-1.708	(-)		10-1976-9391	08-7104-1750	EcoAnalysts
17			13	15:55	1.165	-0.4472	-1.55	(-)		00-5853-2505	06-3471-0420	EcoAnalysts
18			21	13:30	1.292	-0.3202	-1.056	(-)		14-7963-5363	20-8907-8030	EcoAnalysts
19		Sep	10	14:45	1.648	0.0358	0.1048			08-0609-5167	00-6589-3953	EcoAnalysts
20		Oct	17	15:45	2.2	0.5878	1.483	(+)		10-0475-9886	00-3718-6473	EcoAnalysts
21		Nov	21	13:15	2.237	0.6248	1.563	(+)		17-3983-7570	18-0011-8937	EcoAnalysts

CETIS Summary Report

Report Date: 26 Nov-19 15:01 (p 1 of 1)
 Test Code/ID: 30AF5936 / 08-1679-8006

Reference Toxicant 96-h Acute Survival Test

EcoAnalysts

Batch ID: 08-9268-3916	Test Type: Survival	Analyst:
Start Date: 21 Nov-19 13:15	Protocol: PSEP (1995)	Diluent: Laboratory Seawater
Ending Date: 25 Nov-19 13:22	Species: Neanthes arenaceodentata	Brine: Not Applicable
Test Length: 4d 0h	Taxon: Polychaeta	Source: Aquatic Toxicology Support Age:
Sample ID: 12-3537-3236	Code: 49A24CB4	Project: Reference Toxicant
Sample Date: 12 Jun-19	Material: Total Ammonia	Source: Reference Toxicant
Receipt Date: 12 Jun-19	CAS (PC):	Station: P190612.53
Sample Age: 162d 13h	Client: Internal Lab	

Multiple Comparison Summary

Analysis ID	Endpoint	Comparison Method	✓ NOEL	LOEL	TOEL	TU	PMSD	S
16-1846-4388	Proportion Survived	Fisher Exact Test	216	270	241.5		n/a	1

Point Estimate Summary

Analysis ID	Endpoint	Point Estimate Method	✓ Level	mg/L	95% LCL	95% UCL	TU	S
07-2089-5036	Proportion Survived	Linear Interpolation (ICPIN)	EC5	219.6	218.4	221		1
			EC10	223.4	220.7	226.1		
			EC15	227.1	223.2	231.4		
			EC20	231	225.6	236.7		
			EC25	234.9	228	242.2		
			EC40	247	235.5	259.3		
			EC50	255.4	240.6	271.4		

Proportion Survived Summary

Conc-mg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	D	3	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.00%
96		3	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.00%
129		3	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.00%
174		3	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.00%
216		3	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.00%
270		3	0.3333	0.0000	0.7128	0.2000	0.5000	0.0882	0.1528	45.83%	66.67%

Proportion Survived Detail

Conc-mg/L	Code	Rep 1	Rep 2	Rep 3
0	D	1.0000	1.0000	1.0000
96		1.0000	1.0000	1.0000
129		1.0000	1.0000	1.0000
174		1.0000	1.0000	1.0000
216		1.0000	1.0000	1.0000
270		0.2000	0.5000	0.3000

Proportion Survived Binomials

Conc-mg/L	Code	Rep 1	Rep 2	Rep 3
0	D	10/10	10/10	10/10
96		10/10	10/10	10/10
129		10/10	10/10	10/10
174		10/10	10/10	10/10
216		10/10	10/10	10/10
270		2/10	5/10	3/10

CETIS Test Data Worksheet

Report Date: 26 Nov-19 15:00 (p 1 of 1)
 Test Code/ID: 30AF5936 / 08-1679-8006

Reference Toxicant 96-h Acute Survival Test			EcoAnalysts
Start Date: 21 Nov-19 13:15 ✓	Species: Neanthes arenaceodentata	Sample Code: 49A24CB4	
End Date: 25 Nov-19 13:22 ✓	Protocol: PSEP (1995)	Sample Source: Reference Toxicant	
Sample Date: 12 Jun-19	Material: Total Ammonia	Sample Station: P190612.53 ✓	

Conc-mg/L	Code	Rep	Pos	# Exposed	# Survived	Notes
0	D	1	15	10	10 ✓	
0	D	2	4	10	10 ✓	
0	D	3	5	10	10 ✓	
96 ✓		1	13	10	10 ✓	
96		2	3	10	10 ✓	
96		3	18	10	10 ✓	
129 ✓		1	9	10	10 ✓	
129		2	17	10	10 ✓	
129		3	2	10	10 ✓	
174 ✓		1	6	10	10 ✓	
174		2	11	10	10 ✓	
174		3	12	10	10 ✓	
216 ✓		1	16	10	10 ✓	
216		2	8	10	10 ✓	
216		3	7	10	10 ✓	
270 ✓		1	1	10	2 ✓	
270		2	10	10	5 ✓	
270		3	14	10	3 ✓	

CETIS Summary Report

Report Date: 26 Nov-19 15:07 (p 1 of 1)
 Test Code/ID: 67B3D082 / 17-3983-7570

Reference Toxicant 96-h Acute Survival Test

EcoAnalysts

Batch ID: 08-9268-3916	Test Type: Survival	Analyst:
Start Date: 21 Nov-19 13:15	Protocol: PSEP (1995)	Diluent: Laboratory Seawater
Ending Date: 25 Nov-19 13:22	Species: Neanthes arenaceodentata	Brine: Not Applicable
Test Length: 4d 0h	Taxon: Polychaeta	Source: Aquatic Toxicology Support Age:
Sample ID: 10-5766-4729	Code: 3F0AAED9	Project: Reference Toxicant
Sample Date: 12 Jun-19	Material: Unionized Ammonia	Source: Reference Toxicant
Receipt Date: 12 Jun-19	CAS (PC):	Station: P190612.53
Sample Age: 162d 13h	Client: Internal Lab	

Multiple Comparison Summary

Analysis ID	Endpoint	Comparison Method	✓ NOEL	LOEL	TOEL	TU	PMSD	S
18-0011-8937	Proportion Survived	Fisher Exact Test	2.237	2.764	2.487		n/a	1

Proportion Survived Summary

Conc-mg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	D	3	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.00%
1.548		3	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.00%
1.646		3	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.00%
2.211		3	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.00%
2.237		3	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.00%
2.764		3	0.3333	0.0000	0.7128	0.2000	0.5000	0.0882	0.1528	45.83%	66.67%

Proportion Survived Detail

Conc-mg/L	Code	Rep 1	Rep 2	Rep 3
0	D	1.0000	1.0000	1.0000
1.548		1.0000	1.0000	1.0000
1.646		1.0000	1.0000	1.0000
2.211		1.0000	1.0000	1.0000
2.237		1.0000	1.0000	1.0000
2.764		0.2000	0.5000	0.3000

Proportion Survived Binomials

Conc-mg/L	Code	Rep 1	Rep 2	Rep 3
0	D	10/10	10/10	10/10
1.548		10/10	10/10	10/10
1.646		10/10	10/10	10/10
2.211		10/10	10/10	10/10
2.237		10/10	10/10	10/10
2.764		2/10	5/10	3/10

CETIS Test Data Worksheet

Report Date: 26 Nov-19 15:06 (p 1 of 1)
 Test Code/ID: 67B3D082 / 17-3983-7570

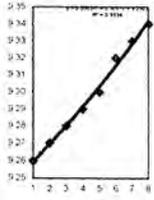
Reference Toxicant 96-h Acute Survival Test				EcoAnalysts	
Start Date: 21 Nov-19 13:15 ✓	Species: Neanthes arenaceodentata		Sample Code: 3F0AAED9		
End Date: 25 Nov-19 13:22 ✓	Protocol: PSEP (1995)		Sample Source: Reference Toxicant		
Sample Date: 12 Jun-19	Material: Unionized Ammonia		Sample Station: P190612.53 ✓		

Conc-mg/L	Code	Rep	Pos	# Exposed	# Survived	Notes
0	D	1	9	10	10 ✓	
0	D	2	12	10	10 ✓	
0	D	3	14	10	10 ✓	
1.548 ✓		1	2	10	10 ✓	
1.548		2	17	10	10 ✓	
1.548		3	7	10	10 ✓	
1.646 ✓		1	5	10	10 ✓	
1.646		2	16	10	10 ✓	
1.646		3	3	10	10 ✓	
2.211 ✓		1	6	10	10 ✓	
2.211		2	18	10	10 ✓	
2.211		3	1	10	10 ✓	
2.237 ✓		1	8	10	10 ✓	
2.237		2	13	10	10 ✓	
2.237		3	10	10	10 ✓	
2.764 ✓		1	11	10	2 ✓	
2.764		2	4	10	5 ✓	
2.764		3	15	10	3 ✓	

CLIENT:	MFA	Test Date:	21-Nov-19 ✓
PROJECT:	Seaport	Test Type:	Neanthes
COMMENTS:			

To convert Total Ammonia (mg/L) to Free (un-ionized) Ammonia (mg/L) enter the corresponding total ammonia, salinity, temperature, and pH.

Integer: I-factor	
1	9.26
2	9.27
3	9.28
4	9.29
5	9.30
6	9.32
7	9.33
	9.34



Sample	Mod NH3T (mg/L)	salinity (ppt)	pH	temp (C)	temp (K)	i-factor	Mod NH3U (mg/L)
Target / Sample Name	Actual	22.9	8.0	24.1	297.26	9.3053	#VALUE!
Example 3.5	2.000	10.0	7.5	5.0	278.16	9.2750	0.008
1	0	28 ✓	8.00 ✓	19.5 ✓	292.66	9.3187	0.000
2	90 ✓	28 ✓	7.70 ✓	19.7 ✓	292.86	9.3187	1.548
3	130 ✓	28 ✓	7.60 ✓	19.6 ✓	292.76	9.3187	1.646
4	170 ✓	28 ✓	7.60 ✓	19.7 ✓	292.86	9.3187	2.237
5	210 ✓	28 ✓	7.50 ✓	19.7 ✓	292.86	9.3187	2.211
6	250 ✓	28 ✓	7.50 ✓	19.7 ✓	292.86	9.3187	2.764
7							
8							
9							
10							
11							
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Ammonia Reference Toxicant Test Survival Data Sheet

CLIENT MFA	PROJECT Seaport	SPECIES <i>Neanthes arenaceodentata</i>	LABORATORY Port Gamble	PROTOCOL USACE 1991
TEST ID P190612.53	LOT #: 18H1356763	TEST START DATE 21Nov19	TIME 1315	4-DAY END DATE 25Nov19
CHAMBER SIZE/TYPE Glass pint jar	EXPOSURE VOLUME 250 mL			

WATER QUALITY DATA

TEST CONDITIONS				DO (mg/L)		TEMP(C)		SAL (ppt)		pH		TECHNICIAN	AMMONIA		SULFIDES				
				> 4.6		20 ± 1		30 ± 2		7.8 ± 0.5									
CLIENT/ENVIRON ID	CONCENTRATION		DAY	REP	D.O.		TEMP.		SALINITY		pH		WQ TECH/ DATE	AMMONIA		Tech	SULFIDES		Tech
	value	units			meter	mg/L	meter	°C	meter	ppt	meter	unit		METER	mg/L		meter	mg/L	
Ref.Tox.-ammonia	0	mg/L	0	Stock	9	7.6	9	19.5	9	28	9	8.0	DM 11/21	10	0.00				NR
			4	1	8	7.0	8	20.6	8	28	8	7.9	NR 11/25						
Ref.Tox.-ammonia	90	mg/L	0	Stock	9	7.8	9	19.7	9	28	9	7.7	DM 11/21	10	96.0				NR
			4	1	8	7.4	8	19.9	8	29	8	7.8	NR 11/25						
Ref.Tox.-ammonia	130	mg/L	0	Stock	9	7.7	9	19.6	9	28	9	7.6	DM 11/21	10	129				NR
			4	1	8	7.4	8	20.2	8	29	8	7.8	NR 11/25						
Ref.Tox.-ammonia	170	mg/L	0	Stock	9	7.7	9	19.7	9	28	9	7.6	DM 11/21	10	174				NR
			4	1	8	7.4	8	20.3	8	28	8	7.8	NR 11/25						
Ref.Tox.-ammonia	210	mg/L	0	Stock	9	7.7	9	19.7	9	28	9	7.5	DM 11/21	10	216				NR
			4	1	8	7.3	8	20.3	8	28	8	7.7	NR 11/25						
Ref.Tox.-ammonia	250	mg/L	0	Stock	9	7.7	9	19.7	9	28	9	7.5	DM 11/21	10	270				NR
			4	1	8	7.4	8	20.3	8	28	8	7.8	NR 11/25						

Ammonia Reference Toxicant Test Survival Data Sheet

CLIENT MFA			PROJECT Seaport		TEST ID P1906/2.53		SPECIES <i>Neanthes arenaceodentata</i>		
PROJECT MANAGER B. Hester			LABORATORY Port Gamble			PROTOCOL USACE 1991			

SURVIVAL & BEHAVIOR DATA

OBSERVATION KEY N = Normal LOE = Loss of equilibrium Q = Quiescent DC = Discoloration NB = No body F = Floating on surface				DAY 1			DAY 2			DAY 3			DAY 4			
				DATE 11/22			DATE 11/23			DATE 11/24			DATE 11/25			
INITIAL # OF ORGANISMS <div style="border: 1px solid black; padding: 5px; display: inline-block;">10</div>				TECHNICIAN DM			TECHNICIAN DM			TECHNICIAN NR			TECHNICIAN MS			
				CLIENT/ENVIRON ID	CONC. value units	REP	INITIAL NUMBER	#ALIVE	#DEAD	OBS	#ALIVE	#DEAD	OBS	#ALIVE	#DEAD	OBS
Ref.Tox.- Ammonia	0 mg/L	1		10	0	N	10	0	N	10	0	N	10	0	N	Q
		2		10	0	N	10	0	N	10	0	IF	10	0	Q	Q
		3		10	0	N	10	0	N	10	0	N	10	0	Q	Q
Ref.Tox.- Ammonia	90 mg/L	1		10	0	N	10	0	N	10	0	N	10	0	Q	Q
		2		10	0	N	10	0	N	10	0	N	10	0	Q	Q
		3		10	0	N	10	0	N	10	0	N	10	0	Q	Q
Ref.Tox.- Ammonia	130 mg/L	1		10	0	N	10	0	N	10	0	N	10	0	Q	Q
		2		10	0	N	10	0	N	10	0	N	10	0	Q	Q
		3		10	0	N	10	0	N	10	0	N	10	0	Q	Q
Ref.Tox.- Ammonia	170 mg/L	1		10	0	N	10	0	N	10	0	N	10	0	Q	Q
		2		10	0	N	10	0	N	10	0	N	10	0	Q	Q
		3		10	0	N	10	0	N	10	0	N	10	0	Q	Q
Ref.Tox.- Ammonia	210 mg/L	1		10	0	N	10	0	N	10	0	Q	10	0	Q	Q
		2		10	0	N	10	0	N	10	0	Q	10	0	Q	Q
		3		10	0	N	10	0	N	10	0	Q	10	0	Q	Q
Ref.Tox.- Ammonia	250 mg/L	1		10	0	N	10	0	Q	2	8	Q	2	0	Q	Q
		2		10	0	N	10	0	Q	5	5	Q	5	0	Q	Q
		3		10	0	N	10	0	Q	3	7	Q	3	0	Q	Q

DIE - MS 11/25

**Ammonia Reference Toxicant
Spiking Worksheet**

Reference Toxicant ID: P190612.53
 Date Prepared: 11/21/19
 Technician Initials: DM

Neanthes NH₃ RT

Assumptions in Model
 Stock ammonia concentration is 10,000 mg/L = 10 mg/mL

Date: 10/14/2019
 Measurement: 13766.66

Test Solutions			Volume of stock to reach desired concentration	
Measured Concentration	Desired Concentration	Volume	mL stock to increase	
mg/L	mg/L	mL	FRESH WATER (mL)	SALT WATER (mL)
96.0	90 ✓	750	[REDACTED]	7.35
129	130 ✓	750		10.62
174	170 ✓	750		13.89
216	210 ✓	750		17.16
270	250 ✓	750		20.43

3. *Mytilus galloprovincialis* Water-Column Test

DRAFT

3.1 *Mytilus galloprovincialis* Test Data

DRAFT

CLIENT MFA	PROJECT Seaport	SPECIES Mytilus sp	LAB / LOCATION Port Gamble / Bath 1	PROTOCOL PSEP (1995)
JOB NUMBER PG1313	PROJECT MANAGER Julia Baum	TEST START DATE 16Oct19	TIME 1620 JB	TEST END DATE 18Oct19
TIME 1652				

* Day 2&4 observations needed only if development endpoint not met by day 2

WATER QUALITY DATA

TEST CONDITIONS				DO (mg/L)		Temp (°C)		Sal (ppt)		pH		Ammonia		Sulfide		TECH	DATE
SAMPLE ID	DAY	Random #	REP	>6.0		16 ± 1		28 ± 1		7 - 9		NA		NA			
				D.O.	TEMP.	SALINITY		pH		AMMONIA		SULFIDE					
				meter	mg/L	meter	°C	meter	ppt	meter	unit	Techn. mg/L (total)	Techn. mg/L (total)	Techn. mg/L (total)	Techn. mg/L (total)		
Control /	0		WQ Surr	9	7.5	9	17.0	9	29	9	7.9	NR	0.00	DM	1	JB	10/16
Control /	1		WQ Surr	8	7.2	8	16.8	8	29	8	8.0					DM	10/17
Control /	2		WQ Surr	9	7.8	9	15.7	9	29	9	8.0	DM	0.00	MS	3	MK	10/18
CR21-West (14) /	0		WQ Surr	9	7.3	9	17.0	9	29	9	7.9	NR	0.00	DM	NO	JB	10/16
CR21-West (14) /	1		WQ Surr	8	6.6	8	16.8	8	29	8	7.9					DM	10/17
CR21-West (14) /	2		WQ Surr	9	7.9	9	15.9	9	29	9	8.0	DM	1.46	MS	8	MK	10/18
Carr20 (47) /	0		WQ Surr	9	7.3	9	17.0	9	29	9	7.9	NR	0.00	DM	9	JB	10/16
Carr20 (47) /	1		WQ Surr	8	5.9 ⁰	8	16.9	8	29	8	7.9					DM	10/17
Carr20 (47) /	2		WQ Surr	9	8.1	9	15.6	9	29	9	8.0	DM	5.77	MS	9	MK	10/18
CR02-South (68) /	0		WQ Surr	9	7.2	9	17.0	9	29	9	7.9	NR	0.00	DM	16	JB	10/16
CR02-South (68) /	1	4	WQ Surr	8	6.2	8	16.9	8	29	8	7.9					DM	10/17
CR02-South (68) /	2		WQ Surr	9	8.0	9	15.8	9	29	9	7.9	DM	0.102	MS	6	MK	10/18
SE-15 /	0		WQ Surr	9	6.8	9	17.0	9	29	9	7.9	NR	0.00	DM	11	JB	10/16
SE-15 /	1	4	WQ Surr	8	5.9 ⁰	8	17.0	8	29	8	7.7					DM	10/17
SE-15 /	2		WQ Surr	9	6.9	9	16.1	9	29	9	7.8	DM	0.0813	MS	4	MK	10/18
SE-16 /	0		WQ Surr	9	6.5	9	17.0	9	29	9	7.8	NR	0.00	DM	15	JB	10/16
SE-16 /	1		WQ Surr	8	6.0	8	17.0	8	29	8	7.8					DM	10/17
SE-16 /	2		WQ Surr	9	7.4	9	17.0	9	28	9	7.8	DM	0.202	MS	1	MK	10/18

① Aeration initiated to test chambers. MK 10/17.

