APPENDIX N
Data Validation Reports

GeoEngineers

Data Validation Report

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Project:	Port of Everett – Mill A Cleanup Site, Marine Area Sediment Investigation, Bioassay
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Bioassay testing was conducted as part of a follow-up to the initial Weyerhaeuser Former Mill A Marine Area sediment investigation that was completed in October 2015. Test sediment samples were collected on September 13, 2016 at locations previously selected for evaluation of biological effects under the Washington State Sediment Management Standards (Chapter 173-204 WAC). The samples were obtained from the former Mill A Site located at 3500 Terminal Avenue in Everett, Snohomish County, Washington.

DATA QUALITY ASSURANCE REVIEW

Ramboll Environ US Corporation (Ramboll), an Ecology-certified laboratory (Accreditation No. C2021) located in Port Gamble, Washington conducted the bioassay testing and reference sediment sample collection. Biological testing was completed in general accordance with the Marine Area SAP (GeoEngineers 2014), Puget Sound Estuary Program's (PSEP) recommended protocols (PSEP 1995), and the Sediment Cleanup Users Manual II (SCUM II) (Ecology 2015) with modifications as specified by the Sediment Management Annual Review Meeting (SMARM) papers documented in Appendix B of SCUM II (Ecology 2013).

The standard suite of bioassays included both acute and chronic tests to characterize toxicity of 11 surface sediment samples (9 test samples from the Marine Area and 2 reference samples from Carr Inlet). Bioassay testing for each sample included:

- 10-day amphipod mortality test (acute toxicity) using *Eohaustorius estuarius*.
- 20-day juvenile infaunal growth test (chronic toxicity) using *Neanthes arenaceodentata*.
- Sediment larval test (acute toxicity) using *Mytilus galloprovincialis*.

Bioassay procedures, test conditions and results are documented in Ramboll 2016. All procedures and test conditions met specifications, with the exception of temperature during the amphipod test. On the fourth day of the test the temperature dropped below the ideal range for test performance (15 °C ± 1°) by half a degree in almost all test chambers; the water bath temperature was adjusted but the temperature dipped slightly below 14 °C (the lower end of the range) on several more occasions. This small deviation in temperature is well within the natural variability in temperature experienced by the test organism in its native habitat and is not expected to have adversely affected the test outcome.

Bioassay testing required that test sediments be run with matching reference sediment to factor out sediment grain-size effects on bioassay organisms. Matching test and reference sediment is based on the percent fine-grained (i.e., silt and clay) sediment in each sample. 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.

Mill A bioassay sample locations had been previously characterized for grain size and other chemical and conventional parameters in October 2015. Percent fines, as measured in the laboratory using PSEP protocol, ranged from 3.2 to 57.7 percent in the 2015 samples. A grain size match between a reference sample and test

sample percent fines is generally considered to be within 20 percent of each other. The grain size for reference sediment samples was targeted at 20 percent and 40 percent fines to provide samples within a matching range for the 2016 bioassay samples. A wet-sieve grain size analysis of the reference sediment was conducted in the field at the time of collection by Ramboll to estimate the percent fines in the reference samples. The apparent reference sediment grain sizes were 16 percent and 44 percent fines, which was considered acceptable for use in the bioassays. The wet-sieve technique was also applied to the test samples upon receipt by Ramboll to confirm the appropriateness of the reference samples. The apparent grain size for the test samples ranged from 18 percent to 40 percent fines and was within the range considered a match.

An aliquot of each of the 2016 reference and test sediment samples was also submitted to ARI for grain size analysis using the PSEP protocols. Subsequent laboratory grain size results indicated that the reference samples were much coarser than predicted by the wet sieve technique (4.9 and 17.6 versus 16 and 44 percent fines). Wet-sieve data are not expected to exactly match laboratory grain size results but are typically anticipated to be within 10 percent of the laboratory results. The laboratory results indicated that the grain size for the test samples ranged from 18.5 to 58.7 percent fines and were within the range previously observed for the test samples. Therefore, the percent fines of the test samples, as measured using PSEP protocols, were all greater than the percent fines of the reference samples. Additionally, with the exception of one test sample (MAF-SS-09-0-10), the percent fines of the test samples were greater than the percent fines measured in the reference samples by more than 20 percent. The percent fines measured in the reference and test sediment samples using both the wet-sieve and PSEP protocols are summarized below.

TABLE 1: REFERENCE AND TEST SEDIMENT SAMPLE GRAIN SIZE COMPARISON

Sample	2016 Wet-sieve Estimate of Percent Fines	2016 Analytical Results for Percent Fines (PSEP Protocol)
Carr-16	16	4.9
Carr-44	44	17.6
MAF-SS-09-0-10	18	18.5
MAF-SS-10-0-10	24	39.4
MAF-SS-11-0-10	20	47.6
MAF-SS-12-0-10	32	46.4
MAF-SS-20-0-10	40	49.2
MAF-SS-21-0-10	32 (average)	50.7
MAF-SS-22-0-10	30	45.0
MAF-SS-31-0-10	34	52.6
MAF-SS-35-0-10	34	58.7

OVERALL ASSESSMENT

Because the percent fines of the test samples, as measured using PSEP protocols, were all greater than the percent fines of the reference samples, the characteristics and performance of the reference samples were evaluated further. Carr-44 had higher percent fines than Carr-16 (17.6% vs 4.9%). In addition, Carr-44 had the

highest percent survival (100%) among control and reference samples in the amphipod bioassay, test organisms grew more than control or Carr-16 organisms in the polychaete growth bioassay and had a higher normal survivorship relative to control when compared to Carr-16. Statistical and threshold comparison with Carr-44 would result in a more protective outcome than Carr-16. Because the bioassays performed on reference sample Carr-44 met quality assurance and control benchmarks, had higher percent fines in the sediment and would provide a conservative assessment of biological effects, Carr-44 is recommended for use in statistical comparisons to the test samples and for the purpose of decision making. The bioassay lab elected to use Carr-44 for all comparisons except MAF-SS-09, which was compared to Carr-16. MAF-SS-09 was also within 20% of the grain size reported for Carr-16 and therefore appropriate to use. The outcome of all tests associated with MAF-SS-09 would have been the same had Carr-44 been used for comparison, therefore all results are acceptable as reported by the lab.

The lab identified two anomalous result for a single replicate in both MAF-SS-09 (Replicate 1) and MAF-SS-12 (Replicate 5) for the larval bioassay. In each case the replicate results for normal survivors were an order of magnitude lower than all other replicates in the sample. Counts of a backup subsample for each replicate confirmed the anomalous results. Statistical tests also identified these replicates as outliers. The lab did not carry forward the anomalous results in comparisons to regulatory standards (i.e., MAF-SS-09 and MAF-SS-12 comparisons are based on 4 replicates rather than 5). Upon review of the laboratory bench sheets and statistical outputs, this response to anomalous results seems reasonable and regulatory comparisons, as presented by the lab, are acceptable.

REFERENCES

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Data Validation Report

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Project: Port of Everett – Mill A Cleanup Site, Marine Area Sediment Investigation October and November 2015 Sampling Events

GEI File No: 00676-020-04

Date: November 29, 2016

This report documents the results of a United States Environmental Protection Agency (USEPA)-defined Stage 2B data validation (USEPA Document 540-R-08-005; USEPA 2009) of analytical data from the analyses of surface/subsurface sediment and pore water samples collected as part of the October and November 2015 sampling events, and the associated laboratory and field quality control (QC) samples. The samples were obtained from the former Mill A Site located at 3500 Terminal Avenue in Everett, Snohomish County, Washington.

OBJECTIVE AND QUALITY CONTROL ELEMENTS

GeoEngineers, Inc. (GeoEngineers) completed the data validation consistent with USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review (USEPA 2008) and Inorganic Superfund Data Review (USEPA 2010) (National Functional Guidelines) to determine if the laboratory analytical results meet the project objectives and are usable for their intended purpose. Data usability was assessed by determining if:

- The samples were analyzed using well-defined and acceptable methods that provide reporting limits below applicable regulatory criteria;
- The precision and accuracy of the data are well-defined and sufficient to provide defensible data; and
- The quality assurance/quality control (QA/QC) procedures utilized by the laboratory meet acceptable industry practices and standards.

In accordance with the Marine Area Remedial Investigation Sampling and Analysis Plan (GeoEngineers, 2014), the data validation included review of the following QC elements:

- Data Package Completeness
- Chain-of-Custody Documentation
- Holding Times and Sample Preservation
- Surrogate Recoveries
- Method Blanks
- Matrix Spikes/Matrix Spike Duplicates

- Laboratory Control Samples/Laboratory Control Sample Duplicates
- Laboratory and Field Duplicates
- Instrument Tuning
- Internal Standards
- Initial Calibrations (ICALs)
- Continuing Calibrations (CCALs)
- Dilutions
- Miscellaneous

VALIDATED SAMPLE DELIVERY GROUPS

This data validation included review of the sample delivery groups (SDGs) listed below in Table 1.

TABLE 1: SUMMARY OF VALIDATED SAMPLE DELIVERY GROUPS

Laboratory SDG	Samples Validated
AOZ7 (K1512185)	MAF-SS-07_0-10, MAF-SS-08_0-10, MAF-SS-DUP-02, MAF-SS-09_0-10, MAF-SS-31_0-10, MAF-SS-32_0-10, MAF-SS-33_0-10, MAF-SS-DUP-06, MAF-SS-35_0-10, MAF-SS-36_0-10 **Sample submitted to secondary laboratory for Chlorinated Herbicides analysis:** MAF-SS-32_0-10
AOZ8	MAF-SS-01_0-10, MAF-SS-DUP-01, MAF-SS-02_0-10, MAF-SS-03_0-10, MAF-SS-04_0-10, MAF-SS-05_0-10, MAF-SS-10_0-10, MAF-SS-11_0-10, MAF-SS-12_0-10, MAF-SS-13_0-10, MAF-SS-19_0-10, MAF-SS-20_0-10, MAF-SS-34_0-10
APB6	MAF-SS-14_0-10, MAF-SS-15_0-10, MAF-SS-16_0-10, MAF-SS-17_0-10, MAF-SS-18_0-10, MAF-SS-21_0-10, MAF-SS-DUP-04, MAF-SS-22_0-10, MAF-SS-23_0-10, MAF-SS-24_0-10, MAF-SS-25_0-10, MAF-SS-26_0-10, MAF-SS-27_0-10, MAF-SS-28_0-10, MAF-SS-DUP-05, MAF-SS-29_0-10, MAF-SS-30_0-10, MAF-SS-DUP-03
APG3	Porewater Samples MAF-SS-07_0-10, MAF-SS-08_0-10, MAF-SS-DUP-02, MAF-SS-09_0-10, MAF-SS-31_0-10, MAF-SS-32_0-10, MAF-SS-33_0-10, MAF-SS-DUP-06, MAF-SS-35_0-10, MAF-SS-36_0-10
API3	Porewater Samples MAF-SS-01_0-10, MAF-SS-DUP-01, MAF-SS-02_0-10, MAF-SS-03_0-10, MAF-SS-04_0-10, MAF-SS-05_0-10, MAF-SS-10_0-10, MAF-SS-11_0-10, MAF-SS-12_0-10, MAF-SS-13_0-10, MAF-SS-19_0-10, MAF-SS-20_0-10, MAF-SS-34_0-10
APJ0	MAF-SC-04_0-2, MAF-SC-DUP-05, MAF-SC-04_2-4, MAF-SC-DUP-06, MAF-SC-04_4-6, MAF-SC-04_8-10

Laboratory SDG	Samples Validated
APK3	Porewater Samples MAF-SS-17_0-10, MAF-SS-18_0-10, MAF-SS-21_0-10, MAF-SS-DUP-04, MAF-SS-22_0-10, MAF-SS-23_0-10, MAF-SS-24_0-10, MAF-SS-25_0-10, MAF-SS-28_0-10, MAF-SS-29_0-10, MAF-SS-30_0-10, MAF-SS-DUP-03
APK4	Porewater Samples MAF-SS-14_0-10, MAF-SS-15_0-10, MAF-SS-16_0-10, MAF-SS-DUP-05, MAF-SS-26_0-10, MAF-SS-27_0-10
APM7	MAF-SC-04_4-6
APQ8	MAF-SC-10_0-2, MAF-SC-DUP-07, MAF-SC-21_0-1, MAF-SC-DUP-09
APR5	MAF-SC-11_0-2, MAF-SC-11_2-4, MAF-SC-12_0-2, MAF-SC-12_2-4, MAF-SC-15_0-2, MAF-SC-DUP-08
AQN4	MAF-SC-01_0-2, MAF-SC-DUP-01, MAF-SC-01_2-4, MAF-SC-01_4-6, MAF-SC-01_20-22, MAF-SC-DUP-02, MAF-SC-02_0-2, MAF-SC-02_2-4, MAF-SC-02_4-6, MAF-SC-02_20-22, MAF-SC-DUP-10, MAF-SC-03_0-2, MAF-SC-DUP-03, MAF-SC-03_2-4, MAF-SC-03_4-6, MAF-SC-03_8-10, MAF-SC-05_0-2, MAF-SC-05_4-6
ASA4	MAF-SC-10_0-2, MAF-SC-DUP-07, MAF-SC-11_0-2, MAF-SC-11_2-4, MAF-SC-12_0-2, MAF-SC-12_2-4, MAF-SC-15_0-2, MAF-DUP-08, MAF-SC-21_0-1, MAF-SC-DUP-09
Second Round of Requested Analyses – All Samples Validated by GeoEngineers	
16H0006	MAF-SS-22_0-10, MAF-SS-23_0-10, MAF-SS-35_0-10
16H0238	MAF-SC-03_21-23, MAF-SC-04_16-18, MAF-SC-05_12-14, MAF-SC-10_6-7.6, MAF-SC-11_6-8, MAF-SC-20_1-2, MAF-SC-21_2-4
16I0213	MAF-SS-37_0-10, MAF-SS-38_0-10, MAF-SS-39_0-10, MAF-SS-40_0-10, MAF-SS-41_0-10, MAF-SS-42_0-10, MAF-SS-43_0-10, MAF-SS-44_0-10, MAF-SS-45_0-10, MAF-SS-46_0-10, MAF-SS-47_0-10, MAF-SS-48_0-10, MAF-SS-49_0-10, MAF-SS-50_0-10, MAF-SS-51_0-10, MAF-SS-52_0-10, MAF-SS-53_0-10, MAF-SS-54_0-10
9372 (Dioxins - PCB Congeners)	MAF-SS-01_0-10, MAF-SS-03_0-10, MAF-SS-04_0-10, MAF-SS-05_0-10, MAF-SS-07_0-10, MAF-SS-09_0-10, MAF-SS-31_0-10, MAF-SS-35_0-10
9373 (Dioxins - PCB Congeners)	MAF-SS-11_0-10, MAF-SS-13_0-10, MAF-SS-19_0-10, MAF-SS-20_0-10, MAF-SS-22_0-10
9393 (PCB Congeners)	MAF-SC-DUP-06
9396 (PCB Congeners)	MAF-SC-11_2-4, MAF-SC-12_2-4
9402 (PCB Congeners)	MAF-SC-21_2-4
9429 (PCB Congeners)	MAF-SC-01_0-2, MAF-SC-04_16-18
9431 (PCB Congeners)	MAF-SC-03_21-23, MAF-SC-05_0-2, MAF-SC-05_12-14
17A0289/10402 (Dioxins - PCB Congeners)	MAF-SS-37_0-10, MAF-SS-38_0-10, MAF-SS-46_0-10, MAF-SS-49_0-10
10552 (Dioxins)	MAF-SS-37_0-10, MAF-SS-40_0-10, MAF-SS-49_0-10

CHEMICAL ANALYSIS PERFORMED

Analytical Resources, Inc. (ARI), located in Tukwila, Washington, performed laboratory analysis on the sediment samples using one or more of the following methods:

- Semi-volatile Organic Compounds (SVOCs) by Method SW8270D and SW8270D-SIM;
- Resin Acids by Method SW8270D;
- Polycyclic Aromatic Hydrocarbons (PAHs) by Method SW8270D-SIM;
- Pesticides by Method SW8081;
- Total Metals by Methods EPA6010C/7471A;
- Total Solids (TS), Preserved Total Solids (PTS), and Total Volatile Solids (TVS) by Method SM2540G;
- N-Ammonia by Method EPA350.1M;
- Sulfide by Method SM4500-S2D; and
- Total Organic Carbon (TOC) by Method Plumb 1981

ARI performed laboratory analysis on the porewater samples using one or more of the following methods:

- Tributyltin Ion (TBT) by Method SW8270D-SIM;
- pH by Method SM4500H;
- Ammonia nitrogen by Method EPA350.1M; and
- Sulfides by Method SM4500-S2D

ALS Environmental (ALS) located in Kelso, Washington, performed laboratory analysis on the sediment samples using the following method:

- Chlorinated Herbicides by Method SW8151A

DATA VALIDATION SUMMARY

The results for each of the QC elements are summarized below.

Data Package Completeness

ARI and ALS provided all required deliverables for the data validation according to the National Functional Guidelines. The laboratories followed adequate corrective action processes and all identified anomalies were discussed in the relevant laboratory case narrative.

Chain-of-Custody Documentation

Chain-of-custody (COC) forms were provided with the laboratory analytical reports. The COCs were accurate and complete when submitted to the lab, with the following exceptions:

SDG APB6: The laboratory noted that one 4-ounce jar was broken during log-in at the laboratory for Sample MAF-SS-DUP-05. The sample was contained and placed in a new jar.

SDG APG3: The laboratory noted that there was limited porewater sample volume for Sample MAF-SS-DUP-02. For this reason, only ammonia analysis was performed.

Holding Times and Sample Preservation

The sample holding time is defined as the time that elapses between sample collection and sample analysis. Maximum holding time criteria exist for each analysis to help ensure that the analyte concentrations found at the time of analysis reflect the concentration present at the time of sample collection. Established holding times were met for all analyses, with the exception noted below. The sample coolers arrived at the laboratory within the appropriate temperatures of between 2 and 6 degrees Celsius, with the exceptions noted below.

SDGs AOZ7/AOZ8: One sample cooler temperature recorded at the laboratory was 1.6 degrees Celsius. It was determined through professional judgment that since the samples were not frozen, this temperature should not affect the sample analytical results.

SDG API3: (Sulfide) The 7-day holding time for sulfide was exceeded by 7 days in porewater Sample MAF-SS-12_0-10, due to lab error. The positive result for sulfide was qualified as estimated (J) in this sample.

SDG 16I0213: (pH) The 15 minute holding time for pH was exceeded in Samples MAF-SS-37_0-10, MAF-SS-38_0-10, and MAF-DUP-07. However, the samples were analyzed within 24 hours. The positive results for pH were qualified as estimated (J) in these samples.

Surrogate Recoveries

A surrogate compound is a compound that is chemically similar to the organic analytes of interest, but unlikely to be found in any environmental sample. Surrogates are used for organic analyses and are added to all samples, standards, and blanks to serve as an accuracy and specificity check of each analysis. The surrogates are added to the samples at a known concentration and percent recoveries (%R) are calculated following analysis. All surrogate recoveries for field samples were within the laboratory control limits, with the following exceptions:

SDG AOZ8: (Resin Acids) The %R for surrogate o-Methyl podocarpic acid was not recoverable in Sample MAF-SS-03_0-10. The sample required dilution (30X). The surrogates are added to the sample when it is extracted. If the sample is diluted 10X or more, accurate recovery of the surrogates is often not possible because it is also diluted below the linear calibration range of the instrument. No action was required for this outlier.

SDG APG3: (TBT) The %R for surrogate tripropyl tin chloride was less than the control limits in Samples MAF-SS-32_0-10, MAF-SS-33_0-10, and MAF-SS-DUP-06; however, the porewater samples were spiked with one additional surrogate, all within the control limits. No action was required for these outliers.

SDG API3: (TBT) The %R for surrogates tripropyl tin chloride and tripentyl tin chloride was less than the control limits in porewater Sample MAF-SS-34_0-10. The reporting limit for tributyltin ion was qualified as estimated (UJ) in this sample.

SDG APJ0: (SVOCs) The surrogates were not recoverable in the dilutions for Samples MAF-SC-04_0-2 and MAF-SC-DUP-05. The samples required dilution (50X). The surrogates are added to the sample when it is extracted. If the sample is diluted 10X or more, accurate recovery of the surrogates is often not possible because it is also diluted below the linear calibration range of the instrument. No action was required for these outliers.

Additionally, the %R for surrogate d14-p-Terphenyl was greater than the control limits in the dilution for Sample MAF-SC-DUP-06; however, the sample was spiked with three additional base neutral surrogates

and in each case the %R values were within their respective control limits. No action was required for this outlier.

(PAHs) The %R for many of the surrogates was less than the control limits or not recoverable in Samples MAF-SC-04_0-2, MAF-SC-DUP-05, MAF-SC-04_4-6, MAF-SC-DUP-06, and MAF-SC-04_8-10. The samples required dilution at varying dilution factors. The surrogates are added to the sample when it is extracted. If the sample is diluted 10X or more, accurate recovery of the surrogates is often not possible because it is also diluted below the linear calibration range of the instrument. No action was required for these outliers.

SDG APR5: (SVOCs-SIM) The %R for surrogate d14-p-Terphenyl was greater than the control limits in Samples MAF-SC-12_0-2 and MAF-SC-15_0-2. The positive results for 1,2-Dichlorobenzene and 1,4-Dichlorobenzene were qualified as estimated (J) in Sample MAF-SC-12_0-2. There were no positive results for target analytes associated with this surrogate in Sample MAF-SC-15_0-2; therefore, no action was required.

(PAHs) The %R for surrogates d10-Fluoranthene and d14-Dibenzo(a,h)anthracene was less than the control limits or not recoverable in Sample MAF-SC-12_2-4. The sample required dilution (10X). The surrogates are added to the sample when it is extracted. If the sample is diluted 10X or more, accurate recovery of the surrogates is often not possible because it is also diluted below the linear calibration range of the instrument. No action was required for these outliers.

SDG AQN4: (SVOCs) The %R for surrogate d14-p-Terphenyl was greater than the control limits in Sample MAF-SC-01_0-2; however, the sample was spiked with three additional base neutral surrogates and in each case the %R values were within their respective control limits. No action was required for this outlier.

The %R for surrogate d4-1,2-Dichlorobenzene was less than the control limits in Sample MAF-SC-01_4-6; however, the sample was spiked with three additional base neutral surrogates and in each case the %R values were within their respective control limits. No action was required for this outlier.

(SVOCs-SIM) The %R for surrogate d14-p-Terphenyl was greater than the control limits in Sample MAF-SC-01_0-2. The positive results for 1,2,4-Trichlorobenzene, 1,4-Dichlorobenzene, and hexachlorobutadiene were qualified as estimated (J) in Sample MAF-SC-01_0-2.

(PAHs) The %R for surrogates d10-2-Methylnaphthalene and d14-Dibenzo(a,h)anthracene was less than the control limits or not recoverable in Samples MAF-SC-02_0-2 and MAF-SC-02_4-6. Additionally, the %R for surrogate d14-Dibenzo(a,h)anthracene was less than the control limits in Samples MAF-SC-01_4-6, MAF-SC-03_0-2, MAF-SC-DUP-03, MAF-SC-03_4-6, and MAF-SC-03_8-10. The samples required dilution at varying dilution factors. The surrogates are added to the sample when it is extracted. If the sample is diluted 10X or more, accurate recovery of the surrogates is often not possible because it is also diluted below the linear calibration range of the instrument. No action was required for these outliers.

Method Blanks

Method blanks are analyzed to ensure that laboratory procedures and reagents do not introduce measurable concentrations of the analytes of interest. A method blank was analyzed with each batch of samples, at a frequency of 1 per 20 samples. For all sample batches, method blanks were analyzed at the required frequency. None of the analytes of interest were detected in any of the method blanks, with the following exceptions:

SDG AOZ7: (PAHs) There was a positive result for fluoranthene, phenanthrene, and pyrene detected above the method detection limit, but below the reporting limit in the method blank extracted on

10/30/2015. The associated field samples, MAF-SS-07_0-10, MAF-SS-09_0-10, MAF-SS-31_0-10, MAF-SS-32_0-10, MAF-SS-33_0-10, MAF-SS-DUP-06, MAF-SS-35_0-10, and MAF-SS-36_0-10, reported positive results detected above the reporting limit or at concentrations greater than 5X the concentration in the method blank for these analytes; therefore, no qualification was required. The positive results for fluoranthene, phenanthrene, and pyrene were qualified as non-detected (U) in Samples MAF-SS-08_0-10 and MAF-SS-DUP-02.

(Metals) There was a positive result for cadmium, copper, and zinc detected above the method detection limit, but below the reporting limit in the method blank extracted on 11/3/2015. The associated field samples, MAF-SS-07_0-10, MAF-SS-31_0-10, MAF-SS-32_0-10, MAF-SS-33_0-10, MAF-SS-DUP-06, and MAF-SS-36_0-10, reported positive results detected above the reporting limit or at concentrations greater than 10X the concentration in the method blank for these analytes; therefore, no qualification was required. The positive results for cadmium were qualified as non-detected (U) in Samples MAF-SS-08_0-10, MAF-SS-DUP-02, and MAF-SS-09_0-10.

SDG K1512185: (Herbicides) There was a positive result for butanoic acid (2,4-DB) detected above the method detection limit, but below the reporting limit in the method blank extracted on 10/30/2015. There were no positive results for this target analyte in the associated field sample; therefore, no action was required.

SDG AOZ8: (Metals) There was a positive result for copper detected above the method detection limit, but below the reporting limit in the method blank extracted on 11/4/2015. The associated field samples reported positive results detected above the reporting limit for this target analyte; therefore, no qualification was required.

SDG APB6: (SVOCs) There was a positive result for phenol detected above the reporting limit in the method blank extracted on 10/28/2015. The associated field samples, MAF-SS-21_0-10 and MAF-SS-DUP-04, reported positive results at concentrations greater than 5X the concentration in the method blank for this analyte; therefore, no qualification was required. The positive results for phenol were qualified as non-detected (U) in Samples MAF-SS-17_0-10, MAF-SS-18_0-10, MAF-SS-25_0-10, and MAF-SS-27_0-10. There were no positive results for this target analyte in Samples MAF-SS-14_0-10, MAF-SS-15_0-10, MAF-SS-16_0-10, MAF-SS-24_0-10, and MAF-SS-26_0-10; therefore, no action was required.

(Metals) There was a positive result for cadmium, copper, and zinc detected above the method detection limit, but below the reporting limit in the method blank extracted on 11/3/2015. The associated field samples, MAF-SS-15_0-10 (no positive results for cadmium), MAF-SS-17_0-10, MAF-SS-18_0-10, MAF-SS-21_0-10, and MAF-SS-DUP-04, reported positive results detected above the reporting limit or at concentrations greater than 10X the concentration in the method blank for these analytes; therefore, no qualification was required. The positive results for cadmium were qualified as non-detected (U) in Samples MAF-SS-14_0-10, MAF-SS-16_0-10, MAF-SS-24_0-10, MAF-SS-25_0-10, MAF-SS-26_0-10, and MAF-SS-27_0-10.

SDG APQ8: (Metals) There was a positive result for chromium and mercury detected above the method detection limit, but below the reporting limit in the method blank extracted on 11/12/2015. The associated field samples, MAF-SC-10_0-2, MAF-SC-DUP-07, MAF-SC-21_0-1, and MAF-SC-DUP-09, reported positive results detected above the reporting limit for these analytes; therefore, no qualification was required.

SDG APR5: (Metals) There was a positive result for chromium and mercury detected above the method detection limit, but below the reporting limit in the method blank extracted on 11/12/2015. The associated field samples, MAF-SC-11_0-2, MAF-SC-11_2-4, MAF-SC-12_0-2, MAF-SC-12_2-4,

MAF-SC-15_0-2, and MAF-SC-DUP-08, reported positive results detected above the reporting limit for these analytes; therefore, no qualification was required.

SDG AQN4: (Metals) There was a positive result for chromium detected above the method detection limit, but below the reporting limit in the method blank extracted on 11/23/2015. The associated field samples, MAF-SC-01_0-2, MAF-SC-DUP-01, MAF-SC-01_4-6, MAF-SC-01_20-22, MAF-SC-DUP-02, MAF-SC-02_0-2, MAF-SC-02_4-6, MAF-SC-02_20-22, MAF-SC-DUP-10, MAF-SC-03_0-2, MAF-SC-DUP-03, MAF-SC-03_4-6, MAF-SC-03_8-10, MAF-SC-05_0-2, and MAF-SC-05_4-6, reported positive results detected above the reporting limit for these analytes; therefore, no qualification was required.

SDG 16H0238: (Metals) There was a positive result for mercury detected above the method detection limit, but below the reporting limit in the method blank digested on 9/7/16. The associated field sample, MAF-SC-03_21-23, reported a positive result detected at the reporting limit; therefore, the positive result for mercury was qualified as non-detected (U) in this sample. There were positive results for cadmium, chromium, and copper detected above the method detection limits, but below the reporting limits in the method blank digested on 9/7/16. The associated field sample, MAF-SC-03_21-23, reported a positive result detected below the reporting limit for cadmium; therefore, the positive result for cadmium was qualified as non-detected (U) in this sample.

In cases were target analytes are qualified as non-detected because of blank contamination, the new reporting limit is elevated to the level of the former concentration reported in the sample.

Matrix Spikes/Matrix Spike Duplicates

Since the actual analyte concentration in an environmental sample is not known, the accuracy of a particular analysis is usually inferred by performing a matrix spike (MS) analysis on one sample from the associated batch, known as the parent sample. One aliquot of the sample is analyzed in the normal manner and then a second aliquot of the sample is spiked with a known amount of analyte concentration and analyzed. From these analyses, a %R is calculated. Matrix spike duplicate (MSD) analyses are generally performed for organic analyses as a precision check and analyzed in the same sequence as a matrix spike. Using the results from the MS and MSD, the relative percent difference (RPD) is calculated. The %R control limits for MS and MSD analyses are specified in the laboratory documents, as are the RPD control limits for MS/MSD sample sets.

One MS/MSD analysis should be performed for every analytical batch or every 20 field samples, whichever is more frequent. The frequency requirements were met for all analyses and the %R and RPD values were within the proper control limits, with the following exceptions:

SDG AOZ7: (Sulfide) The laboratory performed a matrix spike on Sample MAF-SS-31_0-10. The %R for sulfide was less than the control limits in the MS extracted on 10/23/2015. The positive result for this target analyte was qualified as estimated (J) in this sample.

(TOC) The laboratory performed a matrix spike on Samples MAF-SS-08_0-10 and MAF-SS-DUP-02. The %R for TOC was less than the control limits in the MS extracted on 11/18/2015. The positive results for this target analyte were qualified as estimated (J) in Samples MAF-SS-08_0-10 and MAF-SS-DUP-02.

SDG AOZ8: (SVOCs) The laboratory performed an MS/MSD sample set on Sample MAF-SS-10_0-10. The %R values and RPD for diethyl phthalate were greater than the control limits in the MS/MSD extracted on 11/2/2015. There were no positive results for this target analyte in this sample; therefore, no action was required.

Also, in the same MS/MSD sample set, the %R for 4-Methylphenol in the MSD and the %R for bis(2-Ethylhexyl)phthalate) in the MS were greater than the control limits; however, the %R values for these target analytes were within in the control limits in the corresponding MS and MSD. For this reason, no action was required.

Additionally, in the same MS/MSD sample set, the RPD values for 4-Methylphenol, bis(2-Ethylhexyl)phthalate, n-Nitrosodiphenylamine, and phenol were greater than the control limit. The positive results for 4-Methylphenol, bis(2-Ethylhexyl)phthalate, and phenol were qualified as estimated (J) in Sample MAF-SS-10_0-10. There were no positive results for n-Nitrosodiphenylamine in this sample; therefore, no action was required.

(Resin Acids) The laboratory performed an MS/MSD sample set on Sample MAF-SS-02_0-10. The %R for abietic acid, isopimaric acid, linoienic acid, neoabietic acid, and palustric acid was less than the control limits or not recoverable, and the RPD for abietic acid was greater than the control limit in MS/MSD extracted on 10/31/2015. The positive result for abietic acid and the reporting limits for isopimaric acid, linoienic acid, neoabietic acid, and palustric acid were qualified as estimated (J and UJ, respectively) in Sample MAF-SS-02_0-10.

(PAHs) The laboratory performed an MS/MSD sample set on Sample MAF-SS-10_0-10. The %R and RPD for many of the target analytes were less than the control limits or not recoverable due to high concentration of analytes and dilution of the sample. The %R for all target analytes was within the control limits in the associated sample batch laboratory control sample; therefore, no qualification of the data was required.

SDG APB6: (SVOCs) The laboratory performed an MS/MSD sample set on Sample MAF-SS-15_0-10. The %R for benzyl alcohol was less than the control limits in both the MS and MSD extracted on 10/28/2015. The reporting limit for this target analyte was qualified as estimated (UJ) in this sample. Also, in the sample MS/MSD sample set, the RPD for 2,4-Dimethylphenol was greater than the control limit. There were no positive results for 2,4-Dimethylphenol in Sample MAF-SS-15_0-10; therefore, no action was required.

(SVOCs-SIM) The laboratory performed an MS/MSD sample set on Sample MAF-SS-15_0-10. The RPD for 2,4-Dimethylphenol was greater than the control limit in the MS/MSD extracted on 10/28/2015. There were no positive results for 2,4-Dimethylphenol in this sample; therefore, no action was required.

(TOC) The laboratory performed a matrix spike on Sample MAF-SS-22_0-10. The %R for TOC was less than the control limits in the MS extracted on 11/20/2015. The positive result for this target analyte was qualified as estimated (J) in this sample.

SDG APK3: (Sulfide) The laboratory performed a matrix spike on porewater Sample MAF-SS-21_0-10. The %R for sulfide was less than the control limits in the MS extracted on 10/29/2015. The positive results for this target analyte were qualified as estimated (J) in Samples MAF-SS-21_0-10 and MAF-SS-DUP-04.

SDG APJ0: (SVOCs) The laboratory performed an MS/MSD on Sample MAF-SC-04_8-10. The %R and RPD for many of the target analytes were outside the control limits or not recoverable due to high concentration of analytes and dilution of the sample. The %R for all target analytes was within the control limits in the associated sample batch laboratory control sample; therefore, no qualification of the data was required.

(Resin Acids) The laboratory performed an MS/MSD sample set on Sample MAF-SC-DUP-06. The %R and RPD for many of the target analytes were outside the control limits or not recoverable due to high concentration of analytes and dilution of the sample. With the exception of abietic acid, neoabietic acid,

and palustric acid, the %R for all target analytes was within the control limits in the associated sample batch LCS; therefore, no qualification of the data was required. See section Laboratory Control Samples/Laboratory Control Samples Duplicates for qualifications of abietic acid, neoabietic acid, and palustric acid.

(SVOCs-SIM) The laboratory performed an MS/MSD on Sample MAF-SC-04_8-10. The %R for dibenz(a,h)anthracene was less than the control limits (MS) and not recoverable (MSD), and the RPD was greater than the control limit in the MS/MSD extracted on 11/5/2015. The positive result for this target analyte was qualified as estimated (J) in this sample.

(PAHs) The laboratory performed an MS/MSD on Sample MAF-SC-DUP-05. The %R and RPD for many of the target analytes were less than the control limits or not recoverable due to high concentration of analytes and dilution of the sample. The %R for all target analytes was within the control limits in the associated sample batch laboratory control sample; therefore, no qualification of the data was required.

SDG APR5: (SVOCs) The laboratory performed an MS/MSD on Sample MAF-SC-12_0-2. The %R for 2-Methylphenol and phenol was greater than the control limit in the MS extracted on 11/10/2015. The %R for these target analytes was within the control limits in the corresponding MSD. No action was required for these outliers.

Also, in the same MS/MSD sample set, the %R for 4-Methylphenol and benzyl alcohol was greater than the control limits. The positive results for 4-Methylphenol were qualified as estimated (J) in Sample MAF-SC-12_0-2. There were no positive results for benzyl alcohol in Sample MAF-SC-12_0-2; therefore, no action was required.

(PAHs) The laboratory performed an MS/MSD on Sample MAF-SC-12_0-2. The %R for many of the target analytes were less than the control limits or not recoverable due to high concentration of analytes and dilution of the sample. The %R for all target analytes was within the control limits in the associated sample batch laboratory control sample; therefore, no qualification of the data was required.

(Metals) The laboratory performed a matrix spike on Sample MAF-SC-12_0-2. The %R for zinc was less than the control limits in the MS extracted on 11/12/2015. The positive results for this target analyte were qualified as estimated (J) in Samples MAF-SC-12_0-2 and MAF-SC-12_2-4.

(Sulfide) The laboratory performed a matrix spike on Sample MAF-SC-11_0-2. The %R for sulfide was less than the control limits in the MS extracted on 11/3/2015. The positive result for this target analyte was qualified as estimated (J) in this sample.

SDG AQN4: (SVOCs) The laboratory performed an MS/MSD on Sample MAF-SC-02_20-22. The %R for benzoic acid was less than the control limits and the RPD was greater than the control limit in the MS/MSD extracted 11/23/2015. The reporting limit for this target analyte was qualified as estimated (UJ) in this sample.

The laboratory performed an MS/MSD on Sample MAF-SC-DUP-10. The %R for benzyl alcohol was less than the control limits and the RPD was greater than the control limit in the MS/MSD extracted 11/23/2015. The reporting limit for this target analyte was qualified as estimated (UJ) in this sample.

(Resin Acids) The laboratory performed an MS/MSD on Sample MAF-SC-02_2-4. The %R and RPD for many of the target analytes were outside the control limits or not recoverable due to high concentration of analytes and dilution of the sample. With the exception of abietic acid, neoabietic acid, and palustric acid, the %R for all target analytes was within the control limits in the associated sample batch laboratory control sample; therefore, no qualification of the data was required. See section Laboratory Control

Samples/Laboratory Control Samples Duplicates for qualifications of abietic acid, neoabietic acid, and palustric acid.

(PAHs) The laboratory performed an MS/MSD on Sample MAF-SC-02_20-22. The %R for naphthalene was less than the control limits and the RPD for benzo(g,h,i)perylene was greater than the control limit in the MS/MSD extracted 11/23/2015. The positive result for naphthalene was qualified as estimated (J) in this sample. There were no positive results for benzo(g,h,i)perylene in Sample MAF-SC-02_20-22; therefore, no action was required.

The laboratory performed an MS/MSD on Sample MAF-SC-DUP-10. The %R for many of the target analytes were less than the control limits or not recoverable due to high concentration of analytes and dilution of the sample. The %R for all target analytes was within the control limits in the associated sample batch laboratory control sample; therefore, no qualification of the data was required.

The laboratory performed an MS/MSD on Sample MAF-SC-01_20-22. The RPD for dibenz(a,h)anthracene and indeno(1,2,3-cd)pyrene was greater than the control limit in the MS/MSD extracted on 11/23/2015. There were no positive results for these target analytes in this sample; therefore, no action was required.

The laboratory performed an MS/MSD on Sample MAF-SC-05_0-2. The %R for many of the target analytes were outside the control limits or not recoverable due to high concentration of analytes and dilution of the sample. The %R for all target analytes was within the control limits in the associated sample batch laboratory control sample; therefore, no qualification of the data was required.

(Metals) The laboratory performed a matrix spike on Sample MAF-SC-DUP-10. The %R for mercury was greater than the control limits in the MS extracted on 11/20/2015. The positive result for this target analyte was qualified as estimated (J) in this sample.

(TOC) The laboratory performed a matrix spike on Sample MAF-SC-01_20-22. The %R for TOC was less than the control limits in the MS extracted on 12/7/2015. The positive result for this target analyte was qualified as estimated (J) in this sample.

The laboratory performed a matrix spike on Sample MAF-SC-05_0-2. The %R for TOC was less than the control limits in the MS extracted on 12/7/2015. The positive results for this target analyte were qualified as estimated (J) in Samples MAF-SC-05_0-2 and MAF-SC-05_4-6.

(Sulfide) The laboratory performed a matrix spike on Sample MAF-SC-05_0-2. The %R for sulfide was less than the control limits in the MS extracted on 12/7/2015. The positive result for this target analyte was qualified as estimated (J) in this sample.

SDG 16H0238: (SVOCs) The laboratory performed an MS/MSD on Sample MAF-SC-11_6-8. The RPD for dibenzofuran was greater than the control limit in this sample set. The positive result for this target analyte was qualified as estimated (J) in this sample.

(SVOC-SIM) The laboratory performed an MS/MSD on Sample MAF-SC-10_6-7.6. The %R values for benzo(a)anthracene, benzo(a)pyrene, indeno(1,2,3-cd)pyrene, dibenz(a,h)anthracene, benzo(ghi)perylene, and Total benzofluoranthenes were outside of the control limits in this sample set. The positive results for these target analytes were qualified as estimated (J) in the parent sample. Also, the RPD value for anthracene was greater than the control limit of 30% in this sample set. The positive result for anthracene was qualified as estimated (J) in the parent sample.

The %R values for naphthalene were outside of the control limits in this sample set. The native sample concentration for naphthalene was greater than four times the amount spiked into the sample; therefore,

no qualifiiers were required. The %R values for fluroanthene, pyrene, and chrysene were outside of the control limits in either the MS or the MSD of this sample set. No qualifiers were required because in each case the corresponding MS or MSD %R value was within the control limit.

Laboratory Control Samples/Laboratory Control Sample Duplicates

A laboratory control sample (LCS) is a blank sample that is spiked with a known amount of analyte and then analyzed. An LCS is similar to an MS, but without the possibility of matrix interference. Given that matrix interference is not an issue, control limits for accuracy and precision in the the LCS and its duplicate (LCSD) are usually more rigorous than for MS/MSD analyses. Additionally, data qualification based on LCS/LCSD analyses would apply to each sample in the associated batch, instead of just the parent sample. The %R control limits for LCS and LCSD analyses are specified in the laboratory documents, as are the RPD control limits for LCS/LCSD sample sets.

One LCS/LCSD analysis should be performed for every analytical batch or every 20 field samples, whichever is more frequent. The frequency requirements were met for each analysis and the %R and RPD values were within the proper control limits, with the following exceptions:

SDG AOZ7: (SVOCs) The %R for diethyl phthalate was greater than the control limits in the LCS extracted on 10/30/2015. The positive results this target analyte were qualified as estimated (J) in Samples MAF-SS-07_0-10, MAF-SS-09_0-10, and MAF-SS-DUP-02.

(Resin Acids) The %R for neoabietic acid was less than the control limits in the LCS extracted on 10/31/2015. The reporting limit for this target analyte was qualified as estimated (UJ) in Sample MAF-SS-32_0-10.

SDG AOZ8: (Resin Acids) The %R for neoabietic acid was less than the control limits in the LCS extracted on 10/31/2015. The reporting limits for this target analyte were qualified as estimated (UJ) in Samples MAF-SS-01_0-10, MAF-SS-DUP-01, MAF-SS-02_0-10, MAF-SS-03_0-10, and MAF-SS-04_0-10.

SDG APJ0: (Resin Acids) The %R for neoabietic acid and palustric acid was less than the control limits and %R for abietic acid was greater than the control limits in the LCS extracted on 11/6/2015. The positive results and reporting limits for these target analytes were qualified as estimated (J and UJ, respectively) in Samples MAF-SC-04_2-4, MAF-SC-DUP-06, and MAF-SC-DUP-05.

SDG AQN4: (Resin Acids) The %R for palustric acid and neoabietic acid was less than the control limits and not recoverable, and the %R for abietic acid was greater than the control limits in the LCS extracted on 11/21/2015. The positive results and reporting limits for these target analytes were qualified as estimated (J and UJ, respectively) in Samples MAF-SC-01_2-4, MAF-SC-02_2-4, and MAF-SC-03_2-4.

Laboratory Duplicates

Internal laboratory duplicate analyses are performed to monitor the precision of the analyses. Two separate aliquots of a sample are analyzed as distinct samples in the laboratory and the RPD between the two results is calculated. Duplicate analyses should be performed once per analytical batch. If one or more of the samples used has a concentration less than five times the reporting limit for that sample, the absolute difference is used instead of the RPD. The RPD control limits are specified in the laboratory documents. Laboratory duplicates were analyzed at the proper frequency and the specified acceptance criteria were met, with the following exceptions:

SDG AOZ7: (Metals) A laboratory duplicate analysis was performed on Sample MAF-SS-08_0-10. The RPD for zinc was greater than the control limit. The positive result for this target analyte was qualified as estimated (J) in Sample MAF-SS-08_0-10.

A laboratory duplicate analysis was performed on Sample MAF-SS-DUP-02. The RPD for copper, lead, and zinc was greater than the control limit. The positive results for these target analyte were qualified as estimated (J) in Sample MAF-SS-DUP-02.

(Sulfide) A laboratory duplicate analysis was performed on Sample MAF-SS-31_0-10. The RPD for sulfide was greater than the control limit. The positive result for this target analyte was qualified as estimated (J) in Sample MAF-SS-31_0-10.

(TOC) A laboratory duplicate analysis was performed on Samples MAF-SS-08_0-10 and MAF-SS-DUP-02. The RPD for TOC was greater than the control limit. The positive results for this target analyte were qualified as estimated (J) in Samples MAF-SS-08_0-10 and MAF-SS-DUP-02.

SDG APB6: (Metals) A laboratory duplicate analysis was performed on Sample MAF-SS-08_0-10. The RPD for zinc was greater than the control limit. This sample is reported in a different SDG; therefore, no action was required.

SDG APJ0: (Metals) A laboratory duplicate analysis was performed on Sample MAF-SC-04_0-2. The RPD for lead and mercury was greater than the control limit. The positive results for these target analytes were qualified as estimated (J) in Samples MAF-SC-04_0-2, MAF-SC-DUP-05, MAF-SC-DUP-06, MAF-SC-04_4-6, and MAF-SC-04_8-10.

(TOC) A laboratory duplicate analysis was performed on Sample MAF-SC-04_0-2. The RPD for TOC was greater than the control limit. The positive results for this target analyte were qualified as estimated (J) in Samples MAF-SC-04_0-2, MAF-SC-DUP-05, MAF-SC-DUP-06, and MAF-SC-04_8-10.

SDG APR5: (Metals) A laboratory duplicate analysis was performed on Sample MAF-SC-12_0-2. The RPD for lead and zinc was greater than the control limit. The positive results for these target analytes were qualified as estimated (J) in Samples MAF-SC-12_0-2 and MAF-SC-12_2-4.

(Sulfide) A laboratory duplicate analysis was performed on Sample MAF-SC-11_0-2. The RPD for sulfide was greater than the control limit. The positive result for this target analyte was qualified as estimated (J) in Sample MAF-SC-11_0-2.

SDG AQN4: (Metals) A laboratory duplicate analysis was performed on Sample MAF-SC-02_20-22. The RPD for chromium and zinc was greater than the control limit. The positive results for these target analytes were qualified as estimated (J) in Samples MAF-SC-02_0-2, MAF-SC-02_4-6, MAF-SC-02_20-22, and MAF-SC-DUP-10.

A laboratory duplicate analysis was performed on Sample MAF-SC-DUP-10. The RPD for copper was greater than the control limit. The positive results for this target analyte were qualified as estimated (J) in Samples MAF-SC-02_20-22 and MAF-SC-DUP-10.

(TOC) A laboratory duplicate analysis was performed on Sample MAF-SC-DUP-10. The RPD for TOC was greater than the control limit. The positive results for this target analyte were qualified as estimated (J) in Samples MAF-SC-02_20-22 and MAF-SC-DUP-10.

A laboratory duplicate analysis was performed on Sample MAF-SC-01_20-22. The RPD for TOC was greater than the control limit. The positive results for this target analyte were qualified as estimated (J) in Samples MAF-SC-01_0-2, MAF-SC-DUP-01, MAF-SC-01_4-6, MAF-SC-01_20-22, and MAF-SC-DUP-02.

(Sulfide) A laboratory duplicate analysis was performed on Sample MAF-SC-05_0-2. The RPD for sulfide was greater than the control limit. The positive result for this target analyte was qualified as estimated (J) in Sample MAF-SC-05_0-2.

Field Duplicates

Field duplicates are similar to laboratory duplicates in that they are used to assess precision. Two samples (parent and duplicate) are created in the field by subsampling the homogenized sample and submitting them to the lab as separate samples. Duplicate samples were collected and analyzed for the same parameters as the associated parent samples. Precision is determined by calculating the RPD between each pair of samples. If one or more of the sample analytes has a concentration greater than five times the reporting limit for that sample, then the absolute difference is used instead of the RPD. The RPD control limit for water samples is 35 percent. The RPD control limit for sediment samples is 50 percent.

SDG AOZ7: Two field duplicate sample pairs, MAF-SS-08_0-10/MAF-SS-DUP-02 and MAF-SS-33_0-10/MAF-SS-DUP-06, were submitted with this SDG. The precision criteria for all target analytes were met for these sample pairs, with the following exceptions:

MAF-SS-08_0-10/MAF-SS-DUP-02: The positive results for copper and lead were qualified as estimated (J) in this sample pair.

MAF-SS-33_0-10/MAF-SS-DUP-06: The positive results for benzo(g,h,i)perylene, chrysene, indeno(1,2,3-cd)pyrene, and phenol were qualified as estimated (J) in this sample pair.

SDG AOZ8: One field duplicate sample pair, MAF-SS-01_0-10 and MAF-SS-DUP-01, was submitted with this SDG. The precision criteria for all target analytes were met for this sample pair, with the exception of abietic acid, acenaphthylene, benzo(a)pyrene, benzo(g,h,i)perylene, indeno(1,2,3-cd)pyrene, and total benzofluoranthenes. The positive results for these target analytes were qualified as estimated (J) in this sample pair.

SDG APB6: Three field duplicate sample pairs, MAF-SS-21_0-10/MAF-SS-DUP-04, MAF-SS-28_0-10/MAF-SS-DUP-05, and MAF SS 30_0-10/MAF-SS-DUP-03, were submitted with this SDG. The precision criteria for all target analytes were met for these sample pairs, with the following exceptions:

MAF-SS-21_0-10/MAF-SS-DUP-04: The positive results for phenol and TOC were qualified as estimated (J) in this sample pair.

SDG APG3: Two field duplicate porewater sample pairs, MAF-SS-08_0-10/MAF-SS-DUP-02 and MAF-SS-33_0-10/MAF-SS-DUP-06, were submitted with this SDG. The precision criteria for all target analytes were met for these sample pairs, with the following exceptions:

MAF-SS-33_0-10/MAF-SS-DUP-06: The positive results for sulfide were qualified as estimated (J) in this sample pair.

SDG API3: One field duplicate porewater sample pair, MAF-SS-01_0-10 and MAF-SS-DUP-01, was submitted with this SDG. The precision criteria for all target analytes were met for this sample pair, with the exception of sulfide. The positive results for this target analyte were qualified as estimated (J) in this sample pair.

SDGs APK3/APK4: Three field duplicate porewater sample pairs, MAF-SS-21_0-10/MAF-SS-DUP-04, MAF-SS-28_0-10/MAF-SS-DUP-05, and MAF-SS-30_0-10/MAF-SS-DUP-03, were submitted with these SDGs. The precision criteria for all target analytes were met for these sample pairs, with the following exceptions:

MAF-SS-21_0-10/MAF-SS-DUP-04: The positive results for sulfide were qualified as estimated (J) in this sample pair.

MAF-SS-28_0-10/MAF-SS-DUP-05: The positive results for n-Ammonia were qualified as estimated (J) in this sample pair.

MAF-SS-30_0-10/MAF-SS-DUP-03: The positive results for sulfide were qualified as estimated (J) in this sample pair.

SDG APJ0: Two field duplicate sample pairs, MAF-SC-04_0-2/MAF-SC-DUP-05 and MAF-SC-04_2-4/MAF-SC-DUP-06, were submitted with this SDG. The precision criteria for all target analytes were met for these sample pairs, with the following exceptions:

MAF-SC-04_0-2/MAF-SC-DUP-05: The positive results for benzyl alcohol were qualified as estimated (J) in this sample pair.

MAF-SC-04_2-4/MAF-SC-DUP-06: The positive results for abietic acid and guaiacol were qualified as estimated (J) in this sample pair.

SDG APQ8: Two field duplicate sample pairs, MAF-SC-10_0-2/MAF-SC-DUP-07 and MAF-SC-21_0-1/MAF-SC-DUP-09, were submitted with this SDG. The precision criteria for all target analytes were met for these sample pairs, with the following exceptions:

MAF-SC-10_0-2/MAF-SC-DUP-07: The positive results and reporting limits for 1,4-Dichlorobenzene, 2,4-Dimethylphenol, benzo(a)pyrene, benzo(g,h,i)perylene, benzoic acid, bis(2-Ethylhexyl)phthalate, cadmium, dibenz(a,h)anthracene, di-n-Butylphthalate, indeno(1,2,3-cd)pyrene, and phenol were qualified as estimated (J and UJ, respectively) in this sample pair.

MAF-SC-21_0-1/MAF-SC-DUP-09: The positive results for 2-Methylnaphthalene and fluorene were qualified as estimated (J) in this sample pair.

SDG APR5: One field duplicate sample pair, MAF-SC-15_0-2 and MAF-SC-DUP-08, was submitted with this SDG. The precision criteria for all target analytes were met for this sample pair, with the exception of 4-Methylphenol, acenaphthylene, benzo(a)anthracene, benzo(a)pyrene, benzo(g,h,i)perylene, chrysene, dibenzofuran, fluorene, indeno(1,2,3-cd)pyrene, and total benzofluoranthenes. The positive results for these target analytes were qualified as estimated (J) in this sample pair.

SDG AQN4: Four field duplicate sample pairs, MAF-SC-01_0-2/MAF-SC-DUP-01, MAF-SC-01_20-22/MAF-SC-DUP-02, MAF-SC-03_0-2/MAF-SC-DUP-03, and MAF-SC-02_20-22/MAF-SC-DUP-10, were submitted with this SDG. The precision criteria for all target analytes were met for these sample pairs, with the following exceptions:

MAF-SC-01_0-2/MAF-SC-DUP-01: The positive results and reporting limits for 1,2,4-Trichlorobenzene, 2,4-Dimethylphenol, 2-Methylnaphthalene, acenaphthene, acenaphthylene, arsenic, bis(2-Ethylhexyl)phthalate, cadmium, chromium, copper, dibenzofuran, hexachlorobutadiene, naphthalene, phenol, and TOC were qualified as estimated (J) in this sample pair.

MAF-SC-01_20-22/MAF-SC-DUP-02: The positive results for naphthalene were qualified as estimated (J) in this sample pair.

MAF-SC-03_0-2/MAF-SC-DUP-03: The positive results and reporting limit for 1,2,4-Trichlorobenzene, 1,2-Dichlorobenzene, 2,4-Dimethylphenol, 2-Methylnaphthalene, 2-Methylphenol, 4-Methylphenol, benzoic acid, bis(2-Ethylhexyl)phthalate, dibenzofuran, diethyl phthalate, fluorene, phenol, sulfide, TOC, and zinc were qualified as estimated (J and UJ, respectively) in this sample pair.

MAF-SC-02_20-22/MAF-SC-DUP-10: The positive results for 2-Methylnaphthalene, acenaphthene, anthracene, fluoranthene, fluorene, naphthalene, and phenanthrene were qualified as estimated (J) in this sample pair.

Instrument Tuning

Instrument tuning for analyses by gas chromatography/mass spectrometry (GC/MS) are completed to ensure that mass resolution, identification, and sensitivity of the analyses are acceptable. Instrument tuning should be performed at the beginning of each 12-hour period during which samples or standards are analyzed. The frequency and specified acceptance criteria were met for each applicable analysis.

Internal Standards (Low Resolution Mass Spectrometry)

Like the surrogate, an internal standard is a compound that is chemically similar to the analytes of interest, but unlikely to be found in any environmental sample. Internal standards are used only for the mass spectrometry instrumentation and are usually added to the sample aliquot after extraction has taken place. The internal standard should be analyzed at the beginning of a 12-hour sample run and the control limits for internal standard recoveries are 50 percent to 200 percent of the calibration standard. All internal standard recoveries were within the control limits, with the following exceptions:

SDG AOZ7: (Pesticides) The internal standard %R for 1-Bromo-2-Nitrobenzene was outside the control limits in the first column, but within the control limits in the second column. No action was required for this outlier.

SDG AOZ8: (Resin Acids) The internal standard %R for chrysene-d12 was outside the control limits in Sample MAF-SS-04_0-10. The positive results for abietic acid and dehydroabietic acid were qualified as estimated (J) in this sample.

(Pesticides) The internal standard %R for 1-Bromo-2-Nitrobenzene was outside the control limits in the first column, but within the control limits in the second column. No action was required for this outlier.

SDG APB6: (Pesticides) The internal standard %R for 1-Bromo-2-Nitrobenzene was outside the control limits in the first column, but within the control limits in the second column. No action was required for this outlier.

Initial Calibrations (ICALs)

The initial calibrations were conducted according to the laboratory methods and consisted of the appropriate number of standards. For inorganic analyses, the %R values were within the control limits of 90% and 110%. For organic analyses, the percent relative standard deviation (%RSD) and relative response factors (RRF) values were within the control limits stated in the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (USEPA 2008).

Continuing Calibrations (CCALs)

The continuing calibrations were conducted according to the laboratory methods and consisted of the appropriate number of standards. For inorganic analyses, the %R values were within the control limits of 90% and 110%. For organic analyses, the percent difference (%D) and relative response factors (RRF) values were within the control limits in the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (USEPA 2008), with the following exceptions:

SDG AOZ7: (SVOCs) The %D for diethyl phthalate was outside the control limits in the continuing calibration verification performed on 11/23/2015. The positive results and reporting limits for this target analyte were qualified as estimated (J and UJ, respectively) in Samples MAF-SS-07_0-10, MAF-SS-08_0-10, MAF-SS-DUP-02, MAF-SS-09_0-10, MAF-SS-31_0-10, MAF-SS-32_0-10, MAF-SS-33_0-10, MAF-SS-DUP-06, and MAF-SS-36_0-10.

(Resin Acids) The %D for abietic acid was outside the control limits in the continuing calibration verification performed on 11/6/2015. The positive result for this target analyte was qualified as estimated (J) in Sample MAF-SS-32_0-10.

(Pesticides) The %D values for endrin, endosulfan II, 4,4'-DDD, 4,4'-DDT, methoxychlor, and endrin aldehyde were outside the control limits in the first column, but within the control limits in the second column for the continuing calibration verification performed on 11/5/2015. No action was required for these outliers.

SDG AOZ8: (SVOCs) The %D for diethyl phthalate was outside the control limits in the continuing calibration verifications performed on 11/24/2015 and 11/25/2015. The positive results and reporting limits for this target analyte were qualified as estimated (J and UJ, respectively) in Samples MAF-SS-01_0-10, MAF-SS-DUP-01, MAF-SS-02_0-10, MAF-SS-03_0-10, MAF-SS-04_0-10, MAF-SS-05_0-10, MAF-SS-10_0-10, MAF-SS-11_0-10, MAF-SS-12_0-10, MAF-SS-13_0-10, MAF-SS-19_0-10, MAF-SS-20_0-10, and MAF-SS-34_0-10.

(Resin Acids) The %D for abietic acid was outside the control limits in the continuing calibration verification performed on 11/6/2015. The positive results for this target analyte were qualified as estimated (J) in Samples MAF-SS-01_0-10, MAF-SS-DUP-01, MAF-SS-02_0-10, and MAF-SS-03_0-10.

(Pesticides) The %D values for endrin, endosulfan II, 4,4'-DDD, 4,4'-DDT, methoxychlor, and endrin aldehyde were outside the control limits in the first column, but within the control limits in the second column for the continuing calibration verification performed on 11/5/2015. No action was required for these outliers.

SDG APB6: (SVOCs) The %D for pentachlorophenol was outside the control limits in the continuing calibration verification performed on 11/16/2015. The positive result and reporting limits for this target analyte were qualified as estimated (J and UJ, respectively) in Samples MAF-SS-14_0-10, MAF-SS-15_0-10, MAF-SS-16_0-10, MAF-SS-17_0-10, MAF-SS-18_0-10, MAF-SS-21_0-10, MAF-SS-DUP-04, MAF-SS-24_0-10, MAF-SS-25_0-10, MAF-SS-26_0-10, and MAF-SS-27_0-10.

(Pesticides) The %D values for endrin, endosulfan II, 4,4'-DDD, 4,4'-DDT, methoxychlor, and endrin aldehyde were outside the control limits in the first column, but within the control limits in the second column for the continuing calibration verification performed on 11/5/2015. No action was required for these outliers.