CLIENT MFA	PROJECT Seaport	SPECIES Mytilus sp	LAB / LOCATION Port Gamble / Bath 1	PROTOCOL PSEP (1995)
JOB NUMBER PG1313	PROJECT MANAGER Julia Baum	TEST START DATE 16Oct19	TIME 1620 JB	TEST END DATE 18Oct19

* Day 3&4 observations needed only if development endpoint not met by day 2

WATER QUALITY DATA

TEST CONDITIONS				DO (mg/L)		Temp (°C)		Sal (ppt)		pH		Ammonia		Sulfide		TECH	DATE
SAMPLE ID	DAY	Random #	REP	>6.0		16 ± 1		28 ± 1		7 - 9		NA		NA			
				D.O.		TEMP.		SALINITY		pH		AMMONIA		SULFIDE			
				meter	mg/L	meter	°C	meter	ppt	meter	unit	Techn.	mg/L (total)	Techn.	mg/L (Total)		
SE-17 /	0		WQ Surr	9	6.7	9	16.5	9	29	9	7.7	NR	0.00	DM	ND	JB	10/16
SE-17 /	1		WQ Surr	8	6.1	8	16.9	8	29	8	7.7					DM	10/17
SE-17 /	2		WQ Surr	9	7.9	9	15.8	9	29	9	7.9	MS	0.00	MS	ND	MK	10/18
SE-18 /	0		WQ Surr	9	5.9 ^{7.7}	9	16.9	9	29	9	7.7	NR	0.00	DM	6	JB	10/16
SE-18 /	1		WQ Surr	8	7.7	8	16.6	8	29	8	7.7					DM	10/17
SE-18 /	2		WQ Surr	9	7.6	9	15.7	9	29	9	7.9	MS	0.0252	MS	6	MK	10/18
SE-20 /	0		WQ Surr	9	6.7	9	16.5	9	29	9	7.7	NR	0.00	DM	7	JB	10/16
SE-20 /	1		WQ Surr	8	6.3	8	17.0	8	29	8	7.7					DM	10/17
SE-20 /	2		WQ Surr	9	8.1	9	15.6	9	29	9	7.9	MS	0.00	MS	16	MK	10/18
SE-24 /	0		WQ Surr	9	6.8 ^{7.8}	9	17.0	9	29	9	7.4	NR	0.00	DM	ND	JB	10/16
SE-24 /	1		WQ Surr	8	7.0	8	16.9	8	29	8	7.4					DM	10/17
SE-24 /	2		WQ Surr	9	7.8	9	16.3	9	29	9	7.8	MS	0.0179	MS	3	MK	10/18
SE-26 /	0		WQ Surr	9	7.5	9	16.9	9	29	9	7.5	NR	0.00	DM	27	JB	10/16
SE-26 /	1		WQ Surr	8	6.4	8	16.8	8	29	8	7.4					DM	10/17
SE-26 /	2		WQ Surr	9	8.0	9	15.6	9	29	9	7.8	MS	0.0377	MS	9	MK	10/18

① Airsted prior to test initiation 10.16.19 BH

CLIENT MFA	PROJECT Seaport	SPECIES Mytilus sp	LAB / LOCATION Port Gamble / Bath 1	PROTOCOL PSEP (1995)
JOB NUMBER PG1313	PROJECT MANAGER Julia Baum	TEST START DATE 16Oct19	TIME 1620 JB	TEST END DATE 18Oct19

* Day 3&4 observations needed only if development endpoint not met by day 2

WATER QUALITY DATA

TEST CONDITIONS				DO (mg/L)		Temp (°C)		Sal (ppt)		pH		Ammonia NA		Sulfide NA		TECH	DATE
SAMPLE ID	DAY	Random #	REP	D.O.		TEMP.		SALINITY		pH		AMMONIA		SULFIDE			
				meter	mg/L	meter	°C	meter	ppt	meter	unit	Techn.	mg/L (total)	Techn.	mg/L (Total)		
SE-31 /	0		WQ Surr	9	6.6	9	17.0	9	29	9	7.8	NR	0.00	DM	2	JB	10/16
SE-31 /	1		WQ Surr	8	5.9	8	16.7	8	29	8	7.7					DM	10/17
SE-31 /	2		WQ Surr	9	7.8	9	16.4	9	29	9	7.7	MS	0.00	MS	5	MF	10/18
SE-31 /	3		WQ Surr														
SE-31 /	4		WQ Surr														

① Aeration added to all test chambers. MC 10/17.

CLIENT MFA	PROJECT Seaport	JOB NUMBER PG1313	PROJECT MANAGER Julia Baum	LABORATORY Port Gamble Bath 1	PROTOCOL PSEP (1995)
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TEST ORGANISM SPAWNING DATA

SPECIES <i>Mytilus sp</i>			
SUPPLIER Taylor Shellfish		ORGANISM BATCH TS073119 TS100419 TS082719	
SPAWNING METHOD			
MALES 3	FEMALES 9	SPERM VIABILITY ✓	EGG CONDITION ✓
INITIAL SPAWNING TIME		BEGIN FERTILIZATION	CONDITION OF EMBRYOS ✓

SAMPLE STORAGE 4 Degrees Celsius - dark
SEDIMENT TREATMENT none
TEST CHAMBERS 1 L Mason Jars
EXPOSURE VOLUME 900mL seawater / 18g Sediment
TIME OF SHAKE 1120
TIME OF INITIATION 1620 dB

SPECIAL CONDITIONS

UV LIGHT EXPOSURE (YES/NO) N	AERATION FROM TEST INITIATION (YES/NO) N
SCREEN TUBE TEST (YES/NO) N	OTHER (EXPLAIN)

EMBRYO DENSITY CALCULATIONS

$$27 \times 100 = 27100$$

$$\frac{27000}{27100} = 0.996 \text{ ml per chamber}$$

$$PT: \frac{2700}{27100} = 0.0996 \times 40 \text{ mL}$$

4 mL egg stock
36 mL FSW

deliver 100 mL

SPECIES <i>Mytilus sp</i>	
CLIENT MFA	PROJECT Seaport
JOB NUMBER PG1313	PROJECT MANAGER Julia Baum
LAB / LOCATION Port Gamble / Bath 1	PROTOCOL PSEP (1995)

LARVAL OBSERVATION DATA

CLIENT/ ID	REP	NUMBER NORMAL	NUMBER	DATE	TECHNICIAN	COMMENTS
STOCKING DENSITY	1		244	11/1/19	MK	
	2		195			
	3		222			
	4		273			
	5		228	↓	↓	
Control /	1	262	5	10.19.19	BH	
	2	220	4	11/1/19	MK	QA MTHF N A 223 5
	3	245	4			
	4	255	3			
	5	245	4			
CR21-West (14) /	1	224	3			
	2	233	7			
	3	213	6			
	4	238	5			
	5	189	2			
Carr20 (47) /	1	233	7			
	2	201	6			
	3	224	13			
	4	212	6			QA marker N A 216 5
	5	207	3	↓	↓	

SPECIES Mytilus sp	
CLIENT MFA	PROJECT Seaport
JOB NUMBER PG1313	PROJECT MANAGER Julia Baum
LAB / LOCATION Port Gamble / Bath 1	PROTOCOL PSEP (1995)

LARVAL OBSERVATION DATA

CLIENT/ ID	REP	NUMBER NORMAL	NUMBER	DATE	TECHNICIAN	COMMENTS		
CR02-South (68) /	1	213	15	11/21/19	MK			
	2	198	1	↓	↓			
	3	① 208 218	4					
	4	241	6					
	5	239	8					
SE-15 /	1	199	8			11/13/19	↓	
	2	195	6					
	3	202	5					
	4	167 ② 183	② 4 7					
	5	209	1		Quant N A 202 1			
SE-16 /	1	150 ② 177	② 20 2		↓			
	2	222	1					
	3	196	4					
	4	198	14					
	5	200	5					
SE-17 /	1	187	16	↓	↓			
	2	② 165 204	② 24 14					
	3	198	12					Quant N A 200 2 ③
	4	191	14					
	5	212	15					

- ① illegible - MK 11/21.
- ② 16. MK 11/21.
- ③ Several barnacle larvae present, may have been scored as abnormal in original count. 11/26/19 MKH

SPECIES <i>Mytilus sp</i>	
CLIENT MFA	PROJECT Seaport
JOB NUMBER PG1313	PROJECT MANAGER Julia Baum
LAB / LOCATION Port Gamble / Bath 1	PROTOCOL PSEP (1995)

LARVAL OBSERVATION DATA

CLIENT/ ID	REP	NUMBER NORMAL	NUMBER	DATE	TECHNICIAN	COMMENTS
SE-18 /	1	232	4	11/14	MK	
	2	193	16			
	3	213	6			
	4	223	6			
	5	185	17			
SE-20 /	1	201	8			
	2	208	3			
	3	202	6			QAMREU N A 193 5
	4	170	4			
	5	201	14			
SE-24 /	1	119	69	11/20		
	2	88	97			
	3	123	66			
	4	118	47			
	5	97	65			
SE-26 /	1	172	30			
	2	197	25			QAMREU N A 199 25
	3	207	17			
	4	166	21			
	5	178	36			

SPECIES <i>Mytilus sp</i>	
CLIENT MFA	PROJECT Seaport
JOB NUMBER PG1313	PROJECT MANAGER Julia Baum
LAB / LOCATION Port Gamble / Bath 1	PROTOCOL PSEP (1995)

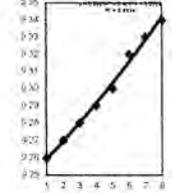
LARVAL OBSERVATION DATA

CLIENT/ ID	REP	NUMBER NORMAL	NUMBER	DATE	TECHNICIAN	COMMENTS
SE-31 /	1	194	9	11/21/19	MK	
	2	211	10	↓	↓	
	3	196	28	↓	↓	
	4	178	25	↓	↓	
	5	184	15	↓	↓	

CLIENT:	MFA	Test Date:	16-Oct-19
PROJECT:	Seaport	Test Type:	Larval
COMMENTS:			

To convert Total Ammonia (mg/L) to Free (un-ionized) Ammonia (mg/L) enter the corresponding total ammonia, salinity, temperature, and pH.

Integer: I-factor	
1	9.26
2	9.27
3	9.28
4	9.29
5	9.30
6	9.32
7	9.33
	9.34



Sample	Mod NH3T (mg/L)	salinity (ppt)	pH	temp (C)	temp (K)	i-factor	Mod NH3U (mg/L)
Target / Sample Name	Actual	22.9	8.0	24.1	297.26	9.3053	#VALUE!
Example 3.5	2.000	10.0	7.5	5.0	278.16	9.2750	0.008
1 Control	0	29	7.90	17.0	290.16	9.3214	0.000
2 CR21-West (14)	0.00	29	7.90	17.0	290.16	9.3214	0.000
3 Carr20 (47)	0.00	29	7.90	17.0	290.16	9.3214	0.000
4 CR02-South (68)	0.00	29	7.90	17.0	290.16	9.3214	0.000
5 SE-15	0.00	29	7.90	17.0	290.16	9.3214	0.000
6 SE-16	0.00	29	7.80	17.0	290.16	9.3214	0.000
7 SE-17	0.000	29.0	7.7	16.5	289.66	9.3214	0.000
8 SE-18	0.000	29.0	7.7	16.9	290.06	9.3214	0.000
9 SE-20	0.000	29.0	7.7	16.5	289.66	9.3214	0.000
10 SE-24	0.000	29.0	7.4	17.0	290.16	9.3214	0.000
11 SE-26	0	29	7.50	16.9	290.06	9.3214	0.000
12 SE-31	0	29	7.8	17.0	290.16	9.3214	0.000
13 Control	0	29	8.0	15.7	288.86	9.3214	0.000
14 CR21-West (14)	1.46	29	8.0	15.9	289.06	9.3214	0.035
15 Carr20 (47)	5.77	29	8.0	15.6	288.76	9.3214	0.135
16 CR02-South (68)	0.102	29	7.9	15.8	288.96	9.3214	0.002
17 SE-15	0.0813	29	7.8	16.1	289.26	9.3214	0.001
18 SE-16	0.202	28	7.8	17.0	290.16	9.3187	0.003
19 SE-17	0	29	7.9	15.8	288.96	9.3214	0.000
20 SE-18	0.0252	29	7.9	15.7	288.86	9.3214	0.000
21 SE-20	0.00	29	7.9	15.6	288.76	9.3214	0.000
22 SE-24	0.0179	29	7.8	16.3	289.46	9.3214	0.000
23 SE-26	0.0377	29	7.8	15.6	288.76	9.3214	0.001
24 SE-31	0.0	29	7.7	16.4	289.56	9.3214	0.000
25							
26							
27							
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46							

Initial

Final

Seaport : Larval Sulfides

		Input				Output	
	Sample ID	Total Dissolved Sulfide (µg/L as S)	Temperature (°C)	Salinity (‰)	pH	Undissociated H2S (µg/L as H2S)	Weight Fraction (H2S/Total S)
Initial	Control	1	17	29	7.9	0.09	9.14%
	CR21-West (14)	ND	17	29	7.9	#VALUE!	#VALUE!
	Carr20 (47)	9	17	29	7.9	0.82	9.14%
	CR02-South (68)	16	17	29	7.9	1.46	9.14%
	SE-15	11	17	29	7.9	1.00	9.14%
	SE-16	15	17	29	7.8	1.69	11.25%
	SE-17	ND	16.5	29	7.7	#VALUE!	#VALUE!
	SE-18	6	16.9	29	7.7	0.83	13.83%
	SE-20	7	16.5	29	7.7	0.9809	14.01%
	SE-24	ND	17	29	7.4	#VALUE!	#VALUE!
	SE-26	27	16.9	29	7.5	5.50	20.37%
SE-31	2	17	29	7.8	0.23	11.25%	
Final	Control	3	15.7	29	8	0.23	7.73%
	CR21-West (14)	8	15.9	29	8	0.61	7.68%
	Carr20 (47)	9	15.6	29	8	0.70	7.76%
	CR02-South (68)	6	15.8	29	7.9	0.57	9.52%
	SE-15	4	16.1	29	7.8	0.46	11.60%
	SE-16	1	17	28	7.8	0.11	11.30%
	SE-17	ND	15.8	29	7.9	#VALUE!	#VALUE!
	SE-18	6	15.7	29	7.9	0.57	9.55%
	SE-20	16	15.6	29	7.9	1.53	9.59%
	SE-24	3	16.3	29	7.8	0.35	11.52%
	SE-26	9	15.6	29	7.8	1.06	11.79%
SE-31	5	16.4	29	7.7	0.70	14.06%	

3.2 *Mytilus galloprovincialis* Statistical Results

DRAFT

3.3 *Mytilus galloprovincialis* Reference Toxicant Test Results

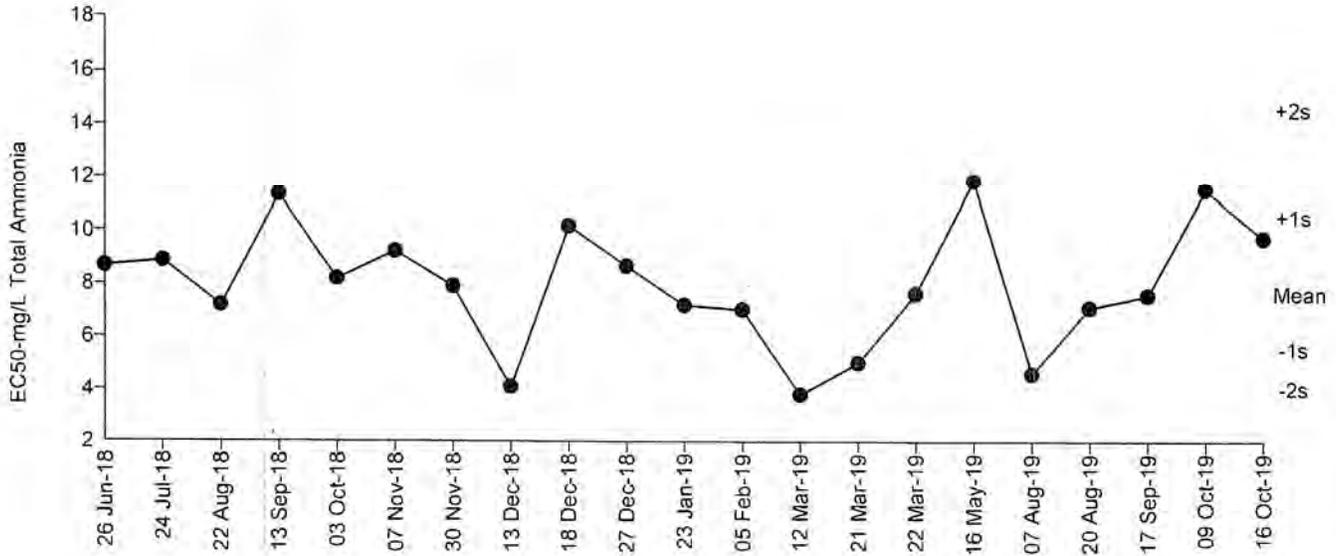
DRAFT

Bivalve Larval Survival and Development Test

All Matching Labs

Test Type: Development-Survival Organism: Mytilus galloprovincialis (Bay Mussel) Material: Total Ammonia
 Protocol: EPA/600/R-95/136 (1995) Endpoint: Combined Proportion Normal Source: Reference Toxicant-REF

Bivalve Larval Survival and Development Test



Mean: 7.523 Count: 20 -1s Warning Limit: 5.431 -2s Action Limit: 3.919
 Sigma: n/a CV: 33.50% +1s Warning Limit: 10.43 +2s Action Limit: 14.45

Quality Control Data

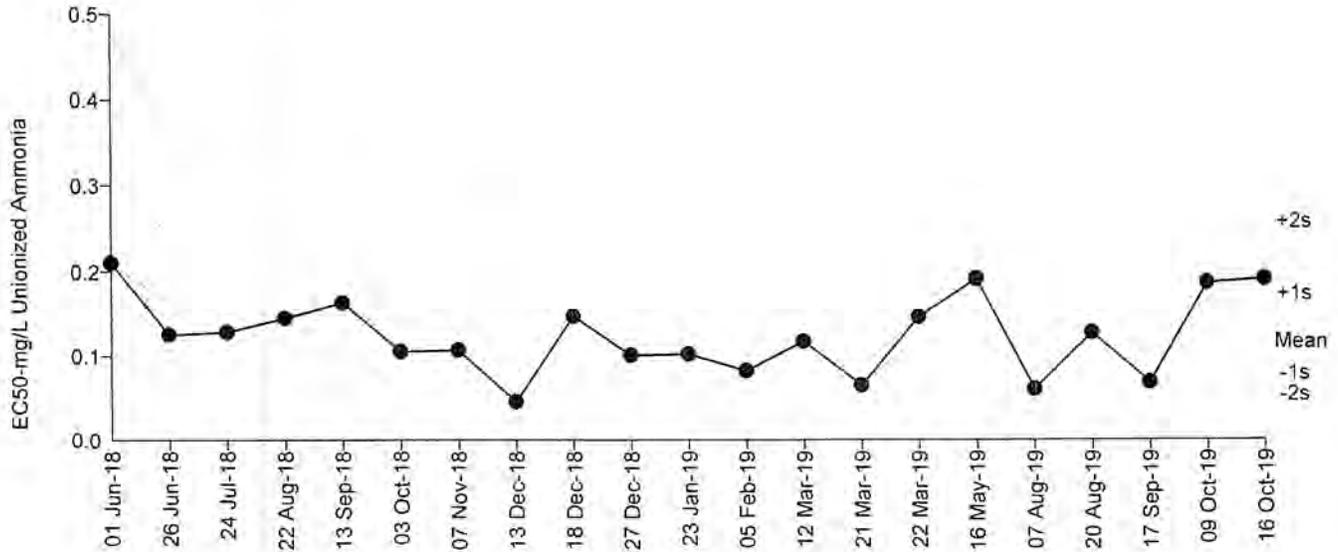
Point	Year	Month	Day	Time	QC Data	Delta	Sigma	Warning	Action	Test ID	Analysis ID	Laboratory
1	2018	Jun	26	19:10	8.678	1.155	0.4377			17-9894-2551	06-4820-9232	EcoAnalysts
2		Jul	24	14:29	8.87	1.346	0.5047			03-7590-2196	04-9004-0822	EcoAnalysts
3		Aug	22	17:20	7.194	-0.3289	-0.137			16-3013-6338	06-6775-4461	EcoAnalysts
4		Sep	13	14:35	11.31	3.787	1.25	(+)		01-6059-1010	10-3453-2996	EcoAnalysts
5		Oct	3	16:45	8.195	0.6718	0.2622			12-1625-9203	05-0256-3584	EcoAnalysts
6		Nov	7	16:30	9.232	1.708	0.6273			18-8445-1794	01-7154-3646	EcoAnalysts
7			30	16:15	7.912	0.3883	0.1543			08-9828-8669	10-9562-1026	EcoAnalysts
8		Dec	13	17:15	4.088	-3.436	-1.87	(-)		02-5107-8586	13-2935-1649	EcoAnalysts
9			18	13:45	10.17	2.651	0.9255			05-9743-4123	08-2986-6785	EcoAnalysts
10			27	17:55	8.682	1.159	0.4393			20-5834-3973	06-3380-4265	EcoAnalysts
11	2019	Jan	23	16:50	7.2	-0.3233	-0.1347			01-3143-2267	12-8726-6037	EcoAnalysts
12		Feb	5	16:40	7.033	-0.4901	-0.2065			07-7484-3747	07-2651-6673	EcoAnalysts
13		Mar	12	16:42	3.807	-3.716	-2.088	(-)	(-)	16-7636-2372	18-4260-6750	EcoAnalysts
14			21	16:35	5.014	-2.509	-1.244	(-)		00-6726-4861	04-4433-8982	EcoAnalysts
15			22	15:22	7.643	0.1197	0.0484			05-2194-2268	19-0448-6516	EcoAnalysts
16		May	16	16:33	11.87	4.342	1.397	(+)		09-3888-0201	09-7288-8962	EcoAnalysts
17		Aug	7	17:50	4.599	-2.924	-1.509	(-)		03-5717-3338	03-1729-1939	EcoAnalysts
18			20	14:30	7.113	-0.4106	-0.1721			03-9071-1098	10-9698-8580	EcoAnalysts
19		Sep	17	16:45	7.58	0.05662	0.02299			04-9239-0885	17-1518-8274	EcoAnalysts
20		Oct	9	16:32	11.54	4.014	1.311	(+)		15-3196-0400	00-5854-2935	EcoAnalysts
21			16	16:10	9.739	2.216	0.7914			00-6600-5589	12-8699-0346	EcoAnalysts

Bivalve Larval Survival and Development Test

All Matching Labs

Test Type: Development-Survival Organism: Mytilus galloprovincialis (Bay Mussel) Material: Unionized Ammonia
 Protocol: EPA/600/R-95/136 (1995) Endpoint: Combined Proportion Normal Source: Reference Toxicant-REF

Bivalve Larval Survival and Development Test



Mean: 0.1129 Count: 20 -1s Warning Limit: 0.075 -2s Action Limit: 0.04983
 Sigma: n/a CV: 42.60% +1s Warning Limit: 0.1699 +2s Action Limit: 0.2557