SDG APJ0: (SVOCs) The %D for diethyl phthalate was outside the control limits in the continuing calibration verification performed on 11/25/2015. The positive results and reporting limits for this target analyte were qualified as estimated (J and UJ, respectively) in Samples MAF-SC-04_0-2, MAF-SC-DUP-05, MAF-SC-DUP-06, MAF-SC-04_4-6, and MAF-SC-04_8-10.

(SVOCs-SIM) The %D for dibenz(a,h)anthracene was outside the control limits in the continuing calibration verification performed on 11/25/2015. The positive results for this target analyte were qualified as estimated (J) in Samples MAF-SC-04_0-2, MAF-SC-DUP-05, MAF-SC-DUP-06, MAF-SC-04_4-6, and MAF-SC-04_8-10.

SDG APQ8: (SVOCs) The %D for hexachlorobenzene, pentachlorophenol, and phenol was outside the control limits in the continuing calibration verification performed on 11/21/2015. The positive results and reporting limits for these target analytes were qualified as estimated (J and UJ, respectively) in Sample MAF-SC-10_0-2.

The %D for benzyl alcohol, butylbenzylphthalate, hexachlorobenzene, and pentachlorophenol was outside the control limits in the continuing calibration verification performed on 11/23/2015. The positive results and reporting limits for these target analytes were qualified as estimated (J and UJ, respectively) in Samples MAF-SC-21_0-1, MAF-SC-DUP-09, and MAF-SC-DUP-07.

(SVOCS-SIM) The %D for hexachlorobenzene was outside the control limits in the continuing calibration verification performed on 11/21/2015. The reporting limits for this target analyte were qualified as estimated (UJ) in Samples MAF-SC-10_0-2, MAF-SC-DUP-07, MAF-SC-21_0-1, and MAF-SC-DUP-09.

SDG APR5: (SVOCs) The %D for hexachlorobenzene, pentachlorophenol, and phenol was outside the control limits in the continuing calibration verification performed on 11/21/2015. The positive results and reporting limits for these target analytes were qualified as estimated (J and UJ, respectively) in Samples MAF-SC-11_0-2, MAF-SC-12_0-2, MAF-SC-12_2-4, MAF-SC-15_0-2, and MAF-SC-DUP-08.

The %D for benzyl alcohol, butylbenzylphthalate, hexachlorobenzene, and pentachlorophenol was outside the control limits in the continuing calibration verification performed on 11/23/2015. The reporting limits for these target analytes were qualified as estimated (UJ) in Sample MAF-SC-11_2-4.

(SVOCS-SIM) The %D for hexachlorobenzene was outside the control limits in the continuing calibration verification performed on 11/21/2015. The reporting limits for this target analyte were qualified as estimated (UJ) in Samples MAF-SC-11_0-2, MAF-SC-11_2-4, MAF-SC-12_0-2, MAF-SC-12_2-4, MAF-SC-15_0-2, and MAF-SC-DUP-08.

SDG AQN4: (SVOCs) The %D for 3,4,5-Trichloroguaiacol was outside the control limits in the continuing calibration verification performed on 12/5/2015. The reporting limit for this target analyte was qualified as estimated (UJ) in Sample MAF-SC-03_2-4.

(Resin Acids) The %D for abietic acid was outside the control limits in the continuing calibration verification performed on 12/2/2015. The positive results for this target analyte were qualified as estimated (J) in Samples MAF-SC-01_2-4, MAF-SC-02_2-4, and MAF-SC-03_2-4.

Dilutions

There were several cases where target analytes exceeded the linear calibration range of the analytical instrument. In these cases, the laboratory flagged these analytes with an “E”, and re-analyzed these samples at various dilutions. In each case, both sets of data were reported by the laboratory. In order to avoid duplicate analytical reporting, the validator labeled all “E” flags with Do-Not-Report (DNR). Correspondingly, the validator labeled all other analytes in the dilutions with DNR so that only one concise set of analytes per sample were to be used for this project. The affected samples are listed below.

SDG AOZ7: (PAHs) Samples MAF-SS-09_0-10, MAF-SS-31_0-10, MAF-SS-32_0-10, MAF-SS-33_0-10, MAF-SS-DUP-06, and MAF-SS-35_0-10.

SDG AOZ8: (SVOCs) Sample MAF-SS-03_0-10.

(Resin Acids) Sample MAF-SS-04_0-10.

(PAHs) Samples MAF-SS-02_0-10, MAF-SS-03_0-10, MAF-SS-04_0-10, MAF-SS-10_0-10, MAF-SS-11_0-10, MAF-SS-19_0-10, MAF-SS-20_0-10, and MAF-SS-34_0-10.

SDG APJ0: (SVOCs) Samples MAF-SC-04_0-2, MAF-SC-DUP-05, MAF-SC-04_4-6, MAF-SC-04_8-10, and MAF-SC-DUP-06.

(Resin Acids) Samples MAF-SC-04_2-4, MAF-SC-DUP-06, and MAF-SC-DUP-05.

(PAHs) Samples MAF-SC-04_0-2, MAF-SC-DUP-05, MAF-SC-04_4-6, MAF-SC-04_8-10, and MAF-SC-DUP-06.

SDG APQ8: (PAHs) Samples MAF-SC-10_0-2, MAF-SC-DUP-07, MAF-SC-21_0-1, and MAF-SC-DUP-09.

SDG APR5: (PAHs) Samples MAF-SC-11_0-2, MAF-SC-11_2-4, MAF-SC-12_0-2, and MAF-SC-12_2-4.

SDG AQN4: (SVOCs) Sample MAF-SC-03_8-10.

(Resin Acids) Samples MAF-SC-02_2-4 and MAF-SC-03_2-4.

(PAHs) Samples MAF-SC-02_0-2, MAF-SC-02_4-6, MAF-SC-DUP-10, MAF-SC-03_4-6, MAF-SC-03_8-10, MAF-SC-05_0-2, and MAF-SC-05_4-6.

SDG 16H0006: (PAHs) Sample MAF-SS-22_0-10

SDG 16H0238: (PAHs) Sample MAF-SC-10_6-7.6, MAF-SC-11_6-8

Miscellaneous

SDG APJ0: (SVOC-SIM) The result for 2,4-Dimethylphenol exceeded the instrument calibration range in Sample MAF-SC-04_8-10. For this reason, the positive result for this target analyte was qualified as estimated (J) in this sample.

SDG APQ8: (SVOCs) The benzy alcohol result in Sample MAF-SC-DUP-07 was flagged with an "M", indicating that this result is an estimated value with low spectral match parameters. For this reason, the positive result for benzyl alcohol was qualified as estimated (J) in this sample.

SDG APR5: (SVOCs) The benzy alcohol result in Samples MAF-SC-11_0-2 and MAF-SC-12_2-4 were flagged with an "M", indicating that the benzyl alcohol result is an estimated value with low spectral match parameters. For this reason, the positive results for benzyl alcohol were qualified as estimated (J) in these samples.

SDG 16H0006: (SVOCs/SVOC-SIM/PAHs) The laboratory extracted Samples MAF-SS-22_0-10 and MAF-SS-23_0-10 within a laboratory batch that was represented by a method blank (BEH0063-BLK1) with several surrogate outliers. For this reason, the laboratory re-extracted both samples with passing surrogates in the method blank (BEH0221-BLK2). Both sets of data were reported by the laboratory. In order to avoid duplicate analytical reporting, the validator labeled the first set of results with Do-Not-Report (DNR). Correspondingly, the validator labeled all other analytes in the dilutions with DNR so that only one concise set of analytes per sample were to be used for this project.

SDG 9372: (Dioxins/Furans) The positive results for Total TCDF and Total PeCDF in Sample MAF-SS-31_0-10 were noted by the laboratory to represent the Estimated Maximum Possible Concentration for these compounds. Also, the positive results for Total TCDF, Total PeCDF, and Total HxCDF in Sample MAF-SS-35_0-10 were noted by the laboratory for the same reason. This is typically due to the chromatography exhibiting the presence of diphenyl ethers in the samples. The concentrations for these homolog groups were qualified as biased high (J) in these samples.

SDG 9373: (Dioxins/Furans) The positive result for Total TCDF in Sample MAF-SS-13_0-10 were noted by the laboratory to represent the Estimated Maximum Possible Concentration for these compounds. Also, the positive results for Total TCDF and Total PeCDF in Samples MAF-SS-19_0-10, MAF-SS-20_0-10, and MAF-SS-22_0-10 were noted by the laboratory for the same reason. This is typically due to the chromatography exhibiting the presence of diphenyl ethers in the samples. The concentrations for these homolog groups were qualified as biased high (J) in these samples.

SDG 10402: (Dioxins/Furans) The positive results for Total TCDF and Total PeCDF in Sample MAF-SS-38_0-10 were noted by the laboratory to represent the Estimated Maximum Possible Concentration for these compounds. This is typically due to the chromatography exhibiting the presence of diphenyl ethers in the sample. The concentrations for these homolog groups were qualified as biased high (J) in these samples.

SDG 10552: (Dioxins/Furans) The positive results for Total TCDF and Total PeCDF in Samples MAF-SS-37_0-10, MAF-SS-40_0-10 and MAF-SS-49_0-10 (Total TCDF only) were noted by the laboratory to represent the Estimated Maximum Possible Concentration for these compounds. This is typically due to the chromatography exhibiting the presence of diphenyl ethers in these samples. The concentrations for these homolog groups were qualified as biased high (J) in these samples.

OVERALL ASSESSMENT

As was determined by this data validation, the laboratory followed the specified analytical methods. Accuracy was acceptable, as demonstrated by the surrogate, LCS/LCSD, and MS/MSD %R values, with the exceptions noted above. Precision was acceptable, as demonstrated by the LCS/LCSD, MS/MSD, and laboratory/field duplicate RPD values, with the exceptions noted above.

All data are acceptable for the intended use, with the following qualifications listed below in Table 2.

TABLE 2: SUMMARY OF QUALIFIED SAMPLES

Sample ID	Analyte	Qualifier	Reason
MAF-SC-01_0-2	1,2,4-Trichlorobenzene (SVOCs-SIM)	J	Surrogate %R
	1,2,4-Trichlorobenzene (SVOCs)	UJ	Field Duplicate RPD
	1,4-Dichlorobenzene (SVOCs-SIM)	J	Surrogate %R
	2,4-Dimethylphenol (SVOCs)	UJ	Field Duplicate RPD
	2-Methylnaphthalene	J	Field Duplicate RPD
	Acenaphthene	J	Field Duplicate RPD
	Acenaphthylene	J	Field Duplicate RPD
	Arsenic	J	Field Duplicate RPD
	Bis(2-Ethylhexyl)phthalate	J	Field Duplicate RPD
	Cadmium	J	Field Duplicate RPD
	Chromium	J	Field Duplicate RPD
	Copper	J	Field Duplicate RPD
	Dibenzofuran	J	Field Duplicate RPD
	Hexachlorobutadiene (SVOCs-SIM)	J	Surrogate %R/Field Dup RPD
	Naphthalene	J	Field Duplicate RPD
	Phenol	J	Field Duplicate RPD
	TOC	J	Lab/Field Duplicate RPD
MAF-SC-DUP-01	1,2,4-Trichlorobenzene (SVOCs)	J	Field Duplicate RPD
	2,4-Dimethylphenol (SVOCs)	J	Field Duplicate RPD
	2-Methylnaphthalene	J	Field Duplicate RPD
	Acenaphthene	J	Field Duplicate RPD
	Acenaphthylene	J	Field Duplicate RPD
	Arsenic	J	Field Duplicate RPD
	bis(2-Ethylhexyl)phthalate	J	Field Duplicate RPD
	Cadmium	J	Field Duplicate RPD
	Chromium	J	Field Duplicate RPD
	Copper	J	Field Duplicate RPD
	Dibenzofuran	J	Field Duplicate RPD
	Hexachlorobutadiene (SVOCs-SIM)	J	Field Duplicate RPD
	Naphthalene	J	Field Duplicate RPD
	Phenol	J	Field Duplicate RPD
	TOC	J	Lab/Field Duplicate RPD
MAF-SC-01_2-4	Abietic acid	J	LCS %R/CCAL %D
	Neoabietic acid	UJ	LCS %R
	Palustric acid	UJ	LCS %R
MAF-SC-01_4-6	TOC	J	Laboratory Duplicate RPD
MAF-SC-01_20-22	Naphthalene	J	Field Duplicate RPD
	TOC	J	MS/MSD %R/Lab Dup RPD
MAF-SC-DUP-02	Naphthalene	J	Field Duplicate RPD
	TOC	J	Laboratory Duplicate RPD
MAF-SC-02_0-2	Chromium	J	Laboratory Duplicate RPD
	Zinc	J	Laboratory Duplicate RPD
MAF-SC-02_2-4	Abietic acid	J	LCS %R/CCAL %D
	Neoabietic acid	UJ	LCS %R
	Palustric acid	UJ	LCS %R
MAF-SC-02_4-6	Chromium	J	Laboratory Duplicate RPD
	Zinc	J	Laboratory Duplicate RPD

Sample ID	Analyte	Qualifier	Reason
MAF-SC-02_20-22	2-Methylnaphthalene	J	Field Duplicate RPD
	Acenaphthene	J	Field Duplicate RPD
	Anthracene	J	Field Duplicate RPD
	Benzoic acid	UJ	MS/MSD %R and RPD
	Chromium	J	Laboratory Duplicate RPD
	Copper	J	Laboratory Duplicate RPD
	Fluoranthene	J	Field Duplicate RPD
	Fluorene	J	Field Duplicate RPD
	Naphthalene	J	MS/MSD %R/Field Dup RPD
	Phenanthrene	J	Field Duplicate RPD
	TOC	J	Laboratory Duplicate RPD
	Zinc	J	Laboratory Duplicate RPD
MAF-SC-DUP-10	2-Methylnaphthalene	J	Field Duplicate RPD
	Acenaphthene	J	Field Duplicate RPD
	Anthracene	J	Field Duplicate RPD
	Benzyl alcohol	UJ	MS/MSD %R and RPD
	Chromium	J	Laboratory Duplicate RPD
	Copper	J	Laboratory Duplicate RPD
	Fluoranthene	J	Field Duplicate RPD
	Fluorene	J	Field Duplicate RPD
	Mercury	J	MS/MSD %R
	Naphthalene	J	Field Duplicate RPD
	Phenanthrene	J	Field Duplicate RPD
	TOC	J	Laboratory Duplicate RPD
	Zinc	J	Laboratory Duplicate RPD
MAF-SC-03_0-2	1,2,4-Trichlorobenzene (SVOCs-SIM)	UJ	Field Duplicate RPD
	1,2-Dichlorobenzene (SVOCs-SIM)	UJ	Field Duplicate RPD
	2,4-Dimethylphenol (SVOCs-SIM)	J	Field Duplicate RPD
	2-Methylnaphthalene	J	Field Duplicate RPD
	2-Methylphenol	J	Field Duplicate RPD
	4-Methylphenol	J	Field Duplicate RPD
	Benzoic Acid	J	Field Duplicate RPD
	Bis(2-Ethylhexyl)phthalate	J	Field Duplicate RPD
	Dibenzofuran	J	Field Duplicate RPD
	Diethyl phthalate	J	Field Duplicate RPD
	Fluorene	J	Field Duplicate RPD
	Phenol	J	Field Duplicate RPD
	Sulfide	J	Field Duplicate RPD
	TOC	J	Field Duplicate RPD
	Zinc	J	Field Duplicate RPD

Sample ID	Analyte	Qualifier	Reason
MAF-SC-DUP-03	1,2,4-Trichlorobenzene (SVOCs-SIM)	J	Field Duplicate RPD
	1,2-Dichlorobenzene (SVOCs-SIM)	J	Field Duplicate RPD
	2,4-Dimethylphenol (SVOCs-SIM)	J	Field Duplicate RPD
	2-Methylnaphthalene	J	Field Duplicate RPD
	2-Methylphenol	J	Field Duplicate RPD
	4-Methylphenol	J	Field Duplicate RPD
	Benzoic Acid	J	Field Duplicate RPD
	Bis(2-Ethylhexyl)phthalate	J	Field Duplicate RPD
	Dibenzofuran	J	Field Duplicate RPD
	Diethyl phthalate	UJ	Field Duplicate RPD
	Fluorene	J	Field Duplicate RPD
	Phenol	J	Field Duplicate RPD
	Sulfide	J	Field Duplicate RPD
	TOC	J	Field Duplicate RPD
	Zinc	J	Field Duplicate RPD
MAF-SC-03_2-4	3,4,5-Trichloroguaiacol	UJ	CCAL %D
	Abietic acid	J	LCS %R/CCAL %D
	Neoabietic acid	UJ	LCS %R
	Palustric acid	UJ	LCS %R
MAF-SC-04_0-2	Benzyl alcohol	J	Field Duplicate RPD
	Dibenz(a,h)anthracene	J	CCAL %D
	Diethyl phthalate	UJ	CCAL %D
	Lead	J	Laboratory Duplicate RPD
	Mercury	J	Laboratory Duplicate RPD
	TOC	J	Laboratory Duplicate RPD
MAF-SC-DUP-05	Abietic acid	J	LCS %R
	Benzyl alcohol	J	Field Duplicate RPD
	Dibenz(a,h)anthracene	J	CCAL %D
	Diethyl phthalate	UJ	CCAL %D
	Lead	J	Laboratory Duplicate RPD
	Mercury	J	Laboratory Duplicate RPD
	Neoabietic acid	UJ	LCS %R
	Palustric acid	UJ	LCS %R
	TOC	J	Laboratory Duplicate RPD
MAF-SC-04_2-4	Abietic acid	J	LCS %R/Field Duplicate RPD
	Guaiacol	J	Field Duplicate RPD
	Neoabietic acid	UJ	LCS %R
	Palustric acid	UJ	LCS %R
MAF-SC-DUP-06	Abietic acid	J	LCS %R/Field Duplicate RPD
	Dibenz(a,h)anthracene	J	CCAL %D
	Diethyl phthalate	UJ	CCAL %D
	Guaiacol	J	Field Duplicate RPD
	Lead	J	Laboratory Duplicate RPD
	Mercury	J	Laboratory Duplicate RPD
	Neoabietic acid	J	LCS %R
	Palustric acid	UJ	LCS %R
	TOC	J	Laboratory Duplicate RPD

Sample ID	Analyte	Qualifier	Reason
MAF-SC-04_4-6	Dibenz(a,h)anthracene	J	CCAL %D
	Diethyl phthalate	J	CCAL %D
	Lead	J	Laboratory Duplicate RPD
	Mercury	J	Laboratory Duplicate RPD
MAF-SC-04_8-10	2,4-Dimethylphenol	J	See Miscellaneous
	Dibenz(a,h)anthracene	J	MS/MSD %R and RPD/CCAL %D
	Diethyl phthalate	J	CCAL %D
	Lead	J	Laboratory Duplicate RPD
	Mercury	J	Laboratory Duplicate RPD
	TOC	J	Laboratory Duplicate RPD
MAF-SC-05_0-2	Sulfide	J	MS/MSD %R/Lab Dup RPD
	TOC	J	MS/MSD %R
MAF-SC-05_4-6	TOC	J	MS/MSD %R
MAF-SC-10_0-2	1,4-Dichlorobenzene (SVOCs)	J	Field Duplicate RPD
	2,4-Dimethylphenol (SVOCs)	J	Field Duplicate RPD
	2,4-Dimethylphenol (SVOCs-SIM)	J	Field Duplicate RPD
	Benzo(a)pyrene	J	Field Duplicate RPD
	Benzo(g,h,i)perylene	J	Field Duplicate RPD
	Benzoic Acid	J	Field Duplicate RPD
	bis(2-Ethylhexyl)phthalate	J	Field Duplicate RPD
	Cadmium	J	Field Duplicate RPD
	Dibenz(a,h)anthracene	J	Field Duplicate RPD
	Di-n-Butylphthalate	UJ	Field Duplicate RPD
	Hexachlorobenzene (SVOCs)	UJ	CCAL %D
	Hexachlorobenzene (SVOCs-SIM)	UJ	CCAL %D
	Indeno(1,2,3-cd)pyrene	J	Field Duplicate RPD
	Pentachlorophenol	UJ	CCAL %D
	Phenol	J	Field Duplicate RPD/CCAL %D
MAF-SC-DUP-07	1,4-Dichlorobenzene (SVOCs)	UJ	Field Duplicate RPD
	2,4-Dimethylphenol (SVOCs)	UJ	Field Duplicate RPD
	2,4-Dimethylphenol (SVOCs-SIM)	J	Field Duplicate RPD
	Benzo(a)pyrene	J	Field Duplicate RPD
	Benzo(g,h,i)perylene	J	Field Duplicate RPD
	Benzoic Acid	J	Field Duplicate RPD
	Benzyl alcohol	J	CCAL %D/See Miscellaneous
	bis(2-Ethylhexyl)phthalate	J	Field Duplicate RPD
	Butylbenzylphthalate	UJ	CCAL %D
	Cadmium	J	Field Duplicate RPD
	Dibenz(a,h)anthracene	J	Field Duplicate RPD
	Di-n-Butylphthalate	J	Field Duplicate RPD
	Hexachlorobenzene (SVOCs)	UJ	CCAL %D
	Hexachlorobenzene (SVOCs-SIM)	UJ	CCAL %D
	Indeno(1,2,3-cd)pyrene	J	Field Duplicate RPD
	Pentachlorophenol	UJ	CCAL %D
	Phenol	J	Field Duplicate RPD

Sample ID	Analyte	Qualifier	Reason
MAF-SC-11_0-2	Benzyl alcohol	J	See Miscellaneous
	Hexachlorobenzene (SVOCs)	UJ	CCAL %D
	Hexachlorobenzene (SVOCs-SIM)	UJ	CCAL %D
	Pentachlorophenol	UJ	CCAL %D
	Phenol	J	CCAL %D
	Sulfide	J	MS/MSD %R/Lab Dup RPD
MAF-SC-11_2-4	Benzyl alcohol	UJ	CCAL %D
	Butylbenzylphthalate (SVOCs)	UJ	CCAL %D
	Hexachlorobenzene (SVOCs)	UJ	CCAL %D
	Hexachlorobenzene (SVOCs-SIM)	UJ	CCAL %D
	Pentachlorophenol	UJ	CCAL %D
MAF-SC-12_0-2	1,2-Dichlorobenzene (SVOCs-SIM)	J	Surrogate %R
	1,4-Dichlorobenzene (SVOCs-SIM)	J	Surrogate %R
	4-Methylphenol	J	MS/MSD %R
	Hexachlorobenzene (SVOCs)	UJ	CCAL %D
	Hexachlorobenzene (SVOCs-SIM)	UJ	CCAL %D
	Lead	J	Laboratory Duplicate RPD
	Pentachlorophenol	UJ	CCAL %D
	Phenol	J	CCAL %D
	Zinc	J	MS/MSD %R/Lab Dup RPD
MAF-SC-12_2-4	Benzyl alcohol	J	See Miscellaneous
	Hexachlorobenzene (SVOCs)	UJ	CCAL %D
	Hexachlorobenzene (SVOCs-SIM)	UJ	CCAL %D
	Lead	J	MS/MSD %R/Lab Dup RPD
	Pentachlorophenol	UJ	CCAL %D
	Phenol	J	CCAL %D
	Zinc	J	MS/MSD %R/Lab Dup RPD
MAF-SC-15_0-2	4-Methylphenol	J	Field Duplicate RPD
	Acenaphthylene	J	Field Duplicate RPD
	Benzo(a)anthracene	J	Field Duplicate RPD
	Benzo(a)pyrene	J	Field Duplicate RPD
	Benzo(g,h,i)perylene	J	Field Duplicate RPD
	Chrysene	J	Field Duplicate RPD
	Dibenzofuran	J	Field Duplicate RPD
	Hexachlorobenzene (SVOCs)	UJ	CCAL %D
	Hexachlorobenzene (SVOCs-SIM)	UJ	CCAL %D
	Fluorene	J	Field Duplicate RPD
	Indeno(1,2,3-cd)pyrene	J	Field Duplicate RPD
	Pentachlorophenol	UJ	CCAL %D
	Phenol	J	CCAL %D
	Total Benzofluoranthenes	J	Field Duplicate RPD

Sample ID	Analyte	Qualifier	Reason
MAF-SC-DUP-08	4-Methylphenol	J	Field Duplicate RPD
	Acenaphthylene	J	Field Duplicate RPD
	Benzo(a)anthracene	J	Field Duplicate RPD
	Benzo(a)pyrene	J	Field Duplicate RPD
	Benzo(g,h,i)perylene	J	Field Duplicate RPD
	Chrysene	J	Field Duplicate RPD
	Dibenzofuran	J	Field Duplicate RPD
	Hexachlorobenzene (SVOCs)	UJ	CCAL %D
	Hexachlorobenzene (SVOCs-SIM)	UJ	CCAL %D
	Fluorene	J	Field Duplicate RPD
	Indeno(1,2,3-cd)pyrene	J	Field Duplicate RPD
	Pentachlorophenol	UJ	CCAL %D
	Phenol	J	CCAL %D
	Total Benzofluoranthenes	J	Field Duplicate RPD
MAF-SC-21_0-1	2-Methylnaphthalene	J	Field Duplicate RPD
	Benzyl alcohol	UJ	CCAL %D
	Butylbenzylphthalate (SVOCs)	UJ	CCAL %D
	Fluorene	J	Field Duplicate RPD
	Hexachlorobenzene (SVOCs)	UJ	CCAL %D
	Hexachlorobenzene (SVOCs-SIM)	UJ	CCAL %D
	Pentachlorophenol	UJ	CCAL %D
MAF-SC-DUP-09	2-Methylnaphthalene	J	Field Duplicate RPD
	Benzyl alcohol	UJ	CCAL %D
	Butylbenzylphthalate (SVOCs)	UJ	CCAL %D
	Fluorene	J	Field Duplicate RPD
	Hexachlorobenzene (SVOCs)	UJ	CCAL %D
	Hexachlorobenzene (SVOCs-SIM)	UJ	CCAL %D
	Pentachlorophenol	UJ	CCAL %D
MAF-SS-01_0-10	Abietic acid	J	Field Duplicate RPD/CCAL %D
	Acenaphthylene	J	Field Duplicate RPD
	Benzo(a)pyrene	J	Field Duplicate RPD
	Benzo(g,h,i)perylene	J	Field Duplicate RPD
	Diethyl phthalate	UJ	CCAL %D
	Indeno(1,2,3-cd)pyrene	J	Field Duplicate RPD
	Neoabietic acid	UJ	LCS %R
	Sulfide	J	Field Duplicate RPD
	Total Benzofluoranthenes	J	Field Duplicate RPD
MAF-SS-DUP-01	Abietic acid	J	Field Duplicate RPD/CCAL %D
	Acenaphthylene	J	Field Duplicate RPD
	Benzo(a)pyrene	J	Field Duplicate RPD
	Benzo(g,h,i)perylene	J	Field Duplicate RPD
	Diethyl phthalate	UJ	CCAL %D
	Indeno(1,2,3-cd)pyrene	J	Field Duplicate RPD
	Neoabietic acid	UJ	LCS %R
	Sulfide	J	Field Duplicate RPD
	Total Benzofluoranthenes	J	Field Duplicate RPD

Sample ID	Analyte	Qualifier	Reason
MAF-SS-02_0-10	Abietic acid	J	MS/MSD %R and RPD/CCAL %D
	Diethyl phthalate	UJ	CCAL %D
	Isopimaric acid	UJ	MS/MSD %R
	Linoienic acid	UJ	MS/MSD %R
	Neoabietic acid	UJ	MS/MSD %R/LCS %R
	Palustric acid	UJ	MS/MSD %R
MAF-SS-03_0-10	Abietic acid	J	CCAL %D
	Diethyl phthalate	UJ	CCAL %D
	Neoabietic acid	UJ	LCS %R
MAF-SS-04_0-10	Abietic acid	J	Internal Standards %R
	Dehydroabietic acid	J	Internal Standards %R
	Diethyl phthalate	UJ	CCAL %D
	Neoabietic acid	UJ	LCS %R
MAF-SS-05_0-10	Diethyl phthalate	J	CCAL %D
MAF-SS-07_0-10	Diethyl phthalate	J	LCS %R/CCAL %D
MAF-SS-08_0-10	Cadmium	U	Method Blank Contamination
	Copper	J	Field Duplicate RPD
	Diethyl phthalate	UJ	CCAL %D
	Fluoranthene	U	Method Blank Contamination
	Lead	J	Field Duplicate RPD
	Phenanthrene	U	Method Blank Contamination
	Pyrene	U	Method Blank Contamination
	TOC	J	MS/MSD %R/Lab Dup RPD
	Zinc	J	Laboratory Duplicate RPD
MAF-SS-DUP-02	Cadmium	U	Method Blank Contamination
	Copper	J	Lab/Field Duplicate RPD
	Diethyl phthalate	J	LCS %R/CCAL %D
	Fluoranthene	U	Method Blank Contamination
	Lead	J	Lab/Field Duplicate RPD
	Phenanthrene	U	Method Blank Contamination
	Pyrene	U	Method Blank Contamination
	TOC	J	MS/MSD %R/Lab Dup RPD
	Zinc	J	Laboratory Duplicate RPD
MAF-SS-09_0-10	Cadmium	U	Method Blank Contamination
	Diethyl phthalate	J	LCS %R/CCAL %D
MAF-SS-10_0-10	4-Methylphenol	J	MS/MSD RPD
	Bis(2-Ethylhexyl)phthalate	J	MS/MSD RPD
	Diethyl phthalate	UJ	CCAL %D
	Phenol	J	MS/MSD RPD
MAF-SS-11_0-10	Diethyl phthalate	UJ	CCAL %D
MAF-SS-12_0-10	Diethyl phthalate	UJ	CCAL %D
	Sulfide	J	Holding Time
MAF-SS-13_0-10	Diethyl phthalate	UJ	CCAL %D
	Total TCDF	J	Bias from Matrix Interference
MAF-SS-14_0-10	Cadmium	U	Method Blank Contamination
	Pentachlorophenol	UJ	CCAL %D
MAF-SS-15_0-10	Benzyl alcohol	UJ	MS/MSD %R
	Pentachlorophenol	UJ	CCAL %D