Quality Control Data

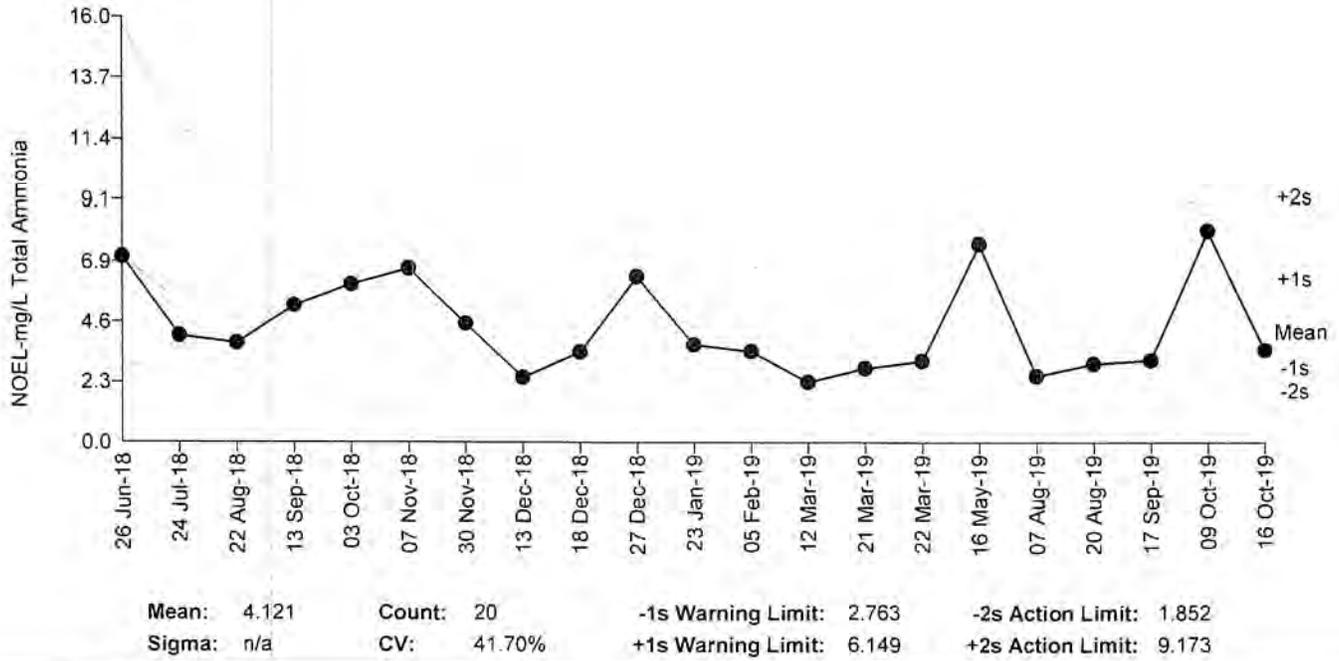
Point	Year	Month	Day	Time	QC Data	Delta	Sigma	Warning	Action	Test ID	Analysis ID	Laboratory
1	2018	Jun	1	18:20	0.2103	0.09736	1.521	(+)		05-1801-7066	04-7994-1641	EcoAnalysts
2			26	19:10	0.1255	0.01255	0.2578			06-7139-6937	06-3245-7683	EcoAnalysts
3		Jul	24	14:29	0.1286	0.01566	0.3178			16-0134-7952	19-7798-4523	EcoAnalysts
4		Aug	22	17:20	0.1449	0.03194	0.6092			07-1087-5324	12-5339-9193	EcoAnalysts
5		Sep	13	14:35	0.1632	0.05032	0.9015			13-4913-4836	01-9378-4348	EcoAnalysts
6		Oct	3	16:45	0.1056	-0.007328	-0.1641			01-0403-3220	16-2351-0172	EcoAnalysts
7		Nov	7	16:30	0.1072	-0.00573	-0.1274			19-6967-7694	10-9733-6078	EcoAnalysts
8		Dec	13	17:15	0.04585	-0.06708	-2.205	(-)	(-)	08-7264-5404	13-5759-9152	EcoAnalysts
9			18	13:45	0.1473	0.0344	0.6504			21-4303-2112	16-4607-0947	EcoAnalysts
10			27	17:55	0.1012	-0.01176	-0.2691			02-0452-1897	14-1502-0285	EcoAnalysts
11	2019	Jan	23	16:50	0.1023	-0.01068	-0.2429			03-6716-4793	04-6739-1093	EcoAnalysts
12		Feb	5	16:40	0.08252	-0.03041	-0.7673			14-3580-4225	15-0794-6822	EcoAnalysts
13		Mar	12	16:42	0.1173	0.004414	0.0938			13-3144-3638	15-4861-0438	EcoAnalysts
14			21	16:35	0.06516	-0.04777	-1.345	(-)		06-4106-6442	03-4179-5928	EcoAnalysts
15			22	15:22	0.1465	0.0336	0.6372			01-0752-6416	02-4664-9643	EcoAnalysts
16		May	16	16:33	0.1919	0.07896	1.297	(+)		07-0061-1769	04-6166-1891	EcoAnalysts
17		Aug	7	17:50	0.06086	-0.05207	-1.512	(-)		15-8779-1180	02-3303-2773	EcoAnalysts
18			20	14:30	0.1278	0.0149	0.3031			06-4832-5208	10-5428-1743	EcoAnalysts
19		Sep	17	16:45	0.06876	-0.04417	-1.214	(-)		09-4282-9709	18-3806-6707	EcoAnalysts
20		Oct	9	16:32	0.1871	0.07413	1.235	(+)		15-1529-2166	12-8322-4318	EcoAnalysts
21			16	16:10	0.1915	0.07855	1.292	(+)		11-6436-0310	03-5301-7660	EcoAnalysts

Bivalve Larval Survival and Development Test

All Matching Labs

Test Type: Development-Survival Organism: Mytilus galloprovincialis (Bay Mussel) Material: Total Ammonia
 Protocol: EPA/600/R-95/136 (1995) Endpoint: Combined Proportion Normal Source: Reference Toxicant-REF

Bivalve Larval Survival and Development Test



Quality Control Data

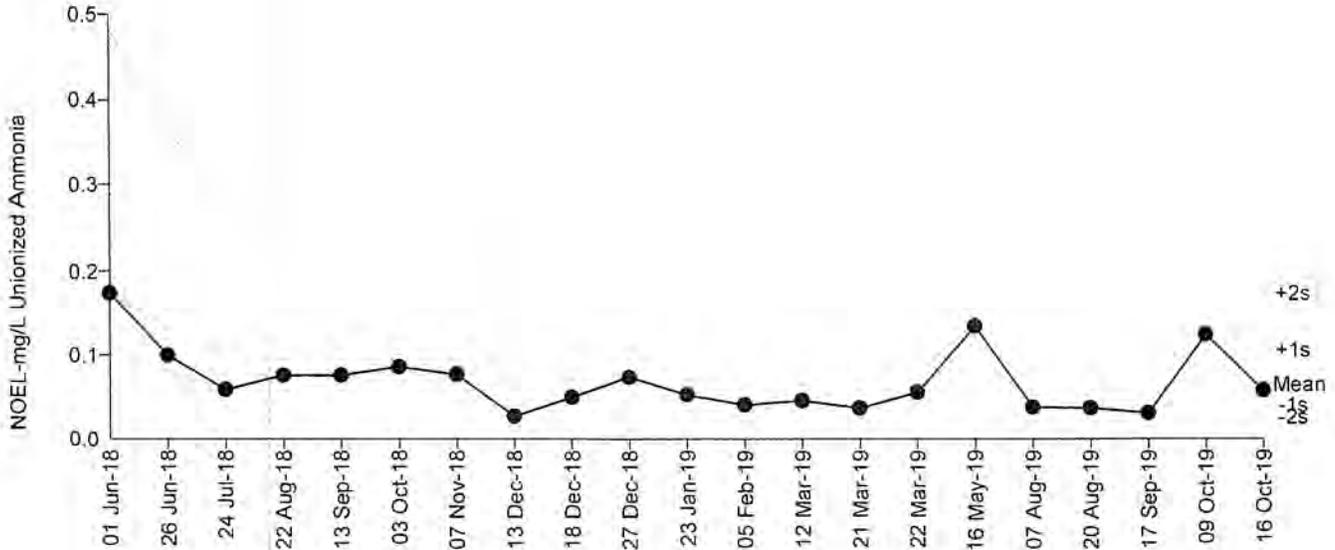
Point	Year	Month	Day	Time	QC Data	Delta	Sigma	Warning	Action	Test ID	Analysis ID	Laboratory
1	2018	Jun	26	19:10	7.04	2.919	1.339	(+)		17-9894-2551	00-8683-5940	EcoAnalysts
2		Jul	24	14:29	4.05	-0.07061	-0.04321			03-7590-2196	16-4897-6151	EcoAnalysts
3		Aug	22	17:20	3.77	-0.3506	-0.2223			16-3013-6338	05-9641-9153	EcoAnalysts
4		Sep	13	14:35	5.2	1.079	0.5816			01-6059-1010	13-0371-9861	EcoAnalysts
5		Oct	3	16:45	6.01	1.889	0.9436			12-1625-9203	13-5762-5882	EcoAnalysts
6		Nov	7	16:30	6.61	2.489	1.181	(+)		18-8445-1794	02-9565-7369	EcoAnalysts
7			30	16:15	4.51	0.3894	0.2257			08-9628-8669	09-3129-9816	EcoAnalysts
8		Dec	13	17:15	2.46	-1.661	-1.29	(-)		02-5107-8586	00-4152-9471	EcoAnalysts
9			18	13:45	3.43	-0.6906	-0.4586			05-9743-4123	01-2584-9444	EcoAnalysts
10			27	17:55	6.32	2.199	1.069	(+)		20-5834-3973	18-8197-1468	EcoAnalysts
11	2019	Jan	23	16:50	3.72	-0.4006	-0.2557			01-3143-2267	14-2023-7810	EcoAnalysts
12		Feb	5	16:40	3.47	-0.6506	-0.4296			07-7484-3747	20-0253-6343	EcoAnalysts
13		Mar	12	16:42	2.3	-1.821	-1.458	(-)		16-7636-2372	04-2647-6439	EcoAnalysts
14			21	16:35	2.82	-1.301	-0.9482			00-6726-4861	04-9186-0751	EcoAnalysts
15			22	15:22	3.1	-1.021	-0.7115			05-2194-2268	00-9861-7903	EcoAnalysts
16		May	16	16:33	7.55	3.429	1.514	(+)		09-3888-0201	11-6771-6470	EcoAnalysts
17		Aug	7	17:50	2.53	-1.591	-1.219	(-)		03-5717-3338	11-0747-7205	EcoAnalysts
18			20	14:30	3	-1.121	-0.7935			03-9071-1098	12-1928-0933	EcoAnalysts
19		Sep	17	16:45	3.13	-0.9906	-0.6874			04-9239-0885	15-2734-6977	EcoAnalysts
20		Oct	9	16:32	8.05	3.929	1.674	(+)		15-3196-0400	07-4286-2299	EcoAnalysts
21			16	16:10	3.52	-0.6006	-0.3938			00-6600-5589	20-3352-7258	EcoAnalysts

Bivalve Larval Survival and Development Test

All Matching Labs

Test Type: Development-Survival Organism: Mytilus galloprovincialis (Bay Mussel) Material: Unionized Ammonia
 Protocol: EPA/600/R-95/136 (1995) Endpoint: Combined Proportion Normal Source: Reference Toxicant-REF

Bivalve Larval Survival and Development Test



Mean: 0.06148 Count: 20 -1s Warning Limit: 0.03692 -2s Action Limit: 0.02216
 Sigma: n/a CV: 54.50% +1s Warning Limit: 0.1024 +2s Action Limit: 0.1706

Quality Control Data

Point	Year	Month	Day	Time	QC Data	Delta	Sigma	Warning	Action	Test ID	Analysis ID	Laboratory
1	2018	Jun	1	18:20	0.174	0.1125	2.039	(+)	(+)	05-1801-7066	00-0472-0630	EcoAnalysts
2			26	19:10	0.1	0.03852	0.9534			06-7139-6937	00-3402-6456	EcoAnalysts
3		Jul	24	14:29	0.059	-0.002483	-0.08079			16-0134-7952	12-3548-9987	EcoAnalysts
4		Aug	22	17:20	0.076	-0.01452	0.4155			07-1087-5324	19-8244-5254	EcoAnalysts
5		Sep	13	14:35	0.076	0.01452	0.4155			13-4913-4836	13-9376-6554	EcoAnalysts
6		Oct	3	16:45	0.086	0.02452	0.6578			01-0403-3220	16-6521-7341	EcoAnalysts
7		Nov	7	16:30	0.077	0.01552	0.4411			19-6967-7694	14-0187-1629	EcoAnalysts
8		Dec	13	17:15	0.027	-0.03448	-1.613	(-)		08-7264-5404	11-0232-4157	EcoAnalysts
9			18	13:45	0.05	-0.01148	-0.4052			21-4303-2112	19-7204-1962	EcoAnalysts
10			27	17:55	0.074	0.01252	0.3632			02-0452-1897	00-4497-0178	EcoAnalysts
11	2019	Jan	23	16:50	0.053	-0.008483	-0.291			03-6716-4793	03-7446-6496	EcoAnalysts
12		Feb	5	16:40	0.041	-0.02048	-0.7942			14-3580-4225	08-5494-8584	EcoAnalysts
13		Mar	12	16:42	0.046	-0.01548	-0.5686			13-3144-3638	19-4910-1502	EcoAnalysts
14			21	16:35	0.037	-0.02448	-0.9954			06-4106-6442	15-4223-6168	EcoAnalysts
15			22	15:22	0.056	-0.005483	-0.1831			01-0752-6416	20-3069-3159	EcoAnalysts
16		May	16	16:33	0.135	0.07352	1.542	(+)		07-0061-1769	00-8726-9146	EcoAnalysts
17		Aug	7	17:50	0.038	-0.02348	-0.9431			15-8779-1180	08-2296-8329	EcoAnalysts
18			20	14:30	0.037	-0.02448	-0.9954			06-4832-5208	16-0215-7949	EcoAnalysts
19		Sep	17	16:45	0.031	-0.03048	-1.342	(-)		09-4282-9709	19-4589-1387	EcoAnalysts
20		Oct	9	16:32	0.125	0.06352	1.391	(+)		15-1529-2166	11-0317-3036	EcoAnalysts
21			16	16:10	0.058	-0.003483	-0.1143			11-6436-0310	09-3064-2620	EcoAnalysts

CETIS Summary Report

Report Date: 26 Nov-19 14:44 (p 1 of 4)
 Test Code/ID: 3EF2A55 / 00-6600-5589

Bivalve Larval Survival and Development Test

EcoAnalysts

Batch ID: 15-2246-0909	Test Type: Development-Survival	Analyst:
Start Date: 16 Oct-19 16:10	Protocol: EPA/600/R-95/136 (1995)	Diluent: Laboratory Seawater
Ending Date: 18 Oct-19 15:03	Species: Mytilus galloprovincialis	Brine: Not Applicable
Test Length: 47h	Taxon:	Source: Taylor Shellfish
Sample ID: 01-5953-6186	Code: 982543A	Age:
Sample Date: 12 Jun-19	Material: Total Ammonia	Project: Reference Toxicant
Receipt Date: 12 Jun-19	CAS (PC):	Source: Reference Toxicant
Sample Age: 126d 16h	Client: Internal Lab	Station: P190612.45

Multiple Comparison Summary

Analysis ID	Endpoint	Comparison Method	✓	NOEL	LOEL	TOEL	TU	PMSD	S
20-3352-7258	Combined Proportion Norma	Dunnett Multiple Comparison Test	✓	3.52	7.5	5.138		8.38%	1
03-2874-8147	Proportion Normal	Dunnett Multiple Comparison Test	✓	3.52	7.5	5.138		3.22%	1
14-8206-5639	Proportion Survived	Dunnett Multiple Comparison Test		21.6	>21.6	n/a		10.7%	1

Point Estimate Summary

Analysis ID	Endpoint	Point Estimate Method	✓	Level	mg/L	95% LCL	95% UCL	TU	S
12-8699-0346	Combined Proportion Norma	Linear Interpolation (ICPIN)		EC5	4.387	n/a	6.923		1
				EC10	6.585	1.747	8.679		
				EC15	7.675	5.965	8.018		
				EC20	7.943	7.453	8.276		
				EC25	8.22	7.749	8.541		
				EC40	9.104	8.685	9.385		
				EC50	9.739	9.368	9.987		

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits			Overlap	Decision
				Lower	Upper			
03-2874-8147	Proportion Normal	Control Resp	0.9757	0.9	>>	Yes	Passes Criteria	
14-8206-5639	Proportion Survived	Control Resp	0.9153	0.5	>>	Yes	Passes Criteria	
20-3352-7258	Combined Proportion Norma	PMSD	0.0838	<<	0.25	No	Passes Criteria	

CETIS Summary Report

Report Date: 26 Nov-19 14:44 (p 2 of 4)
 Test Code/ID: 3EF2A55 / 00-6600-5589

Bivalve Larval Survival and Development Test

EcoAnalysts

Combined Proportion Normal Summary

Conc-mg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	D	3	0.8931	0.7687	1.0000	0.8417	0.9417	0.0289	0.0501	5.61%	0.00%
0.522		3	0.8639	0.8050	0.9227	0.8375	0.8833	0.0137	0.0237	2.74%	3.27%
1.49		3	0.8667	0.7407	0.9926	0.8333	0.9250	0.0293	0.0507	5.85%	2.95%
3.52		3	0.8833	0.7885	0.9782	0.8417	0.9167	0.0221	0.0382	4.32%	1.09%
7.5		3	0.7889	0.7400	0.8378	0.7667	0.8042	0.0114	0.0197	2.50%	11.66%
12.1		3	0.1556	0.1436	0.1675	0.1500	0.1583	0.0028	0.0048	3.09%	82.58%
21.6		3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		100.00%

Proportion Normal Summary

Conc-mg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	D	3	0.9757	0.9621	0.9892	0.9712	0.9817	0.0032	0.0055	0.56%	0.00%
0.522		3	0.9703	0.9451	0.9955	0.9617	0.9815	0.0059	0.0102	1.05%	0.55%
1.49		3	0.9745	0.9289	1.0000	0.9615	0.9955	0.0106	0.0184	1.88%	0.12%
3.52		3	0.9684	0.9370	0.9997	0.9554	0.9806	0.0073	0.0126	1.30%	0.75%
7.5		3	0.8780	0.8143	0.9417	0.8558	0.9061	0.0148	0.0257	2.92%	10.01%
12.1		3	0.1687	0.1333	0.2041	0.1552	0.1836	0.0082	0.0143	8.44%	82.71%
21.6		3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		100.00%

Proportion Survived Summary

Conc-mg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	D	3	0.9153	0.7909	1.0000	0.8667	0.9667	0.0289	0.0501	5.47%	0.00%
0.522		3	0.8903	0.8484	0.9321	0.8708	0.9000	0.0097	0.0168	1.89%	2.73%
1.49		3	0.8889	0.8021	0.9757	0.8667	0.9292	0.0202	0.0349	3.93%	2.88%
3.52		3	0.9125	0.7949	1.0000	0.8583	0.9458	0.0273	0.0473	5.19%	0.30%
7.5		3	0.8986	0.8670	0.9302	0.8875	0.9125	0.0073	0.0127	1.42%	1.82%
12.1		3	0.9250	0.7881	1.0000	0.8625	0.9667	0.0318	0.0551	5.96%	-1.06%
21.6		3	0.8694	0.7137	1.0000	0.8042	0.9292	0.0362	0.0627	7.21%	5.01%

CETIS Summary Report

Report Date: 26 Nov-19 14:44 (p 3 of 4)
Test Code/ID: 3EF2A55 / 00-6600-5589

Bivalve Larval Survival and Development Test

EcoAnalysts

Combined Proportion Normal Detail

Conc-mg/L	Code	Rep 1	Rep 2	Rep 3
0	D	0.8958	0.8417	0.9417
0.522		0.8833	0.8375	0.8708
1.49		0.8333	0.8417	0.9250
3.52		0.9167	0.8917	0.8417
7.5		0.7958	0.8042	0.7667
12.1		0.1500	0.1583	0.1583
21.6		0.0000	0.0000	0.0000

Proportion Normal Detail

Conc-mg/L	Code	Rep 1	Rep 2	Rep 3
0	D	0.9817	0.9712	0.9741
0.522		0.9815	0.9617	0.9676
1.49		0.9615	0.9665	0.9955
3.52		0.9692	0.9554	0.9806
7.5		0.8721	0.9061	0.8558
12.1		0.1552	0.1836	0.1674
21.6		0.0000	0.0000	0.0000

Proportion Survived Detail

Conc-mg/L	Code	Rep 1	Rep 2	Rep 3
0	D	0.9125	0.8667	0.9667
0.522		0.9000	0.8708	0.9000
1.49		0.8667	0.8708	0.9292
3.52		0.9458	0.9333	0.8583
7.5		0.9125	0.8875	0.8958
12.1		0.9667	0.8625	0.9458
21.6		0.9292	0.8750	0.8042