Sample ID	Analyte	Qualifier	Reason
MAF-SS-16_0-10	Cadmium	U	Method Blank Contamination
	Pentachlorophenol	UJ	CCAL %D
MAF-SS-17_0-10	Pentachlorophenol	UJ	CCAL %D
	Phenol	U	Method Blank Contamination
MAF-SS-18_0-10	Pentachlorophenol	UJ	CCAL %D
	Phenol	U	Method Blank Contamination
MAF-SS-19_0-10	Diethyl phthalate	UJ	CCAL %D
	Total TCDF	J	Bias from Matrix Interference
	Total PeCDF	J	Bias from Matrix Interference
MAF-SS-20_0-10	Diethyl phthalate	UJ	CCAL %D
	Total TCDF	J	Bias from Matrix Interference
	Total PeCDF	J	Bias from Matrix Interference
MAF-SS-21_0-10	Pentachlorophenol	J	CCAL %D
	Phenol	J	Field Duplicate RPD
	Sulfide	J	MS/MSD %R/Field Dup RPD
	TOC	J	Field Duplicate RPD
MAF-SS-DUP-04	Pentachlorophenol	UJ	CCAL %D
	Phenol	J	Field Duplicate RPD
	Sulfide	J	MS/MSD %R/Field Dup RPD
	TOC	J	Field Duplicate RPD
MAF-SS-22_0-10	TOC	J	MS/MSD %R
	Total TCDF	J	Bias from Matrix Interference
	Total PeCDF	J	Bias from Matrix Interference
MAF-SS-24_0-10	Cadmium	U	Method Blank Contamination
	Pentachlorophenol	UJ	CCAL %D
MAF-SS-25_0-10	Cadmium	U	Method Blank Contamination
	Pentachlorophenol	UJ	CCAL %D
	Phenol	U	Method Blank Contamination
MAF-SS-26_0-10	Cadmium	U	Method Blank Contamination
	Pentachlorophenol	UJ	CCAL %D
MAF-SS-27_0-10	Cadmium	U	Method Blank Contamination
	Pentachlorophenol	UJ	CCAL %D
	Phenol	U	Method Blank Contamination
MAF-SS-28_0-10	n-Ammonia	J	Field Duplicate RPD
MAF-SS-DUP-05	n-Ammonia	J	Field Duplicate RPD
MAF-SS-30_0-10	Sulfide	J	Field Duplicate RPD
MAF-SS-DUP-03	Sulfide	J	Field Duplicate RPD
MAF-SS-31_0-10	Diethyl phthalate	UJ	CCAL %D
	Sulfide	J	MS/MSD %R/Lab Dup RPD
	Total TCDF		Bias from Matrix Interference
	Total PeCDF		Bias from Matrix Interference
MAF-SS-32_0-10	Abietic acid	J	CCAL %D
	Diethyl phthalate	UJ	CCAL %D
	Neoabietic acid	UJ	LCS %R

Sample ID	Analyte	Qualifier	Reason
MAF-SS-33_0-10	Benzo(g,h,i)perylene	J	Field Duplicate RPD
	Chrysene	J	Field Duplicate RPD
	Diethyl phthalate	UJ	CCAL %D
	Indeno(1,2,3-cd)pyrene	J	Field Duplicate RPD
	Phenol	J	Field Duplicate RPD
	Sulfide	J	Field Duplicate RPD
MAF-SS-DUP-06	Benzo(g,h,i)perylene	J	Field Duplicate RPD
	Chrysene	J	Field Duplicate RPD
	Diethyl phthalate	UJ	CCAL %D
	Indeno(1,2,3-cd)pyrene	J	Field Duplicate RPD
	Phenol	J	Field Duplicate RPD
	Sulfide	J	Field Duplicate RPD
MAF-SS-34_0-10	Diethyl phthalate	J	CCAL %D
	Tributyltin ion	UJ	Surrogate %R
MAF-SS-35_0-10	Total TCDF	J	Bias from Matrix Interference
	Total PeCDF	J	Bias from Matrix Interference
MAF-SS-36_0-10	Diethyl phthalate	UJ	CCAL %D
MAF-SS-38_0-10	Total TCDF	J	Bias from Matrix Interference
	Total PeCDF	J	Bias from Matrix Interference
MAF-SS-37_0-10	Total TCDF	J	Bias from Matrix Interference
	Total PeCDF	J	Bias from Matrix Interference
MAF-SS-40_0-10	Total TCDF	J	Bias from Matrix Interference
	Total PeCDF	J	Bias from Matrix Interference
MAF-SS-49_0-10	Total TCDF	J	Bias from Matrix Interference

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Data Validation Report

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Project: Port of Everett – Supplemental Marine Area Sediment Investigation
GEI File No: 00676-020-06 (Task 0700)

Date: April 24, 2019

This report documents the results of a United States Environmental Protection Agency (USEPA)-defined Stage 2B/Stage 4 data validation (USEPA Document 540-R-08-005; USEPA 2009) of analytical data from the analyses of surface/subsurface sediment and porewater samples collected as part of the November 2018 sampling event, and the associated laboratory and field quality control (QC) samples. The samples were obtained from the former Mill A Site located at 3500 Terminal Avenue in Everett, Snohomish County, Washington.

OBJECTIVE AND QUALITY CONTROL ELEMENTS

GeoEngineers, Inc. (GeoEngineers) completed the data validation consistent with National Functional Guidelines for Organic Superfund Methods Data Review (USEPA 2017) and National Functional Guidelines for Inorganic Superfund Methods Data Review (USEPA 2017) to determine if the laboratory analytical results meet the project objectives and are usable for their intended purpose. Data usability was assessed by determining if:

- The samples were analyzed using well-defined and acceptable methods that provide reporting limits below applicable regulatory criteria;
- The precision and accuracy of the data are well-defined and sufficient to provide defensible data; and
- The quality assurance/quality control (QA/QC) procedures utilized by the laboratory meet acceptable industry practices and standards.

In accordance with the Marine Area Sampling and Analysis Plan (GeoEngineers 2014), the data validation included review of the following QC elements:

- Data Package Completeness
- Chain-of-Custody Documentation
- Holding Times and Sample Preservation
- Surrogate Recoveries
- Method Blanks
- Matrix Spikes/Matrix Spike Duplicates
- Laboratory Control Samples/Laboratory Control Sample Duplicates
- Laboratory and Field Duplicates

- Instrument Tuning
- Internal Standards
- Initial Calibrations (ICALs)
- Continuing Calibrations (CCALs)
- Dilutions
- Miscellaneous and False Positives

VALIDATED SAMPLE DELIVERY GROUPS

This data validation included review of the sample delivery groups (SDGs) listed below in Table 1.

TABLE 1: SUMMARY OF VALIDATED SAMPLE DELIVERY GROUPS

Laboratory SDG	Samples Validated
18K0220 (K1811233)	MAF-SS-55_0-10, MAF-SS-56_0-10, MAF-SS-57_0-10, MAF-SS-58_0-10, MAF-SS-59_0-10, MAF-SS-60_0-10, MAF-SS-61_0-10, MAF-SS-DUP-11, MAF-SC-56_0-2, MAF-SC-56_2-4, MAF-SC-57_0-2, MAF-SC-57_2-4, MAF-SC-58_2-4, MAF-SC-DUP-07, MAF-SC-59_2-4, MAF-SC-59_6-8, MAF-SC-60_4-6, and MAF-SC-60_8-10 **Samples submitted to secondary laboratory for analyses on porewater matrix in the following samples:** MAF-SS-56_0-10, MAF-SS-57_0-10, MAF-SS-58_0-10, MAF-SS-59_0-10, MAF-SS-60_0-10
(Archived Frozen) 19B0349/12232	MAF-SC-59_10-12

CHEMICAL ANALYSIS PERFORMED

Analytical Resources, Inc. (ARI), located in Tukwila, Washington, performed laboratory analysis on the sediment samples using one or more of the following methods:

- Semi-volatile Organic Compounds (SVOCs) by Method SW8270D and SW8270D-SIM;
- Polycyclic Aromatic Hydrocarbons (PAHs) by Method SW8270D-SIM;
- Total Metals by Methods EPA6020A/7471B;
- Total Solids (TS) and Total Volatile Solids (TVS) by Method SM2540G;
- N-Ammonia by Method SM4500-NH3;
- Sulfide by Method SM4500-S2D; and
- Total Organic Carbon (TOC) by Method Plumb 1981

ALS Environmental (ALS) located in Kelso, Washington, performed laboratory analyses on the porewater extracts using one or more of the following methods:

- N-Ammonia by Method SM4500-NH3 (solid analysis for Sample MAF-SS-56_0-10);

- Sulfides by Method SM4500-S2D;
- Sulfides by Method SW9030M (solid analysis for Sample MAF-SS-56_0-10)

Frontier Analytical Laboratory (Frontier) located in El Dorado Hills, California, performed laboratory analysis on the groundwater samples using the following method:

- Dioxin/Furan compounds by Method EPA 1663

DATA VALIDATION SUMMARY

The results for each of the QC elements are summarized below.

Data Package Completeness

ARI and ALS provided all required deliverables for the data validation according to the National Functional Guidelines. The laboratories followed adequate corrective action processes and all identified anomalies were discussed in the relevant laboratory case narrative.

Chain-of-Custody Documentation

Chain-of-custody (COC) forms were provided with the laboratory analytical reports. The COCs were accurate and complete when submitted to the lab, with the following exceptions:

SDG K1811233: The laboratory noted that there was limited porewater sample volume for Sample MAF-SS-56_0-10. For this reason, ammonia and sulfide analyses were performed on the solid portion of the sample. No qualification was required.

Holding Times and Sample Preservation

The sample holding time is defined as the time that elapses between sample collection and sample analysis. Maximum holding time criteria exist for each analysis to help ensure that the analyte concentrations found at the time of analysis reflect the concentration present at the time of sample collection. Established holding times were met for all analyses, with the exception noted below. The sample coolers arrived at the laboratory within the appropriate temperatures of between 2 and 6 degrees Celsius. All analyses were conducted within the appropriate holding times with the exceptions below:

SDG K1811233: The laboratory noted that there was limited porewater sample volume for Sample MAF-SS-56_0-10. For this reason, the sulfide analysis exceeded the holding time of seven days by one day. The positive result for Total sulfide was qualified as estimated (J) in this sample.

Surrogate Recoveries

A surrogate compound is a compound that is chemically similar to the organic analytes of interest, but unlikely to be found in any environmental sample. Surrogates are used for organic analyses and are added to all samples, standards, and blanks to serve as an accuracy and specificity check of each analysis. The surrogates are added to the samples at a known concentration and percent recoveries (%R) are calculated following analysis. All organic surrogate recoveries for field samples were within the laboratory control limits.

Method Blanks

Method blanks are analyzed to ensure that laboratory procedures and reagents do not introduce measurable concentrations of the analytes of interest. A method blank was analyzed with each batch of samples, at a frequency of 1 per 20 samples. For all sample batches, method blanks were analyzed at the required frequency. The following analytes of interest were detected in the listed method blanks.

SDG 18K0220: (SVOC-SIM) There was a positive result for dibenzo(a,h)anthracene detected above the reporting limit in the method blank extracted on 11/19/2018. The associated field samples, MAF-SS-55_0-10, MAF-SS-56_0-10, MAF-SS-61_0-10, MAF-SS-DUP-11, MAF-SC-56_0-2, MAF-SC-56_2-4, MAF-SC-57_0-2, MAF-SC-57_2-4, MAF-SC-58_2-4, MAF-SC-DUP-07_(2018), and MAF-SC-59_6-8, reported positive results detected below the action level of 5X the concentration in the method blank for this analyte. The positive results for dibenzo(a,h)anthracene were qualified as non-detected (U) in these samples.

There were also positive results for fluoranthene, phenanthrene, benzo(k)fluoranthene, benzo(a)pyrene, benzo(ghi)perylene, and pyrene detected above the method detection limit, but below the reporting limit in the same method blank extracted on 11/19/2018. The associated field sample, MAF-SC-56_2-4, detected results below the reporting limit for fluoranthene, phenanthrene, benzo(a)pyrene, and pyrene. The positive results for these analytes were qualified as non-detected (U) in Sample MAF-SC-56_2-4. The associated field sample, MAF-SC-57_2-4, detected results below the reporting limit for benzo(a)pyrene, and benzo(ghi)perylene. The positive results for these analytes were qualified as non-detected (U) in Samples MAF-SC-57_2-4. The associated field sample, MAF-SC-60_8-10, detected results below the reporting limit for benzo(a)pyrene. The positive result for this analyte were qualified as non-detected (U) in Sample MAF-SC-60_8-10.

SDG 18K0220: (Metals) There was a positive result for antimony detected above the method detection limit, but below the reporting limit in the method blank digested on 11/29/2018. There were no positive results for antimony in any of the associated field samples; therefore, no qualification was required.

In cases were target analytes are qualified as non-detected because of blank contamination, the new reporting limit is elevated to the level of the former concentration reported in the sample.

SDG 19B0349: (Metals) There was positive results for antimony and zinc detected above the method detection limits, but below the reporting limits in the method blank digested on 3/11/2019. The associated Sample MAF-SC-59_10-12 reported a positive result for zinc greater than five times the reporting limit and no positive result for antimony; therefore, no qualification was required in either case.

Matrix Spikes/Matrix Spike Duplicates

Since the actual analyte concentration in an environmental sample is not known, the accuracy of a particular analysis is usually inferred by performing a matrix spike (MS) analysis on one sample from the associated batch, known as the parent sample. One aliquot of the sample is analyzed in the normal manner and then a second aliquot of the sample is spiked with a known amount of analyte concentration and analyzed. From these analyses, a percent recovery (%R) is calculated. Matrix spike duplicate (MSD) analyses are generally performed for organic analyses as a precision check and analyzed in the same sequence as a matrix spike. Using the results from the MS and MSD, the relative percent difference (RPD) is calculated. The %R control limits for MS and MSD analyses are specified in the laboratory documents, as are the RPD control limits for MS/MSD sample sets.

One MS/MSD analysis should be performed for every analytical batch or every 20 field samples, whichever is more frequent. The %R and RPD values were within the proper control limits.

Laboratory Control Samples/Laboratory Control Sample Duplicates

A laboratory control sample (LCS) is a blank sample that is spiked with a known amount of analyte and then analyzed. An LCS is similar to an MS, but without the possibility of matrix interference. Given that matrix interference is not an issue, control limits for accuracy and precision in the the LCS and its duplicate (LCSD) are usually more rigorous than for MS/MSD analyses. Additionally, data qualification based on LCS/LCSD analyses would apply to each sample in the associated batch, instead of just the parent sample. The %R control limits for LCS and LCSD analyses are specified in the laboratory documents, as are the RPD control limits for LCS/LCSD sample sets.

One LCS/LCSD analysis should be performed for every analytical batch or every 20 field samples, whichever is more frequent. The frequency requirements were met for each analysis and the %R and RPD values were within the proper control limits.

Laboratory Duplicates

Internal laboratory duplicate analyses are performed to monitor the precision of the analyses. Two separate aliquots of a sample are analyzed as distinct samples in the laboratory and the RPD between the two results is calculated. Duplicate analyses should be performed once per analytical batch. If one or more of the samples used has a concentration less than five times the reporting limit for that sample, the absolute difference is used instead of the RPD. The RPD control limits are specified in the laboratory documents. Laboratory duplicates were analyzed at the proper frequency and the specified acceptance criteria were met, with the following exceptions:

SDG 18K0220: (TOC) Two sets of laboratory duplicates were performed on Sample MAF-SC-56_0-2. The RPD value for the first sample pair was greater than the control limit. However, the RPD value for the second sample pair was within the control limits. Since only one successful measurement of precision is required by the validation guidelines, no qualifiers were required.

Field Duplicates

Field duplicates are similar to laboratory duplicates in that they are used to assess precision. Two samples (parent and duplicate) are created in the field by subsampling the homogenized sample and submitting them to the lab as separate samples. Duplicate samples were collected and analyzed for the same parameters as the associated parent samples. Precision is determined by calculating the RPD between each pair of samples. If one or more of the sample analytes has a concentration greater than five times the reporting limit for that sample, then the absolute difference is used instead of the RPD. The RPD control limit for water samples is 35 percent. The RPD control limit for sediment samples is 50 percent.

SDG 18K0220: Two field duplicate sample pairs, MAF-SS-56_0-10/MAF-SC-DUP-07 and MAF-SS-61_0-10/MAF-SS-DUP-11, were submitted with this SDG. The precision criteria for all target analytes were met for these sample pairs, with the following exceptions:

MAF-SS-56_0-10/MAF-SC-DUP-07: The positive results for 2-methylnaphthalene, acenaphthene, fluorene, anthracene, fluoranthene, pyrene and mercury, were qualified as estimated (J) in this sample pair.

MAF-SS-61_0-10/MAF-SS-DUP-11: The positive results for Total benzofluoranthenes, benzo(a)pyrene, benzo(a)anthracene, chrysene, and indeno(1,2,3-cd)pyrene were qualified as estimated (J) in this sample pair.

Instrument Tuning

Instrument tuning for analyses by gas chromatography/mass spectrometry (GC/MS) are completed to ensure that mass resolution, identification, and sensitivity of the analyses are acceptable. Instrument tuning should be performed at the beginning of each 12-hour period during which samples or standards are analyzed. The frequency and specified acceptance criteria were met for each applicable analysis.

Internal Standards (Low Resolution Mass Spectrometry)

Like the surrogate, an internal standard is a compound that is chemically similar to the analytes of interest, but unlikely to be found in any environmental sample. Internal standards are used only for the mass spectrometry instrumentation and are usually added to the sample aliquot after extraction has taken place. The internal standard should be analyzed at the beginning of a 12-hour sample run and the control limits for internal standard recoveries are 50 percent to 200 percent of the calibration standard. All internal standard recoveries were within the control limits, with the following exceptions:

SDG 18K0220: (SVOCs) The areas for internal standards 1,4-dichlorobenzene-d4 and naphthalene-d8 were lower than 50% in Samples MAF-SS-56_0-10 and MAF-SC-DUP-07. There were no positive results for any of the internally associated target analytes in either sample. The reporting limits for the appropriate analytes were qualified as estimated (UJ) in both samples.

The area for internal standard 1,4-dichlorobenzene-d4 was lower than 50% in Sample MAF-SS-57_0-10. There were no positive results for any of the internally associated target analytes in either sample. The reporting limits for the appropriate analytes were were qualified as estimated (UJ) in Sample MAF-SS-57_0-10.

Initial Calibrations (ICALs)

The initial calibrations were conducted according to the laboratory methods and consisted of the appropriate number of standards. For inorganic analyses, the %R values were within the control limits of 90% and 110%. For organic analyses, the percent relative standard deviation (%RSD) and relative response factors (RRF) values were within the control limits stated in the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (USEPA 2008).

Continuing Calibrations (CCALs)

The continuing calibrations were conducted according to the laboratory methods and consisted of the appropriate number of standards. For inorganic analyses, the %R values were within the control limits of 90% and 110%. For organic analyses, the percent difference (%D) and relative response factors (RRF) values were within the control limits in the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (USEPA 2008), with the following exceptions:

SDG 18K0220: (SVOC-SIMs) The %D values for benzoic acid were less than the control limits in the continuing calibration verification performed on 11/29/2018. The positive results for benzoic acid were qualified as estimated (J) in all samples in this SDG.

Dilutions

There were several cases where target analytes exceeded the linear calibration range of the analytical instrument. In these cases, the laboratory flagged these analytes with an "E", and re-analyzed these samples at various dilutions. In each case, both sets of data were reported by the laboratory. In order to avoid duplicate analytical reporting, the validator labeled all "E" flags with Do-Not-Report (DNR). Correspondingly, the validator labeled all other analytes in the dilutions with DNR so that only one concise set of analytes per sample were to be used for this project. The affected samples are listed below.

SDG 18K0220: (8270-SIM) Sample MAF-SC-60_4-6 (pyrene)

Miscellaneous and False Positives

SDG 18K0220: (SVOCs) The phenol results in Samples MAF-SS-57_0-10, MAF-SS-58_0-10, MAF-SS-59_0-10, and MAF-SS-60_0-10 were flagged with an "M", indicating that this result is an estimated value with low spectral match parameters. For this reason, the positive result for phenol were qualified as estimated (J) in these samples.

SDG 19B0349: (Dioxins) The ion abundance ratio for the Total TCDD homolog group in Sample MAF-SC-59_10-12 was not within the control limits, indicating that this result could potentially be a false positive. For this reason, the positive result for Total TCDD was qualified as not detected (U).

OVERALL ASSESSMENT

As was determined by this data validation, the laboratory followed the specified analytical methods. Accuracy was acceptable, as demonstrated by the surrogate, LCS/LCSD, and MS/MSD percent recovery values, with the exceptions mentioned above. Precision was acceptable, as demonstrated by the LCS/LCSD, MS/MSD, and laboratory/field duplicate RPD values, with the exceptions mentioned above. All data are acceptable for the intended use, with the qualifications listed below.

All data are acceptable for the intended use, with the following qualifications listed below in Table 2.

TABLE 2: SUMMARY OF QUALIFIED SAMPLES

Sample ID	Analyte	Qualifier	Reason
MAF-SC-56_0-2	Dibenzo(a,h)anthracene (SW8270DSIM)	U	MB
MAF-SC-56_2-4	Benzo(a)pyrene (SW8270DSIM)	U	MB
	Dibenzo(a,h)anthracene (SW8270DSIM)	U	MB
	Fluoranthene (SW8270DSIM)	U	MB
	Phenanthrene (SW8270DSIM)	U	MB
	Pyrene (SW8270DSIM)	U	MB
MAF-SC-57_0-2	Dibenzo(a,h)anthracene (SW8270DSIM)	U	MB
MAF-SC-57_2-4	Benzo(a)pyrene (SW8270DSIM)	U	MB
	Benzo(g,h,i)perylene (SW8270DSIM)	U	MB
	Dibenzo(a,h)anthracene (SW8270DSIM)	U	MB
MAF-SC-58_2-4	Dibenzo(a,h)anthracene (SW8270DSIM)	U	MB
MAF-SC-59_2-4	Benzoic Acid (SW8270DSIM)	J	CCAL

MAF-SC-59_6-8	Dibenzo(a,h)anthracene (SW8270DSIM)	U	MB
MAF-SC-60_8-10	Benzo(a)pyrene (SW8270DSIM)	U	MB
MAF-SC-DUP-07_(2018)	2-methylnaphthalene (SW8270DSIM)	J	FD
	Acenaphthene (SW8270DSIM)	J	FD
	Fluorene (SW8270DSIM)	J	FD
	Anthracene (SW8270DSIM)	J	FD
	Fluoranthene (SW8270DSIM)	J	FD
	Pyrene (SW8270DSIM)	J	FD
	Mercury	J	FD
	1,2,4-Trichlorobenzene (SW8270D)	UJ	IS
	1,2-Dichlorobenzene (o-Dichlorobenzene) (SW8270D)	UJ	IS
	1,4-Dichlorobenzene (p-Dichlorobenzene) (SW8270D)	UJ	IS
	2,4-Dimethylphenol (SW8270D)	UJ	IS
	2-methylphenol (o-Cresol) (SW8270D)	UJ	IS
	4-methylphenol (p-Cresol) (SW8270D)	UJ	IS
	Benzoic Acid (SW8270D)	UJ	IS
	Benzyl Alcohol (SW8270D)	UJ	IS
	Hexachlorobutadiene (SW8270D)	UJ	IS
	Phenol (SW8270D)	UJ	IS
	Dibenzo(a,h)anthracene (SW8270DSIM)	U	MB
MAF-SS-55_0-10	Dibenzo(a,h)anthracene (SW8270DSIM)	U	MB
MAF-SS-56_0-10	2-methylnaphthalene (SW8270DSIM)	J	FD
	Acenaphthene (SW8270DSIM)	J	FD
	Fluorene (SW8270DSIM)	J	FD
	Anthracene (SW8270DSIM)	J	FD
	Fluoranthene (SW8270DSIM)	J	FD
	Pyrene (SW8270DSIM)	J	FD
	Mercury	J	FD
	Sulfide	J	HT
	1,2,4-Trichlorobenzene (SW8270D)	UJ	IS
	1,2-Dichlorobenzene (o-Dichlorobenzene) (SW8270D)	UJ	IS
	1,4-Dichlorobenzene (p-Dichlorobenzene) (SW8270D)	UJ	IS
	2,4-Dimethylphenol (SW8270D)	UJ	IS
	2-methylphenol (o-Cresol) (SW8270D)	UJ	IS
	4-methylphenol (p-Cresol) (SW8270D)	UJ	IS

	Benzoic Acid (SW8270D)	UJ	IS
	Benzyl Alcohol (SW8270D)	UJ	IS
	Hexachlorobutadiene (SW8270D)	UJ	IS
	Phenol (SW8270D)	J	IS
	Dibenzo(a,h)anthracene (SW8270DSIM)	U	MB
MAF-SS-57_0-10	1,2-Dichlorobenzene (o-Dichlorobenzene) (SW8270D)	UJ	IS
	1,4-Dichlorobenzene (p-Dichlorobenzene) (SW8270D)	UJ	IS
	2-methylphenol (o-Cresol) (SW8270D)	UJ	IS
	4-methylphenol (p-Cresol) (SW8270D)	J	IS
	Benzyl Alcohol (SW8270D)	UJ	IS
	Phenol (SW8270D)	J	IS, MI
MAF-SS-58_0-10	Phenol (SW8270D)	J	MI
MAF-SS-59_0-10	Phenol (SW8270D)	J	MI
MAF-SS-60_0-10	Phenol (SW8270D)	J	MI
MAF-SS-61_0-10	Benzo(a)anthracene (SW8270DSIM)	J	FD
	Benzo(a)pyrene (SW8270DSIM)	J	FD
	Benzofluoranthenes (Total)	J	FD
	Chrysene (SW8270DSIM)	J	FD
	Indeno(1,2,3-c,d)pyrene (SW8270DSIM)	J	FD
	Dibenzo(a,h)anthracene (SW8270DSIM)	U	MB
MAF-SS-DUP-11	Benzo(a)anthracene (SW8270DSIM)	J	FD
	Benzo(a)pyrene (SW8270DSIM)	J	FD
	Benzofluoranthenes (Total)	J	FD
	Chrysene (SW8270DSIM)	J	FD
	Indeno(1,2,3-c,d)pyrene (SW8270DSIM)	J	FD
	Dibenzo(a,h)anthracene (SW8270DSIM)	U	MB
MAF-SC-60_4-6	2-Methylnaphthalene (SW8270DSIM)	R	DNR
	Acenaphthene (SW8270DSIM)	R	DNR
	Acenaphthylene (SW8270DSIM)	R	DNR
	Anthracene (SW8270DSIM)	R	DNR
	Benzo(a)anthracene (SW8270DSIM)	R	DNR
	Benzo(a)pyrene (SW8270DSIM)	R	DNR
	Benzo(g,h,i)perylene (SW8270DSIM)	R	DNR
	Benzofluoranthenes (Total) (SW8270DSIM)	R	DNR
	Chrysene (SW8270DSIM)	R	DNR
	Dibenzo(a,h)anthracene (SW8270DSIM)	R	DNR

	Fluoranthene (SW8270DSIM)	R	DNR
	Fluorene (SW8270DSIM)	R	DNR
	Indeno(1,2,3-c,d)pyrene (SW8270DSIM)	R	DNR
	Naphthalene (SW8270DSIM)	R	DNR
	Phenanthrene (SW8270DSIM)	R	DNR
	Pyrene (SW8270DSIM)	R	DNR
MAF-SC-59_10-12	Total TCDD	U	CID

Below is a list of definitions for the Qualifier Reason Codes:

- HT = Holding Time
- MB = Method Blank
- FD = Field Duplicate
- IS = Internal Standard
- CCAL = Continuing Calibration Verification
- CID = Compound Identification (i.e., ion ratio, retention time, relative abundance, etc.)
- DNR = Do-Not-Report (Due to Sample/Analyte reduncancy; analyte reported more than once)

REFERENCES

U.S. Environmental Protection Agency (USEPA). "Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use," EPA-540-R-08-005. January 2009.

U.S. Environmental Protection Agency (USEPA). "National Functional Guidelines for Organic Superfund Methods Data Review" EPA-540-R-2017-002. January 2017.

U.S. Environmental Protection Agency (USEPA). "National Functional Guidelines for Inorganic Superfund Methods Data Review" EPA-540-R-2017-001. January 2017.

GeoEngineers 2014b. Marine Area Sampling and Analysis Plan, Weyerhaeuser Mill A Former, Everett, Washington, Ecology Agreed Order No. DE 8979. Prepared for Washington State Department of Ecology on behalf of the Port of Everett, Weyerhaeuser Company and Washington State Department of Natural Resources. October 16, 2014.

DATA VALIDATION REPORT

PORT OF EVERETT
WEYERHAUSER MILL A CLEANUP SITE

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PROJECT NARRATIVE

Basis for the Data Validation

This report summarizes the results of summary and full validation (EPA Stage 2B, EPA Stage 4) performed on sediment and quality control sample data for the Port of Everett – Weyerhauser Mill A Cleanup Site, Everett, Washington. A complete list of samples is provided in the **Sample Index**.

Samples were analyzed by Frontier Analytical Laboratory, El Dorado Hills, California. The analytical methods and EcoChem project chemists are noted below:

ANALYSIS	METHOD	PRIMARY REVIEW	SECONDARY REVIEW
PCB Congeners	1668	Melissa Swanson/Eric Clayton	C. Ransom
Dioxin/Furan Compounds	1613B	E. Clayton	

The data were reviewed using guidance and quality control criteria documented in the analytical methods; *National Functional Guidelines for Chlorinated Dioxin/Furan Data Review* (USEPA 2011); and *USEPA Region 2 Data Validation, Standard Operating Procedure for EPA Method 1668A, Revision 1* (September 2008).

EcoChem's goal in assigning data assessment qualifiers is to assist in proper data interpretation. If values are estimated (J or UJ), data may be used for site evaluation and risk assessment purposes but reasons for data qualification should be taken into consideration when interpreting sample concentrations. If values are assigned an R, the data are to be rejected and should not be used for any site evaluation purposes. If values have no data qualifier assigned, then the data meet the data quality objectives as stated in the documents and methods referenced above.

Data qualifier definitions, reason codes, and validation criteria are included as **APPENDIX A**. A Qualified Data Summary Table is included in **APPENDIX B**. Data Validation Worksheets and project associated communications will be kept on file at EcoChem, Inc. A qualified laboratory electronic data deliverable (EDD) is also submitted with this report.