CETIS Summary Report

Report Date: 26 Nov-19 14:44 (p 4 of 4)
Test Code/ID: 3EF2A55 / 00-6600-5589

Bivalve Larval Survival and Development Test

EcoAnalysts

Combined Proportion Normal Binomials

Conc-mg/L	Code	Rep 1	Rep 2	Rep 3
0	D	215/240	202/240	226/240
0.522		212/240	201/240	209/240
1.49		200/240	202/240	222/240
3.52		220/240	214/240	202/240
7.5		191/240	193/240	184/240
12.1		36/240	38/240	38/240
21.6		0/240	0/240	0/240

Proportion Normal Binomials

Conc-mg/L	Code	Rep 1	Rep 2	Rep 3
0	D	215/219	202/208	226/232
0.522		212/216	201/209	209/216
1.49		200/208	202/209	222/223
3.52		220/227	214/224	202/206
7.5		191/219	193/213	184/215
12.1		36/232	38/207	38/227
21.6		0/223	0/210	0/193

Proportion Survived Binomials

Conc-mg/L	Code	Rep 1	Rep 2	Rep 3
0	D	219/240	208/240	232/240
0.522		216/240	209/240	216/240
1.49		208/240	209/240	223/240
3.52		227/240	224/240	206/240
7.5		219/240	213/240	215/240
12.1		232/240	207/240	227/240
21.6		223/240	210/240	193/240

CETIS Test Data Worksheet

Report Date: 26 Nov-19 14:41 (p 1 of 1)
 Test Code/ID: 3EF2A55 / 00-6600-5589

Bivalve Larval Survival and Development Test			EcoAnalysts
Start Date: 16 Oct-19 16:10 ✓	Species: Mytilus galloprovincialis	Sample Code: 982543A	
End Date: 18 Oct-19 15:03 ✓	Protocol: EPA/600/R-95/136 (1995)	Sample Source: Reference Toxicant	
Sample Date: 12 Jun-19	Material: Total Ammonia	Sample Station: P190612.45 ✓	

Conc-mg/L	Code	Rep	Pos	Initial Density	Final Density	# Counted	# Normal	Notes
0	D	1	17	240 ✓	219	219	215	
0	D	2	5	240	208	208	202	
0	D	3	3	240	232	232	226	
0.522 ✓		1	19	240	216	216	212	
0.522		2	6	240	209	209	201	
0.522		3	18	240	216	216	209	
1.49 ✓		1	15	240	208	208	200	
1.49		2	10	240	209	209	202	
1.49		3	4	240	223	223	222	
3.52 ✓		1	1	240	227	227	220	
3.52		2	16	240	224	224	214	
3.52		3	9	240	206	206	202	
7.5 ✓		1	7	240	219	219	191	
7.5		2	8	240	213	213	193	
7.5		3	13	240	215	215	184	
12.1 ✓		1	20	240	232	232	36	
12.1		2	12	240	207	207	38	
12.1		3	11	240	227	227	38	
21.6 ✓		1	14	240	223	223	0	
21.6		2	2	240	210	210	0	
21.6		3	21	240	193	193	0	

*Ad on
 N/A
 sheet*

CETIS Summary Report

Report Date: 26 Nov-19 14:50 (p 1 of 4)
 Test Code/ID: 4566BA76 / 11-6436-0310

Bivalve Larval Survival and Development Test

EcoAnalysts

Batch ID: 15-2246-0909	Test Type: Development-Survival	Analyst:
Start Date: 16 Oct-19 16:10	Protocol: EPA/600/R-95/136 (1995)	Diluent: Laboratory Seawater
Ending Date: 18 Oct-19 15:03	Species: Mytilus galloprovincialis	Brine: Not Applicable
Test Length: 47h	Taxon:	Source: Taylor Shellfish
Sample ID: 01-8862-1173	Code: B3E2175	Project: Reference Toxicant
Sample Date: 12 Jun-19	Material: Unionized Ammonia	Source: Reference Toxicant
Receipt Date: 12 Jun-19	CAS (PC):	Station: P190612.45
Sample Age: 126d 16h	Client: Internal Lab	Age:

Multiple Comparison Summary

Analysis ID	Endpoint	Comparison Method	✓	NOEL	LOEL	TOEL	TU	PMSD	S
09-3064-2620	Combined Proportion Norma	Dunnett Multiple Comparison Test	✓	0.058	0.124	0.08481		8.38%	1
20-6977-1567	Proportion Normal	Dunnett Multiple Comparison Test	✓	0.058	0.124	0.08481		3.22%	1
00-4661-6866	Proportion Survived	Dunnett Multiple Comparison Test		0.358	>0.358	n/a		10.7%	1

Point Estimate Summary

Analysis ID	Endpoint	Point Estimate Method	✓	Level	mg/L	95% LCL	95% UCL	TU	S
03-5301-7660	Combined Proportion Norma	Linear Interpolation (ICPIN)		EC5	0.07594	n/a	0.1181		1
				EC10	0.1118	0.0286	0.1441		
				EC15	0.1297	0.09545	0.1417		
				EC20	0.1383	0.1226	0.1496		
				EC25	0.147	0.1323	0.1575		
				EC40	0.1735	0.1617	0.1819		
				EC50	0.1915	0.1814	0.1988		

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits			Overlap	Decision
				Lower	Upper			
20-6977-1567	Proportion Normal	Control Resp	0.9757	0.9	>>	Yes	Passes Criteria	
00-4661-6866	Proportion Survived	Control Resp	0.9153	0.5	>>	Yes	Passes Criteria	
09-3064-2620	Combined Proportion Norma	PMSD	0.0838	<<	0.25	No	Passes Criteria	

CETIS Summary Report

Report Date: 26 Nov-19 14:50 (p 2 of 4)
 Test Code/ID: 4566BA76 / 11-6436-0310

Bivalve Larval Survival and Development Test

EcoAnalysts

Combined Proportion Normal Summary

Conc-mg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	D	3	0.8931	0.7687	1.0000	0.8417	0.9417	0.0289	0.0501	5.61%	0.00%
0.009		3	0.8639	0.8050	0.9227	0.8375	0.8833	0.0137	0.0237	2.74%	3.27%
0.025		3	0.8667	0.7407	0.9926	0.8333	0.9250	0.0293	0.0507	5.85%	2.95%
0.058		3	0.8833	0.7885	0.9782	0.8417	0.9167	0.0221	0.0382	4.32%	1.09%
0.124		3	0.7889	0.7400	0.8378	0.7667	0.8042	0.0114	0.0197	2.50%	11.66%
0.252		3	0.1556	0.1436	0.1675	0.1500	0.1583	0.0028	0.0048	3.09%	82.58%
0.358		3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		100.00%

Proportion Normal Summary

Conc-mg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	D	3	0.9757	0.9621	0.9892	0.9712	0.9817	0.0032	0.0055	0.56%	0.00%
0.009		3	0.9703	0.9451	0.9955	0.9617	0.9815	0.0059	0.0102	1.05%	0.55%
0.025		3	0.9745	0.9289	1.0000	0.9615	0.9955	0.0106	0.0184	1.88%	0.12%
0.058		3	0.9684	0.9370	0.9997	0.9554	0.9806	0.0073	0.0126	1.30%	0.75%
0.124		3	0.8780	0.8143	0.9417	0.8558	0.9061	0.0148	0.0257	2.92%	10.01%
0.252		3	0.1687	0.1333	0.2041	0.1552	0.1836	0.0082	0.0143	8.44%	82.71%
0.358		3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		100.00%

Proportion Survived Summary

Conc-mg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	D	3	0.9153	0.7909	1.0000	0.8667	0.9667	0.0289	0.0501	5.47%	0.00%
0.009		3	0.8903	0.8484	0.9321	0.8708	0.9000	0.0097	0.0168	1.89%	2.73%
0.025		3	0.8889	0.8021	0.9757	0.8667	0.9292	0.0202	0.0349	3.93%	2.88%
0.058		3	0.9125	0.7949	1.0000	0.8583	0.9458	0.0273	0.0473	5.19%	0.30%
0.124		3	0.8986	0.8670	0.9302	0.8875	0.9125	0.0073	0.0127	1.42%	1.82%
0.252		3	0.9250	0.7881	1.0000	0.8625	0.9667	0.0318	0.0551	5.96%	-1.06%
0.358		3	0.8694	0.7137	1.0000	0.8042	0.9292	0.0362	0.0627	7.21%	5.01%

CETIS Summary Report

Report Date: 26 Nov-19 14:50 (p 3 of 4)
Test Code/ID: 4566BA76 / 11-6436-0310

Bivalve Larval Survival and Development Test

EcoAnalysts

Combined Proportion Normal Detail

Conc-mg/L	Code	Rep 1	Rep 2	Rep 3
0	D	0.8958	0.8417	0.9417
0.009		0.8833	0.8375	0.8708
0.025		0.8333	0.8417	0.9250
0.058		0.9167	0.8917	0.8417
0.124		0.7958	0.8042	0.7667
0.252		0.1500	0.1583	0.1583
0.358		0.0000	0.0000	0.0000

Proportion Normal Detail

Conc-mg/L	Code	Rep 1	Rep 2	Rep 3
0	D	0.9817	0.9712	0.9741
0.009		0.9815	0.9617	0.9676
0.025		0.9615	0.9665	0.9955
0.058		0.9692	0.9554	0.9806
0.124		0.8721	0.9061	0.8558
0.252		0.1552	0.1836	0.1674
0.358		0.0000	0.0000	0.0000

Proportion Survived Detail

Conc-mg/L	Code	Rep 1	Rep 2	Rep 3
0	D	0.9125	0.8667	0.9667
0.009		0.9000	0.8708	0.9000
0.025		0.8667	0.8708	0.9292
0.058		0.9458	0.9333	0.8583
0.124		0.9125	0.8875	0.8958
0.252		0.9667	0.8625	0.9458
0.358		0.9292	0.8750	0.8042

CETIS Summary Report

Report Date: 26 Nov-19 14:50 (p 4 of 4)
 Test Code/ID: 4566BA76 / 11-6436-0310

Bivalve Larval Survival and Development Test

EcoAnalysts

Combined Proportion Normal Binomials

Conc-mg/L	Code	Rep 1	Rep 2	Rep 3
0	D	215/240	202/240	226/240
0.009		212/240	201/240	209/240
0.025		200/240	202/240	222/240
0.058		220/240	214/240	202/240
0.124		191/240	193/240	184/240
0.252		36/240	38/240	38/240
0.358		0/240	0/240	0/240

Proportion Normal Binomials

Conc-mg/L	Code	Rep 1	Rep 2	Rep 3
0	D	215/219	202/208	226/232
0.009		212/216	201/209	209/216
0.025		200/208	202/209	222/223
0.058		220/227	214/224	202/206
0.124		191/219	193/213	184/215
0.252		36/232	38/207	38/227
0.358		0/223	0/210	0/193

Proportion Survived Binomials

Conc-mg/L	Code	Rep 1	Rep 2	Rep 3
0	D	219/240	208/240	232/240
0.009		216/240	209/240	216/240
0.025		208/240	209/240	223/240
0.058		227/240	224/240	206/240
0.124		219/240	213/240	215/240
0.252		232/240	207/240	227/240
0.358		223/240	210/240	193/240

CETIS Test Data Worksheet

Report Date: 26 Nov-19 14:48 (p 1 of 1)
 Test Code/ID: 4566BA76 / 11-6436-0310

Bivalve Larval Survival and Development Test			EcoAnalysts
Start Date: 16 Oct-19 16:10 ✓	Species: Mytilus galloprovincialis	Sample Code: B3E2175	
End Date: 18 Oct-19 15:03 ✓	Protocol: EPA/600/R-95/136 (1995)	Sample Source: Reference Toxicant	
Sample Date: 12 Jun-19 ✓	Material: Unionized Ammonia	Sample Station: P190612.45 ✓	

Conc-mg/L	Code	Rep	Pos	Initial Density	Final Density	# Counted	# Normal	Notes
0	D	1	19	240 ✓	219	219 ✓	215 ✓	
0	D	2	18	240	208	208 ✓	202 ✓	
0	D	3	13	240	232	232 ✓	226 ✓	
0.009 ✓		1	4	240	216	216 ✓	212 ✓	
0.009		2	2	240	209	209 ✓	201 ✓	
0.009		3	14	240	216	216 ✓	209 ✓	
0.025 ✓		1	6	240	208	208 ✓	200 ✓	
0.025		2	15	240	209	209 ✓	202 ✓	
0.025		3	11	240	223	223 ✓	222 ✓	
0.058 ✓		1	10	240	227	227 ✓	220 ✓	
0.058		2	9	240	224	224 ✓	214 ✓	
0.058		3	21	240	206	206 ✓	202 ✓	
0.124 ✓		1	5	240	219	219 ✓	191 ✓	
0.124		2	20	240	213	213 ✓	193 ✓	
0.124		3	16	240	215	215 ✓	184 ✓	
0.252 ✓		1	8	240	232	232 ✓	36 ✓	
0.252		2	17	240	207	207 ✓	38 ✓	
0.252		3	7	240	227	227 ✓	38 ✓	
0.358 ✓		1	12	240	223	223 ✓	0 ✓	
0.358		2	1	240	210	210 ✓	0 ✓	
0.358		3	3	240	193	193 ✓	0 ✓	

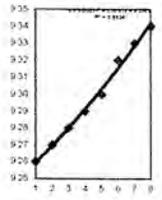
CLIENT:	--	Test Date:	16-Oct-19 ✓
PROJECT:	--	Test Type:	Mytilus sp
COMMENTS:			

To convert Total Ammonia (mg/L) to Free (un-ionized) Ammonia (mg/L) enter the corresponding total ammonia, salinity, temperature, and pH.

Sample	Mod NH3T (mg/L)	salinity (ppt)	pH	temp (C)	temp (K)	i-factor	Mod NH3U (mg/L)
Target / Sample Name	Actual	22.9	8.0	24.1	297.26	9.3053	#VALUE!
Example 3.5	2.000	10.0	7.5	5.0	278.16	9.2750	0.008
1	0	27	7.80	16.8	289.96	9.3160	0.000
2	0.75	28	7.80	17.0	290.16	9.3187	0.009
3	1.5	28	7.80	17.0	290.16	9.3187	0.025
4	3	28	7.80	17.0	290.16	9.3187	0.058
5	6	28	7.80	17.0	290.16	9.3187	0.124
6	12	28	7.90	17.0	290.16	9.3187	0.252
7	18	28.0	7.8	17.0	290.16	9.3187	0.358
8							
9							
10							
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41							
42							
43							
44							
45							
46							

Integer: i-factor

1	9.26
2	9.27
3	9.28
4	9.29
5	9.30
6	9.32
7	9.33
	9.34



48 Hour Bivalve Development Reference Toxicant Test

Test ID: P190612.45	Replicates: 3	Study Director: J. Baum	Location: Bath 1				
Dilution Water Batch: FSW101519.02	Organism Batch: TS082719, 073119, 100419	Associated Test(s):	Organism: Mytilus sp.				
Chamber Size/Type: 30 ml shell vial	Exposure Volume: 10 ml						
Toxicant: Ammonium Chloride:	Lot #: 18H1356763	Date Prepared: 10/16/19	Initials: MK				
Target Concentrations: See spiking worksheet		Quantity of Stock: Target: See spiking worksheet	Quantity of Diluent: Target: 200 mL				
See spiking worksheet		Actual: See spiking worksheet	Actual: ↓				
0 Hours Date: 10/16/19 WQ Time: 1400 MK STOCK Start Time: 1610 Initials: JB, JW							
	Control	0.75	1.5	3	6	12	18
D.O. (%) (>3.3 mg/L)	7.6	7.8	7.8	7.9	7.8	7.9	7.9
Temperature (16 ± 1°C)	16.8	17.0	17.0	17.0	17.0	17.0	17.0
Salinity (20 ± 2 ppt)	27	28	28	28	28	28	28
pH (7.8 ± 0.5)	7.8	7.8	7.8	7.8	7.8	7.9	7.8
Day 1	Temperature (16 ± 1°C)	16.3					
Final Day Date: 10/18/19 WQ Time: 1110 MK STOCK End Time: 1503 Initials: BH							
	Control	0.75	1.5	3	6	12	18
D.O. (%) (>3.3 mg/L)	7.0	7.7	7.9	8.0	8.0	8.1	8.1
Temperature (16 ± 1°C)	16.3	15.7	15.6	15.6	15.6	15.6	15.6
Salinity (20 ± 2 ppt)	27	27	27	27	27	28	28
pH (7.8 ± 0.5)	7.9	8.0	8.0	8.0	8.0	8.0	8.0

Notes:

48 Hour Bivalve Development Reference Toxicant Test

Conc.	Rep	Number Normal	Number Abnormal	Date	Initials
Control	1	215	4	4/22/19	MK
	2	202	6		
	3	226	6		
0.75	1	212	4		
	2	201	8		
	3	209	7		
1.5	1	200	8		
	2	ⓐ 207 202	7		
	3	222	1		
3	1	220	7		
	2	214	10		
	3	202	4		
6	1	191	28		
	2	193	20		
	3	184	31		
12	1	36	196		
	2	38	169		
	3	38	189		
18	1	0	223		
	2	0	210		
	3	0	193		
Stocking Density					
Rep		Count		Init.	
1	255	→		MK	
2	213	→		↓	
3	253	→			
Mean:		240.3			
QA Count Checks:					
#1 conc/rep <u>02</u>	#2 conc/rep <u>62</u>	#3 conc/rep <u>102</u>	#4 conc/rep <u>1.53</u>		
# normal <u>206</u>	# normal <u>186</u>	# normal <u>0</u>	# normal <u>217</u>		
# abnormal <u>3</u>	# abnormal <u>22</u>	# abnormal <u>216</u>	# abnormal <u>1</u>		
Tech. Init. <u>JB</u>	Tech. Init. <u>JB</u>	Tech. Init. <u>JB</u>	Tech. Init. <u>JB</u>		
Calc. $\frac{202}{208} = 0.97$ $\frac{206}{209} = 0.99$	$\frac{186}{208} = 0.89$ $\frac{193}{213} = 0.91$	$\frac{0}{216} = 0$ $\frac{0}{210} = 0$	$\frac{222}{223} = 0.996$ $\frac{217}{218} = 0.995$		
QA Check Acceptability: <input checked="" type="checkbox"/> <5% difference in means of QA & orig. counts					

ⓐ i.e. MK 4/22.

**Ammonia Reference Toxicant
Spiking Worksheet**

Reference Toxicant ID: P190612.45
 Date Prepared: 10/16/19
 Technician Initials: MLC

Biv / Echino NH₃ RT

Assumptions in Model
 Stock ammonia concentration is 9,000 mg/L = 9 mg/mL

Date: 10/14/2019
 Measurement: 13766.66

Test Solutions			Volume of stock to reach desired concentration
Measured Concentration	Desired Concentration	Volume	
mg/L	mg/L	mL	mL stock to increase
			SALT WATER
0.522	0.75	200	0.016
1.49	1.5	200	0.033
3.52	3	200	0.065
7.50	6	200	0.131
12.1	12	200	0.262
21.6	18	200	0.392

APPENDIX B. CHAIN-OF-CUSTODY FORMS, LOGS, AND PRE-TEST DOCUMENTS

DRAFT

CHAIN OF CUSTODY



LIFE IN WATER

EcoAnalysts, Inc.
4770 NE View Dr., Port Gamble, WA. 98364

Tel: (360) 297-6040

Destination: EcoAnalyst	Sample Originator (Organization): MFA	Report Results To: EMILY HESS MFA	Phone: _____
Destination Contact: Julia Baum	PERSON WHO COLLECTED SAMPLE: Meaghan Pollock & Amy Devita - Microside	Contact Name: EMILY HESS	Fax: _____
Date: 9/27/2019	Address: 109 E 13th St. Vancouver, WA 98660	Lab Address: see previous	Email: ehess@maui-foster.com
Turn-Around-Time: Standard.	Phone: (360) 433-0249	Invoicing To: MFA	
Project Name: SEAPORT In-WATER RI 1044.02.00	Fax: _____	Comments or Special Instructions:	
Contract/PO:	E-mail: ehess@maui-foster.com		

No.	Sample ID	Matrix	Volume & Type of Container	Date & Time	Biossary							Preservation	Sample Temp Upon Receipt	LAB ID
1	SE-20-0-0.33	Sed	2.5L poly bag	9/25, 18:15	X							N/A	4.4	P190928.05
2	SE-24-0-0.33	Sed		9/27, 13:13	X							N/A	4.4	P190928.06
3	SE-31-0-0.33	Sed		9/27, 12:10	X							N/A	4.8	P190928.08
4	SE-18-0-0.33	Sed		9/27, 11:54	X							N/A	4.8	P190928.04
5	SE-15-0-0.33	Sed		9/27, 11:24	X							N/A	6.0	P190928.01
6	SE-19-0-0.33			9/27, 08:30										
7	SE-17-0-0.33	Sed		9/27, 9:47	X							N/A	5.2	P190928.03
8	SE-10-0-0.33	Sed		9/27, 09:00	X							N/A	5.2	P190928.02
9	SE-26-0-0.33	Sed	2.5L poly bag	9/27, 17:25	X							N/A	6.0	P190928.07
10														
11														
12														
13														
14														
15														
16														
17														
18														
19														
20														

Relinquished by:		Received by:		Relinquished by:		Received by:		Matrix Codes FW = Fresh Water SB = Salt & Brackish Water SS = Soil & Sediment
Print Name: Meaghan Pollock	Print Name: ERIC PEEVER	Print Name: ERIC PEEVER	Print Name: Brian Hester					
Signature: <i>Meaghan Pollock</i>	Signature: <i>Eric Peever</i>	Signature: <i>Eric Peever</i>	Signature: <i>Brian Hester</i>					
Affiliation: MFA	Affiliation: RYS	Affiliation: RYS	Affiliation: EcoAnalysts					
Date/Time: 9/27/19 1745	Date/Time: 9/27/19 1745	Date/Time: 9/28/19 10:10	Date/Time: 9.28.19 1016					

SAMPLE RECEIPT LOG FOR SEDIMENTS IN COOLERS

Client/Project:	MFA- Grays Harbor Seaport
Date/Time Received:	9.28.19 1016
Delivery Method:	FedEx / UPS / Hand Delivered / <u>Other</u> : Picked up from Eric Parker / RSS
Airbill #:	NA
Received By:	Brian Hester

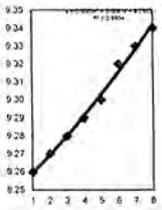
*Notify project manager or study director if temperatures exceed 6°C. Client must be notified ASAP.

Cooler #	Client ID	Lab ID	Sample Type (Sediment, Sitewater, Soil, Other)	#/Type & Volume of Container	Custody Seal Intact? Intact / Broken / Not Present	Condition of Container	Condition of Wet or Blue Ice: Frozen (Ice Present) / <u>Ice-Water Mix</u> / Water (Thawed)	Corrected Temperature (°C) Instrument #: T15
1	SE-31	P190928.08	Sed	1 Poly Bag ~ 6L	Not Present	Good	Ice/water	4.8
1	SE-18	" ".04	↓	↓	↓	↓	Ice/water	4.8
2	SE-20	.05	↓	↓	↓	↓	↓	4.4
2	SE-24	.06	↓	↓	↓	↓	↓	4.4
3	SE-17	.03	↓	↓	↓	↓	↓	5.2
3	SE-16	.02	↓	↓	↓	↓	↓	5.2
4	SE-15	.01	↓	↓	↓	↓	↓	6.0
4	SE-26	.07	↓	↓	↓	↓	↓	6.0

CLIENT:	MFA	Test Date:	01-Oct-19
PROJECT:	Seaport	Test Type:	
COMMENTS:	Bulk Ammonia		

To convert Total Ammonia (mg/L) to Free (un-ionized) Ammonia (mg/L) enter the corresponding total ammonia, salinity, temperature, and pH.

Integer	I-factor
1	9.26
2	9.27
3	9.28
4	9.29
5	9.30
6	9.32
7	9.33
8	9.34

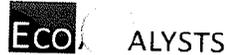


Sample	Mod NH3T (mg/L)	salinity (ppt)	pH	temp (C)	temp (K)	i-factor	Mod NH3U (mg/L)
Target / Sample Name	Actual	22.9	8.0	24.1	297.26	9.3053	#VALUE!
Example 3.5	2.000	10.0	7.5	5.0	278.16	9.2750	0.008
1 SE-15	1.52	14	7.40	15.1	288.26	9.2838	0.010
2 SE-16	2.980	16	7.40	15.2	288.36	9.2884	0.019
3 SE-17	2.440	20	7.20	15.1	288.26	9.2980	0.009
4 SE-18	4.070	21	7.40	15.1	288.26	9.3005	0.025
5 SE-20	1.400	15	7.60	15.2	288.36	9.2861	0.014
6 SE-24	1.610	15	6.70	15.1	288.26	9.2861	0.002
7 SE-26	1.560	17	6.8	15.2	288.36	9.2908	0.002
8 SE-31	2.660	20	7.4	15.3	288.46	9.2980	0.016
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46							

Bulk sulfides - hydrogen sulfide

		Input				Output	
	Sample ID	Total Dissolved Sulfide ($\mu\text{g/L}$ as S)	Temperature ($^{\circ}\text{C}$)	Salinity (‰)	pH	Undissociated H ₂ S ($\mu\text{g/L}$ as H ₂ S)	Weight Fraction (H ₂ S/Total S)
Bulk	SE-15	1	21.4	14	7.4	0.24	23.60%
	SE-16	27	21.3	16	7.4	6.28	23.26%
	SE-17	2	21.5	20	7.2	0.63	31.69%
	SE-18	375	21	21	7.4	84.87	22.63%
	SE-20	2	22	15	7.6	0.32	15.79%
	SE-24	ND	21.8	15	6.7	#VALUE!	#VALUE!
	SE-26	ND	21.2	17	6.8	#VALUE!	#VALUE!
	SE-31	ND	21.4	20	7.4	#VALUE!	#VALUE!

CHAIN OF CUSTODY



LIFE IN WATER

EcoAnalysts, Inc.
4770 NE View Dr., Portland, OR 97131
Tel: (360) 297-6040

Destination: EcoAnalyst	Sample Originator (Organization): Blandon Environmental	Report Results To: MA	Phone:
Destination Contact: J. Baum	PERSON WHO COLLECTED SAMPLE: Laura Handcamp / Marisa Seibert	Contact Name:	Fax:
Date: 10/11/19	Address:	Address:	Email:
Turn-Around-Time:	Phone:	Invoicing To:	
Project Name: Major Whittom Waterway MFA Grays Harbor	Fax:	Comments or Special Instructions:	
Contract/PO:	E-mail:		

No.	Sample ID	Matrix	Volume & Type of Container	Date & Time	Analyses:					Preservation	Sample Temp Upon Receipt	LAB ID
1	CARR 80	Sed	3 1/4 sed. bag	10/11/19 1326						none	①	P191011-01
2	CARR 14	↓	↓	↓ 1209								↓ .02
3	CARR 47	↓	↓	↓ 1530								↓ .03
4	CARR 68	↓	↓	↓ 1424								↓ .04
5	CARR 32	↓	↓	↓ 1550								↓ .05
6												
7												
8												
9												
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												

Relinquished by:		Received by:		Relinquished by:		Received by:		Matrix Codes FW = Fresh Water SB = Salt & Brackish Water SS = Soil & Sediment
Print Name: Marisa Seibert	Signature: <i>[Signature]</i>	Print Name: Julia Baum	Signature: <i>[Signature]</i>	Print Name:	Signature:	Print Name:	Signature:	
Affiliation: EcoAnalysts	Date/Time: 10/11/19 1815	Affiliation: EcoAnalysts	Date/Time: 10/11/19 1815	Affiliation:	Date/Time:	Affiliation:	Date/Time:	

ONA, transported directly from field to lab in cooler

Wet-Sieve Procedure for Determining Percent Fines (<63 μm) of Sediment

DATE: 10/01/19	CLIENT: MFA	PROJECT: Seaport
----------------	-------------	------------------

Procedure:

1. Collect 50 mL of sediment to be analyzed
2. Transfer sediment to a #230 (63 μm) testing sieve
3. Rinse sieve thoroughly with a stream of water until water flowing through the sieve is clear
4. Transfer all retained material to a 100mL graduated cylinder using a small funnel and DI squirt bottle
5. Allow sediment to settle. Record the volume of sediment retained below.

SAMPLE ID:	INITIAL VOLUME OF SEDIMENT (mL)	VOLUME OF SEDIMENT RETAINED (mL)	(INIT VOL - VOL RETAINED) * 2		Estimated Percent Fines	
				=		
SE-15	50	31 ^③	19	=	38	
16	↓	23	27	=	54	
17		11	39	=	78	
18		19	31	=	62	
20 ①		20	30	=	60	
24		34	16	=	32	
26		60 ^②		=	0	
31		31	19	=	38	
					=	
					=	
				=		
				=		
				=		
				=		
				=		
				=		
				=		
				=		
				=		
				=		
				=		
				=		

① worms present 10.1.19 BH/MR
 ② ~50 mL woody debris, 10mL sediment settled on top - NR 10/2
 ③ ~ 18mL woody debris, 19 mL sediment on top - NR 10/2
 19

ORGANISM RECEIPT LOG

Date: 10/15/19		Time: 1230		Batch No. NWA101519			
Organism: Echaustorius estuarius							
Source / Supplier: Northwest Amphipod							
No. Ordered: 1785		No. Received: 1785 +10%		Source Batch: Collection date, hatch date, etc.): collected 10/13/19			
Condition of Organisms: good				Approximate Size or Age: (Days from hatch, life stage, size class, etc.): 3-5mm			
Shipper: FedEx				B of L (Tracking No.): 8137 7831 5477			
Condition of Container: good				Received By: NR			
Container	D.O. (mg/L)	Temp. (°C)	Cond. or Sal. (Include Units)	pH (Units)	# Dead	% Dead*	Tech. (Initials)
* →		11.9	* →				NR
<small>*if >10% contact lab manager</small>							
Notes: * received dry (moist sand, no standing water)							

Northwest Amphipod, LLC

3101 SE Ferry Slip Rd #803, P.O. Box 542, Newport, OR 97365
Tel: 541-867-7225, nwamphipod@gmail.com

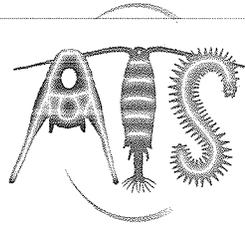
SUBJECT: Animal Collection Data Sheet (shipping)			
SOLD TO: EcoAnalysts 4770 NE View Dr. P.O. Box 216 Port Gamble WA 98364 FedEx# 1817-5747-7		Brian Hester/Collin Ray/Hillary Eicholer, Lauren Brandkamp 360.297.6040 Julia Baum 360.509.4141 P.O. # PGL	
DATE OF SHIPMENT: 10-14-19			
ANIMAL HISTORY			
Species	Age/Size	Number Shipped	
<i>Eohaustorius estuarius</i>	3-5mm	1785 + 10%	
WATER QUALITY AT TIME OF SHIPMENT			
Temperature (°C): 14.9	pH: 8.1	Salinity (ppt): 30.0	D.O. (mg/L): 8.6
Other:			
PACKAGED BY: Yves Nakahara		DATE: 10-14-19	
FIELD COLLECTION/CULTURE NOTES Collected 10-13-19 from Yaquina Bay, OR. Interstitial WQ: Temp 7.5 °C, Salinity 33.0 ppt; salinity adjusted ~5 ppt up or down as needed. Held at ~15°C in aerated water.			
ADDITIONAL COMMENTS 2-liters of 0.5 mm sieved home sediment included.			

PLEASE RETURN ALL SHIPPING MATERIALS Thank you!

If you have any questions, please call Gary Buhler or Gerald Irissarri at (541) 867-7225. Thank You.

ORGANISM RECEIPT LOG

Date: 10/17/19		Time: 1150		Batch No. ATS101719			
Organism: Neanthes							
Source / Supplier: Aquatic Toxicology Support							
No. Ordered: 910 + 10%		No. Received: 1,001		Source Batch: Collection date, hatch date, etc.): emerge date: 9/30/19			
Condition of Organisms: good				Approximate Size or Age: (Days from hatch, life stage, size class, etc.): 17 day post-emergence			
Shipper: courier				B of L (Tracking No.): NA			
Condition of Container: good				Received By: MK			
Container	D.O. (mg/L)	Temp. (°C)	Cond. or Sal. (include Units)	pH (Units)	# Dead	% Dead*	Tech. (Initials)
1 ①	13	19.8	31	7.2	—		MK
*if >10% contact lab manager							
Notes: ① Composite from 10 containers.							



Aquatic Toxicology Support
1849 Charleston Beach Road West
Bremerton, Washington 98312
(360) 813-1202

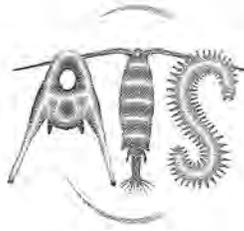
Order Summary

Species: <i>Neanthes arenaceodentata</i> *	Emerge Date: 30 Sept '19
Number Ordered: 910	Number Shipped: 910 + 1090
Date Shipped: 17 Oct '19	Salinity (ppt): 32

*Smith 1964. CSU Long Beach strain. Feed upon arrival.

ORGANISM RECEIPT LOG

Date: 11/21/19		Time: 0950		Batch No. AT5112119			
Organism: <i>Neanthes arenaceodentata</i>							
Source / Supplier: AT5							
No. Ordered: 400		No. Received: 440		Source Batch: emmerge 11/4/19 <small>Collection date, hatch date, etc.):</small>			
Condition of Organisms: good				Approximate Size or Age: 17 days post emergence <small>(Days from hatch, life stage, size class, etc.):</small>			
Shipper: courier				B of L (Tracking No.): NA			
Condition of Container: good				Received By: MK			
Container	D.O. (mg/L)	Temp. (°C)	Cond. or Sal. (ppm) <small>(Include Units)</small>	pH (Units)	# Dead	% Dead*	Tech. (Initials)
1	15.6	18.1	31	7.3	—		MK
<small>*if >10% contact lab manager</small>							
Notes:							



Aquatic Toxicology Support
1849 Charleston Beach Road West
Bremerton, Washington 98312
(360) 813-1202

Order Summary

Species: <i>Neanthes arenaceodentata</i> *	Emerge Date: 4 Nov '19
Number Ordered: 400	Number Shipped: 400 + 10%
Date Shipped: 21 Nov '19	Salinity (ppt): 31

*Smith 1964. CSU Long Beach strain. Feed upon arrival.

ORGANISM RECEIPT LOG

Date: 10/4/19		Time: 1225		Batch No. TS100419.			
Organism: Mytilus sp.							
Source / Supplier: Taylor Shellfish Farms							
No. Ordered: 10 lbs.		No. Received: 10 lbs.		Source Batch: Collection date, hatch date, etc.): collected: 10/03/19			
Condition of Organisms: Good				Approximate Size or Age: (Days from hatch, life stage, size class, etc.): Adult			
Shipper: FedEx				B of L (Tracking No.) 7764 5722 8160			
Condition of Container: Good				Received By: JB/MS			
Container	D.O. (mg/L)	Temp. (°C)	Cond. or Sal. (Include Units)	pH (Units)	# Dead	% Dead*	Tech. (Initials)
1	/	1.5	/	/	0	0	MS
*if >10% contact lab manager							
Notes: received dry							

TAYLOR SHELLFISH FARMS
SE 130 LYNCH RD, SHELTON, WA 98584
PH: (360)426-6178 FAX: (360)426-3643
WASHINGTON CERTIFICATION # WA 46SP

10.00 lbs net
MS TOTTEN INLET MUSSEL REGULAR 10LB/BAG

Original Harvesters Cert#: WA 46 SP
Original Harvest Date: 10/01/2019
Final Harvest Date: 10/03/2019
Harvested In: Washington State
Harvest Area: Totten Inlet - AB
Wet Stored: WS1.102414

Airbill #
Lot # 9274004.WS1.102414

SHIP TO:
ECOANALYSTS
4729 NE VIEW DRIVE
PORT GAMBLE, WA 98364

PO #
ITEM # 10264A
ORD # 431958



(01)90000000102646(11)191003(3202)001000(21)35010718

PERISHABLE KEEP REFRIGERATED
PRODUCT OF USA

ORGANISM RECEIPT LOG

Date: 8/27/19	Time: 1230	Batch No. 75002779					
Organism: Mytilus gallo.							
Source / Supplier: Taylor Shellfish							
No. Ordered: 8 lbs	No. Received: 8 lbs	Source Batch: Collection date, hatch date, etc.): Collected 8/26 Totten Inlet					
Condition of Organisms: Good		Approximate Size or Age: (Days from hatch, life stage, size class, etc.): Adult					
Shipper: Fed Ex		B of L (Tracking No.): 7893 7472 0406					
Condition of Container: Good		Received By: JB					
Container	D.O. (mg/L)	Temp. (°C)	Cond. or Sal. (Include Units)	pH (Units)	# Dead	% Dead*	Tech. (Initials)
*						→	JB
*if >10% contact lab manager							
Notes: * received Dng							

TAYLOR SHELLFISH FARMS
SE 130 LYNCH RD, SHELTON, WA 98584
PH: (360)426-6178 FAX: (360)426-3643
WASHINGTON CERTIFICATION # WA 46SP

8.00 lbs net
MS FZ NEWFOUNDLAND 8LB/BAG

Original Harvesters Cert#: WA 46 SP
Original Harvest Date: 08/26/2019
Final Harvest Date: 08/26/2019
Harvested in: Washington State
Harvest Area: Totten Inlet - E10
Wet Stored:

Airbill #
Lot # 9238003

SHIP TO:
ECOANALYSTS
4729 NE VIEW DRIVE

PORT GAMBLE, WA 98364

PO #
ITEM # 101090
ORD # 428954



(01)90000000101090(11)190826(3202)000800(21)35004147

PERISHABLE KEEP REFRIGERATED
PRODUCT OF USA

ORGANISM RECEIPT LOG

Date: 7/31/19	Time: 0750	Batch No.: TS073119					
Organism: Mytilus							
Source / Supplier: Taylor Shellfish							
No. Ordered: 8 lbs	No. Received: 8 lbs	Source Batch: Collection date, hatch date, etc.): Field Collected					
Condition of Organisms: Good			Approximate Size or Age: (Days from hatch, life stage, size class, etc.): Adult				
Shipper: Taylor Courier			B of L (Tracking No.): NA				
Condition of Container: Good			Received By: JB				
Container	D.O. (mg/L)	Temp. (°C)	Cond. or Sal. (Include Units)	pH (Units)	# Dead	% Dead*	Tech. (Initials)
*	----->						JB
<small>*if >10% contact lab manager</small>							
Notes: * received dry							

MAINTENANCE LOG FOR CULTURES

ORGANISM: Eohs
 LOCATION: Bath 1

Batch Number: NWA101519 Date Received: 10/15/19 Initial # of Organisms: ~1980

Date	Feed AM/PM	Tub No.	D.O.	Temp (°C)	Cond/ Sal ppt	pH	H ₂ O Change	Organisms appear healthy (Y/N)	# Mort	% Mort*	Init.	Comments
10/16/19	-	1	7.4	15.5	28	7.9	① NY	Y	14	0.7	MS	
10/17	←	1	7.9	15.5	29	8.0	Y	Y	16	0.8	JB	
10/18	—	1	8.0	15.4	28	8.0	2	Y	5	0.3	JB	
10/19	—	1	7.6	15.4	28	7.8	2	Y	—	—	DM	
<div style="font-size: 2em; font-family: cursive;"> END OFF CULTURE </div>												

FT = Flow-through
 *if >10% notify lab manager ① IE-MS 10/16

MAINTENANCE LOG FOR CULTURES

ORGANISM: Mussel 5

LOCATION: T5082719 bath 1

Batch Number: <u>T5082719</u>	Date Received: <u>8/27/19</u>	Initial # of Organisms: <u> </u>
-------------------------------	-------------------------------	-------------------------------------

Date	Feed AM/PM	Tub No.	D.O.	Temp (°C)	Cond/ Sal ppt	pH	H ₂ O Change	Organisms appear healthy (Y/N)	# Mort	% Mort*	Init.	Comments
8/28/19	✓	1	5.7	15.9	31	7.5	FT	Y	0	0	NR	
9/02/19	✓	1	5.6	16.1	31	7.4	FT	Y	0	-	JB	
9/4/19	✓	1	6.1	15.2	31	7.4	FT	Y	2	-	MS	
9/6/19	✓	1	7.2	14.9	31	7.4	FT	Y	1	-	MS	
9/09	✓	1	6.5	15.8	31	7.7	FT	Y	0	-	JB	
9/11/19		1	6.7	15.7	31	7.5	FT	Y	0	-	DM	
9/13/19	✓	1	6.7	15.7	31	7.5	FT	Y	0	-	MS	
9/16/19	✓ DX	1	7.1	15.2	32	7.6	FT	Y	0	-	MS	
9/18/19	✓	1	7.0	15.2	32	7.7	FT	Y	0	-	MS	
9/23/19	✓	1	7.3	15.3	31	7.7	FT	Y	0	-	JB	
9/25/19	✓	1	7.2	15.1	31	7.7	FT	Y	0	-	JB	
9/27	✓	1	6.6	14.7	32	7.7	FT	Y		-	JB	
9/30	✓	1	7.4	14.3	32	7.7	FT	Y	0	-	NR	
10/2	✓	1	7.1	13.4	32	7.9	FT	Y	0	-	MS/DM	
10/4/19	✓	1	7.0	13.9	32	7.8	FT	Y	0	-	DM	
10/7/19	✓	1	7.7	14.1	31	7.8	FT	Y	0	-	MS	
10/9/19	✓	1	7.9	13.3	31	7.7	FT	Y	0	-	NR	
10/11/19	✓	1	7.8	13.5	31	7.7	FT	Y	0	-	JB	

FT = Flow-through

*if >10% notify lab manager DIE MS 9/16

MAINTENANCE LOG FOR CULTURES

ORGANISM: Mussels

LOCATION: Bath 1

Batch Number: T5073119

Date Received: 7/31/19

Initial # of Organisms: _____

Date	Feed AM/PM	Tub No.	D.O.	Temp (°C)	Cond/ Sal ppt	pH	H ₂ O Change	Organisms appear healthy (Y/N)	# Mort	% Mort*	Init.	Comments
8/02/19	✓	1	5.7	15.9	31	7.6	FT	Y	0	—	JB	
8/5/19	✓	1	5.0	15.5	31	7.5	FT	Y	0	—	MC	
8/7/19	✓	1	2.9 ^①	15.5	31	7.3	FT	Y	0	—	MS	
8/9/19	✓	1	4.0	16.2	32	7.3	FT	Y	0	—	DM	
8/12/19	✓ ②	1	2.7	16.1	31	7.3	FT	Y	0	—	MS	
8/13/19	—	1	3.8	15.8	31	7.1	FT	Y	0	—	MS	
8/14/19	—	1	5.4	15.1	31	7.4	FT	Y	0	—	MS	
8/16/19	—	1	4.4	15.5	31	6.9	FT	Y	0	—	MS	
8/17/19	—	1	4.2	15.3	31	7.3	FT	Y	0	—	DM	
8/19/19	✓	1	5.1	15.5	31	7.5	FT	Y	1	—	NR	
8/21/19	✓	1	5.4.9	15.5	31	7.5	FT	Y	0	—	MS	
8/23/19	✓	1	4.6	16.7	31	7.4	FT	Y	0	—	DM	
8/26/19	✓	1	6.0	16.1	31	7.4	FT	Y	0	—	JB	
8/28/19	✓	1	5.9	15.8	31	7.5	FT	Y	0	—	NR	
9/02	③	1	4.9	15.9	31	7.6	FT	Y ④	0	—	JB	
9/4	✓	1	4.7	15.0	31	7.4	FT	Y	4	—	MS	
9/6	✓	1	3.8	14.8	31	7.2	FT	Y	2	—	MS	
9/09	✓	1	5.4	15.8	31	7.4	FT	Y	2	—	JB	

FT = Flow-through

*if >10% notify lab manager

① added another airline

② IE MS 8/21/19

③ IE MS 8/21, 9/4

④ Infestation of copepods(?) present. JB 9/02.