Sample Index
Port of Everett - Weyerhauser Mill A Cleanup Site

SDG	Sample ID	Laboratory ID	Dioxins	PCB Congeners
9372	MAF-SS-02_0-10	9372-001-SA	✓	
9372	MAF-SS-10_0-10	9372-009-SA	✓	✓
9372	MAF-SS-32_0-10	9372-005-SA	✓	✓
9372	MAF-SS-34_0-10	9372-015-SA	✓	✓
9372	MAF-SS-36_0-10	9372-001-SA	✓	✓
9373	MAF-SS-21_0-10	9373-007-SA	✓	✓
9373	MAF-SS-25_0-10	9373-013-SA	✓	✓
9373	MAF-SS-12_0-10	9373-002-SA	✓	✓
9374	MAF-SS-14_0-10	9374-005-SA	✓	✓
9374	MAF-SS-15_0-10	9374-004-SA	✓	✓
9374	MAF-SS-16_0-10	9374-003-SA	✓	✓
9374	MAF-SS-27_0-10	9374-002-SA	✓	✓
9374	MAF-SS-DUP-04	9374-009-SA	✓	✓
9374	MAF-SS-DUP-06	9374-011-SA	✓	✓
9393	MAF-SC-04_0-2	9393-001-SA		✓
9396	MAF-SC-11_0-2	9396-007-SA		✓
9403	MAF-SC-10_0-2	9403-005-SA		✓
9403	MAF-SC-DUP-07	9403-009-SA		✓
9429	MAF-SC-04_0-2	9429-001-SA		✓
9430	MAF-SC-03_0-2	9430-009-SA		✓
9430	MAF-SC-DUP-03	9430-010-SA		✓

DATA VALIDATION REPORT
Port of Everett - Weyerhauser Mill A Cleanup Site
Dioxin/Furan Compounds by Method 1613B

This report documents the review of analytical data from the analysis of sediment samples and the associated laboratory and field quality control (QC) samples. Samples were analyzed by Frontier Analytical Laboratory., El Dorado Hills, California. Refer to the SAMPLE INDEX for a complete list of samples.

SDG	NUMBER OF SAMPLES	VALIDATION LEVEL
9372	5 Sediment	EPA Stage 2B
9373	3 Sediment	EPA Stage 4
9374	6 Sediment	EPA Stage 2B

DATA PACKAGE COMPLETENESS

The laboratory submitted all required deliverables. The laboratory followed adequate corrective action processes and all anomalies were discussed in the case narrative.

EDD TO HARDCOPY VERIFICATION

Sample results and related quality control data were received as an electronic data deliverable (EDD) and laboratory report. The EDD was verified against the laboratory report (10%). The following discrepancies were noted:

The sampling dates in the EDD for the following samples did not match the COC. The dates in the EDD were corrected.

SDG	Sample ID	Lab ID	COC Date Collected	dbase sample_date
9372	MAF-SS-36_0-10	9372-001-SA	10/19/2015	10/26/2015
	MAF-SS-32_0-10	9372-005-SA	10/19/2015	10/26/2015
	MAF-SS-10_0-10	9372-009-SA	10/20/2015	10/27/2015
	MAF-SS-34_0-10	9372-015-SA	10/20/2015	10/27/2015
9373	MAF-SS-12_0-10	9373-002-SA	10/20/2015	10/27/2015
9374	MAF-SS-DUP-06	9374-011-SA	10/19/2015	10/26/2015

TECHNICAL DATA VALIDATION

The quality control (QC) requirements reviewed are summarized in the following table:

✓	Sample Receipt, Preservation, and Holding Times	✓	Ongoing Precision and Recovery (OPR)
✓	System Performance and Resolution Checks	1	Field Duplicates
✓	Initial Calibration (ICAL)	✓	Target Analyte List
✓	Calibration Verification	✓	Reported Results
✓	Blanks (Laboratory and Field)	2	Compound Identification
✓	Labeled Compound Recovery	1	Calculation Verification
1	Matrix Spike/Matrix Spike Duplicates (MS/MSD)		

✓ ***Stated method quality objectives (MQO) and QC criteria have been met. No outliers are noted or discussed.***
1 ***Quality control results are discussed below, but no data were qualified.***
2 ***Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed below.***

Matrix Spike/Matrix Spike Duplicates

Sample MAF-SS-10_0-10 was marked for matrix spike/matrix spike duplicate (MS/MSD) analysis on the COCs, however MS/MSDs are not required by the analytical method or the quality assurance project plan (QAPP). The MS/MSD results were not used to evaluate laboratory precision or accuracy.

Field Duplicates

The field duplicate relative percent difference (RPD) control limit is 50% for concentrations greater than 5x the reporting limit (RL). For concentrations less than 5x the RL, the difference between the sample result and the duplicate result must be less than 2x the RL. Outlier results were estimated (J-9). Field duplicate samples and any outliers are noted below.

SDG 9372: One set of field duplicates was collected: MAF-SS-33_0-10 and MAF-SS-DUP-06. The parent sample was not marked for analysis. No evaluation could be performed.

SDG 9373: One set of field duplicates was submitted: MAF-SS-21_0-10 and MAF-SS-DUP-04. All field precision criteria were met.

Compound Identification

The method requires the confirmation of 2,3,7,8-TCDF using an alternate GC column if the column that is typically used cannot fully separate 2,3,7,8-TCDF from closely eluting non-target TCDF isomers. The laboratory performed a second column confirmation as necessary. Results reported from the confirmation column were flagged with an "F".

The laboratory assigned an "M" flag to one or more analytes to indicate that the ion ratio criterion for positive identification was not met. Since the ion abundance ratio is the primary identification criterion for high resolution mass spectroscopy, an outlier indicates that the reported result may be a false positive. These "M" flagged results were qualified as not detected (U-25) at the reported concentration. The laboratory also assigned "M" flags to total homolog groups. In these cases, the result for the group was estimated (J-25).

Diphenyl ether interferences were present in some samples. The laboratory assigned a "D" flag to the results affected by these interferences. These results were estimated (J-23) to indicate a potential high bias.

Calculation Verification

SDG 9373: Several results were verified by recalculation from the raw data. No calculation or transcription errors were found.

OVERALL ASSESSMENT

As determined by this evaluation, the laboratory followed the specified analytical method. With the exceptions noted above, accuracy was acceptable as demonstrated by the labeled compound and OPR recoveries and precision was acceptable as demonstrated by the OPR and field duplicate RPD values.

Detection limits were elevated based on ion ratio outliers. Results were estimated because they exceeded the calibration range or due to diphenyl ether interference. Results for total homolog groups with "M" flags were also estimated.

All data, as qualified, are acceptable for use.

DATA VALIDATION REPORT
Port of Everett - Weyerhauser Mill A Cleanup Site
Polychlorinated Biphenyl Compounds by Method 1668

This report documents the review of analytical data from the analysis of sediment samples and the associated laboratory and field quality control (QC) samples. Samples were analyzed by Frontier Analytical Laboratory., El Dorado Hills, California. Refer to the SAMPLE INDEX for a complete list of samples.

SDG	NUMBER OF SAMPLES	VALIDATION LEVEL
9372	4 Sediment	EPA Stage 2B
9373	3 Sediment	EPA Stage 4
9374	6 Sediment	EPA Stage 2B
9393	1 Sediment	EPA Stage 2B
9396	1 Sediment	EPA Stage 2B
9403	2 Sediment	EPA Stage 2B
9429	1 Sediment	EPA Stage 2B
9430	2 Sediment	EPA Stage 2B

DATA PACKAGE COMPLETENESS

The laboratory submitted all required deliverables. The laboratory followed adequate corrective action processes and all anomalies were discussed in the case narrative.

EDD TO HARDCOPY VERIFICATION

Sample results and related quality control data were received as an electronic data deliverable (EDD) and laboratory report. The EDD was verified against the laboratory report (10%). The following discrepancies were noted:

The sampling dates in the EDD for the following samples did not match the COC. The dates in the EDD were corrected.

SDG	Sample ID	Lab ID	COC Date Collected	dbase sample_date
9372	MAF-SS-36_0-10	9372-001-SA	10/19/2015	10/26/2015
	MAF-SS-32_0-10	9372-005-SA	10/19/2015	10/26/2015
	MAF-SS-10_0-10	9372-009-SA	10/20/2015	10/27/2015
	MAF-SS-34_0-10	9372-015-SA	10/20/2015	10/27/2015
9373	MAF-SS-12_0-10	9373-002-SA	10/20/2015	10/27/2015
9374	MAF-SS-DUP-06	9374-011-SA	10/19/2015	10/26/2015
9429	MAF-SC-04_0-2(B)	9429-001-SA	11/10/2015	10/26/2015

SDG 9429: The laboratory added ID suffix "(B)" to Sample MAF-SC-04_0-2 in the EDD only.

TECHNICAL DATA VALIDATION

The quality control (QC) requirements reviewed are summarized in the following table:

✓	Sample Receipt, Preservation, and Holding Times	✓	Ongoing Precision and Recovery (OPR)
✓	System Performance and Resolution Checks	2	Field Duplicates
✓	Initial Calibration (ICAL)	✓	Target Analyte List
✓	Calibration Verification	1	Reported Results
✓	Blanks (Laboratory and Field)	2	Compound Identification
✓	Labeled Compound Recovery	1	Calculation Verification
✓	Matrix Spike/Matrix Spike Duplicates (MS/MSD)		

✓ ***Stated method quality objectives (MQO) and QC criteria have been met. No outliers are noted or discussed.***
1 ***Quality control results are discussed below, but no data were qualified.***
2 ***Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed below.***

Field Duplicates

The field duplicate relative percent difference (RPD) control limit is 50% for concentrations greater than 5x the reporting limit (RL). For concentrations less than 5x the RL, the difference between the sample result and the duplicate result must be less than 2x the RL. Field duplicate samples and any outliers are noted below.

SDGs 9373, 9374: One set of field duplicates, MAF-SS-21_0-10 and MAF-SS-DUP-04, were submitted. The parent sample was in SDG 9373 and the duplicate was in SDG 9374. The RPD values or difference values for 154 PCB congeners were outside control limits. Results for theses congeners were estimated (J/UJ-9) in these two samples.

SDG 9374: Sample MAF-SS-DUP-06 was submitted with this SDG, the parent sample MAF-SS-33_0-10 was not designated for analysis on the chain of custody.

SDG 9403: One set of field duplicates was submitted, MAF-SC-10_0-2 and MAF-SC-DUP-07. The RPD values or difference values for 165 congeners were outside control limits. The results for these congeners were estimated (J/UJ-9) in these two samples.

SDG 9430: One set of field duplicates was submitted, MAF-SC-03_0-2 and MAF-SC-DUP-03. The RPD values or difference values for 46 congeners were outside control limits. The results for these congeners were estimated (J/UJ-9) in these two samples.

Reported Results

The laboratory reported co-elutions differently in the hardcopy versus the EDD. In the hardcopy report, the co-elution result was reported for the lowest congener number; there was no result reported for the remaining co-elutors. The lab added flags indicating the associated congeners for a given co-elution. In the EDD, the result for a co-elution was reported for each congener represented in a given co-elution. No action was taken; however, data users should be aware of this reporting convention so that double counting does not occur when re-calculating total PCBs.

Compound Identification

SDG 9430: Unidentified matrix interferences were present in both samples. The laboratory assigned an "X" flag to congener results impacted by these interferences. The positive results were estimated (J-14) to indicate a potential high bias. No action was taken for the result that was reported as not-detected at an elevated detection limit.

Calculation Verification

SDG 9373: Several results were verified by recalculation from the raw data. No calculation or transcription errors were found.

OVERALL ASSESSMENT

As determined by this evaluation, the laboratory followed the specified analytical method. Accuracy was acceptable as demonstrated by the labeled compound and OPR recoveries. With the exceptions noted above precision was acceptable as demonstrated by the OPR and field duplicate RPD values.

Data were estimated due to field duplicate precision outliers and matrix interferences.

All data, as qualified, are acceptable for use.

ECOCHEM
Data Quality

APPENDIX A

DATA QUALIFIER DEFINITIONS
REASON CODES
AND CRITERIA TABLES

DATA VALIDATION QUALIFIER CODES
Based on National Functional Guidelines

The following definitions provide brief explanations of the qualifiers assigned to results in the data review process.

U	The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
J	The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
NJ	The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents the approximate concentration.
UJ	The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
R	The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

The following is an EcoChem qualifier that may also be assigned during the data review process:

DNR	Do not report; a more appropriate result is reported from another analysis or dilution.

DATA QUALIFIER REASON CODES

Group	Code	Reason for Qualification
Sample Handling	1	Improper Sample Handling or Sample Preservation (i.e., headspace, cooler temperature, pH, summa canister pressure); Exceeded Holding Times
Instrument Performance	24	Instrument Performance (i.e., tune, resolution, retention time window, endrin breakdown, lock-mass)
	5A	Initial Calibration (RF, %RSD, r^2)
	5B	Calibration Verification (CCV, CCAL; RF, %D, %R) Use bias flags (H,L)[1] where appropriate
	5C	Initial Calibration Verification (ICV %D, %R) Use bias flags (H,L)[1] where appropriate
Blank Contamination	6	Field Blank Contamination (Equipment Rinsate, Trip Blank, etc.)
	7	Lab Blank Contamination (i.e., method blank, instrument blank, etc.) Use low bias flag (L)[1] for negative instrument blanks
Precision and Accuracy	8	Matrix Spike (MS and/or MSD) Recoveries Use bias flags (H,L)[1] where appropriate
	9	Precision (all replicates: LCS/LCSD, MS/MSD, Lab Replicate, Field Replicate)
	10	Laboratory Control Sample Recoveries (a.k.a. Blank Spikes) Use bias flags (H,L)[1] where appropriate
	12	Reference Material Use bias flags (H,L)[1] where appropriate
	13	Surrogate Spike Recoveries (a.k.a. labeled compounds, recovery standards) Use bias flags (H,L)[1] where appropriate
Interferences	16	ICP/ICP-MS Serial Dilution Percent Difference
	17	ICP/ICP-MS Interference Check Standard Recovery Use bias flags (H,L)[1] where appropriate
	19	Internal Standard Performance (i.e., area, retention time, recovery)
	22	Elevated Detection Limit due to Interference (i.e., chemical and/or matrix)
	23	Bias from Matrix Interference (i.e. diphenyl ether, PCB/pesticides)
Identification and Quantitation	2	Chromatographic pattern in sample does not match pattern of calibration standard
	3	2nd column confirmation (RPD or %D)
	4	Tentatively Identified Compound (TIC) (associated with NJ only)
	20	Calibration Range or Linear Range Exceeded
	25	Compound Identification (i.e., ion ratio, retention time, relative abundance, etc.)
Miscellaneous	11	A more appropriate result is reported (multiple reported analyses i.e., dilutions, re-extractions, etc. Associated with "R" and "DNR" only)
	14	Other (See DV report for details)
	26	Method QC information not provided

[1] H = high bias indicated
L = low bias indicated

Dioxin/Furan Analysis by HRMS
(Based on Dioxin NFG 2011 and Methods EPA 1613B and SW-846 8290)

QC Element	Acceptance Criteria	Source of Criteria	Action for Non-Conformance	Reason Code	Discussion and Comments
Sample Handling					
Cooler/Storage Temperature Preservation	Waters/Solids ≤ 6°C & in the dark Tissues <-10°C & in the dark **Preservation Aqueous:** If Cl_2 is present Thiosulfate must be added and if pH > 9 it must be adjusted to 7 - 9	NFG [1] Method[2]	J(pos)/R(ND) if thiosulfate not added if Cl_2 present; J(pos)/UJ(ND) if pH not adjusted J(pos)/UJ(ND) if temp > 20°C	1	**EcoChem PJ, see TM-05**
Holding Time	**If properly stored, 1 year or:** **Extraction (all matrices):** 30 days from collection **Analysis (all matrices)**: 45 days from extraction	NFG [1] Method[2]	If not properly stored or HT exceedance: J(pos)/UJ(ND)	1	**EcoChem PJ, see TM-05** Gross exceedance = > 1 year 2011 NFG **Note:** Under CWA, SDWA, and RCRA the HT for H2O is 7 days.
Instrument Performance					
Mass Resolution (Tuning)	PFK (Perfluorokerosene) ≥10,000 resolving power at m/z 304.9824. Exact mass of m/z 380.9760 w/in 5 ppm of theoretical value (380.97410 to 380.97790) . Analyzed prior to ICAL and at the start and end of each 12 hr. shift.	NFG [1] Method [2]	R(pos/ND) all analytes in all samples associated with the tune	24	Notify PM
Windows Defining Mix	Peaks for first and last eluters must be within established retention time windows for each selector group (chlorination level)	NFG [1] Method [2]	If peaks are not completely within windows (clipped): If natives are ok, J(pos)/UJ(ND) homologs (Totals) If natives are affected, R all results for that selector group	24	Notify PM
Column Performance Mix	Both mixes must be analyzed before ICAL and CCAL Valley < 25% (valley = (x/y)*100%) where x = ht. of TCDD (or TCDF) & y = baseline to bottom of valley For all isomers eluting near the 2378-TCDD (TCDF) peak (TCDD only for 8290)	NFG [1] Method [2]	J(pos) if valley > 25%	24	**EcoChem PJ, see TM-05, Rev. 2**; Note: TCDF is evaluated only if second column confirmation is performed
Initial Calibration **Sensitivity**	S/N ratio > 10 for all native and labeled compounds in CS1 std.	NFG [1] Method [2]	If <10, elevate Det. Limit or R(ND)	5A	
Initial Calibration **Selectivity**	Ion Abundance ratios within QC limits (Table 8 of method 8290) (Table 9 of method 1613B)	NFG [1] Method [2]	If 2 or more ion ratios are out for one compound in ICAL, J(pos)	5A	**EcoChem PJ, see TM-05, Rev. 2**

Dioxin/Furan Analysis by HRMS
(Based on Dioxin NFG 2011 and Methods EPA 1613B and SW-846 8290)

QC Element	Acceptance Criteria	Source of Criteria	Action for Non-Conformance	Reason Code	Discussion and Comments
Instrument Performance (continued)					
Initial Calibration (Minimum 5 stds.) **Stability**	%RSD < 20% for native compounds %RSD <30% for labeled compounds (%RSD < 35% for labeled compounds under 1613b)	NFG [1] Method [2]	J(pos) natives if %RSD > 20%	5A	
	Absolute RT of $^{13}C_{12}$-1234-TCDD >25 min on DB5 & >15 min on DB-225	NFG [1] Method [2]	Narrate, no action		**EcoChem PJ, see TM-05, Rev. 2**
Continuing Calibration (Prior to each 12 hr. shift) **Sensitivity**	S/N ratio for CS3 standard > 10	NFG [1] Method [2]	If <10, elevate Det. Limit or R(ND)	5B	
Continuing Calibration (Prior to each 12 hr. shift) **Selectivity**	Ion Abundance ratios within QC limits (Table 8 of method 8290) (Table 9 of method 1613B)	NFG [1] Method [2]	For congener with ion ratio outlier, J(pos) natives in all samples associated with CCAL. No action for labeled congener ion ratio outliers.	25	**EcoChem PJ, see TM-05**
Continuing Calibration (Prior to each 12 hr. shift) **Stability**	%D+/-20% for native compounds %D +/-30% for labeled compounds **(Must meet limits in Table 6, Method 1613B)** If %D in the closing CCAL are within 25%/35%, the mean RF from the two CCAL may be used to calculate samples **(Section 8.3.2.4 of 8290)**.	NFG [1] Method [2]	**Labeled compounds:** Narrate, no action. **Native compounds:** 1613: J(pos)/UJ(ND)if %D is outside Table 6 limits J(pos)/R(ND) if %D is +/-75% of Table 6 limits 8290: J(pos)/UJ(ND) if %D = 20% - 75% J(pos)/R(ND) if %D > 75%	5B (H,L)[3]	
	Absolute RT of $^{13}C_{12}$-1234-TCDD and $^{13}C_{12}$-123789-HxCDD should be ± 15 seconds of ICAL RRT for all other compounds must meet criteria listed in Table 2 Method 1316.	NFG [1] Method [2]	Narrate, no action	5B	**EcoChem PJ, see TM-05**
Blank Contamination					
Method Blank (MB)	MB: One per matrix per batch of (of ≤ 20 samples) No detected compounds > RL	NFG [1] Method [2]	U(pos) if result is < 5X action level.	7	**Hierarchy of blank review:** **#1 - Review MB, qualify as needed** **#2 - Review FB , qualify as needed**
Field Blank (FB)	FB: frequency as per QAPP No detected compounds > RL		U(pos) if result is < 5X action level.	6	

Dioxin/Furan Analysis by HRMS
(Based on Dioxin NFG 2011 and Methods EPA 1613B and SW-846 8290)

QC Element	Acceptance Criteria	Source of Criteria	Action for Non-Conformance	Reason Code	Discussion and Comments
Precision and Accuracy					
MS/MSD (recovery)	**MS/MSD not typically required for HRMS analyses.** If lab analyzes MS/MSD then one set per matrix per batch (of ≤ 20 samples) Use most current laboratory control limits	EcoChem standard policy	J(pos) if both %R > UCL - high bias J(pos)/UJ(ND) if both %R < LCL - low bias J(pos)/R(ND) if both %R < 10% - very low bias J(pos)/UJ(ND) if one > UCL & one < LCL, with no bias **PJ if only one %R outlier**	8 (H,L)[3]	No action if only one spike %R is outside criteria. No action if parent concentration is >4x the amount spiked. Qualify parent sample only unless other QC indicates systematic problems.
MS/MSD (RPD)	**MS/MSD not typically required for HRMS analyses.** If lab analyzes MS/MSD then one set per matrix per batch (of ≤ 20 samples) Use most current laboratory control limits	EcoChem standard policy	J(pos) in parent sample if RPD > CL	9	Qualify parent sample only.
LCS (or OPR)	One per lab batch (of ≤ 20 samples) Use most current laboratory control limits **or** Limits from Table 6 of 1613B	NFG [1] Method [2]	J(pos) if %R > UCL - high bias J(pos)/UJ(ND) if %R < LCL - low bias J(pos)/R(ND) if %R < 10% - very low bias	10 (H,L)[3]	No action if only one spike %R is outside criteria, when LCSD is analyzed. Qualify all associated samples.
LCS/LCSD (RPD)	**LCSD not typically required for HRMS analyses.** One set per matrix and batch of 20 samples RPD < 35%	Method [2] Ecochem standard policy	J(pos) assoc. compound in all samples if RPD > CL	9	Qualify all associated samples.
Lab Duplicate (RPD)	**Lab Dup not typically required for HRMS analyses.** One per lab batch (of ≤ 20 samples) Use most current laboratory control limits	EcoChem standard policy	J(pos)/UJ(ND) if RPD > CL	9	
Labeled Compounds (Internal Standards)	Added to all samples %R = 40% - 135% in all samples 8290 %R must meet limits in Table 7 Method 1613B	NFG [1] Method [2]	J(pos) if %R > UCL - high bias J(pos)/UJ(ND) if %R < LCL - low bias J(pos)/R(ND) if %R < 10% - very low bias	13 (H,L)[3]	
Field Duplicates	Solids: RPD <50% OR difference < 2X RL (for results < 5X RL) Aqueous: RPD <35% OR difference < 1X RL (for results < 5X RL)	EcoChem standard policy	Narrate and qualify if required by project	9	**Use professional judgment**

Dioxin/Furan Analysis by HRMS
(Based on Dioxin NFG 2011 and Methods EPA 1613B and SW-846 8290)

QC Element	Acceptance Criteria	Source of Criteria	Action for Non-Conformance	Reason Code	Discussion and Comments
Compound ID and Calculation					
Quantitation/ Identification	All ions for each isomer must maximize within ± 2 seconds. S/N ratio >2.5 Ion ratios must meet criteria listed in Table 8 Method 8290, or Table 9 of 1613B; RRTs w/in limits in Table 2 of 1613B	NFG [1] Method [2]	Narrate in report; qualify if necessary NJ(pos) for retention time outliers. U(pos) for ion ratio outliers.	25	**EcoChem PJ, see TM-05**
EMPC (estimated maximum possible concentration)	If quantitation identification criteria are not met, laboratory should report an EMPC value.	NFG [1] Method [2]	If laboratory correctly reported an EMPC value, qualify the native compound U(pos) to indicate that the value is a detection limit and qualify total homolog groups J (pos)	25	**Use professional judgment See TM-18**
Interferences	Interferences from chlorodiphenyl ether compounds	NFG [1] Method [2]	J(pos)/UJ(ND) if present	23	**See TM-16**
	Lock masses must not deviate ± 20% from values in Table 8 of 1613B	Method [2]	J(pos)/UJ(ND) if present	24	**See TM-17**
Second Column Confirmation	All 2,3,7,8-TCDF hits must be confirmed on a DB-225 (or equiv) column. All QC criteria must also be met for the confirmation analysis.	NFG [1] Method [2]	Report the DB-225 value. If not performed use PJ.	3	DNR-11 DB5 result if both results from both columns are reported. **EcoChem PJ, see TM-05**
Calculation Check	Check 10% of field & QC sample results	EcoChem standard policy	Contact laboratory for resolution and/or corrective action	na	Full data validation only.
Electronic Data Deliverable (EDD)					
Verification of EDD to hardcopy data	EcoChem verify @ 10% unless problems noted; then increase level up to 100% for next several packages.		Depending on scope of problem, correct at EcoChem (minor issues) to resubmittal by laboratory (major issues).	na	EcoChem Project Manager and/or Database Administrator will work with lab to provide long-term corrective action.
Dilutions, Re-extractions and/or Reanalyses	Report only one result per analyte	Standard reporting policy	Use "DNR" to flag results that will not be reported.	11	

(pos) - positive (detected) results; (ND) - not detected results

[1] National Functional Guidelines for Chlorinated Dibenzo-p-Dioxins (CDDs) & Chlorinated Dibenzofurans (CDFs) Data Review, September 2011

[2] Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by High-Resolution Gas Chromatography/High-Resolution Mass Spectrometry (HRGC/HRMS), USEPA SW-846, Method 8290

[2] EPA Method 1613, Rev.B, Tetra-through Octa-Chlorinated Dioxins and Furans by Isotope Dilution HRGS/HRMS, October 1994

[3] NFG 2013 suggests using "+ / -" to indicate bias; EcoChem has chosen "H" = high bias indicated; "L" = low bias indicated.

PCB Congener Analysis by HRMS
(Based on EPA DV Guidance[1] and Method EPA 1668C)

QC Element	Acceptance Criteria	Source of Criteria	Action for Non-Conformance	Reason Code	Discussion and Comments
Sample Handling					
Cooler/Storage Temperature Preservation	Waters/Solids ≤ 6°C & in the dark Tissues <-10°C & in the dark **Preservation Aqueous:** If Cl_2 is present Thiosulfate must be added and if needed adjust pH to 2 - 3 (drinking water requirement)	EPA (1) Method (2)	J(pos)/R(ND) if thiosulfate not added if Cl_2 present and J(pos)/UJ(ND) if pH not adjusted; J(pos)/UJ(ND) if temp > 20°C	1	Note: EPA DV guidance documents use < 4°C, method uses ≤ 6°C. Info in EcoChem TM-05 also generally applies.
Holding Time	If properly stored, 1 year prior to extraction. If extracts properly stored (< -10°C & in dark), 1 year from extraction to analysis.	EPA (1) Method (2)	If not properly stored or HT exceeded: J(pos)/UJ(ND)	1	May **be dictated by QAPP** Info in EcoChem TM-05 also generally applies
Instrument Performance					
Mass Resolution (Tuning)	≥10,000 resolving power at m/z 330.9792 <5 ppm deviation from each m/z listed in **Table 7** of method. Analyzed prior to ICAL and at the beginning and end of each 12 hr. shift	EPA (1) Method (2)	R all analytes in all samples associated with a failed tune	24	PFK (Perfluorokerosene) tuning compound
Column Resolution	Mix of all 209 PCBs run prior to each ICAL/12 hours RT of PCB209 must be > 55 min PCB156 & 157 must coelute w/in 2 sec PCB34 & 23 and PCB187 & 182 must be resolved where ((x/y)*100%) < 40% x = ht of valley and y = ht of shortest peak RRT of all congeners must fall within the range in **Table 2** of the method	EPA (1) Method (2)	If criteria are not met, review sample chromatograms to determine if sample results are negatively impacted. If so, discuss with client for possible reanalyses, or J(pos) all data.	24	Criteria are for SPB-octyl column. If different column used, see Section 6.9.1.2 of method. Appendix A provides info for DB-1 column
Initial Calibration **Sensitivity**	S/N ratio > 10 for all native and labeled congeners in CS1 std.	EPA (1) Method (2)	If <10, elevate Det. Limit or R(ND)	5A	
Initial Calibration **Selectivity**	Ion Abundance ratios within QC limits (**Table 8** of Method 1668C)	EPA (1) Method (2)	If ion ratios are out for a given congener in 2 or more standards in ICAL, J(pos) results for that congener in all samples	5A	Professional judgement. The info in EcoChem TM-05 also generally applies
Initial Calibration (Minimum 5 stds.) **Stability**	%RSD < 20% for congeners listed in **Table 3** of method RRT of all congeners must meet **Table 2** of method	EPA (1) Method (2)	J(pos) natives if %RSD > 20% RRT outliers: narrate, no action	5A	RRT outliers: professional judgement. The info in EcoChem TM-05 also generally applies
Continuing Calibration (Prior to each 12 hr. shift) **Sensitivity**	S/N ratio for CS3 standard > 10	EPA (1) Method (2)	If <10, elevate Det. Limit to lowest calibration or R(ND)	5B	
Continuing Calibration (Prior to each 12 hr. shift) **Selectivity**	Ion Abundance ratios within QC limits (**Table 8** of Method 1668C)	EPA (1) Method (2)	No action if %D acceptable, review sample ion ratios, U(pos) if ion ratio outside limits	5B	Professional judgement. The info in EcoChem TM-05 also generally applies.