MAINTENANCE LOG FOR CULTURES

ORGANISM: Mussels
 LOCATION: BATH

Batch Number: TS 073119 Date Received: 7/31/19 Initial # of Organisms: _____

Date	Feed AM/PM	Tub No.	D.O.	Temp (°C)	Cond/ (Sal) ^{ppk}	pH	H ₂ O Change	Organisms appear healthy (Y/N)	# Mort	% Mort*	Init.	Comments
9/11/19		1	4.9	15.9	31	7.2	FT	Y	0	—	DM	
9/13/19	✓	1	4.7	15.5	31	7.3	FT	Y	0	—	MS	
9/10/19	✓	1	6.4	15.0	32	7.4	FT	Y	0	—	MS	
9/18/19	✓	1	5.5	15.1	32	7.2	FT	Y	0	—	MS	
9/23	✓	1	5.9	15.3	31	7.4	FT	Y	2	—	JB	
9/25	✓	1	6.8	14.9	31	7.5	FT	Y	1	—	JB	
9/27	✓	1	6.2	14.4	32	7.5	FT	Y	0	—	JB	
9/30	✓	1	7.5	14.0	32	7.7	FT	Y	0	—	JB	
10/2	✓	1	6.5	13.4	32	7.9	FT	Y	0	—	MS/DM	
10/4	✓	1	7.0	13.7	32	7.7	FT	Y	0	—	DM	
10/7	✓	1	7.3	14.0	31	7.7	FT	Y	0	—	MS	
10/9	✓	1	7.4	13.1	30	7.7	FT	Y	0	—	NR	
10/11	✓	1	7.5	13.2	31	7.7	FT	Y	0	—	JB	
10/15	✓	1	7.9	13.6	32	7.7	FT	Y	0	—	NR	
10/18	✓	1	10.9 _{7.0}	15.1	31	7.6	FT	Y	0	—	MS	
10/21	✓	1	7.4	15.0	31	7.6	FT	Y	0	—	MS	
11/6		1	8.1	12.6	30	7.9	FY	Y	0	—	MS	
11/13/19	✓	1	7.6	13.3	31	7.7	FT	Y	—	—	NR	

FT = Flow-through

*if >10% notify lab manager

① NR - actual 7.0 - MS 10/18/19

APPENDIX J
DATA VALIDATION MEMORANDA

DRAFT



DATA QUALITY ASSURANCE/QUALITY CONTROL REVIEW

PROJECT NO. 1044.02.14 | NOVEMBER 19, 2019 | GRAYS HARBOR
HISTORICAL SEAPORT AUTHORITY

Maul Foster & Alongi, Inc. (MFA) conducted an independent review of the quality of analytical results for sediment samples collected in September 2019 at the Seaport Landing tidelands.

Apex Laboratories, LLC (Apex), Analytical Resources, Inc. (ARI), and Cape Fear Analytical (CFA) performed the analyses. Apex report numbers A9I0822, A9I0893, A9J0006, A9L0191 (the last containing sediment sample results with time-stamp 01 30 20 1620), and A0D0095; and CFA report numbers WO15579, WO15582, and WO15951 were reviewed. Samples collected on September 23 and 24 were submitted directly to ARI for mercury and sulfide analysis, and results were appended to report A9I0822. Apex subcontracted the remaining samples requiring mercury and sulfide analysis to ARI and the samples requiring U.S. Environmental Protection Agency (EPA) 1613B analysis to CFA. Samples originally submitted to Apex for report A9L0191 were split into two separate reports at the request of the MFA project manager. The associated subcontract CFA lab report WO15951 was similarly split. The report time-stamp is referenced below to distinguish it from the split laboratory report containing upland results, which are validated in a separate memorandum. Sample SE-07A-0-1.0, originally submitted for report A9I0893, was logged to new report A0D0095 for additional Northwest Total Petroleum Hydrocarbon (NWTPH)-Dx analysis. The analyses performed and samples analyzed are listed below. Samples submitted to the laboratory on hold are also indicated.

Analysis	Reference
Ammonia	Plumb/SM 4500-NH3-G
Dioxin and Furans	EPA 1613B
Diesel- and Oil-Range-Hydrocarbons with Acid/Silica-Gel Cleanup	NWTPH-Dx/SG
Gasoline-Range Hydrocarbons	NWTPH-Gx
Grain Size	ASTM D422-modified
Percent Dry Weight	EPA 8000C
Polychlorinated Biphenyls as Aroclors	EPA 8082A
Semivolatile Organic Compounds	EPA 8270D
Sulfide	SM 4500-S2-D-00
Sulfide—Pore Water	SM 4500-S2-D-00
TCLP Mercury	EPA 1311/7470A
TCLP Metals and Mercury	EPA 1311/6010C
Total Mercury	EPA 7470A/7471B
Total Metals	EPA 6020A

Analysis	Reference
Total Organic Carbon	EPA 9060A-modified/SM 5310C
Total Solids	PSEP 1986/SM 2540G
Total Volatile Solids	SM 2540G
NOTES: ASTM = ASTM International. EPA = U.S. Environmental Protection Agency. NWTPH = Northwest Total Petroleum Hydrocarbon. PSEP = Puget Sound Estuary Protocol. SG = silica-gel cleanup. SM = Standard Methods for the Treatment of Water and Wastewater.	

Samples Analyzed			
Report A9I0822	Report A9I0893/A0D0095	Report A9J0006	Report A9L0191 01 30 20 1620/WO15951
SE05a-2.0-3.0	SE-01A-1.0-2.0	SE-24-0-0.33	RAU2-GA2-SO-10.75 (hold)
SE-29-0-2.0	SE-01B-0.5-1.5 (hold)	SE-24-0-0.33 (pore water)	RAU2-GA2-SO-15.75 (hold)
SE-08a-0-1.0	SE-01C-2.0-3.0 (hold)	SE-14-0-0.33	RAU2-GA2-SO-20.75 (hold)
SE-08b-0-1.0 (hold)	SE-01D-0-1.0 (hold)	SE-14-0-0.33 (pore water)	RAU2-GA2-SO-25.75 (hold)
SE-08c-3.2-4.2	SE-03A-0-1.0	SE-23-0-0.33	RAU2-GA1-SO-3.25
SE-08d-2.0-3.0 (hold)	SE-03B-1.0-2.0 (hold)	SE-17-0-0.33	RAU2-GA1-SO-5.75
-	SE-06A-0.5-1.5	SE-15-0-0.33	RAU2-GA1-SO-8.25
-	SE-20-0-0.33	SE-21-0-0.33	RAU2-GA1-SO-10.75 (hold)
-	SE-07A-0-1.0	SE-25-0-0.33	RAU2-GA1-SO-15.5 (hold)
-	SE-07B-0-1.0 (hold)	SE-28-0-0.33	RAU2-GA1-SO-20.25 (hold)
-	SE-02A-2.5-3.5	SE-28-0-0.33 (pore water)	RAU2-GA1-SO-25.75 (hold)
-	SE-06B-3.0-4.0 (hold)	SE-26-0-0.33	RAU2-GA2-SO-3.25
-	SE-10-2.0-3.7	SE-26-0-0.33 (pore water)	RAU2-GA2-SO-5.75
-	SE-30-2.5-4.5	SE-18-0-0.33	RAU2-GA2-SO-8.25
-	SE-30-0-2.0 (hold)	SE-18-0-0.33 (pore water)	RAU2-GA2-SO-10.75
-	SE-30-4.5-5.5 (hold)	SE-31-0-0.33	-
-	SE-05B-2.5-3.5 (hold)	SE-16-0-0.33	-
-	rinsate blank	SE-19-0-0.33	-
-	SE-20-0-0.33 (pore water)	SE-22-0-0.33	-
-	-	SE-27-0-0.33	-
-	-	SE-27-0-0.33-Dup	-
-	-	SE-16-0-0.33 (pore water)	-

DATA QUALIFICATIONS

Analytical results were evaluated according to applicable sections of EPA procedures (EPA, 2014, 2016, 2017a,b) and appropriate laboratory and method-specific guidelines (Apex, 2019; ARI, 2018; CFA, 2018; EPA, 1986).

Data validation procedures were modified, as appropriate, to accommodate quality-control requirements for methods not specifically addressed by the EPA procedures (e.g., NWTPH-Dx).

Apex noted that, to minimize matrix interference, EPA Method 8082A samples and associated batch quality control samples were processed with sulfuric acid/permanganate cleanup by EPA Method 3665A, sulfur cleanup by EPA Method 3660B, and florisil cleanup by EPA Method 3620B. No action was required.

According to report A9I0822, the NWTPH-Dx lube-oil-range hydrocarbon result for sample SE-29-0-2.0 was elevated because of the presence of individual analyte peaks that did not resemble a fuel hydrocarbon chromatographic pattern. The result was quantitated within the lube-oil range and reported as oil-range hydrocarbons; thus, qualification was not required.

According to reports A9I0822 and A9J0006, Apex flagged the EPA Method 8270D phenol result for samples SE-29-0-2.0 and SE-15-0-0.33 as estimated because of matrix interference. The results have been qualified by the reviewer with “J” as estimated.

Report	Sample	Component	Original Result (mg/kg)	Qualified Result (mg/kg)
A9I0822	SE-29-0-2.0	Phenol	0.571	0.571 J
A9J0006	SE-15-0-0.33	Benzo(k)fluoranthene	0.0365	0.0365 J
		Phenol	0.0583	0.0583 J
NOTES: J = result is estimated. mg/kg = milligrams per kilogram.				

According to reports A9I0893 and A9J0006, some EPA Method 8082A Aroclor 1254 and Aroclor 1260 results were flagged by Apex as estimated because of the presence of overlapping polychlorinated biphenyl Aroclors. The results have been qualified by the reviewer with “J,” as estimated.

Report	Sample	Component	Original Result (ug/kg)	Qualified Result (ug/kg)
A9I0893	SE-10-2.0-3.7	Aroclor 1254	5.86	5.86 J
		Aroclor 1260	7.17	7.17 J
A9J0006	SE-22-0-0.33	Aroclor 1260	4.43	4.43 J
NOTES: J = result is estimated. ug/kg = micrograms per kilogram.				

EPA Method 1613B laboratory-flagged estimated maximum potential concentration (EMPC) results were qualified by the reviewer as estimated and not detected at the reported

concentration, in accordance with EPA Region 10 guidance for data validation of polychlorinated dibenzodioxins and polychlorinated dibenzo-furans (EPA, 2014) and EPA national functional guidelines for high-resolution Superfund methods data review (EPA, 2016).

EPA Method 1613B results reported by CFA as EMPCs that were also associated with method blank detections requiring qualification are discussed in the method blank section of this validation report but are not discussed in the EMPC qualification tables below.

EPA Method 1613B total homolog results flagged as EMPCs by the laboratory were qualified by the reviewer with “UJ” as estimated, not detected, at the reported concentration when all associated congeners were reported by the laboratory as either EMPCs or were non-detect. However, when one or more associated congener was reported as a detection without an EMPC qualifier, the total homolog result was qualified by the reviewer with “J,” as estimated. Total homolog results already flagged with J by CFA because of detection below the reporting limit did not require additional qualification. Results flagged by CFA due to quantitative interference, as indicated in the table below, did not require additional qualification. The following table shows the reviewer’s qualifications:

Report	Sample	Component	Original Result (pg/g)	Qualified Result (pg/g)
WO15582	SE-14-0-0.33	1,2,3,7,8-PeCDD	2.46 JK	2.46 UJK
		Total PeCDD	33.8 JK	33.8 UJK
		Total PeCDF	22.2 JK	22.2 UJK
	SE-21-0-0.33	2,3,7,8-TCDF	0.575 JK	0.575 UJK
		Total TeCDD	0.404 JK	0.404 UJK
		Total TeCDF	3.19 JK	3.19 UJK
		Total PeCDF	3.70 JK	3.70 UJK
		Total HxCDF	8.49 JK	8.49 UJK
WO15951	RAU2-GA1-SO-3.25	1,2,3,4,7,8,9-HpCDF	0.415 JK	0.415 UJK
		1,2,3,7,8,9-HxCDD	0.869 JK	0.869 UJK
		Total TeCDD	3.80 JK	3.80 UJK
		Total PeCDD	5.48 JK	5.48 UJK
		Total HxCDD	12.1 JK	12.1 UJK
		Total TeCDF	21.7 JK	21.7 UJK
		Total PeCDF	19.7 JK	19.7 UJK
		Total HpCDF	36.3 JK	36.3 UJK
	RAU2-GA1-SO-5.75	Total TeCDD	3.56 JK	3.56 UJK
		Total PeCDD	7.36 JK	7.36 UJK
		Total HxCDD	10.1 JK	10.1 UJK
		Total TeCDF	24.3 JK	24.3 UJK
		Total PeCDF	26.1 JK	26.1 UJK
		Total HxCDF	15.5 JK	15.5 UJK
	RAU2-GA1-SO-8.25	2,3,7,8-TCDD	0.333 JK	0.333 UJK
		2,3,4,6,7,8-HxCDF	0.191 JK	0.191 UJK

Report	Sample	Component	Original Result (pg/g)	Qualified Result (pg/g)
		1,2,3,4,7,8,9-HpCDF	0.103 JK	0.103 UJK
		Total TeCDD	3.05 JK	3.05 UJK
		Total PeCDD	3.52 JK	3.52 UJK
		Total HxCDD	7.88 JK	7.88 UJK
		Total TeCDF	2.72 JK	2.72 UJK
		Total PeCDF	3.44 JK	3.44 UJK
		Total HxCDF	2.50 JK	2.50 UJK
		Total HpCDF	4.30 JK	4.30 UJK
	RAU2-GA2-SO-3.25	1,2,3,7,8-PeCDF	2.86 JK	2.86 UJK
		2,3,4,6,7,8-HxCDF	7.24 JK	7.24 UJK
		Total TeCDD	3.07 JK	3.07 UJK
		Total PeCDD	33.9 JKQ	33.9 UJK
		Total TeCDF	7.00 JK	7.00 UJK
		Total PeCDF	150 JKQ	150 UJK
	RAU2-GA2-SO-5.75	Total HxCDF	260 JK	260 UJK
		2,3,4,7,8-PeCDF	1.59 JK	1.59 UJK
		1,2,3,7,8-PeCDF	1.16 JK	1.16 UJK
		1,2,3,6,7,8-HxCDF	1.18 JK	1.18 UJK
		Total TeCDD	3.63 JK	3.63 UJK
		Total PeCDD	10.6 JK	10.6 UJK
		Total TeCDF	18.3 JK	18.3 UJK
		Total PeCDF	23.7 JK	23.7 UJK
	RAU2-GA2-SO-8.25	Total HxCDF	44.6 JK	44.6 UJK
		2,3,7,8-TCDD	0.550 JK	0.550 UJK
		2,3,7,8-TCDF	0.804 JK	0.804 UJK
		2,3,4,6,7,8-HxCDF	0.570 JK	0.570 UJK
		Total TeCDD	3.80 JK	3.80 UJK
		Total HpCDD	62.3 JK	62.3 UJK
Total TeCDF		7.13 JK	7.13 UJK	
Total PeCDF		8.46 JK	8.46 UJK	
Total HxCDF	12.0 JK	12.0 UJK		
<p>NOTES: JK = result is estimated and an estimated maximum potential concentration. JKQ = result is estimated and an estimated maximum potential concentration with quantitative interference. pg/g = picograms per gram UJK = result is non-detect at an estimated detection limit, at the estimated maximum potential concentration.</p>				

According to report WO15582, EPA Method 1613B 2,3,7,8-TCDF results detected above the reporting limit were confirmed by analysis on a secondary analytical column. Confirmation analysis results are the results of record.

According to report A9L0191 01 30 20 1620, Apex flagged an EPA Method 8270D result for sample RAU2-GA2-SO-3.25 as estimated because of insufficient chromatographic peak separation. The result has been qualified by the reviewer with “J,” as estimated.

Report	Sample	Component	Original Result (ug/kg)	Qualified Result (ug/kg)
A9L0191 01 30 20 1620	RAU2-GA2-SO-3.25	Benzo(k)fluoranthene	1,340	1,340 J
NOTES: J = result is estimated. ug/kg = milligrams per kilogram.				

The data are considered acceptable for their intended use, with the appropriate data qualifiers assigned.

HOLDING TIMES, PRESERVATION, AND SAMPLE STORAGE

Holding Times

According to report A9I0822, the SM 4500-S2-D sulfide analysis was performed three days after the recommended seven-day holding time for all samples. Report A9I0893 states that the SM 4500-S2-D analysis was performed one day after the recommended seven-day holding time for samples SE-01A-1.0-2.0 and SE-03A-0-1.0 and the pore water extract of sample SE-20-0-0.33. The reviewer confirmed that the samples were appropriately preserved and were extracted within seven days of collection and that the recommended holding time is seven days from collection to analysis. The results have been qualified by the reviewer with “J,” as estimated.

Report	Sample	Component	Units	Original Result	Qualified Result
A9I0822	SE-05a-2.0-3.0	Sulfide	mg/kg	4,040	4,040 J
	SE-29-0-2.0			1,510	1,510 J
	SE-08a-0-1.0			153	153 J
	SE-08c-3.2-4.2			124	124 J
A9I0893	SE-01A-1.0-2.0			865	865 J
	SE-03A-0-1.0			856	856 J
	SE-20-0-0.33 (pore water)		mg/L	0.059	0.059 J
NOTES: J = result is estimated. mg/kg = milligrams per kilogram. mg/L = milligrams per liter.					

According to report A9I0893, the Plumb/SM 4500-NH3-G ammonia as nitrogen analysis was performed 13 days after the recommended seven-day holding time for samples SE-01A-1.0-2.0, SE-03A-0-1.0, and SE-06A-0.5-1.5, and 14 days after the recommended seven-day holding time for samples SE-07A-0-1.0 and SE-02A-2.5-3.5. The reviewer confirmed that the analysis

was added to all five samples on October 11, 2019, which was eight to nine days after the recommended seven-day holding time. The results have been qualified by the reviewer with “J,” as estimated.

Report	Sample	Component	Original Result (mg/kg)	Qualified Result (mg/kg)
A9I0893	SE-01A-1.0-2.0	Ammonia as Nitrogen	290	290 J
	SE-03A-0-1.0		168	168 J
	SE-06A-0.5-1.5		408	408 J
	SE-07A-0-1.0		7.73	7.73 J
	SE-02A-2.5-3.5		230	230 J
NOTES: J = result is estimated. mg/kg = milligrams per kilogram.				

According to report A9I0893, the SM 2540G total volatile solids analysis was performed eight days after the recommended 14-day holding time for samples SE-01A-1.0-2.0, SE-03A-0-1.0, and SE-06A-0.5-1.5, and seven days after the recommended 14-day holding time for samples SE-07A-0-1.0 and SE-02A-2.5-3.5. The matrix spike/matrix spike duplicate (MS/MSD) prepared with sample SE-03A-0-1.0 was also flagged by Apex because of the holding time exceedance. The reviewer confirmed that the analysis was added to all five samples by MFA on October 11, 2019, which was two to three days after the recommended 14-day holding time. The results have been qualified by the reviewer with “J,” as estimated.

Report	Sample	Component	Original Result (percent)	Qualified Result (percent)
A9I0893	SE-01A-1.0-2.0	Total Volatile Solids	11.9	11.9 J
	SE-03A-0-1.0		8.11	8.11 J
	SE-06A-0.5-1.5		9.92	9.92 J
	SE-07A-0-1.0		20.7	20.7 J
	SE-02A-2.5-3.5		7.94	7.94 J
NOTE: J = result is estimated.				

According to report A0D0095, the NWTPH-Dx extraction for sample SE-07A-0-1.0 was performed within the method-recommended holding time because the holding time was extended by sample storage at -18°C. Apex also noted that the total time in 4°C storage for sample SE-07A-0-1.0 met holding time requirements.

The remaining extractions and analyses were performed within the recommended holding time criteria.

Preservation and Sample Storage

The samples were preserved and stored appropriately. Apex noted on the sample login forms associated with report A9I0893 that more containers than were noted on the chain of custody (COC) were received for samples SE-01A-1.0-2.0, SE-03A-0-1.0, and SE-06A-0.5-1.5. No action was required.

Apex noted on the cooler receipt form associated with report A9L0191 01 30 20 1620 that some volatile organic analysis vials had head space and/or sediment. Apex also noted that some samples had a pH of 8 when they should have been greater than 9 standard units. All noted samples were reported in a separate split report, A9L0191 01 30 20 1613, as they were associated with the upland sampling investigation. These samples are validated in a separate memorandum.

BLANKS

Method Blanks

Laboratory method blank analyses were performed at the required frequencies. For purposes of data qualification, the method blanks were associated with all samples prepared in the analytical batch. Where an analyte was detected in a sample and in the associated method blank, the sample result was qualified if the concentration was less than ten times the method blank concentration for EPA Methods 6020A, 7470A, and 7471B results and less than five times the method blank concentration for the remaining results. EPA Method 1613B sample results were qualified by the reviewer with “U,” as not detected at the sample result value, when the result was less than five times the associated method blank EMPC concentration.

For methods other than EPA 1613B, if an analyte was detected between the method detection limit and the method reporting limit (MRL) in both the sample and the associated method blank, the sample result was qualified U, as not detected at the MRL. If an analyte was detected above the MRL and at less than ten times the method blank concentration (for EPA Methods 6020A, 7470A, and 7471B) or less than five times the method blank concentration (for all other methods), the result was qualified U, as not detected at the sample value.

According to report WO15579, the EPA Method 1613B batch 42013 laboratory method blank had several analyte detections below MRLs. Associated rinsate blank sample results that were less than five times the method blank detections were qualified as follows:

Report	Sample	Component	Method Blank Result (pg/L)	Original Result (pg/L)	Qualified Result (pg/L)
WO15579	Rinsate Blank	1,2,3,4,6,7,8-HpCDD	2.44 J	3.78 JK	3.78 UJ
		1,2,3,4,6,7,8,9-OCDD	8.42 JK	82.6 J	82.6 UJ
		1,2,3,4,6,7,8-HpCDF	1.98 J	1.4 J	1.4 UJ
		1,2,3,4,6,7,8,9-OCDF	4.28 J	7.32 J	7.32 UJ
		Total HpCDD	2.44 J	3.78 JK	3.78 UJ
		Total HpCDF	4.00 J	3.09 J	3.09 UJ
NOTES: J = result is estimated. JK = result is estimated and an estimated maximum potential concentration. pg/L = picograms per liter, UJ = result is non-detect at an estimated detection limit.					

According to report WO15579, the EPA Method 1613B batch 42013 laboratory method blank had some detections below MRLs. Associated sample results less than five times the method blank detections were qualified as follows:

Report	Sample	Component	Method Blank Result (pg/g)	Original Result (pg/g)	Qualified Result (pg/g)	
WO15582	SE-14-0-0.33	1,2,3,7,8-PeCDF	0.458 JK	1.26 J	1.26 UJ	
		1,2,3,4,7,8-HxCDF	0.61 J	2.61 J	2.61 UJ	
		1,2,3,6,7,8-HxCDF	0.496 J	1.66 J	1.66 UJ	
		2,3,4,6,7,8-HxCDF	0.496 JK	1.85 J	1.85 UJ	
		1,2,3,4,7,8,9-HpCDF	0.790 J	2.34 JK	2.34 UJ	
	SE-21-0-0.33	2,3,4,7,8-PeCDF	0.442 JK	0.315 JK	0.315 UJ	
		1,2,3,4,7,8-HxCDF	0.61 J	0.376 JK	0.376 UJ	
		1,2,3,6,7,8-HxCDF	0.496 J	0.346 JK	0.346 UJ	
		2,3,4,6,7,8-HxCDF	0.496 JK	0.414 JK	0.414 UJ	
		1,2,3,4,7,8,9-HpCDF	0.790 J	0.462 J	0.462 UJ	
	SE-22-0-0.33	1,2,3,7,8-PeCDF	0.458 JK	1.16 J	1.16 UJ	
		1,2,3,7,8,9-HxCDF	0.618 J	1.15 J	1.15 UJ	
	NOTES: J = result is estimated. JK = result is estimated and an estimated maximum potential concentration. pg/g = picograms per gram. UJ = result is non-detect at an estimated detection limit.					

According to report WO15951, the EPA Method 1613B batch 42595 laboratory method blank had some detections below MRLs. Associated sample results less than five times the method blank detections were qualified as follows:

Report	Sample	Component	Method Blank Result (pg/g)	Original Result (pg/g)	Qualified Result (pg/g)
W015951	RAU2-GA1-SO-3.25	1,2,3,7,8-PeCDD	0.13 J	0.566 JK	0.566 UJ
	RAU2-GA1-SO-8.25			0.505 JK	0.505 UJ
	RAU2-GA1-SO-5.75	1,2,3,4,7,8-HxCDD	0.122 JK	0.162 JK	0.162 UJ
	RAU2-GA1-SO-8.25			0.111 JK	0.111 UJ
	RAU2-GA1-SO-5.75	1,2,3,7,8,9-HxCDD	0.152 J	0.604 J	0.604 UJ
	RAU2-GA1-SO-5.75	1,2,3,7,8-PeCDF	0.16 J	0.183 JK	0.183 UJ
	RAU2-GA1-SO-8.25			0.119 JK	0.119 UJ
	RAU2-GA1-SO-8.25	2,3,4,7,8-PeCDF	0.148 J	0.323 JK	0.323 UJ
	RAU2-GA1-SO-8.25	1,2,3,4,7,8-HxCDF	0.106 JK	0.115 J	0.115 UJ
	RAU2-GA2-SO-8.25			0.503 JK	0.503 UJ
	RAU2-GA1-SO-3.25	1,2,3,6,7,8-HxCDF	0.148 J	0.457 JK	0.457 UJ
	RAU2-GA1-SO-5.75			0.583 JK	0.583 UJ
	RAU2-GA1-SO-8.25			0.127 JK	0.127 UJ
	RAU2-GA1-SO-3.25	1,2,3,7,8,9-HxCDF	0.152 JK	0.223 J	0.223 UJ
RAU2-GA1-SO-5.75	0.259 J			0.259 UJ	

NOTES:
J = result is estimated.
JK = result is estimated and an estimated maximum potential concentration.
pg/g = picograms per gram.
UJ = result is non-detect at an estimated detection limit.

All remaining laboratory method blanks were non-detect.

Trip Blanks

Trip blanks were not required for this sampling event.

Equipment Rinsate Blanks

An equipment rinsate blank (Rinsate Blank) was submitted to Apex with samples associated with report A9I0893 for NWT PH-Dx, NWT PH-Gx, EPA Method 8082A, EPA Method 8270D, EPA Method 6020A, SM4500-NH3-G, SM 5310C, EPA 7470A, and SM 4500-S2-D-00 analyses. The rinsate blank was subcontracted by Apex to CFA for EPA Method 1613B analysis and reported in WO15579. The rinsate blank was also subcontracted by Apex to ARI for EPA Method 7470A and SM 4500-S2-D-00 analyses, and results were appended to report A9I0893. The rinsate blank was associated with all sample results reported in A9I0822, A9I0893, and A9J006. Qualification was not required when associated sample results were greater than five times the rinsate blank concentration.

The rinsate blank had a detection of SM 5310C total organic carbon (TOC) at 1.66 milligrams per liter. The associated sediment sample TOC results were greater than five times the rinsate blank concentration; thus, qualification was not required. The rinsate blank also had EPA Method 8270D detections of naphthalene and phenanthrene. Associated sample results were

compared to five times the rinsate blank detections, as shown in the following table. Qualification was not required, as all associated naphthalene and phenanthrene results were either non-detect or greater than five times the associated rinsate blank concentration. The rinsate blank naphthalene detection was also associated with a laboratory method blank detection of naphthalene; qualification is documented in the method blank section above.

Report	Sample	Analyte	Rinsate Blank (ug/L = ppb)	5 x Rinsate Blank (mg/kg = ppm)	Sample Result (mg/kg)
A9I0822	SE-29-0-2.0	Naphthalene	0.097	0.000485	0.491
A9J0006	SE-24-0-0.33				0.0698
	SE-17-0-0.33				0.0770
	SE-21-0-0.33				0.0492
	SE-26-0-0.33				0.0752
	SE-31-0-0.33				0.0742
	SE-16-0-0.33				0.0136 J
	SE-27-0-0.33				0.0181 J
	SE-29-0-2.0				0.491
	SE-30-2.5-4.5	0.148			
	Phenanthrene	SE-24-0-0.33	0.0163 J	0.000815	0.0768
SE-14-0-0.33		0.0398			
SE-23-0-0.33		0.213			
SE-17-0-0.33		0.575			
SE-15-0-0.33		0.0243			
SE-21-0-0.33		0.0195			
SE-25-0-0.33		0.0648			
SE-26-0-0.33		0.112			
SE-31-0-0.33	0.0289				
NOTES: J = result is estimated. mg/kg = milligrams per kilogram. ppb = parts per billion. ppm = parts per million. ug/L = micrograms per liter.					

According to report A9I0893, the EPA Method 8270D batch 9110614 laboratory method blank had a detection of naphthalene between the detection limit and the reporting limit, at 0.0216 micrograms per liter. The associated sample result had a detection of naphthalene above the reporting limit but within five times the method blank concentration. The associated sample result has been qualified by the reviewer with “J,” as estimated. The associated sample result was from an equipment rinsate blank, the results of which are evaluated against project sediment samples in the equipment rinsate blank section above.

Report	Sample	Component	Original Result (ug/L)	Qualified Result (ug/L)
A9I0893	Rinsate Blank	Naphthalene	0.0597	0.0597 J
NOTES: J = result is estimated. ug/L = micrograms per liter.				

According to report WO15579, the equipment rinsate blank had some EPA Method 1613B detected results. No qualifications were necessary, as all detected equipment rinsate blank results were qualified by the reviewer based on associated laboratory method blank detections.

All remaining equipment rinsate blank results were non-detect to detection limits.

SURROGATE RECOVERY RESULTS

The samples were spiked with surrogate compounds to evaluate laboratory performance on individual samples. The laboratory appropriately documented and qualified surrogate outliers. Associated batch quality assurance/quality control for samples with surrogate outliers was within acceptance criteria, except for the EPA 8082A MS (9120838-MS1) from report A9L0191, which is discussed in the MS section below.

According to report A9I0893, the EPA Method 8270D surrogate 2-fluorobiphenyl result for sample Rinsate Blank was below the lower percent recovery acceptance limit of 44 percent, at 37 percent. The remaining five surrogates had acceptable percent recoveries; thus, qualification was not required.

According to report A9J0006, the EPA Method 8082A surrogate decachlorobiphenyl result for sample SE-14-0-0.33 was below the lower percent recovery acceptance limit of 60 percent, at 59 percent. The associated sample results have been qualified by the reviewer with "J," as estimated. Non-detect results were qualified with J, for a final qualification of UJ as non-detect and estimated. Results already qualified because of detection below the reporting limit did not require additional qualification.

Report	Sample	Component	Original Result (ug/kg)	Qualified Result (ug/kg)
A9J0006	SE-14-0-0.33	Aroclor 1016	5.75 U	5.75 UJ
		Aroclor 1221	5.75 U	5.75 UJ
		Aroclor 1232	5.75 U	5.75 UJ
		Aroclor 1242	5.75 U	5.75 UJ
		Aroclor 1248	5.75 U	5.75 UJ
		Aroclor 1254	5.75 U	5.75 UJ
		Aroclor 1260	8.41 J	8.41 J
NOTES: J = result is estimated. U = result is non-detect at the detection limit. ug/kg = micrograms per kilogram. UJ = result is non-detect at an estimated detection limit.				

According to report A9J0006, the EPA Method 8270D surrogate p-terphenyl-d14 result for sample SE-21-0-0.33 was below the lower percent recovery acceptance limit of 54 percent, at 52 percent. The remaining five surrogates had acceptable percent recoveries; thus, qualification was not required.

According to report A9J0006, the EPA Method 8270D surrogate p-terphenyl-d14 result for sample SE-27-0-0.33 was below the lower percent recovery acceptance limit of 54 percent, at 41 percent. The surrogate 2-fluorobiphenyl result was below the lower percent recovery acceptance limit of 44 percent, at 37 percent. The remaining four surrogates had acceptable percent recoveries; thus, qualification was not required.

According to report A9L0191 01 30 20 1620, the EPA Method 8270D surrogate p-terphenyl-d14 result for sample RAU2-GA2-SO-5.75 was below the lower percent recovery acceptance limit of 54 percent, at 48 percent. The remaining four surrogates had acceptable percent recoveries; thus, qualification was not required.

According to report A9L0191 01 30 20 1620, EPA Method 8270D surrogates 2-fluorobiphenyl and p-tertphenyl-d14 had results below the lower acceptance limit of 44 and 54 percent, respectively, at 36 percent and 40 percent, respectively, for sample RAU2-GA2-SO-8.25. The EPA Method 8270D analytes associated with these basic surrogate compounds have been qualified by the reviewer with J, as estimated, in the table below.

Report	Sample	Component	Original Result (ug/kg)	Qualified Result (ug/kg)
A9L0191 01 30 20 1620	RAU2-GA2-SO-8.25	1,2,4-Trichlorobenzene	151 U	151 UJ
		1,2-Dichlorobenzene	151 U	151 UJ
		1,2-Dinitrobenzene	1510 U	1510 UJ
		1,3-Dichlorobenzene	151 U	151 UJ
		1,3-Dinitrobenzene	1,510 U	1,510 UJ

Report	Sample	Component	Original Result (ug/kg)	Qualified Result (ug/kg)
		1,4-Dichlorobenzene	151 U	151 UJ
		1,4-Dinitrobenzene	1,510 U	1,510 UJ
		1-Methylnaphthalene	121 U	121 UJ
		2,2'-Oxybis(1-Chloropropane)	151 U	151 UJ
		2,4-Dinitrotoluene	603 U	603 UJ
		2,6-Dinitrotoluene	603 U	603 UJ
		2-Chloronaphthalene	60.3 U	60.3 UJ
		2-Methylnaphthalene	121 U	121 UJ
		2-Nitroaniline	1,210 U	1,210 UJ
		3-Nitroaniline	1,210 U	1,210 UJ
		3,3'-Dichlorobenzidine	1,210 U	1,210 UJ
		4-Bromophenyl-phenylether	151 U	151 UJ
		4-Chloroaniline	151 U	151 UJ
		4-Chloro-phenyl-phenyl ether	151 U	151 UJ
		4-Nitroaniline	1,210 U	1,210 UJ
		Acenaphthene	60.3 U	60.3 UJ
		Acenaphthylene	60.3 U	60.3 UJ
		Aniline	302 U	302 UJ
		Anthracene	60.3 U	60.3 UJ
		Azobenzene	151 U	151 UJ
		Benzo(a)anthracene	60.3 U	60.3 UJ
		Benzo(a)pyrene	91.6 J	91.6 J
		Benzo(b)fluoranthene	90.7 U	90.7 UJ
		Benzo(g,h,i)perylene	60.3 U	60.3 UJ
		Benzo(k)fluoranthene	90.7 U	90.7 UJ
		bis(2-Chloroethoxy)methane	151 U	151 UJ
		bis(2-Chloroethyl)ether	151 U	151 UJ
		bis(2-Ethylhexyl) adipate	1,510 U	1,510 UJ
		bis(2-Ethylhexyl)phthalate	907 U	907 UJ
		Butylbenzylphthalate	603 U	603 UJ
		Carbazole	90.7 U	90.7 UJ
		Chrysene	60.3 U	60.3 UJ
		Dibenzo(a,h)anthracene	60.3 U	60.3 UJ
		Dibenzofuran	60.3 U	60.3 UJ
		Diethylphthalate	603 U	603 UJ
		Dimethylphthalate	603 U	603 UJ
		Di-n-butylphthalate	603 U	603 UJ
		Di-n-octylphthalate	603 U	603 UJ
		Fluoranthene	60.3 U	60.3 UJ

Report	Sample	Component	Original Result (ug/kg)	Qualified Result (ug/kg)
		Fluorene	60.3 U	60.3 UJ
		Hexachlorobenzene	60.3 U	60.3 UJ
		Hexachlorobutadiene	151 U	151 UJ
		Hexachlorocyclopentadiene	302 U	302 UJ
		Hexachloroethane	151 U	151 UJ
		Indeno(1,2,3-cd)pyrene	60.3 U	60.3 UJ
		Isophorone	151 U	151 UJ
		Naphthalene	121 U	121 UJ
		Nitrobenzene	603 U	603 UJ
		N-Nitrosodimethylamine	151 U	151 UJ
		n-Nitroso-di-n-propylamine	151 U	151 UJ
		n-Nitrosodiphenylamine	151 U	151 UJ
		Phenanthrene	60.3 U	60.3 UJ
		Pyrene	60.3 U	60.3 UJ
		Pyridine	302 U	302 UJ
NOTES: J = result is estimated. U = result is non-detect. ug/kg = micrograms per kilogram. UJ = result is non-detect at an estimated detection limit.				

All remaining surrogate recoveries were within acceptance limits.

MATRIX SPIKE/MATRIX SPIKE DUPLICATE RESULTS

MS/MSD results are used to evaluate laboratory precision and accuracy. All MS/MSD samples were extracted and analyzed at the required frequency. When MS/MSD percent recoveries and relative percent differences (RPDs) were outside acceptance limits because of high concentrations of analyte in the sample and MS/MSD exceedances were flagged by the laboratory because of high concentrations of analyte, no qualifications were made by the reviewer. Where MS/MSD results were not reported, batch precision was evaluated with laboratory duplicate or laboratory control sample/laboratory control sample duplicate (LCS/LCSD) sample results.

According to reports A9I0822, A9I0893, and A9J0006, the EPA Method 8270D batch 9100490 MS/MSD (9100490-MS1/MSD1) exceeded some upper and lower percent recovery acceptance limits. The MS and MSD were diluted 1:10 for analysis so that some detection limits and reporting limits were raised above spike concentration. The dilution required for analysis did not necessitate qualification of associated sample results.

According to reports A9I0822, A9I0893, and A9J0006, the EPA Method 8270D batch 9100490 MS/MSD (9100490-MS2/MSD2) exceeded some upper and lower percent recovery

acceptance limits. The MS/MSD were prepared with a sample from an unrelated project; thus, qualification was not required.

According to report A9I0822, the EPA Method 6020A batch 9100517 MS (9100517-MS1) results for copper exceeded the upper percent recovery acceptance limits of 125 percent, at 133 percent. The associated MSD had acceptable percent recovery and RPD; thus, qualification was not required. The MS exceeded the upper percent recovery acceptance limit for lead of 125 percent, at 334 percent, and the MS/MSD (9100517-MSD1) exceeded the RPD control limit of 40 percent, at 91 percent; thus, the associated sample result was qualified by the reviewer with “J,” as estimated.

Report	Sample	Component	Original Result (mg/kg)	Qualified Result (mg/kg)
A9I0822	SE-29-0-2.0	Lead	16.2	16.2 J
NOTES: J = result is estimated. mg/kg = milligrams per kilogram.				

According to report A9I0822, the Plumb/SM 4500-NH3-G MS (9091360-MS2) result for ammonia as nitrogen was below the lower percent recovery acceptance limit of 75 percent, at 70 percent. The associated MSD result was within percent recovery acceptance limits and the MS/MSD RPD met the control limit; thus, qualification was not required.

According to report A9I0822, the EPA Method 7471B batch BHI0876 MSD exceeded the upper percent recovery acceptance limit of 125 percent, at 126 percent. The exceedance was minor, the MS result was within percent recovery acceptance limits, and the MS/MSD RPD met the control limit; thus, qualification was not required.

According to report A9I0822, the SM 4500-S2-D-00 batch BHI0893 MSD result for sulfide exceeded the upper percent recovery acceptance limit of 125 percent, at 132 percent. The associated MSD result had acceptable percent recovery and the MS/MSD RPD met the control limit; thus, qualification was not required.

According to reports A9I0893 and A9J0006, the EPA Method 6020A batch 9100629 MS (9100629-MS1) results for copper exceeded the upper percent recovery acceptance limit of 125 percent, at 148 percent. The associated MSD had acceptable percent recovery and the MS/MSD RPD met the control limit; thus, qualification was not required.

According to report A9I0893, the Plumb/SM 4500-NH3-G MS/MSD (9100459-MS1/MSD1) results for ammonia as nitrogen were below the lower percent recovery acceptance limit of 75 percent, at 74 percent and 71 percent, respectively. The associated sample result was qualified by the reviewer with “J,” as estimated.

Report	Sample	Component	Original Result (mg/kg)	Qualified Result (mg/kg)
A9I0893	SE-10-2.0-3.7	Ammonia as Nitrogen	5.37	5.37 J
NOTES: J = result is estimated. mg/kg = milligrams per kilogram.				

According to report A9I0893, the EPA Method 7471B batch BHJ0281 MS (BHJ0281-MS1) results for mercury exceeded the upper percent recovery acceptance limit of 125 percent, at 139 percent. The associated MSD had acceptable percent recovery, and the MS/MSD RPD met the control limit; thus, qualification was not required.

According to report A9I0893, the SM 4500-S2-D-00 batch BHJ0054 MS/MSD results for sulfide were below the lower percent recovery acceptance limit of 75 percent, at 73.2 percent and 21.0 percent, respectively. The MS/MSD were analyzed at a 1:20 dilution; however, the spike concentration was adjusted for the dilution. The associated sample result was qualified by the reviewer with "J," as estimated.