PCB Congener Analysis by HRMS
(Based on EPA DV Guidance[1] and Method EPA 1668C)

QC Element	Acceptance Criteria	Source of Criteria	Action for Non-Conformance	Reason Code	Discussion and Comments
Continuing Calibration (Prior to each 12 hr. shift) **Stability**	Recoveries must meet VER% limits in **Table 6,** Method 1668C	EPA [(1)] Method [(2)]	**Labeled congeners:** Narrate, no action. **Native congeners:** J(pos)/UJ(ND) for low bias J(pos) for high bias	5B (H,L)[3]	
	Absolute RT of all Labeled congeners and Window Defining Congeners must be +/- 15 sec of RT in ICAL RRT of all congeners must be within range in **Table 2** of method	EPA [(1)] Method [(2)]	Narrate, no action	5B	Professional judgement. The info in EcoChem TM-05 also generally applies
Blank Contamination					
Method Blank (MB)	MB: One per matrix per batch of (of ≤ 20 samples) No detected congeners	EPA [(1)] Method [(2)]	U(pos) if sample result is < 5X blank concentration	7	**Heirarchy of blank review:** **#1 - Review MB, quaify as needed** **#2 - Review FB , qualify as needed** EMPC values in blanks as considered to be non-detects
Field Blank (FB)	FB: frequency as per QAPP No detected congeners		U(pos) if sample result is < 5X blank concentration	6	
Precision and Accuracy					
MS/MSD (recovery)	**MS/MSD not typically required for HRMS analyses.** If lab analyzes MS/MSD then one set per matrix per batch (of ≤ 20 samples) Use most current laboratory control limits	EcoChem standard policy	J(pos) if both %R > UCL - high bias J(pos)/UJ(ND) if both %R < LCL - low bias J(pos)/R(ND) if both %R < 10% - very low bias J(pos)/UJ(ND) if one > UCL & one < LCL, with no bias **PJ if only one %R outlier**	8 (H,L)[3]	No action if only one spike %R is outside criteria. No action if parent concentration is >4x the amount spiked. Qualify parent sample only unless other QC indicates systematic problems.
MS/MSD (RPD)	**MS/MSD not typically required for HRMS analyses.** If lab analyzes MS/MSD then one set per matrix per batch (of ≤ 20 samples) Use most current laboratory control limits	EcoChem standard policy	J(pos) in parent sample if RPD > CL	9	Qualify parent sample only.
LCS (or OPR)	One per lab batch (of ≤ 20 samples) %R must meet limits in **Table 6** Method 1668C	EPA [(1)] Method [(2)]	J(pos) if %R > UCL - high bias J(pos)/UJ(ND) if %R < LCL - low bias J(pos)/R(ND) if %R < 10% - very low bias	10 (H,L)[3]	No action if only one spike %R is outside criteria, when LCSD is analyzed. Qualify all associated samples.
LCS/LCSD (RPD)	**LCS/LCSD not typically required for HRMS analyses.** If lab analyzes LCS/LCSD then one set per matrix and batch of 20 samples RPD < 35%	EcoChem standard policy	J(pos) assoc. congener in all samples if RPD > CL	9	Qualify all associated samples.
Lab Duplicate (RPD) (if required)	**Lab Dup not typically required for HRMS analyses.** One per lab batch (of ≤ 20 samples) Use most current laboratory control limits	EcoChem standard policy	J(pos)/UJ(ND) if RPD > CL	9	Optional element. Qualify parent sample only.

PCB Congener Analysis by HRMS
(Based on EPA DV Guidance[1] and Method EPA 1668C)

QC Element	Acceptance Criteria	Source of Criteria	Action for Non-Conformance	Reason Code	Discussion and Comments
Labeled congeners (Internal Standards)	Added to all samples %R must meet limits in **Table 6** Method 1668C	EPA [(1)] Method [(2)]	J(pos) if %R > UCL - high bias J(pos)/UJ(ND) if %R < LCL - low bias J(pos)/R(ND) if %R <5% - very low bias J(pos)/UJ(ND) if %R between 5-10% for two or more labeled compounds in a substitution group (ie, mono, -di-, trichlorinated)- very low bias	13 (H,L)[3]	See next tab for labled congener associations as per **Table 2** Method 1668
Field Duplicates	Solids: RPD <50% OR difference < 2X RL (for results < 5X RL) Aqueous: RPD <35% OR difference < 1X RL (for results < 5X RL)	EcoChem standard policy	Narrate and qualify if required by project **(EcoChem PJ)**	9	**RPD values may be dictated by QAPP** 35% and 50% are EcoChem defaults
Compound ID and Calculation					
Quantitation/ Identification	All ions for each isomer must maximize within +/- 2 seconds. S/N ratio >2.5 Ion ratios must meet criteria listed in **Table 8** of 1668C; RRTs w/in limits in **Table 2** of 1668C	EPA [(1)] Method [(2)]	Narrate in report; qualify if necessary NJ(pos) for retention time outliers. U(pos) for ion ratio outliers.	25	The info in EcoChem TM-05 also generally applies
EMPC (estimated maximum possible concentration)	If quantitation identification criteria are not met, laboratory should report an EMPC value.	EPA [(1)] Method [(2)]	If laboratory correctly reported an EMPC value, qualify the native congener U to indicate that the value is an elevated detection limit and qualify total homolog groups J(+)	25	**Use professional judgment.** **See TM-18**
Interferences	Lock masses must not deviate +/- 20% from values in **Table 7** of 1668C	Method [(2)]	J(pos)/UJ(ND) if present	24	**Use professional judgment.** **See TM-17**
Calibration Range	Results greater than highest calibration standard	EcoChem standard policy	Qualify J (pos)	20	If result from dilution analysis is not reported.
Calculation Check	Check 10% of field & QC sample results	EcoChem standard policy	Contact laboratory for resolution and/or corrective action	na	Full data validation only.
Electronic Data Deliverable (EDD)					
Verification of EDD to hardcopy data	EcoChem verify @ 10% unless problems noted; then increase level up to 100% for next several packages.		Depending on scope of problem, correct at EcoChem (minor issues) to resubmittal by laboratory (major issues).	na	EcoChem Project Manager and/or Database Administrator will work with lab to provide long-term corrective action.
Dilutions, Re-extractions and/or Reanalyses	Report only one result per analyte	Standard reporting policy	Use "DNR" to flag results that will not be reported.	11	

[1] USEPA Region 2 Data Validation, Standard Operating Procedure for EPA Method 1668A, Revision 1, September 2008
USEPA Region 3 Interim Guidelines for the Validation of Data Generated Using Method 1668 PCB Congener Data, Revision 0, April 2004
USEPA Region 10 SOP For the Validation of Method 1668 Toxic, Dioxin-like, PCB Data, Revision 1, December 1995
[2] EPA Method 1668, Rev.C, Chlorinated Biphenyl Congeners in Water, Soil, Sediment, Biosolids, and Tissue by HRGC/HRMS, April 2010
[3] "H" = high bias indicated; "L" = low bias indicated

(pos): Positive Result(s)
(ND): Non-detects

PCB by 1668C

Labeled Compound

1L	3L	4L	15L	19L	37L	54L	77L	81L	104L	105L	114L	118L	123L	126L	155L	156L/ 157L	167L	169L	188L	189L	202L	205L	206L	208L	209L
1	2	**4**	5	16	16	40	40	40	82	82	82	82	82	**126**	128	128	128	128	170	170	194	194	**206**	207	**209**
2	**3**	5	6	17	17	41	41	41	83	83	83	83	83		129	129	129	129	171	171	195	195	207	**208**	
		6	7	18	18	42	42	42	84	84	84	84	84		130	130	130	130	172	172	196	196			
		7	8	**19**	20	43	43	43	85	85	85	85	85		131	131	131	131	173	173	197	197			
		8	9	20	21	44	44	44	86	86	86	86	86		132	132	132	132	174	174	198	198			
		9	10	21	22	45	45	45	87	87	87	87	87		133	133	133	133	175	175	199	199			
		10	11	22	23	46	46	46	88	88	88	88	88		134	134	134	134	176	176	200	200			
		11	12	23	24	47	47	47	89	89	89	89	89		135	135	135	135	177	177	201	201			
		12	13	24	25	48	48	48	90	90	90	90	90		136	136	136	136	178	178	**202**	203			
		13	14	25	26	49	49	49	91	91	91	91	91		137	137	137	137	179	179	203	204			
		14	**15**	26	27	50	50	50	92	92	92	92	92		138	138	138	138	180	180	204	**205**			
				27	28	51	51	51	93	93	93	93	93		139	139	139	139	181	181					
				28	29	52	52	52	94	94	94	94	94		140	140	140	140	182	182					
				29	30	53	53	53	95	95	95	95	95		141	141	141	141	183	183					
				30	31	**54**	55	55	96	96	96	96	96		142	142	142	142	184	184					
				31	32	55	56	56	97	97	97	97	97		143	143	143	143	185	185					
				32	33	56	57	57	98	98	98	98	98		144	144	144	144	186	186					
				33	34	57	58	58	99	99	99	99	99		145	145	145	145	187	187					
				34	35	58	59	59	100	100	100	100	100		146	146	146	146	**188**	**189**					
				35	36	59	60	60	101	101	101	101	101		147	147	147	147	190	190					
				36	**37**	60	61	61	102	102	102	102	102		148	148	148	148	191	191					
				38	38	61	62	62	103	103	103	103	103		149	149	149	149	192	192					
				39	39	62	63	63	**104**	**105**	106	106	106		150	150	150	150	193	193					
						63	64	64	106	106	107	107	107		151	151	151	151							
						64	65	65	107	107	108	108	108		152	152	152	152							
						65	66	66	108	108	109	109	109		153	153	153	153							
						66	67	67	109	109	110	110	110		154	154	154	154							
						67	68	68	110	110	111	111	111		**155**	**156**	158	158							
						68	69	69	111	111	112	112	112		158	**157**	159	159							
						69	70	70	112	112	113	113	113		159	158	160	160							
						70	71	71	113	113	**114**	115	115		160	159	161	161							
						71	72	72	115	115	115	116	116		161	160	162	162							
						72	73	73	116	116	116	117	117		162	161	163	163							
						73	74	74	117	117	117	**118**	119		163	162	164	164							
						74	75	75	119	119	119	119	120		164	163	165	165							
						75	76	76	120	120	120	120	121		165	164	166	166							
						76	**77**	78	121	121	121	121	122		166	165	**167**	168							
						78	78	79	122	122	122	122	**123**		168	166	168	**169**							
						79	79	80	124	124	124	124	124			168									
						80	80	**81**	125	125	125	125	125												
									127	127	127	127	127												

ECOCHEM
Data Quality

APPENDIX B

QUALIFIED DATA SUMMARY TABLE

Qualified Data Summary Table
Port of Everett - Weyerhauser Mill A Cleanup Site

SDG	Sample ID	Method	Analyte	Result	Units	Lab Flag	DV Qualifier	DV Reason
9372	MAF-SS-02_0-10	EPA1613B	Total PeCDF	83.7	pg/g	M	J	25
9372	MAF-SS-02_0-10	EPA1613B	Total TCDF	139	pg/g	D,M	J	23,25
9372	MAF-SS-10_0-10	EPA1613B	Total HxCDF	64.2	pg/g	D,M	J	23,25
9372	MAF-SS-10_0-10	EPA1613B	Total PeCDF	63.3	pg/g	D,M	J	23,25
9372	MAF-SS-10_0-10	EPA1613B	Total TCDF	213	pg/g	D,M	J	23,25
9372	MAF-SS-32_0-10	EPA1613B	Total TCDF	20.2	pg/g	D,M	J	23,25
9372	MAF-SS-34_0-10	EPA1613B	Total TCDF	130.0	pg/g	M	J	25
9373	MAF-SS-21_0-10	EPA1668	PCB-001	36.4	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-002	13.9	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-003	42.9	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-004	34.3	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-006	27.1	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-007	10.8	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-008	114	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-009	9.44	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-011	32.8	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-013	12.9	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-015	78.2	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-016	66.3	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-017	88.9	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-018	234	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-019	18.7	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-020	274	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-021	274	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-022	171	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-025	34.8	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-026	78.3	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-027	15.7	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-028	444	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-031	537	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-032	70.4	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-033	274	pg/g		J	9

Qualified Data Summary Table
Port of Everett - Weyerhauser Mill A Cleanup Site

SDG	Sample ID	Method	Analyte	Result	Units	Lab Flag	DV Qualifier	DV Reason
9373	MAF-SS-21_0-10	EPA1668	PCB-035	12.3	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-037	106	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-040	64.0	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-041	280.0	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-042	81.5	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-043	318	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-044	334	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-045	47.7	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-046	20.0	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-047	85.5	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-048	58.4	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-049	318	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-051	16.0	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-052	655	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-053	56.7	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-055	13.8	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-056	397	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-059	81.5	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-060	397	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-061	871	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-063	23.2	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-064	280.0	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-066	581	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-067	15.5	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-069	655	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-070	871	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-071	280.0	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-072	280.0	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-074	316	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-075	58.4	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-076	581	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-077	49.8	pg/g		J	9

Qualified Data Summary Table
Port of Everett - Weyerhauser Mill A Cleanup Site

SDG	Sample ID	Method	Analyte	Result	Units	Lab Flag	DV Qualifier	DV Reason
9373	MAF-SS-21_0-10	EPA1668	PCB-079	14.9	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-081	32.5	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-082	141	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-083	50.6	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-084	608	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-085	178	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-087	617	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-088	251	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-090	2360	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-091	251	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-092	608	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-095	3360	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-097	355	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-099	532	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-101	2360	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-103	12.0	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-105	660.0	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-106	1980	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-107	107	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-108	107	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-110	1670	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-111	18.4	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-112	50.6	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-114	48.3	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-115	18.4	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-116	178	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-117	617	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-118	1980	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-119	16.7	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-122	27.2	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-123	26.6	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-124	99.7	pg/g		J	9

Qualified Data Summary Table
Port of Everett - Weyerhauser Mill A Cleanup Site

SDG	Sample ID	Method	Analyte	Result	Units	Lab Flag	DV Qualifier	DV Reason
9373	MAF-SS-21_0-10	EPA1668	PCB-125	617	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-126	11.5	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-128	707	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-129	214	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-130	337	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-131	127	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-132	1420	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-133	127	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-134	255	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-135	694	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-136	650.0	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-137	110.0	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-138	5980	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-139	4560	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-141	1540	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-143	255	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-144	351	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-146	826	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-147	42.6	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-149	4560	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-151	1310	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-153	6020	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-154	16.3	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-156	684	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-157	86.9	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-158	735	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-159	67.0	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-160	735	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-161	1420	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-162	707	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-163	5980	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-164	5980	pg/g		J	9

Qualified Data Summary Table
Port of Everett - Weyerhauser Mill A Cleanup Site

SDG	Sample ID	Method	Analyte	Result	Units	Lab Flag	DV Qualifier	DV Reason
9373	MAF-SS-21_0-10	EPA1668	PCB-165	826	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-166	11.8	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-167	284	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-170	2740	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-171	703	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-172	457	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-173	64.7	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-174	2150	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-175	108	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-176	268	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-177	1300	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-178	410.0	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-179	678	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-180	4830	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-182	2170	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-183	1230	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-185	230.0	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-187	2170	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-189	144	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-190	527	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-191	127	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-193	270.0	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-194	1020	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-195	458	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-196	872	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-197	36.6	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-198	51.6	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-199	653	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-200	88.9	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-201	95.8	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-202	114	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1668	PCB-203	872	pg/g		J	9

Qualified Data Summary Table
Port of Everett - Weyerhauser Mill A Cleanup Site

SDG	Sample ID	Method	Analyte	Result	Units	Lab Flag	DV Qualifier	DV Reason
9373	MAF-SS-21_0-10	EPA1668	PCB-205	60.6	pg/g		J	9
9373	MAF-SS-21_0-10	EPA1613B	Total PeCDF	63.2	pg/g	D,M	J	23,25
9373	MAF-SS-21_0-10	EPA1613B	Total TCDF	164	pg/g	D,M	J	23,25
9373	MAF-SS-12_0-10	EPA1613B	Total PeCDF	106	pg/g	D,M	J	23,25
9373	MAF-SS-12_0-10	EPA1613B	Total TCDF	230.0	pg/g	D,M	J	23,25
9374	MAF-SS-15_0-10	EPA1613B	Total TCDD	14.7	pg/g	M	J	25
9374	MAF-SS-DUP-04	EPA1668	PCB-001	5.37	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-002	2.54	pg/g	J	J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-003	6.47	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-004	5.34	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-006	3.92	pg/g	J	J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-007	1.37	pg/g	U	UJ	9
9374	MAF-SS-DUP-04	EPA1668	PCB-008	20.8	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-009	1.40	pg/g	U	UJ	9
9374	MAF-SS-DUP-04	EPA1668	PCB-011	9.96	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-013	1.40	pg/g	U	UJ	9
9374	MAF-SS-DUP-04	EPA1668	PCB-015	16.3	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-016	14.0	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-017	18.5	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-018	38.6	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-019	4.51	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-020	36.0	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-021	36.0	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-022	24.7	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-025	4.57	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-026	10.3	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-027	3.77	pg/g	J	J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-028	65.8	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-031	65.2	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-032	15.9	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-033	36.0	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-035	0.979	pg/g	U	UJ	9

Qualified Data Summary Table
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SDG	Sample ID	Method	Analyte	Result	Units	Lab Flag	DV Qualifier	DV Reason
9374	MAF-SS-DUP-04	EPA1668	PCB-037	20.7	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-040	18.4	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-041	92.7	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-042	30.8	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-043	97.3	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-044	120.0	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-045	11.9	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-046	5.59	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-047	31.1	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-048	18.0	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-049	97.3	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-051	3.90	pg/g	J	J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-052	166	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-053	13.2	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-055	3.07	pg/g	J	J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-056	87.9	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-059	30.8	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-060	87.9	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-061	190.0	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-063	5.41	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-064	92.7	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-066	127	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-067	4.28	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-069	166	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-070	190.0	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-071	92.7	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-072	92.7	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-074	72.4	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-075	18.0	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-076	127	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-077	11.6	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-079	3.41	pg/g	J	J	9

Qualified Data Summary Table
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SDG	Sample ID	Method	Analyte	Result	Units	Lab Flag	DV Qualifier	DV Reason
9374	MAF-SS-DUP-04	EPA1668	PCB-081	4.73	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-082	42.4	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-083	14.3	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-084	117	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-085	53.7	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-087	131	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-088	45.7	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-090	343	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-091	45.7	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-092	117	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-095	299	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-097	92.6	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-099	148	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-101	343	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-103	2.38	pg/g	J	J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-105	144	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-106	351	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-107	23.2	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-108	23.2	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-110	340.0	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-111	7.68	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-112	14.3	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-114	8.93	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-115	7.68	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-116	53.7	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-117	131	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-118	351	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-119	5.11	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-122	4.13	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-123	5.11	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-124	14.7	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-125	131	pg/g		J	9

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SDG	Sample ID	Method	Analyte	Result	Units	Lab Flag	DV Qualifier	DV Reason
9374	MAF-SS-DUP-04	EPA1668	PCB-126	2.16	pg/g	J	J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-128	81.2	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-129	24.2	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-130	27.3	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-131	12.1	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-132	124	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-133	12.1	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-134	20.9	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-135	44.6	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-136	54.0	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-137	28.0	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-138	424	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-139	341	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-141	81.0	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-143	20.9	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-144	21.1	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-146	52.3	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-147	8.28	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-149	341	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-151	75.7	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-153	377	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-154	3.94	pg/g	J	J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-156	52.0	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-157	13.3	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-158	54.7	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-159	3.55	pg/g	J	J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-160	54.7	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-161	124	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-162	81.2	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-163	424	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-164	424	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-165	52.3	pg/g		J	9

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SDG	Sample ID	Method	Analyte	Result	Units	Lab Flag	DV Qualifier	DV Reason
9374	MAF-SS-DUP-04	EPA1668	PCB-166	2.30	pg/g	J	J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-167	19.5	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-170	103	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-171	31.3	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-172	20.4	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-173	2.54	pg/g	J	J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-174	96.4	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-175	4.82	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-176	14.1	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-177	60.3	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-178	22.0	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-179	43.7	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-180	236	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-182	146	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-183	68.7	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-185	12.8	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-187	146	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-189	4.84	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-190	21.8	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-191	4.95	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-193	11.6	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-194	97.1	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-195	28.0	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-196	154	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-197	4.25	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-198	8.35	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-199	143	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-200	14.2	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-201	18.6	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-202	31.3	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-203	154	pg/g		J	9
9374	MAF-SS-DUP-04	EPA1668	PCB-205	3.75	pg/g	J	J	9

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SDG	Sample ID	Method	Analyte	Result	Units	Lab Flag	DV Qualifier	DV Reason
9374	MAF-SS-DUP-04	EPA1613B	Total PeCDF	54.6	pg/g	D,M	J	23,25
9374	MAF-SS-DUP-04	EPA1613B	Total TCDF	178	pg/g	D,M	J	23,25
9374	MAF-SS-DUP-06	EPA1613B	Total TCDF	42.8	pg/g	D,M	J	23,25
9403	MAF-SC-10_0-2	EPA1668	PCB-001	8.44	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-002	1.63	pg/g	U	UJ	9
9403	MAF-SC-10_0-2	EPA1668	PCB-003	7.65	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-004	5.11	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-006	3.66	pg/g	J	J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-007	2.64	pg/g	J	J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-008	21.7	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-009	1.52	pg/g	U	UJ	9
9403	MAF-SC-10_0-2	EPA1668	PCB-011	6.17	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-013	3.78	pg/g	J	J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-015	23.1	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-016	14.4	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-017	16.7	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-018	42.9	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-019	4.34	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-020	28.3	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-021	28.3	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-022	21.5	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-024	0.860	pg/g	U	UJ	9
9403	MAF-SC-10_0-2	EPA1668	PCB-025	4.08	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-026	9.63	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-027	3.58	pg/g	J	J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-028	58.7	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-031	56.7	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-032	12.5	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-033	28.3	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-037	23.1	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-040	19.6	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-041	90.8	pg/g		J	9

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SDG	Sample ID	Method	Analyte	Result	Units	Lab Flag	DV Qualifier	DV Reason
9403	MAF-SC-10_0-2	EPA1668	PCB-042	30.1	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-043	98.2	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-044	129	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-045	13.0	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-046	5.72	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-047	32.0	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-048	18.2	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-049	98.2	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-051	4.25	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-052	192	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-053	13.3	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-055	4.23	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-056	81.9	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-059	30.1	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-060	81.9	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-061	187	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-063	5.77	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-064	90.8	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-066	127	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-067	3.90	pg/g	J	J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-068	0.991	pg/g	U	UJ	9
9403	MAF-SC-10_0-2	EPA1668	PCB-069	192	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-070	187	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-071	90.8	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-072	90.8	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-074	71.8	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-075	18.2	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-076	127	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-077	13.4	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-078	0.753	pg/g	U	UJ	9
9403	MAF-SC-10_0-2	EPA1668	PCB-079	5.49	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-081	8.75	pg/g		J	9

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SDG	Sample ID	Method	Analyte	Result	Units	Lab Flag	DV Qualifier	DV Reason
9403	MAF-SC-10_0-2	EPA1668	PCB-082	46.4	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-083	17.2	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-084	151	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-085	65.1	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-086	1.16	pg/g	U	UJ	9
9403	MAF-SC-10_0-2	EPA1668	PCB-087	173	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-088	58.7	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-089	3.37	pg/g	J	J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-090	497	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-091	58.7	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-092	151	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-094	1.74	pg/g	U	UJ	9
9403	MAF-SC-10_0-2	EPA1668	PCB-095	367	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-096	2.45	pg/g	J	J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-097	114	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-099	166	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-101	497	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-103	2.76	pg/g	J	J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-105	173	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-106	441	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-107	29.6	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-108	29.6	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-110	406	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-111	8.88	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-112	17.2	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-114	13.5	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-115	8.88	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-116	65.1	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-117	173	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-118	441	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-119	5.82	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-122	5.41	pg/g		J	9

Qualified Data Summary Table
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SDG	Sample ID	Method	Analyte	Result	Units	Lab Flag	DV Qualifier	DV Reason
9403	MAF-SC-10_0-2	EPA1668	PCB-123	7.13	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-124	23.2	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-125	173	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-126	3.16	pg/g	J	J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-128	109	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-129	32.6	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-130	42.7	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-131	19.5	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-132	190.0	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-133	19.5	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-134	34.0	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-135	94.5	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-136	92.3	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-137	35.1	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-138	699	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-139	594	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-140	2.47	pg/g	J	J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-141	157	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-143	34.0	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-144	39.6	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-146	91.6	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-147	11.0	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-149	594	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-151	162	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-153	688	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-154	5.45	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-156	72.8	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-157	15.6	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-158	93.8	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-159	9.56	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-160	93.8	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-161	190.0	pg/g		J	9

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SDG	Sample ID	Method	Analyte	Result	Units	Lab Flag	DV Qualifier	DV Reason
9403	MAF-SC-10_0-2	EPA1668	PCB-162	109	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-163	699	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-164	699	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-165	91.6	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-166	2.32	pg/g	J	J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-167	30.2	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-170	239	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-171	78.3	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-172	46.1	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-173	6.93	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-174	245	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-175	14.2	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-176	38.1	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-177	144	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-178	51.4	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-179	100.0	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-180	522	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-182	302	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-183	175	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-185	37.1	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-187	302	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-189	10.7	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-190	56.7	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-191	13.8	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-193	28.6	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-194	143	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-195	61.3	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-196	202	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-197	8.57	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-198	9.81	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-199	150.0	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-200	21.0	pg/g		J	9

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SDG	Sample ID	Method	Analyte	Result	Units	Lab Flag	DV Qualifier	DV Reason
9403	MAF-SC-10_0-2	EPA1668	PCB-201	23.9	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-202	28.2	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-203	202	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-205	9.91	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-206	51.0	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-207	9.09	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-208	12.5	pg/g		J	9
9403	MAF-SC-10_0-2	EPA1668	PCB-209	9.51	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-001	96.9	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-002	20.6	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-003	80.0	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-004	74.6	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-006	39.5	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-007	17.3	pg/g	J	J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-008	220.0	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-009	15.6	pg/g	J	J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-011	36.0	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-013	21.5	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-015	275	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-016	153	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-017	176	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-018	401	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-019	43.3	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-020	349	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-021	349	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-022	262	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-024	10.1	pg/g	J	J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-025	54.0	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-026	119	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-027	32.2	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-028	716	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-031	741	pg/g		J	9

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SDG	Sample ID	Method	Analyte	Result	Units	Lab Flag	DV Qualifier	DV Reason
9403	MAF-SC-DUP-07	EPA1668	PCB-032	142	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-033	349	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-037	231	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-040	165	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-041	754	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-042	253	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-043	840.0	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-044	1120	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-045	125	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-046	56.5	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-047	270.0	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-048	110.0	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-049	840.0	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-051	38.5	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-052	1740	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-053	134	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-055	38.4	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-056	711	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-059	253	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-060	711	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-061	1950	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-063	59.4	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-064	754	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-066	1220	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-067	41.7	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-068	9.20	pg/g	J	J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-069	1740	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-070	1950	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-071	754	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-072	754	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-074	716	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-075	110.0	pg/g		J	9

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SDG	Sample ID	Method	Analyte	Result	Units	Lab Flag	DV Qualifier	DV Reason
9403	MAF-SC-DUP-07	EPA1668	PCB-076	1220	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-077	118	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-078	9.76	pg/g	J	J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-079	23.4	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-081	40.8	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-082	417	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-083	146	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-084	1370	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-085	506	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-086	12.1	pg/g	J	J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-087	1410	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-088	425	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-089	27.0	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-090	3780	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-091	425	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-092	1370	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-094	16.7	pg/g	J	J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-095	2960	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-096	18.0	pg/g	J	J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-097	953	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-099	1400	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-101	3780	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-103	17.0	pg/g	J	J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-105	1120	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-106	2670	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-107	191	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-108	191	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-110	3380	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-111	82.1	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-112	146	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-114	71.0	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-115	82.1	pg/g		J	9

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SDG	Sample ID	Method	Analyte	Result	Units	Lab Flag	DV Qualifier	DV Reason
9403	MAF-SC-DUP-07	EPA1668	PCB-116	506	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-117	1410	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-118	2670	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-119	53.4	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-122	36.2	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-123	40.4	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-124	120.0	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-125	1410	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-126	16.6	pg/g	J	J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-128	608	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-129	177	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-130	251	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-131	106	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-132	962	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-133	106	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-134	194	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-135	510.0	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-136	512	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-137	206	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-138	3680	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-139	3020	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-140	15.1	pg/g	J	J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-141	832	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-143	194	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-144	194	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-146	519	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-147	57.9	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-149	3020	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-151	894	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-153	3600	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-154	28.6	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-156	367	pg/g		J	9

Qualified Data Summary Table
Port of Everett - Weyerhauser Mill A Cleanup Site

SDG	Sample ID	Method	Analyte	Result	Units	Lab Flag	DV Qualifier	DV Reason
9403	MAF-SC-DUP-07	EPA1668	PCB-157	77.4	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-158	495	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-159	37.1	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-160	495	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-161	962	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-162	608	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-163	3680	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-164	3680	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-165	519	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-166	16.2	pg/g	J	J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-167	154	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-170	1150	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-171	374	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-172	225	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-173	33.4	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-174	1280	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-175	59.3	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-176	184	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-177	763	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-178	259	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-179	524	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-180	2310	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-182	1510	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-183	786	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-185	150.0	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-187	1510	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-189	45.6	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-190	245	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-191	53.0	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-193	112	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-194	488	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-195	203	pg/g		J	9

Qualified Data Summary Table
Port of Everett - Weyerhauser Mill A Cleanup Site

SDG	Sample ID	Method	Analyte	Result	Units	Lab Flag	DV Qualifier	DV Reason
9403	MAF-SC-DUP-07	EPA1668	PCB-196	616	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-197	34.5	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-198	35.6	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-199	590.0	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-200	70.9	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-201	91.6	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-202	127	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-203	616	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-205	29.5	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-206	208	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-207	29.0	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-208	60.5	pg/g		J	9
9403	MAF-SC-DUP-07	EPA1668	PCB-209	109	pg/g		J	9
9430	MAF-SC-03_0-2	EPA1668	PCB-005	153	pg/g		J	9
9430	MAF-SC-03_0-2	EPA1668	PCB-006	602	pg/g		J	9
9430	MAF-SC-03_0-2	EPA1668	PCB-007	173	pg/g		J	9
9430	MAF-SC-03_0-2	EPA1668	PCB-008	5010	pg/g		J	9
9430	MAF-SC-03_0-2	EPA1668	PCB-009	192	pg/g		J	9
9430	MAF-SC-03_0-2	EPA1668	PCB-013	125	pg/g		J	9
9430	MAF-SC-03_0-2	EPA1668	PCB-016	7930	pg/g		J	9
9430	MAF-SC-03_0-2	EPA1668	PCB-020	33500	pg/g		J	9
9430	MAF-SC-03_0-2	EPA1668	PCB-021	33500	pg/g		J	9
9430	MAF-SC-03_0-2	EPA1668	PCB-022	14900	pg/g		J	9
9430	MAF-SC-03_0-2	EPA1668	PCB-025	1930	pg/g		J	9
9430	MAF-SC-03_0-2	EPA1668	PCB-026	7320	pg/g		J	9
9430	MAF-SC-03_0-2	EPA1668	PCB-028	71500	pg/g		J	9
9430	MAF-SC-03_0-2	EPA1668	PCB-029	122	pg/g		J	9
9430	MAF-SC-03_0-2	EPA1668	PCB-031	63600	pg/g		J	9
9430	MAF-SC-03_0-2	EPA1668	PCB-033	33500	pg/g		J	9
9430	MAF-SC-03_0-2	EPA1668	PCB-034	197	pg/g		J	9
9430	MAF-SC-03_0-2	EPA1668	PCB-037	12700	pg/g		J	9
9430	MAF-SC-03_0-2	EPA1668	PCB-039	28.6	pg/g	U	UJ	9