Report	Sample	Component	Original Result (mg/kg)	Qualified Result (mg/kg)
A9I0893	SE-10-2.0-3.7	Sulfide	228	228 J
NOTES: J = result is estimated. mg/kg = milligrams per kilogram.				

According to report A9I0893, the SM 4500-S2-D-00 batch BHJ0145 MS result for sulfide was below the lower percent recovery acceptance limit of 75 percent, at 56.9 percent. The associated sample result, for the sample used to prepare the MS was qualified by the reviewer with "J," as estimated. Based on holding time exceedance, the reviewer assigned a final qualification of J to the associated sample result.

Report	Sample	Component	Original Result (mg/L)	Qualified Result (mg/L)
A9I0893	SE-20-0-0.33	Sulfide	0.059	0.059 J
NOTES: J = result is estimated. mg/L = milligrams per liter.				

According to report A9J0006, the EPA Method 8082A batch 9100667 MS result for Aroclor 1016 was below the lower percent recovery acceptance limit of 47 percent, at 46 percent. The sample used to prepare the MS, and the associated field sample, were qualified as follows:

Report	Sample	Component	Original Result (ug/kg)	Qualified Result (ug/kg)
A9J0006	SE-27-0-0.33	Aroclor 1016	2.07 U	2.07 UJ
	SE-27-0-0.33-Dup		1.92 U	1.92 UJ
NOTES: J = result is estimated. ug/kg = micrograms per kilogram. UJ = result is non-detect at an estimated detection limit.				

According to report A9J0006, the EPA Method 8270D batch 9100740 MS (9100740-MS1) was non-detect for 2,4-dinitrophenol and benzoic acid. The MS was diluted 1:4 for analysis, but spike concentrations were still above detection limits. The associated sample result for benzoic acid was non-detect and has been qualified by the reviewer with “J,” as estimated, with final qualification of “UJ,” as non-detect and estimated. Qualification of 2,4-dinitrophenol was not required, as results were not reported in associated samples. The MS result for 3,3'-dichlorobenzidine was above the upper percent recovery acceptance limit of 121 percent, at 123 percent; results were not reported in associated samples; thus, qualification was not required.

Report	Sample	Component	Original Result (ug/kg)	Qualified Result (ug/kg)
A9J0006	SE-24-0-0.33	Benzoic acid	1.85 U	1.85 UJ
NOTES: J = result is estimated. ug/kg = micrograms per kilogram. UJ = result is non-detect at an estimated detection limit.				

According to report A9L0191 01 30 20 1620, the EPA Method 8082A batch 9120838 MS (9120838-MS1) Aroclor 1016 result was below the lower percent recovery acceptance limit of 47 percent, at 42 percent. Additionally, the surrogate decachlorobiphenyl result was below the lower percent recovery acceptance limit of 60 percent, at 56 percent. The validator qualified the non-detect Aroclor 1016 result in the sample used to prepare the MS with “J,” as estimated, for a final qualification of UJ as non-detect and estimated.

Report	Sample	Component	Original Result (ug/kg)	Qualified Result (ug/kg)
A9L0191 01 30 20 1620	RAU2-GA2-SO-8.25	Aroclor 1016	8.98 U	8.98 UJ
NOTES: U = result is non-detect. ug/kg = micrograms per kilogram. UJ = result is non-detect at an estimated detection limit.				

According to report A9L0191 01 30 20 1620, the EPA Method 8270D batch 9120967 MS (9120967-MS2) di-n-octyl phthalate exceeded the upper percent recovery acceptance limit of 140 percent, at 147 percent; benzyl alcohol exceeded the upper percent recovery acceptance limit of 122 percent, at 125 percent; and bis(2-ethylhexyl) adipate exceeded the upper percent recovery acceptance limit of 121 percent, at 141 percent. The associated sample results (sample RAU2-GA2-SO-8.25) were non-detect; thus, qualification was not required. The MS result for

benzoic acid did not have measurable recovery; however, the MS spike concentration was below the detection limit because of a dilution. Qualification based on benzoic acid recovery was not required.

All remaining MS/MSD results were within acceptance limits for percent recovery and RPDs.

LABORATORY DUPLICATE RESULTS

Duplicate results are used to evaluate laboratory precision. All duplicate samples were extracted and analyzed at the required frequency. Laboratory duplicate results within five times the MRL were not evaluated for precision.

In reports A9I0822, A9I0893, and A9J0006, the EPA Method 8270D batch 9100490 laboratory duplicate results for fluoranthene, phenanthrene, and pyrene exceeded the RPD control limit of 30 percent, at 78, 63, and 81 percent, respectively. Associated sample results have been qualified by the reviewer with “J,” as estimated. Additional laboratory duplicate results flagged by Apex because of RPD exceedances did not require qualification, as the results either were not reported in associated samples or were detected at concentrations less than five times the reporting limit.

Report	Sample	Component	Original Result (mg/kg)	Qualified Result (mg/kg)
A9I0822	SE-29-0-2.0	Fluoranthene	1.15	1.15 J
		Phenanthrene	0.491	0.491 J
		Pyrene	0.823	0.823 J
NOTES: J = result is estimated. mg/kg = milligrams per kilogram.				

According to reports A9I0822 and A9I0893, the SM 2540G batch 9091474 laboratory duplicate (9091474-DUP1) exceeded the RPD control limit of 10 percent for total volatile solids, at 28 percent. The associated sample result has been qualified by the reviewer with “J,” as estimated.

Report	Sample	Component	Original Result (percent)	Qualified Result (percent)
A9I0822	SE-29-0-2.0	Total Volatile Solids	27.4	27.4 J
NOTE: J = result is estimated.				

In reports A9I0822 and A9I0893, the PSEP/SM 2540G batch 9091443 laboratory duplicate (9091433-DUP1) results were reported twice. One set of results was the original batch performed by Apex, with the RPD exceeding the control limit of 10 percent, at 12 percent. The second set of results was associated with the subcontracted total volatile solids results from ARI, with the RPD within a control limit of 20 percent. The associated sample result has been qualified by the reviewer with “J,” as estimated.

Report	Sample	Component	Original Result (percent)	Qualified Result (percent)
A9I0822	SE-29-0-2.0	Total Solids	42.9	42.9 J
NOTE: J = result is estimated.				

According to report A9I0893, the EPA 9060A-modified/SM 5310C batch 9100512 laboratory duplicate (9100512-DUP1) exceeded the RPD control limit of 20 percent for TOC, at 23 percent. The associated sample result has been qualified by the reviewer with “J,” as estimated.

Report	Sample	Component	Original Result (mg/kg)	Qualified Result (mg/kg)
A9I0893	SE-10-2.0-3.7	Total Organic Carbon	79,000	79,000 J
NOTES: J = result is estimated. mg/kg = milligrams per kilogram.				

According to report A9I0893, the SM 4500-S2-D-00 batch BHJ0054 laboratory duplicate (BHJ0054-BS1) exceeded the RPD control limit of 20 percent for sulfide, at 32.8 percent. The laboratory duplicate was reanalyzed the following day with acceptable RPD, at 15.8 percent; qualification was not required.

According to report A9J0006, the NWTPH-Gx batch 9100509 laboratory duplicate (9100509-DUP2) exceeded the RPD control limit of 30 percent, at 33 percent. The laboratory duplicate was prepared with a sample from an unrelated project; thus, qualification was not required.

According to report A9J0006, the PSEP/SM 2540G batch 9100520 laboratory duplicate (9100520-DUP1) exceeded the RPD control limit of 20 percent for total solids, at 25 percent. The laboratory duplicate results were reported a second time with an RPD control limit of 10 percent. The associated sample results have been qualified by the reviewer with “J,” as estimated.

Report	Sample	Component	Original Result (percent)	Qualified Result (percent)
A9J0006	SE-24-0-0.33	Total Solids	35.5	35.5 J
NOTES: J = result is estimated.				

According to report A9J0006, the SM 2540G batch 9100558 laboratory duplicate (9100558-DUP1) exceeded the RPD control limit of 10 percent for total volatile solids, at 38 percent. The associated sample results have been qualified by the reviewer with “J,” as estimated.

Report	Sample	Component	Original Result (percent)	Qualified Result (percent)
A9J0006	SE-24-0-0.33	Total Volatile Solids	18.9	18.9 J
NOTES: J = result is estimated.				

According to report A9J0006, the PSEP/SM 2540G batch 9100571 laboratory duplicate (9100571-DUP1) exceeded the RPD control limit of 20 percent for total solids, at 31 percent. The laboratory duplicate results were reported a second time with an RPD control limit of 10 percent. The associated sample results have been qualified by the reviewer with “J,” as estimated.

Report	Sample	Component	Original Result (percent)	Qualified Result (percent)
A9J0006	SE-25-0-0.33	Total Solids	40.6	40.6 J
NOTES: J = result is estimated.				

All remaining laboratory duplicate RPDs were within acceptance limits.

LABORATORY CONTROL SAMPLE/LABORATORY CONTROL SAMPLE DUPLICATE RESULTS

An LCS/LCSD is spiked with target analytes to provide information on laboratory precision and accuracy. The LCS/LCSD samples were extracted and analyzed at the required frequency.

According to reports A9I0822, A9I0893, and A9J0006, the EPA Method 8270D batch 9100490 LCS result for 3,3'-dichlorobenzidine exceeded the upper percent recovery acceptance limit of 121 percent, at 124 percent. Apex also noted that the associated continuing calibration verification (CCV) standard recovery was below the lower percent recovery acceptance limit, indicating a potential low bias in the LCS. The associated sample results were non-detect; thus, qualification was not required.

According to report A9I0893, the EPA Method 8270D batch 9100614 LCS/LCSD exceeded the RPD control limit of 30 percent for hexachlorocyclopentadiene, at 31 percent. The associated sample result was non-detect; thus, qualification was not required.

According to report A9J0006, the EPA Method 8270D batch 9100740 LCS exceeded the upper percent recovery acceptance limit of 121 percent for 3,3'-dichlorobenzidine, at 203 percent. The associated sample results were non-detect; thus, qualification was not required.

All remaining LCS/LCSD results were within acceptance limits for percent recovery and RPD.

FIELD DUPLICATE RESULTS

Field duplicate samples measure both field and laboratory precision. One field duplicate was submitted for analysis (MW2-112807/MW2-112807-Dup). MFA uses acceptance criteria of

100 percent RPD for results that are less than five times the MRL, or 50 percent RPD for results that are greater than five times the MRL. Non-detect data are not used in the evaluation of field duplicate results. All analytes were within the acceptance criteria.

CONTINUING CALIBRATION VERIFICATION RESULTS

CCV results are used to demonstrate instrument precision and accuracy through the end of the sample batch. Apex did not report CCV results. Quality control results flagged by Apex based on CCV exceedances required no action from the reviewer if the quality control results met percent recovery acceptance criteria.

REPORTING LIMITS

Apex and ARI reported non-detect results to detection limits. CFA reported non-detect results to estimated detection limits. Samples requiring dilutions because of high analyte concentrations and/or matrix interferences were reported with raised detection limits and reporting limits. Results between the detection limit and the reporting limit were qualified by Apex with “J,” as estimated.

The reviewer confirmed that NWTPH-Gx sediment results were reported with a base dilution factor of 1:50 because of a dilution required for analysis.

Apex raised some reporting limits and detection limits because of matrix interference. Results were flagged appropriately, and qualification was not required.

DATA PACKAGE

The data packages were reviewed for transcription errors, omissions, and anomalies.

According to report A9I0893, PSEP/SM 4500-NH3-G ammonia, EPA Method 9060A modified TOC, PSEP 1986 total solids, and SM 2540G total volatile solids analyses were added to SE-01A-1.0-2.0, SE-02A-2.5-3.5, SE-03A-0-1.0, SE-06A-0.5-1.5, and SE-07A-0-1.0 after samples were received by Apex. The reviewer confirmed that the analyses were added after the recommended seven-day holding time for ammonia was exceeded. Associated ammonia results are qualified in the holding time section above.

According to report A9I0893, EPA Method 7471B mercury analysis was canceled for SE-01A-1.0-2.0 and SE-03A-0-1.0 after the samples were received by the laboratory.

According to reports A9I0893 and A9J0006, EPA Method 8082A analysis was performed on air-dried sediment samples SE-20-0-0.33, SE-10-2.0-3.7, SE-30-2.5-4.5, SE-17-0-0.33, SE-18-0-0.33, SE-16-0-0.33, SE-22-0-0.33, SE-27-0-0.33, and SE-27-0-0.33-Dup. The reviewer confirmed that the preparation method, EPA Method 3546, allows air drying before extraction. No qualification was required.

EPA Method 8270D aqueous batch 9100456 results were included in the quality control section of report A9I0893, but no associated analytical results were reported. The reviewer

confirmed that project samples were originally analyzed in batch 9100456 but were reanalyzed in batch 9100614. No action was required for any batch 9100456 quality control exceedances.

According to report A9J0006, Apex noted on a sample login form that sample SE-15-0-0.33 collection time was recorded on all containers as 11:14 but was recorded as 11:44 on the COC. The laboratory reported sample collection time based on the COC. Apex also noted that the container received for sample SE-28-0-0.33 for sulfide analysis did not have a label and was identified by the process of elimination. Apex noted that three containers received for sample SE-26-0-0.33 were labeled as SE-06-0-0.33 and did not include a sample collection time. The reviewer confirmed that the sample containers were matched to the correct sample based on the bag in which they had been submitted. No additional action was required.

No other issues were found.

DRAFT

REFERENCES

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- ARI. 2018. Quality assurance plan. Rev. 16.1. Analytical Resources, Inc., Tukwila, Washington. November 12.
- CFA. 2018. Quality assurance plan. Rev. 15. Cape Fear Analytical, LLC, Wilmington, North Carolina. December 1.
- EPA. 1986. Test methods for evaluating solid waste, physical/chemical methods. EPA publication SW-846. 3d ed. U.S. Environmental Protection Agency. Final updates I (1993), II (1995), IIA (1994), IIB (1995), III (1997), IIIA (1999), IIIB (2005), IV (2008), V (2015), VI phase I (2017), VI phase II (2018), and VI phase III (2019).
- EPA. 2014. R10 data validation and review guidelines for polychlorinated dibenzo-p-dioxin and polychlorinated dibenzofuran data (PCDD/PCDF) using Method 1613B and SW846 Method 8290A. EPA-910-R-14-003. U.S. Environmental Protection Agency, Office of Environmental Assessment. May.
- EPA. 2016. EPA contract laboratory program, national functional guidelines for high resolution Superfund methods data review. EPA 542-B-16-001. U.S. Environmental Protection Agency, Office of Superfund Remediation and Technology Innovation. April.
- EPA. 2017a. EPA contract laboratory program, national functional guidelines for inorganic Superfund methods data review. EPA 540-R-2017-001. U.S. Environmental Protection Agency, Office of Superfund Remediation and Technology Innovation. January.
- EPA. 2017b. EPA contract laboratory program, national functional guidelines for Superfund organic methods data review. EPA 540-R-2017-002. U.S. Environmental Protection Agency, Office of Superfund Remediation and Technology Innovation. January.

DATA QUALITY ASSURANCE/QUALITY CONTROL REVIEW

PROJECT NO. 1044.02.14 | DECEMBER 3, 2020 | GRAYS HARBOR
HISTORICAL SEAPORT AUTHORITY

Maul Foster & Alongi, Inc., conducted an independent review of the quality of analytical results for sediment samples collected in July 2020 at Seaport Landing tidelands.

Apex Laboratories, LLC (Apex) and Analytical Resources, Inc. (ARI) performed the analyses. Apex report number A0G0628 was reviewed. Apex subcontracted ARI to perform sulfide and salinity analyses. The analyses performed and samples analyzed are listed below.

Analysis	Reference
Ammonia	Plumb/SM 4500-NH3-G
Salinity—Pore Water	SM 2520-B-00
Sulfide	SM 4500-S2-D-00
Sulfide—Pore Water	SM 4500-S2-D-00
Total Organic Carbon	EPA 9060A-modified
Total Solids	PSEP 1986
Total Volatile Solids	SM 2540G
NOTES: EPA = U.S. Environmental Protection Agency. PSEP = Puget Sound Estuary Protocol. SM = Standard Methods for the Treatment of Water and Wastewater.	

Samples Analyzed	
Report A0G0628	
SE-32	SE-37
SE-33	SE-38
SE-34	SE-39
SE-35	SE-40
SE-36	SE-41

DATA QUALIFICATIONS

Analytical results were evaluated according to applicable sections of U.S. Environmental Protection Agency (EPA) procedures (EPA, 2017a,b) and appropriate laboratory and method-specific guidelines (Apex, 2019; ARI, 2020; EPA, 1986).

Data validation procedures were modified, as appropriate, to accommodate quality-control requirements for methods not specifically addressed by the EPA procedures (e.g., Plumb/SM 4500-NH3-G).

The data are considered acceptable for their intended use, with the appropriate data qualifiers assigned.

HOLDING TIMES, PRESERVATION, AND SAMPLE STORAGE

Holding Times

According to report A0G0628, Apex flagged all SM 2540G total volatile solids results because of holding time exceedances. The reviewer confirmed that all analyses had been performed 13 days after sample collection, which is within the 14-day holding time recommended by the Washington State Department of Ecology sediment management standard guidelines (Ecology, 2019). The laboratory referenced the original SM 2540G holding time, which is seven days for water, wastewater, and sludge analysis. The SM 2540G analyses met the recommended project holding time; thus, qualification was not required.

According to report A0G0628, all SM 4500-S2-D sulfide analyses were performed three days after the recommended seven-day holding time for all sediment samples. The results have been qualified by the reviewer with “J,” as estimated.

Report	Sample	Component	Original Result (mg/kg)	Qualified Result (mg/kg)
A0G0628	SE-32	Sulfide	337	337 J
	SE-33		473	473 J
	SE-34		921	921 J
	SE-35		447	447 J
	SE-36		546	546 J
	SE-37		204	204 J
	SE-38		365	365 J
	SE-39		2,110	2,110 J
	SE-40		392	392 J
	SE-41		567	567 J
NOTES: J = result is estimated. mg/kg = milligrams per kilogram.				

The remaining extractions and analyses were performed within the recommended holding time criteria.

Preservation and Sample Storage

The samples were preserved and stored appropriately.

BLANKS

Method Blanks

Laboratory method blank analyses were performed at the required frequencies. For purposes of data qualification, the method blanks were associated with all samples prepared in the analytical batch.

All laboratory method blanks were non-detect to method reporting limits (MRLs).

Trip Blanks

Trip blanks were not required for this sampling event.

Equipment Rinsate Blanks

An equipment rinsate blank was not submitted to Apex for analysis.

SURROGATE RECOVERY RESULTS

Surrogates were not required for the analyses reviewed in report A0G0628.

MATRIX SPIKE/MATRIX SPIKE DUPLICATE RESULTS

Matrix spike/matrix spike duplicate (MS/MSD) results are used to evaluate laboratory precision and accuracy. All MS/MSD samples were extracted and analyzed at the required frequency. Where MS/MSD results were not reported, batch precision was evaluated with laboratory duplicate or laboratory control sample/laboratory control sample duplicate (LCS/LCSD) sample results.

According to report A0G0628, the SM 4500-S2-D-00 batch BIH0004 MS result for pore water sulfide was below the lower percent recovery acceptance limit of 75 percent, at 48.3 percent. The associated sample result, i.e., for the sample used to prepare the MS/MSD, was qualified by the reviewer with J, as estimated.

Report	Sample	Component	Original Result (mg/L)	Qualified Result (mg/L)
A0G0628	SE-10-2.0-3.7	Sulfide	0.060	0.060 J
NOTES: J = result is estimated. mg/L = milligrams per liter.				

All remaining MS/MSD results were within acceptance limits for percent recovery and relative percent differences (RPDs).

LABORATORY DUPLICATE RESULTS

Duplicate results are used to evaluate laboratory precision. All duplicate samples were extracted and analyzed at the required frequency. Laboratory duplicate results within five times the MRL were not evaluated for precision.

All laboratory duplicate results met the RPD acceptance criteria.

LABORATORY CONTROL SAMPLE/LABORATORY CONTROL SAMPLE DUPLICATE RESULTS

An LCS/LCSD) is spiked with target analytes to provide information on laboratory precision and accuracy. The LCS/LCSD samples were extracted and analyzed at the required frequency.

All LCS/LCSD results were within acceptance limits for percent recovery and RPD.

FIELD DUPLICATE RESULTS

Field duplicate samples measure both field and laboratory precision. Field duplicate samples were not submitted to Apex for analysis.

CONTINUING CALIBRATION VERIFICATION RESULTS

Continuing calibration verification (CCV) results are used to demonstrate instrument precision and accuracy through the end of the sample batch. Apex did not report CCV results.

REPORTING LIMITS

Apex and ARI reported non-detect results to MRLs. Samples requiring dilutions because of high analyte concentrations and/or matrix interferences were reported with raised detection limits and reporting limits.

DATA PACKAGE

The data packages were reviewed for transcription errors, omissions, and anomalies.

According to report A0G0628, all sediment samples except SE-39 were processed for pore water extraction upon receipt by Apex, and the pore water results were associated with sample names appended with “---After Processing.” The analyses performed on the original sediment samples were associated in the report with sample names appended with “---As Received.” The reviewer confirmed that pore water analyses for sample SE-39 had been canceled because insufficient pore water volume was extracted.

According to report A0G0628, SM 2540G total volatile solids analysis was added to all samples after samples had been received by Apex. No action was required by the reviewer.

No additional issues were found.

DRAFT

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