Qualified Data Summary Table
Port of Everett - Weyerhauser Mill A Cleanup Site

SDG	Sample ID	Method	Analyte	Result	Units	Lab Flag	DV Qualifier	DV Reason
9430	MAF-SC-03_0-2	EPA1668	PCB-043	35800	pg/g		J	9
9430	MAF-SC-03_0-2	EPA1668	PCB-049	35800	pg/g		J	9
9430	MAF-SC-03_0-2	EPA1668	PCB-055	4.00	pg/g	UX	UJ	9
9430	MAF-SC-03_0-2	EPA1668	PCB-056	44400	pg/g		J	9
9430	MAF-SC-03_0-2	EPA1668	PCB-057	472	pg/g		J	9
9430	MAF-SC-03_0-2	EPA1668	PCB-060	44400	pg/g		J	9
9430	MAF-SC-03_0-2	EPA1668	PCB-063	4140	pg/g		J	9
9430	MAF-SC-03_0-2	EPA1668	PCB-066	140000	pg/g		J	9
9430	MAF-SC-03_0-2	EPA1668	PCB-067	3000	pg/g		J	9
9430	MAF-SC-03_0-2	EPA1668	PCB-068	150.0	pg/g		J	9
9430	MAF-SC-03_0-2	EPA1668	PCB-074	59200	pg/g		J	9
9430	MAF-SC-03_0-2	EPA1668	PCB-076	140000	pg/g		J	9
9430	MAF-SC-03_0-2	EPA1668	PCB-077	9980	pg/g		J	9
9430	MAF-SC-03_0-2	EPA1668	PCB-079	598	pg/g		J	9
9430	MAF-SC-03_0-2	EPA1668	PCB-088	1540	pg/g	X	J	9,14
9430	MAF-SC-03_0-2	EPA1668	PCB-091	1540	pg/g	X	J	9,14
9430	MAF-SC-03_0-2	EPA1668	PCB-100	2310	pg/g		J	9
9430	MAF-SC-03_0-2	EPA1668	PCB-103	2060	pg/g		J	9
9430	MAF-SC-03_0-2	EPA1668	PCB-119	2020	pg/g		J	9
9430	MAF-SC-03_0-2	EPA1668	PCB-147	5040	pg/g		J	9
9430	MAF-SC-03_0-2	EPA1668	PCB-150	1510	pg/g		J	9
9430	MAF-SC-03_0-2	EPA1668	PCB-154	4740	pg/g		J	9
9430	MAF-SC-03_0-2	EPA1668	PCB-155	105	pg/g		J	9
9430	MAF-SC-03_0-2	EPA1668	PCB-157	425	pg/g		J	9
9430	MAF-SC-03_0-2	EPA1668	PCB-166	58.7	pg/g		J	9
9430	MAF-SC-03_0-2	EPA1668	PCB-184	58.3	pg/g		J	9
9430	MAF-SC-03_0-2	EPA1668	PCB-188	488	pg/g		J	9
9430	MAF-SC-DUP-03	EPA1668	PCB-005	82.3	pg/g		J	9
9430	MAF-SC-DUP-03	EPA1668	PCB-006	279	pg/g		J	9
9430	MAF-SC-DUP-03	EPA1668	PCB-007	96.6	pg/g		J	9
9430	MAF-SC-DUP-03	EPA1668	PCB-008	1980	pg/g		J	9
9430	MAF-SC-DUP-03	EPA1668	PCB-009	114	pg/g		J	9

Qualified Data Summary Table
Port of Everett - Weyerhauser Mill A Cleanup Site

SDG	Sample ID	Method	Analyte	Result	Units	Lab Flag	DV Qualifier	DV Reason
9430	MAF-SC-DUP-03	EPA1668	PCB-013	74.5	pg/g		J	9
9430	MAF-SC-DUP-03	EPA1668	PCB-016	4740	pg/g		J	9
9430	MAF-SC-DUP-03	EPA1668	PCB-020	16400	pg/g		J	9
9430	MAF-SC-DUP-03	EPA1668	PCB-021	16400	pg/g		J	9
9430	MAF-SC-DUP-03	EPA1668	PCB-022	6990	pg/g		J	9
9430	MAF-SC-DUP-03	EPA1668	PCB-025	823	pg/g		J	9
9430	MAF-SC-DUP-03	EPA1668	PCB-026	3660	pg/g		J	9
9430	MAF-SC-DUP-03	EPA1668	PCB-028	29400	pg/g		J	9
9430	MAF-SC-DUP-03	EPA1668	PCB-029	47.3	pg/g	U	UJ	9
9430	MAF-SC-DUP-03	EPA1668	PCB-031	33900	pg/g		J	9
9430	MAF-SC-DUP-03	EPA1668	PCB-033	16400	pg/g		J	9
9430	MAF-SC-DUP-03	EPA1668	PCB-034	105	pg/g		J	9
9430	MAF-SC-DUP-03	EPA1668	PCB-037	3240	pg/g		J	9
9430	MAF-SC-DUP-03	EPA1668	PCB-039	946	pg/g		J	9
9430	MAF-SC-DUP-03	EPA1668	PCB-043	18100	pg/g		J	9
9430	MAF-SC-DUP-03	EPA1668	PCB-049	18100	pg/g		J	9
9430	MAF-SC-DUP-03	EPA1668	PCB-055	206	pg/g	X	J	9,14
9430	MAF-SC-DUP-03	EPA1668	PCB-056	22900	pg/g		J	9
9430	MAF-SC-DUP-03	EPA1668	PCB-057	199	pg/g		J	9
9430	MAF-SC-DUP-03	EPA1668	PCB-060	22900	pg/g		J	9
9430	MAF-SC-DUP-03	EPA1668	PCB-063	1710	pg/g		J	9
9430	MAF-SC-DUP-03	EPA1668	PCB-066	25100	pg/g		J	9
9430	MAF-SC-DUP-03	EPA1668	PCB-067	1030	pg/g		J	9
9430	MAF-SC-DUP-03	EPA1668	PCB-068	28.2	pg/g		J	9
9430	MAF-SC-DUP-03	EPA1668	PCB-074	23800	pg/g		J	9
9430	MAF-SC-DUP-03	EPA1668	PCB-076	25100	pg/g		J	9
9430	MAF-SC-DUP-03	EPA1668	PCB-077	2560	pg/g		J	9
9430	MAF-SC-DUP-03	EPA1668	PCB-079	333	pg/g		J	9
9430	MAF-SC-DUP-03	EPA1668	PCB-088	7420	pg/g	X	J	9,14
9430	MAF-SC-DUP-03	EPA1668	PCB-091	7420	pg/g	X	J	9,14
9430	MAF-SC-DUP-03	EPA1668	PCB-100	828	pg/g		J	9
9430	MAF-SC-DUP-03	EPA1668	PCB-103	1020	pg/g		J	9

Qualified Data Summary Table
Port of Everett - Weyerhauser Mill A Cleanup Site

SDG	Sample ID	Method	Analyte	Result	Units	Lab Flag	DV Qualifier	DV Reason
9430	MAF-SC-DUP-03	EPA1668	PCB-119	1020	pg/g		J	9
9430	MAF-SC-DUP-03	EPA1668	PCB-147	2930	pg/g		J	9
9430	MAF-SC-DUP-03	EPA1668	PCB-150	764	pg/g		J	9
9430	MAF-SC-DUP-03	EPA1668	PCB-154	2080	pg/g		J	9
9430	MAF-SC-DUP-03	EPA1668	PCB-155	50.7	pg/g		J	9
9430	MAF-SC-DUP-03	EPA1668	PCB-157	787	pg/g		J	9
9430	MAF-SC-DUP-03	EPA1668	PCB-166	634	pg/g		J	9
9430	MAF-SC-DUP-03	EPA1668	PCB-184	10.7	pg/g	U	UJ	9
9430	MAF-SC-DUP-03	EPA1668	PCB-188	226	pg/g		J	9

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Data Validation Report

Project: Weyerhaeuser Mill A Former Cleanup Site - Interim Cleanup Action
November 2018 Sediment Samples

GEI File No: 00676-020-06 (Task 0700)

Date: April 24, 2019

This report documents the results of a United States Environmental Protection Agency (USEPA)-defined Stage 2B and Stage 4 data validation (USEPA Document 540-R-08-005; USEPA, 2009) of analytical data from the analyses of sediment samples and the associated laboratory and field quality control (QC) samples collected as part of the dredged material characterization activities completed for a Model Toxics Control Act (MTCA) Interim Cleanup Action (Interim Action) dredging project for the Weyerhaeuser Mill A Former Cleanup SiteAll of the sample delivery group (SDG) data packages from this sampling event received an EPA Stage 2B validation, with 10 % of the Dioxin and PCB Congener packages recieving an EPA Stage 4 validation.

OBJECTIVE AND QUALITY CONTROL ELEMENTS

GeoEngineers, Inc. (GeoEngineers) completed the data validation consistent with National Functional Guidelines for Organic Superfund Methods Data Review (USEPA 2017) and National Functional Guidelines for Inorganic Superfund Methods Data Review (USEPA 2017) to determine if the laboratory analytical results meet the project objectives and are usable for their intended purpose. Data usability was assessed by determining if:

- The samples were analyzed using well-defined and acceptable methods that provide reporting limits below applicable regulatory criteria;
- The precision and accuracy of the data are well-defined and sufficient to provide defensible data; and
- The quality assurance/quality control (QA/QC) procedures utilized by the laboratory meet acceptable industry practices and standards.

In accordance with the FINAL Dredged Material Characterization Sampling and Analysis Plan (GeoEngineers 2018), the data validation included review of the following QC elements:

- Data Package Completeness
- Chain-of-Custody Documentation
- Holding Times and Sample Preservation
- Surrogate Recoveries/Labeled Compounds
- Method and Trip Blanks
- Matrix Spikes/Matrix Spike Duplicates
- Laboratory Control Samples (LCS)/Ongoing Precision and Recovery Samples (OPR)
- Laboratory and Field Duplicates

- Certified/Sediment Reference Material (CRM/SRM)
- Initial Calibrations (ICALs)
- Continuing Calibrations (CCALs)
- Internal Standards
- Miscellaneous and False Positives

VALIDATED SAMPLE DELIVERY GROUPS

This data validation included review of the sample delivery groups (SDGs) listed below in Table 1.

TABLE 1: SUMMARY OF VALIDATED SAMPLE DELIVERY GROUPS

Laboratory SDG	Samples Validated All sample(s) submitted to secondary laboratory for Grain Size analysis
18J0416	ST-101C_13.2-14.2 and ST-102C_6.3-7.3
18J0426	ST-101S_0-10, ST-101C_13.2-14.2, ST-102S_0-10, ST-102C_6.3-7.3, ST-103S_0-10, ST-103C_1.7-2.7, ST-103C_3.7-4.7, ST-103C_5.7-6.7, ST-103C_7.7-8.7, ST-103C_9.7-10.7, ST-103C_11.7-12.7, ST-103C_13.7-14.7, ST-103C_15.7-16.7, ST-104S_0-10, ST-105S_0-10, ST-106S_0-10, ST-107S_0-10, ST-108S_0-10, and ST-109S_0-10
18J0510	ST-104C_7.3-8.3, ST-105C_11-12, ST-106C-3.1-4.41, ST-107C_4.2-5.2, ST-107C_9.3-10.3, ST-108C_0.2-1.2, ST-108C_2.2-3.2, ST-108C_4.2-5.2, ST-108C_6.2-6.6, ST-108C_6.6-7.6, ST-108C_7.6-8.6, ST-108C_9.6-10.6, and ST-109C_8.3-9.3
18J0511	DMMU-1A-COMP, DMMU-1B-COMP, DMMU-1C-COMP, DMMU-1D-COMP, and DMMU-2D-COMP
(Archived Frozen) 18L0058	DMMP-1KEYWAY, DMMP-1E, ST-102C_7.3-8.3, ST-104C_8.3-9.3, ST-106C_4.1-5.1, ST-108C_8.6-9.6, and ST-109C_11.3-12.3
(Archived Frozen) 19B0349/12232/19E0047 (N-Ammonia and Tributyltin Ion)	ST-102C_9.3-10.3, ST-104C_10.3-11.3, ST-106C_6.1-7.1, DMMU-1F_COMP

CHEMICAL ANALYSIS PERFORMED

Analytical Resources, Inc. (ARI), located in Tukwila, Washington, performed laboratory analysis on the sediment samples using one or more of the following methods:

- Total Solids (TS) and Total Volatile Solids (TVS) by Method SM2540G;
- N-Ammonia by Method SM4500-NH3
- Sulfide by Method SM4500-S2D;
- Semi-volatile Organic Compounds (SVOCs) by Method SW8270D (a selected list of 11 analytes);

- Polycyclic Aromatic Hydrocarbons (PAHs) and 6 other selected semi-volatiles (PAHs) by Method SW8270-SIM;
- Tributyltin Ion by Method SW8270-SIM;
- Pesticides by Method SW8081;
- Total Metals by Methods EPA6020A/7471A;
- Total Organic Carbon (TOC) by Method Plumb 1981

Materials Testing & Consulting, Inc. (MT&C) located in Burlington, Washington, performed laboratory analysis on the sediment samples using the following method:

- Grain Size analysis by Puget Sound Estuary Protocol (PSEP)
- Loss On Ignition (LOI) by ASTM D2974

Frontier Analytical Laboratory (Frontier) located in El Dorado Hills, California, performed laboratory analysis on the groundwater samples using the following method:

- Dioxin/Furan compounds by Method EPA 1663
- PCB Congeners by Method EPA 1668

DATA VALIDATION SUMMARY

The results for each of the QC elements are summarized below.

Data Package Completeness

ARI and MT&C provided the required deliverables for data validation according to the National Functional Guidelines. The laboratories followed adequate corrective action processes and identified anomalies were discussed in the relevant laboratory case narrative.

Chain-of-Custody Documentation

Chain-of-custody (COC) forms were provided with the laboratory analytical reports. The COCs were accurate and complete when submitted to the lab with the exceptions identified below.

SDG 18J0416: The sample container labels for COC Sample ID ST-102C_6.3-7.3 were printed onto the jars incorrectly, as Sample ST-103C_6.3-7.3. The correct Sample IDs were accurately recorded on the COCs. This discrepancy was noted in the case narrative and the correct Sample ID was translated into the EDDs and the data stream. No other action was taken other than to note it in this validation report.

Also, several samples that were listed to be archived were noted by the laboratory case narrative as having an incorrect amount of sample jars on the COC.

Holding Times and Sample Preservation

The sample holding time is defined as the time that elapses between sample collection and sample analysis. Maximum holding time criteria exist for each analysis to help ensure that the analyte concentrations found at the time of analysis reflect the concentration present at the time of sample collection. Established holding times were met for chemical analyses, with the exceptions identified

below. The sample coolers arrived at the laboratory at the appropriate temperatures of between 2 and 6 °C, except in cases where the sample coolers were taken directly to laboratory with 12 hours of sampling.

SDG 18J0510: (Ammonia) The ammonia analysis for Sample ST-104C_7.3-8.3 exceeded the holding time of 7 days by 18 days. The positive result for N-ammonia was qualified as estimated (J) in this sample.

SDG 18J0510: (Sulfide) The sufide analyses for Samples ST-108C_9.6-10.6, ST-108C_10.6-11.6, ST-108C_11.6-12.6, and ST-109C_8.3-9.3 exceeded the holding time of 7 days by 1 day. The positive results for Total sulfide were qualified as estimated (J) in these samples.

SDG 18L0058: (Archived Metals) The archived mercury analyses for all samples in this SDG exceeded the holding time of 28 days. The positive results for mercury were qualified as estimated (J) in these samples.

SDG 18L0058: (Archived Sulfide) The Total sufide analyses for all samples in this SDG exceeded the holding time of 7 days. The positive results for Total sulfide were qualified as estimated (J) in these samples.

SDG 19B0349: (Sulfide) The sufide analyses for all samples in this SDG exceeded the holding time of 7 days as they were retrieved from a sample archive freezer. The positive results for Total sulfide were qualified as estimated (J) in these samples.

Surrogate Recoveries

A surrogate compound is a compound that is chemically similar to the organic analytes of interest, but unlikely to be found in any environmental sample. Surrogates are used for organic analyses and are added to all samples, standards, and blanks to serve as an accuracy and specificity check of each analysis. The surrogates are added to the samples at a known concentration and percent recoveries are calculated following analysis. All surrogate percent recoveries for field samples were within the laboratory control limits, with the following exceptions:

SDG 18J0426: (8270-SIM) The percent recovery (%R) values for dibenzo(a,h)anthracene-d14 exceeded the control limits in the diluted extracts for Samples ST-108S_0-10 and ST-109S_0-10. The laboratory reported two out of the three base-neutral surrogates to be within their respective control limits. No qualification was required for either sample.

SDG 18J0510: (8270-SIM) The %R value for dibenzo(a,h)anthracene-d14 exceeded the control limit in the diluted extract for Sample ST-109C_8.3-9.3. The laboratory reported two out of the three base-neutral surrogates to be within their respective control limits. No qualification was required for either sample.

All SDGs: (Pesticides) Several samples had surrogates that were being masked in the chromatography by natural matrix interference. The laboratory flagged these samples with 'NRS' indicating that the surrogates could not be retrieved. No qualification was required.

Method and Trip Blanks

Method blanks are analyzed to ensure that laboratory procedures and reagents do not introduce measurable concentrations of the analytes of interest. A method blank was analyzed with each batch of samples, at a frequency of 1 per 20 samples. For all sample batches, method blanks for all applicable

methods were analyzed at the required frequency. None of the analytes of interest were detected above the reporting limits in any of the method blanks, with the exceptions below:

SDG 18J0416: (Regular SVOCs) There was a positive result for diethyl phthalate in the method blank extracted on 10/31/18 (Lab Sample ID: BGJ1028-BLK1). The associated field samples, ST-101C_13.2-14.2 and ST-102C_6.3-7.3, reported positive results detected below the action level of 5X the concentration in the method blank for this analyte. The positive results for diethyl phthalate were qualified as non-detected (U) in these samples.

SDG 18J0416: (PAHs/SVOC-SIM) There was a positive result for benzoic acid in the method blank detected above the method detection limit, but below the reporting limit, extracted on 10/31/18 (Lab Sample ID: BGJ1028-BLK1). The associated field samples, ST-101C_13.2-14.2 and ST-102C_6.3-7.3, reported positive results detected below the reporting limits for this analyte. The results for benzoic acid were qualified as non-detected (U) in these samples.

SDG 18J0416: (Metals) There was a positive result for antimony in the method blank detected above the method detection limit, but below the reporting limit, digested on 10/29/18 (Lab Sample ID: BGJ0956-BLK1). There were no positive results in the associated field samples in this SDG. No qualification was required for this blank contamination.

SDG 18J0426: (Regular SVOCs) There was a positive result for diethyl phthalate in the method blank extracted on 10/31/18 (Lab Sample ID: BGJ1028-BLK1). The associated field samples, ST-103S_0-10, ST-107S_0-10, and ST-108S_0-10, reported positive results detected below the action level of 5X the concentration in the method blank for this analyte. The positive results for diethyl phthalate were qualified as non-detected (U) in these samples.

SDG 18J0426: (PAHs/SVOC-SIM) There was a positive result for benzoic acid in the method blank detected above the method detection limit, but below the reporting limit, extracted on 10/31/18 (Lab Sample ID: BGJ1028-BLK1). The associated field samples, ST-101S_0-10, ST-102S_0-10, ST-103S_0-10, ST-104S_0-10, ST-105S_0-10, ST-106S_0-10, ST-107S_0-10, and ST-108S_0-10 reported positive results detected below the reporting limits for this analyte. The results for benzoic acid were qualified as non-detected (U) in these samples.

SDG 18J0426: (Metals) There was a positive result for antimony in the method blank detected above the method detection limit, but below the reporting limit, digested on 10/29/18 (Lab Sample ID: BGJ0956-BLK1). The associated field samples, ST-104S_0-10, ST-108S_0-10, and ST-109S_0-10 reported positive results detected below the reporting limits for this analyte. The results for antimony were qualified as non-detected (U) in these samples.

SDG 18J0510: (Regular SVOCs) There was a positive result for diethyl phthalate in the method blank extracted on 10/31/18 (Lab Sample ID: BGJ1028-BLK1). The associated field sample, ST-106C-3.1-4.41, reported a positive result detected below the action level of 5X the concentration in the method blank for this analyte. The positive result for diethyl phthalate was qualified as non-detected (U) in this sample.

SDG 18J0510: (PAHs/SVOC-SIM) There was a positive result for benzoic acid in the method blank detected above the method detection limit, but below the reporting limit, extracted on 10/31/18 (Lab Sample ID: BGJ1028-BLK1). The associated field sample, ST-106C-3.1-4.41, reported a positive result

detected below the reporting limit for this analyte. The results for benzoic acid were qualified as non-detected (U) in this sample.

SDG 18J0510: (Metals) There was a positive result for antimony in the method blank detected above the method detection limit, but below the reporting limit, digested on 11/9/18 (Lab Sample ID: BGK0222-BLK2). The associated field sample, ST-106C-3.1-4.41, reported a positive result detected below the reporting limit for this analyte. The result for antimony was qualified as non-detected (U) in this sample.

SDG 18J0511: (PAHs/SVOC-SIM) There was a positive result for benzoic acid in the method blank extracted on 11/5/19 (Lab Sample ID: BGJ1070-BLK1). The associated field samples, DMMU-1A-COMP, DMMU-1B-COMP, DMMU-1C-COMP, DMMU-1D-COMP, and DMMU-2D-COMP, reported positive results detected below the action level of 5X the concentration in the method blank for this analyte. The results for benzoic acid were qualified as non-detected (U) in these samples.

SDG 18J0511: (Metals) There was a positive result for antimony in the method blank detected above the method detection limit, but below the reporting limit, digested on 11/9/18 (Lab Sample ID: BGK0222-BLK2). There were no positive results for antimony in the associated field samples. No qualification was required for this blank contamination.

SDG 18L0058: (Regular SVOCs) There were positive results for diethyl phthalate and di-n-butylphthalate in the method blank extracted on 1/04/19 (Lab Sample ID: BHA0077-BLK1). The associated field sample, ST-102C_7.3-8.3, reported a positive result detected below the action level of 5X the concentration in the method blank for this analyte. The positive result for diethyl phthalate was qualified as non-detected (U) in this sample.

SDG 18L0058: (PAHs/SVOC-SIM) There were positive results detected above the detection limit, but below the reporting limit, for 2-methylnaphthalene, acenaphthene, phenanthrene, fluoranthene, and pyrene in the method blank extracted on 1/3/19 (Lab Sample ID: BHA0070-BLK1). The associated field samples all reported positive results detected above the action level of 5X the concentration in the method blank for these analytes. No qualification was required for this blank contamination.

SDG 18L0058: (Metals) There was a positive result for antimony in the method blank detected above the method detection limit, but below the reporting limit, digested on 12/10/18 (Lab Sample ID: BGL0226-BLK1). There were no positive results for antimony in the associated field samples. No qualification was required for this blank contamination.

There was a positive result for zinc in the method blank detected above the method detection limit, but below the reporting limit, digested on 1/3/19 (Lab Sample ID: BHA0064-BLK1). The associated field samples all reported positive results detected above the action level of 5X the concentration in the method blank for this metal. No qualification was required for this blank contamination.

SDG 19B0349: (Regular SVOCs) There was a positive result for di-n-butylphthalate detected above the reporting limit in the method blank extracted on 3/30/2019. The associated field samples, ST-102C_9.3-10.3, ST-104C_10.3-11.3, ST-106C_6.1-7.1, and DMMU-1F_COMP, reported positive results detected below the action level of 5X the concentration in the method blank for this analyte. The positive results for di-n-butylphthalate were qualified as non-detected (U) in these samples.

(PAHs/SVOC-SIM) There was a positive result detected above the detection limit, but below the reporting limit, for acenaphthene in the method blank extracted on 3/29/19 (Lab Sample ID: BHC0256-BLK1). The associated field samples all reported positive results detected above the action level of 5X the concentration in the method blank for this analyte. No qualification was required for this blank contamination.

(Metals) There was positive results for antimony and zinc detected above the method detection limits, but below the reporting limits in the method blank digested on 3/11/2019. The associated Sample ST-102C_9.3-10.3 reported a positive result for antimony that was less than the reporting limit, the result was qualified as not-detected (U) in this sample.

Matrix Spikes/Matrix Spike Duplicates

Since the actual analyte concentration in an environmental sample is not known, the accuracy of a particular analysis is usually inferred by performing a matrix spike (MS) analysis on one sample from the associated batch, known as the parent sample. One aliquot of the sample is analyzed in the normal manner and then a second aliquot of the sample is spiked with a known amount of analyte concentration and analyzed. From these analyses, a percent recovery is calculated. Matrix spike duplicate (MSD) analyses are generally performed for organic analyses as a precision check and analyzed in the same sequence as a matrix spike. Using the result values from the MS and MSD, the relative percent difference (RPD) is calculated. The percent recovery control limits for MS and MSD analyses are specified in the laboratory documents, as are the RPD control limits for MS/MSD sample sets.

For inorganic methods, the matrix spike is followed by a post-digestion spike sample if any element percent recoveries were outside the control limits in the matrix spike. The percent recovery control limits for inorganic matrix spikes are 75% to 125%.

One MS/MSD analysis should be performed for every analytical batch or every 20 field samples, whichever is more frequent. The frequency requirements were met for all analyses and the percent recovery and RPD values were within the proper control limits, with the following exceptions:

SDG 18J0426: (Metals) The laboratory performed a matrix spike on Sample ST-103S_0-10. The %R values for antimony were lower than the control limits in the MS/MSD sample set. However, the post spike sample %R values were within the control limits. For this reason, no qualification was required.

SDG 18J0511: (PAH/SVOC-SIM) The laboratory performed a matrix spike on Sample DMMU-1A-Comp. There were ten %R values that exceeded the control limits in either the MS or the MSD. However, several of these analytes exceeded the linear range of the instrument. For this reason, no qualification was required.

SDG 18J0511: (Pesticides) The laboratory performed a matrix spike on Sample DMMU-1A-Comp. The %R values for heptachlor and 4,4'-DDT were lower than the control limits in the MSD sample; however, the corresponding MS %R values for these compounds were within the established control limits. No qualifications were required for these outliers. The RPD values for heptachlor, 4,4'-DDT, heptachlor, trans-chlordane were greater than the control limit of 30% in this QC sample set. No qualification was required because there were no positive results for these compounds in the parent sample.

SDG 18J0511: (Metals) The laboratory performed a matrix spike on Sample DMMU-1A-Comp. The %R values for antimony were lower than the control limits in the MS/MSD sample set. However, the post spike sample %R values were within the control limits. For this reason, no qualification was required.

SDG 18L0058: (Regular SVOCs) The laboratory performed a matrix spike on Sample ST-109C_11.3-12.3. The RPD value for benzoic acid was greater than the control limit of 30% in this QC sample set. No qualification was required because benzoic acid was reported from the SW8270-SIM method in this project.

SDG 18L0058: (PAH/SVOC-SIM) The laboratory performed a matrix spike on Sample ST-109C_11.3-12.3. The %R values for naphthalene and 2-methylnaphthalene were lower than the control limits in the MS/MSD sample set. The positive result for naphthalene was qualified as estimated (J) in the parent sample. Also, the %R value for acenaphthene were lower than the control limits in the MSD sample; however, the corresponding MS %R value for this compound was within the established control limits. No qualification was required for this compound.

SDG 18L0058:The RPD value for benzoic acid was greater than the control limit of 30% in this QC sample set. No qualification was required because there were no positive results for benzoic acid in the parent sample.

SDG 18L0058: (Metals) The laboratory performed two matrix spike sample sets on Samples DMMP-1Keyway and ST-102C_7.3-8.3. The %R values for antimony were lower than the control limits in both of the MS/MSD sample sets. In both cases, the post spike sample %R values were within the control limits. For this reason, no qualification was required for this metal.

SDG 19B0349: (Regular SVOCs) The laboratory performed a matrix spike sample set on Sample ST-102C_9.3-10.3. The %R values for diethyl phthalate exceeded the control limits in both of the MS/MSD sample sets. In both cases, the parent sample concentration was greater than four times the amount spiked into the sample. For this reason, no qualification was required for this compound.

SDG 19B0349: (Pesticides) The laboratory performed a matrix spike sample set on Sample ST-102C_9.3-10.3. The %R values for several compounds were outside of the control limits in both of the MS/MSD sample sets; including one compound, aldrin, which reported no recovery at all. For these reasons, all positive results and reporting limits were qualified as estimated (J/UJ) in this sample.

Laboratory Control Samples/ Laboratory Control Sample Duplicates (LCS/LCSD)

A laboratory control sample (LCS) or an Ongoing Precision and Recovery Sample (OPR) is a blank sample that is spiked with a known amount of analyte and then analyzed. These internal QC samples are similar to an MS, but without the possibility of matrix interference. Given that matrix interference is not an issue, the LCS/OPR control limits for accuracy and precision are usually more rigorous than for MS/MSD analyses. Additionally, data qualification based on LCS/OPR analyses would apply to all samples in the associated batch, instead of just the parent sample. The percent recovery (%R) control limits for an LCS/OPR analyses are specified in the laboratory documents, as are the RPD control limits for LCS/LCSD sample sets.

One LCS/LCSD or OPR analysis should be performed for every analytical batch or every 20 field samples, whichever is more frequent. The frequency requirements were met for all analyses and the %R and RPD values were within the proper control limits.

SDG 18L0058: (Regular SVOCs) The %R value for di-n-butylphthalate exceeded the control limit in the LCS analyzed on 12/20/19. The positive results for this analyte were qualified as estimated (J) in Samples DMMP-1E, DMMP-1KEYWAY, ST-102C_7.3-8.3, ST-104C_8.3-9.3, ST-106C_4.1-5.1, ST-108C_8.6-9.6, and ST-109C_11.3-12.3 in order to indicate a high bias.

Certified/Sediment Reference Material (CRM/SRM)

A total of three reference material standards were received from the laboratory in order to comply with Dredgement Material Management Program (DMMP) requirements. A description of each analysis is provided below:

SVOCs (Including PAHs)

One Certified Reference Material (CRM143-50G) standard was analyzed by the laboratory for the semi-volatile compounds. The concentrations were within the appropriate prediction intervals, with the SIM exceptions below. Only the compounds listed in the tables below were analyzed. The positive results and reporting limits for naphthalene, acenaphthylene, acenaphthene, benzo(a)pyrene, and dibenz(a,h)anthracene were qualified as estimated (J/UJ) for all samples in these SDGs.

SVOC Analytes				
Phenol	Pentachlorophenol	N-Nitrosodiphenylamine	2-Methylphenol	Dibenzofuran
1,4-Dichlorobenzene	Butyl benzyl phthalate	bis(2-Ethylhexyl)phthalate	4-Methylphenol	Diethyl phthalate

SIM Analytes		
Analyte	**Recovery**	**Prediction Interval**
Naphthalene	39.7	51-149
Acenaphthylene	48.1	61-138
Acenaphthene	57.2	69-131
Benzo(a)pyrene	64.2	71-128
Dibenz(a,h)anthracene	127	85-115

Pesticides

One Certified Reference Material (CRM860-50G) standard was analyzed by the laboratory for the pesticide compounds. The concentrations were within the appropriate prediction intervals, with the exceptions below:

SDGs 18J0416, 18J0426, and 18J0510: The column #1 %R value below was lower than the prediction interval for the SRM # G008107, analyzed on 11/13/18. Upon inspection, it was found that the laboratory used the secondary column for reporting hexachlorobenzene results for this project. No qualification was required for this compound.

Analyte	% Recovery	Prediction Interval
Hexachlorobenzene (Column 1)	52.7	55.1 - 144.9

Metals

One Certified Reference Material (F4382 – Lot # D095-540) standard was analyzed by the laboratory for the metals suite of analytes. The concentrations were within the appropriate prediction intervals. Only the elements listed in the tables below were analyzed.

Metals				
Arsenic	Antimony	Chromium	Cadmium	Copper
Lead	Mercury	Selenium	Silver	Zinc

Total Organic Carbon Analysis

A CRM (NIST-1941b) standard was used to analyze for Total Organic Carbon (TOC). The positive value for this parameter was within the appropriate advisory range.

Laboratory Duplicates

Internal laboratory duplicate analyses are performed to monitor the precision of the analyses. Two separate aliquots of a sample are analyzed as distinct samples in the laboratory and the RPD between the two results is calculated. Duplicate analyses should be performed once per analytical batch. If one or more of the samples used has a concentration less than five times the reporting limit for that sample, the absolute difference is used instead of the RPD. For organic analyses, the RPD control limits are specified in the laboratory documents. For inorganic analyses, the RPD control limit for soil/sediment samples is 35 percent. Laboratory duplicates were analyzed at the proper frequency and the specified acceptance criteria were met, with the following exceptions:

SDG 18L0058: (Metals) A laboratory duplicate analysis was performed on Sample DMMP-1Keyway. The RPD value for lead exceeded the control limit in this duplicate pair. The positive results for lead were qualified as estimated (J) in Samples DMMP-1KEYWAY, DMMP-1E, ST-104C_8.3-9.3, ST-106C_4.1-5.1, ST-108C_8.6-9.6, and ST-109C_11.3-12.3.

Field Duplicates

In order to assess precision, field duplicate samples were collected and analyzed along with the reviewed sample batches. The duplicate samples were analyzed for the same parameters as the associated parent samples. Precision is determined by calculating the RPD between each pair of samples. If one or more of the sample analytes has a concentration less than five times the reporting limit for that sample, then the absolute difference is used instead of the RPD. The RPD control limit for sediment samples is 50 percent.

No field duplicates were used for this sampling event.

Initial Calibrations (ICALs)

All initial calibrations were conducted according to the laboratory methods and consisted of the appropriate number of standards. For inorganic analyses, all percent recoveries were within the control limits of 90% and 110%. For organic analyses, all percent relative standard deviation (%RSD) and relative response factors (RRF) values were within the control limits stated in the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (USEPA, 2017).

Initial Calibration Verification (ICVs)

All continuing calibrations were conducted according to the laboratory methods and consisted of the appropriate number of standards. For inorganic analyses, all percent recoveries were within the control limits of 90% and 110%. For organic analyses, all percent difference (%D) and relative response factors (RRF) values were within the control limits in the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (USEPA, 2017), with the following exceptions.

SDG 18J0426: (Regular SVOCs) The %D for benzoic acid was lower than the control limits in several of the ICVs analyzed 11/8/18 through 1/4/19. No action was taken as benzoic acid was reported from the SIM analysis.

SDG 18L0058: (PAH/SVOC-SIM) The %D for pentachlorophenol was lower than the control limit in the ICV analyzed on 1/9/19 (Instrument NT14). The positive result for pentachlorophenol was qualified as estimated (J) in Sample ST-102C_7.3-8.3.

SDGs 18J0426 and 18J0510: (Pesticides) The secondary column %D for 4,4'-DDT was lower than the control limit in the CCV analyzed on 11/12/18 (Instrument ECD6). Upon inspection of the raw data, it was confirmed that the laboratory reported all 4,4'-DDT data from the primary column. No qualification was required for this outlier.

Internal Standards (Low Resolution Mass Spectrometry)

Like the surrogate, an internal standard is a compound that is chemically similar to the analytes of interest, but unlikely to be found in any environmental sample. Internal standards are used only for the mass spectrometry instrumentation and are usually added to the sample aliquot after extraction has taken place. The internal standard should be analyzed at the beginning of a 12 hour sample run. For organic analyses, the control limits for internal standard recoveries are 50 percent to 200 percent of the calibration standard. For inorganic analyses, the control limits for internal standard recoveries are 60 percent to 125 percent of the calibration standard. All internal standard recoveries were within the control limits.

Dilutions and Reporting Limits

(PAHs and SVOCs) There were several cases where target analytes exceeded the linear calibarion range of the analytical instrument. In these cases, the laboratory flagged these analytes with an "E", and re-analyzed these samples at various dilutions. In each case, both sets of data were reported by the laboratory. In order to avoid duplicate analytical reporting, the validation labeled all "E" flags with Do-Not-Report (DNR). Correspondingly, the validation labeled all other analytes in the dilutions with Do-Not-Report so that only one concise set of analytes per sample were to be used for this project.

SDG 19B0349: (Pesticides) Matrix interence was a factor for Samples ST-102C_9.3-10.3 and ST-104C_10.3-11.3 in this SDG. For this reason, several compound reporting limits were elevated due to the presence of non-target analytes. These reporting limits were flagged (Y1) by the laboratory and brought into the GeoEngineers database without any qualification, as no bias was encountered even though the sensitivey of the instrument was decreased in these cases.

Miscellaneous and False Positives

SDG 19B0349*: (Dioxins)* The ion abundance ratios for the Total TCDF and Total PeCDF homolog groups in Samples ST-102C_9.3-10.3, ST-104C_10.3-11.3, and DMMU-1F_COMP were not within the control limits,

indicating that these results could potentially be false positives. Also, ion abundance ratios for just the Total TCDF homolog group in Sample ST-106C_6.1-7.1 was not within the control limits. For these reasons, the positive results for Total TCDF and Total PeCDF were selectively qualified as not detected (U) in the appropriate samples.

OVERALL ASSESSMENT

As was determined by this data validation, the laboratory followed the specified analytical methods. Accuracy was acceptable, as demonstrated by the surrogate, LCS/LCSD, and MS/MSD percent recovery values, with the exceptions mentioned above. Precision was acceptable, as demonstrated by the LCS/LCSD, MS/MSD, and laboratory/field duplicate RPD values, with the exceptions mentioned above. All data are acceptable for the intended use, with the qualifications listed below.

All data are acceptable for the intended use, with the following qualifications listed below in Table 2.

TABLE 2: SUMMARY OF QUALIFIED SAMPLES

Sample ID	Analyte	Qualifier	Reason Code
DMMP-1E	Mercury	J	HT
	Sulfide	J	HT
	Dibutyl Phthalate (SW8270D)	J	LCS
	Lead	J	Pr
	Acenaphthene (SW8270DSIM)	J	SRM
	Acenaphthylene (SW8270DSIM)	J	SRM
	Benzo(a)pyrene (SW8270DSIM)	J	SRM
	Dibenzo(a,h)anthracene (SW8270DSIM)	J	SRM
	Naphthalene (SW8270DSIM)	J	SRM
DMMP-1KEYWAY	Mercury	J	HT
	Sulfide	J	HT
	Dibutyl Phthalate (SW8270D)	J	LCS
	Lead	J	Pr
	Acenaphthene (SW8270DSIM)	J	SRM
	Acenaphthylene (SW8270DSIM)	J	SRM
	Benzo(a)pyrene (SW8270DSIM)	J	SRM
	Dibenzo(a,h)anthracene (SW8270DSIM)	J	SRM
	Naphthalene (SW8270DSIM)	J	SRM
DMMU-1A-COMP	Benzoic Acid (SW8270DSIM)	U	MB
	Acenaphthene (SW8270DSIM)	J	SRM
	Acenaphthylene (SW8270DSIM)	J	SRM
	Benzo(a)pyrene (SW8270DSIM)	J	SRM
	Dibenzo(a,h)anthracene (SW8270DSIM)	J	SRM
	Naphthalene (SW8270DSIM)	J	SRM

DMMU-1B-COMP	Benzoic Acid (SW8270DSIM)	U	MB
	Acenaphthene (SW8270DSIM)	J	SRM
	Acenaphthylene (SW8270DSIM)	J	SRM
	Benzo(a)pyrene (SW8270DSIM)	J	SRM
	Dibenzo(a,h)anthracene (SW8270DSIM)	J	SRM
	Naphthalene (SW8270DSIM)	J	SRM
DMMU-1C-COMP	Benzoic Acid (SW8270DSIM)	U	MB
	Acenaphthene (SW8270DSIM)	J	SRM
	Acenaphthylene (SW8270DSIM)	J	SRM
	Benzo(a)pyrene (SW8270DSIM)	J	SRM
	Dibenzo(a,h)anthracene (SW8270DSIM)	J	SRM
	Naphthalene (SW8270DSIM)	J	SRM
DMMU-1D-COMP	Benzoic Acid (SW8270DSIM)	U	MB
	Acenaphthene (SW8270DSIM)	J	SRM
	Acenaphthylene (SW8270DSIM)	J	SRM
	Benzo(a)pyrene (SW8270DSIM)	J	SRM
	Dibenzo(a,h)anthracene (SW8270DSIM)	J	SRM
	Naphthalene (SW8270DSIM)	J	SRM
DMMU-2D-COMP	Benzoic Acid (SW8270DSIM)	U	MB
	Acenaphthene (SW8270DSIM)	J	SRM
	Acenaphthylene (SW8270DSIM)	J	SRM
	Benzo(a)pyrene (SW8270DSIM)	J	SRM
	Dibenzo(a,h)anthracene (SW8270DSIM)	J	SRM
	Naphthalene (SW8270DSIM)	J	SRM
ST-101C_13.2-14.2	Benzoic Acid (SW8270DSIM)	U	MB
	Diethyl Phthalate (SW8270D)	U	MB
	Acenaphthene (SW8270DSIM)	UJ	SRM
	Acenaphthylene (SW8270DSIM)	UJ	SRM
	Benzo(a)pyrene (SW8270DSIM)	UJ	SRM
	Dibenzo(a,h)anthracene (SW8270DSIM)	UJ	SRM
	Naphthalene (SW8270DSIM)	UJ	SRM
ST-101S_0-10	Benzoic Acid (SW8270DSIM)	U	MB
	Acenaphthene (SW8270DSIM)	J	SRM
	Acenaphthylene (SW8270DSIM)	J	SRM
	Benzo(a)pyrene (SW8270DSIM)	J	SRM
	Dibenzo(a,h)anthracene (SW8270DSIM)	J	SRM
	Naphthalene (SW8270DSIM)	J	SRM
ST-102C_6.3-7.3	Benzoic Acid (SW8270DSIM)	U	MB

	Diethyl Phthalate (SW8270D)	U	MB
	Acenaphthene (SW8270DSIM)	J	SRM
	Acenaphthylene (SW8270DSIM)	J	SRM
	Benzo(a)pyrene (SW8270DSIM)	J	SRM
	Dibenzo(a,h)anthracene (SW8270DSIM)	J	SRM
	Naphthalene (SW8270DSIM)	J	SRM
ST-102C_7.3-8.3	Pentachlorophenol (SW8270DSIM)	J	CCAL
	Mercury	J	HT
	Sulfide	J	HT
	Dibutyl Phthalate (SW8270D)	J	LCS
	Diethyl Phthalate (SW8270D)	U	MB
	Acenaphthene (SW8270DSIM)	J	SRM
	Acenaphthylene (SW8270DSIM)	J	SRM
	Benzo(a)pyrene (SW8270DSIM)	J	SRM
	Dibenzo(a,h)anthracene (SW8270DSIM)	J	SRM
	Naphthalene (SW8270DSIM)	J	SRM
ST-102S_0-10	Benzoic Acid (SW8270DSIM)	U	MB
	Acenaphthene (SW8270DSIM)	UJ	SRM
	Acenaphthylene (SW8270DSIM)	UJ	SRM
	Benzo(a)pyrene (SW8270DSIM)	J	SRM
	Dibenzo(a,h)anthracene (SW8270DSIM)	J	SRM
	Naphthalene (SW8270DSIM)	J	SRM
	Benzoic Acid (SW8270DSIM)	U	MB
	Diethyl Phthalate (SW8270D)	U	MB
	Acenaphthene (SW8270DSIM)	J	SRM
	Acenaphthylene (SW8270DSIM)	UJ	SRM
	Benzo(a)pyrene (SW8270DSIM)	J	SRM
	Dibenzo(a,h)anthracene (SW8270DSIM)	J	SRM
	Naphthalene (SW8270DSIM)	J	SRM
ST-104C_7.3-8.3	Ammonia (Total as N)	J	HT
	Acenaphthene (SW8270DSIM)	J	SRM
	Acenaphthylene (SW8270DSIM)	J	SRM
	Benzo(a)pyrene (SW8270DSIM)	J	SRM
	Dibenzo(a,h)anthracene (SW8270DSIM)	J	SRM
	Naphthalene (SW8270DSIM)	J	SRM
ST-104C_8.3-9.3	Mercury	J	HT
	Sulfide	J	HT
	Dibutyl Phthalate (SW8270D)	J	LCS

	Lead	J	Pr
	Acenaphthene (SW8270DSIM)	J	SRM
	Acenaphthylene (SW8270DSIM)	J	SRM
	Benzo(a)pyrene (SW8270DSIM)	J	SRM
	Dibenzo(a,h)anthracene (SW8270DSIM)	J	SRM
	Naphthalene (SW8270DSIM)	J	SRM
ST-104S_0-10	Antimony	U	MB
	Benzoic Acid (SW8270DSIM)	U	MB
	Acenaphthene (SW8270DSIM)	J	SRM
	Acenaphthylene (SW8270DSIM)	J	SRM
	Benzo(a)pyrene (SW8270DSIM)	J	SRM
	Dibenzo(a,h)anthracene (SW8270DSIM)	J	SRM
	Naphthalene (SW8270DSIM)	J	SRM
ST-105C_11-12	Acenaphthene (SW8270DSIM)	UJ	SRM
	Acenaphthylene (SW8270DSIM)	UJ	SRM
	Benzo(a)pyrene (SW8270DSIM)	UJ	SRM
	Dibenzo(a,h)anthracene (SW8270DSIM)	UJ	SRM
	Naphthalene (SW8270DSIM)	UJ	SRM
ST-105S_0-10	Benzoic Acid (SW8270DSIM)	U	MB
	Acenaphthene (SW8270DSIM)	J	SRM
	Acenaphthylene (SW8270DSIM)	J	SRM
	Benzo(a)pyrene (SW8270DSIM)	J	SRM
	Dibenzo(a,h)anthracene (SW8270DSIM)	J	SRM
	Naphthalene (SW8270DSIM)	J	SRM
ST-106C_3.1-4.41	Antimony	U	MB
	Benzoic Acid (SW8270DSIM)	U	MB
	Diethyl Phthalate (SW8270D)	U	MB
	Acenaphthene (SW8270DSIM)	J	SRM
	Acenaphthylene (SW8270DSIM)	J	SRM
	Benzo(a)pyrene (SW8270DSIM)	J	SRM
	Dibenzo(a,h)anthracene (SW8270DSIM)	J	SRM
	Naphthalene (SW8270DSIM)	J	SRM
ST-106C_4.1-5.1	Mercury	J	HT
	Sulfide	J	HT
	Dibutyl Phthalate (SW8270D)	J	LCS
	Lead	J	Pr
	Acenaphthene (SW8270DSIM)	J	SRM
	Acenaphthylene (SW8270DSIM)	J	SRM

	Benzo(a)pyrene (SW8270DSIM)	J	SRM
	Dibenzo(a,h)anthracene (SW8270DSIM)	J	SRM
	Naphthalene (SW8270DSIM)	J	SRM
ST-106S_0-10	Benzoic Acid (SW8270DSIM)	U	MB
	Acenaphthene (SW8270DSIM)	J	SRM
	Acenaphthylene (SW8270DSIM)	J	SRM
	Benzo(a)pyrene (SW8270DSIM)	J	SRM
	Dibenzo(a,h)anthracene (SW8270DSIM)	J	SRM
	Naphthalene (SW8270DSIM)	J	SRM
ST-107C_4.2-5.2	Acenaphthene (SW8270DSIM)	J	SRM
	Acenaphthylene (SW8270DSIM)	UJ	SRM
	Benzo(a)pyrene (SW8270DSIM)	J	SRM
	Dibenzo(a,h)anthracene (SW8270DSIM)	UJ	SRM
	Naphthalene (SW8270DSIM)	J	SRM
ST-107C_9.3-10.3	Acenaphthene (SW8270DSIM)	UJ	SRM
	Acenaphthylene (SW8270DSIM)	UJ	SRM
	Benzo(a)pyrene (SW8270DSIM)	UJ	SRM
	Dibenzo(a,h)anthracene (SW8270DSIM)	UJ	SRM
	Naphthalene (SW8270DSIM)	UJ	SRM
ST-107S_0-10	Benzoic Acid (SW8270DSIM)	U	MB
	Diethyl Phthalate (SW8270D)	U	MB
	Acenaphthene (SW8270DSIM)	J	SRM
	Acenaphthylene (SW8270DSIM)	J	SRM
	Benzo(a)pyrene (SW8270DSIM)	J	SRM
	Dibenzo(a,h)anthracene (SW8270DSIM)	J	SRM
	Naphthalene (SW8270DSIM)	J	SRM
ST-108C_10.6-11.6	Sulfide	J	HT
ST-108C_11.6-12.6	Sulfide	J	HT
ST-108C_6.6-7.6	Acenaphthene (SW8270DSIM)	J	SRM
	Acenaphthylene (SW8270DSIM)	J	SRM
	Benzo(a)pyrene (SW8270DSIM)	J	SRM
	Dibenzo(a,h)anthracene (SW8270DSIM)	J	SRM
	Naphthalene (SW8270DSIM)	J	SRM
ST-108C_8.6-9.6	Mercury	J	HT
	Sulfide	J	HT
	Dibutyl Phthalate (SW8270D)	J	LCS

	Lead	J	Pr
	Acenaphthene (SW8270DSIM)	J	SRM
	Acenaphthylene (SW8270DSIM)	J	SRM
	Benzo(a)pyrene (SW8270DSIM)	J	SRM
	Dibenzo(a,h)anthracene (SW8270DSIM)	J	SRM
	Naphthalene (SW8270DSIM)	J	SRM
ST-108C_9.6-10.6	Sulfide	J	HT
ST-108S_0-10	Antimony	U	MB
	Benzoic Acid (SW8270DSIM)	U	MB
	Diethyl Phthalate (SW8270D)	U	MB
	Acenaphthene (SW8270DSIM)	J	SRM
	Acenaphthylene (SW8270DSIM)	J	SRM
	Acenaphthylene (SW8270DSIM)	UJ	SRM
	Benzo(a)pyrene (SW8270DSIM)	J	SRM
	Dibenzo(a,h)anthracene (SW8270DSIM)	J	SRM
	Naphthalene (SW8270DSIM)	J	SRM
ST-109C_11.3-12.3	Mercury	J	HT
	Sulfide	J	HT
	Dibutyl Phthalate (SW8270D)	J	LCS
	Lead	J	Pr
	Acenaphthene (SW8270DSIM)	J	SRM
	Acenaphthylene (SW8270DSIM)	J	SRM
	Benzo(a)pyrene (SW8270DSIM)	J	SRM
	Dibenzo(a,h)anthracene (SW8270DSIM)	UJ	SRM
	Naphthalene (SW8270DSIM)	J	SRM
ST-109C_8.3-9.3	Sulfide	J	HT
	Acenaphthene (SW8270DSIM)	J	SRM
	Acenaphthylene (SW8270DSIM)	J	SRM
	Benzo(a)pyrene (SW8270DSIM)	J	SRM
	Dibenzo(a,h)anthracene (SW8270DSIM)	J	SRM
	Naphthalene (SW8270DSIM)	J	SRM
ST-109S_0-10	Antimony	U	MB
	Acenaphthene (SW8270DSIM)	J	SRM
	Acenaphthylene (SW8270DSIM)	J	SRM
	Benzo(a)pyrene (SW8270DSIM)	J	SRM
	Dibenzo(a,h)anthracene (SW8270DSIM)	J	SRM
	Naphthalene (SW8270DSIM)	J	SRM
DMMP-1E	1,2,4-Trichlorobenzene (SW8270D)	R	DNR

	1,2-Dichlorobenzene (o-Dichlorobenzene) (SW8270D)	R	DNR
	1,4-Dichlorobenzene (p-Dichlorobenzene) (SW8270D)	R	DNR
	2,4-Dimethylphenol (SW8270D)	R	DNR
	2-Methylnaphthalene (SW8270DSIM)	R	DNR
	2-methylphenol (o-Cresol) (SW8270D)	R	DNR
	4-methylphenol (p-Cresol) (SW8270D)	R	DNR
	Acenaphthene (SW8270DSIM)	R	DNR
	Acenaphthylene (SW8270DSIM)	R	DNR
	Anthracene (SW8270DSIM)	R	DNR
	Benzo(a)anthracene (SW8270DSIM)	R	DNR
	Benzo(a)pyrene (SW8270DSIM)	R	DNR
	Benzo(g,h,i)perylene (SW8270DSIM)	R	DNR
	Benzofluoranthenes (Total) (SW8270DSIM)	R	DNR
	Benzoic Acid (SW8270D)	R	DNR
	Benzyl Alcohol (SW8270D)	R	DNR
	Bis(2-Ethylhexyl) Phthalate (SW8270D)	R	DNR
	Butyl benzyl Phthalate (SW8270D)	R	DNR
	Chrysene (SW8270DSIM)	R	DNR
	Di-N-Octyl Phthalate (SW8270D)	R	DNR
	Dibenzo(a,h)anthracene (SW8270DSIM)	R	DNR
	Dibenzofuran (SW8270D)	R	DNR
	Dibutyl Phthalate (SW8270D)	R	DNR
	Diethyl Phthalate (SW8270D)	R	DNR
	Dimethyl Phthalate (SW8270D)	R	DNR
	Fluoranthene (SW8270DSIM)	R	DNR
	Fluorene (SW8270DSIM)	R	DNR
	Hexachlorobenzene (SW8270D)	R	DNR
	Hexachlorobenzene (SW8270DSIM)	R	DNR
	Hexachlorobutadiene (SW8270D)	R	DNR
	Indeno(1,2,3-c,d)pyrene (SW8270DSIM)	R	DNR
	N-Nitrosodiphenylamine (as diphenylamine) (SW8270D)	R	DNR
	Naphthalene (SW8270DSIM)	R	DNR
	Pentachlorophenol (SW8270D)	R	DNR
	Phenanthrene (SW8270DSIM)	R	DNR
	Phenol (SW8270D)	R	DNR
	Pyrene (SW8270DSIM)	R	DNR
DMMU-2D-COMP	2-Methylnaphthalene (SW8270DSIM)	R	DNR

	Acenaphthene (SW8270DSIM)	R	DNR
	Acenaphthylene (SW8270DSIM)	R	DNR
	Anthracene (SW8270DSIM)	R	DNR
	Benzo(a)anthracene (SW8270DSIM)	R	DNR
	Benzo(a)pyrene (SW8270DSIM)	R	DNR
	Benzo(g,h,i)perylene (SW8270DSIM)	R	DNR
	Benzofluoranthenes (Total) (SW8270DSIM)	R	DNR
	Chrysene (SW8270DSIM)	R	DNR
	Dibenzo(a,h)anthracene (SW8270DSIM)	R	DNR
	Fluoranthene (SW8270DSIM)	R	DNR
	Fluorene (SW8270DSIM)	R	DNR
	Hexachlorobenzene (SW8270DSIM)	R	DNR
	Indeno(1,2,3-c,d)pyrene (SW8270DSIM)	R	DNR
	Naphthalene (SW8270DSIM)	R	DNR
	Phenanthrene (SW8270DSIM)	R	DNR
	Pyrene (SW8270DSIM)	R	DNR
	Tributyltin Ion (SW8270DSIM)	R	DNR
ST-102C_6.3-7.3	2-Methylnaphthalene (SW8270DSIM)	R	DNR
	Acenaphthene (SW8270DSIM)	R	DNR
	Acenaphthylene (SW8270DSIM)	R	DNR
	Anthracene (SW8270DSIM)	R	DNR
	Benzo(a)anthracene (SW8270DSIM)	R	DNR
	Benzo(a)pyrene (SW8270DSIM)	R	DNR
	Benzo(g,h,i)perylene (SW8270DSIM)	R	DNR
	Benzofluoranthenes (Total) (SW8270DSIM)	R	DNR
	Chrysene (SW8270DSIM)	R	DNR
	Dibenzo(a,h)anthracene (SW8270DSIM)	R	DNR
	Fluoranthene (SW8270DSIM)	R	DNR
	Fluorene (SW8270DSIM)	R	DNR
	Hexachlorobenzene (SW8270DSIM)	R	DNR
	Indeno(1,2,3-c,d)pyrene (SW8270DSIM)	R	DNR
	Naphthalene (SW8270DSIM)	R	DNR
	Phenanthrene (SW8270DSIM)	R	DNR
	Pyrene (SW8270DSIM)	R	DNR
ST-102C_7.3-8.3	2-Methylnaphthalene (SW8270DSIM)	R	DNR
	Acenaphthene (SW8270DSIM)	R	DNR
	Acenaphthylene (SW8270DSIM)	R	DNR
	Anthracene (SW8270DSIM)	R	DNR

	Benzo(a)anthracene (SW8270DSIM)	R	DNR
	Benzo(a)pyrene (SW8270DSIM)	R	DNR
	Benzo(g,h,i)perylene (SW8270DSIM)	R	DNR
	Benzofluoranthenes (Total) (SW8270DSIM)	R	DNR
	Chrysene (SW8270DSIM)	R	DNR
	Dibenzo(a,h)anthracene (SW8270DSIM)	R	DNR
	Fluoranthene (SW8270DSIM)	R	DNR
	Fluorene (SW8270DSIM)	R	DNR
	Hexachlorobenzene (SW8270DSIM)	R	DNR
	Indeno(1,2,3-c,d)pyrene (SW8270DSIM)	R	DNR
	Naphthalene (SW8270DSIM)	R	DNR
	Phenanthrene (SW8270DSIM)	R	DNR
	Pyrene (SW8270DSIM)	R	DNR
ST-107S_0-10	2-Methylnaphthalene (SW8270DSIM)	R	DNR
	Acenaphthene (SW8270DSIM)	R	DNR
	Acenaphthylene (SW8270DSIM)	R	DNR
	Anthracene (SW8270DSIM)	R	DNR
	Benzo(a)anthracene (SW8270DSIM)	R	DNR
	Benzo(a)pyrene (SW8270DSIM)	R	DNR
	Benzo(g,h,i)perylene (SW8270DSIM)	R	DNR
	Benzofluoranthenes (Total) (SW8270DSIM)	R	DNR
	Chrysene (SW8270DSIM)	R	DNR
	Dibenzo(a,h)anthracene (SW8270DSIM)	R	DNR
	Fluoranthene (SW8270DSIM)	R	DNR
	Fluorene (SW8270DSIM)	R	DNR
	Hexachlorobenzene (SW8270DSIM)	R	DNR
	Indeno(1,2,3-c,d)pyrene (SW8270DSIM)	R	DNR
	Naphthalene (SW8270DSIM)	R	DNR
	Phenanthrene (SW8270DSIM)	R	DNR
	Pyrene (SW8270DSIM)	R	DNR
ST-108C_6.6-7.6	2-Methylnaphthalene (SW8270DSIM)	R	DNR
	Acenaphthene (SW8270DSIM)	R	DNR
	Acenaphthylene (SW8270DSIM)	R	DNR
	Anthracene (SW8270DSIM)	R	DNR
	Benzo(a)anthracene (SW8270DSIM)	R	DNR
	Benzo(a)pyrene (SW8270DSIM)	R	DNR
	Benzo(g,h,i)perylene (SW8270DSIM)	R	DNR
	Benzofluoranthenes (Total) (SW8270DSIM)	R	DNR

	Chrysene (SW8270DSIM)	R	DNR
	Dibenzo(a,h)anthracene (SW8270DSIM)	R	DNR
	Fluoranthene (SW8270DSIM)	R	DNR
	Fluorene (SW8270DSIM)	R	DNR
	Hexachlorobenzene (SW8270DSIM)	R	DNR
	Indeno(1,2,3-c,d)pyrene (SW8270DSIM)	R	DNR
	Naphthalene (SW8270DSIM)	R	DNR
	Phenanthrene (SW8270DSIM)	R	DNR
	Pyrene (SW8270DSIM)	R	DNR
	Tributyltin Ion (SW8270DSIM)	R	DNR
ST-109C_8.3-9.3	2-Methylnaphthalene (SW8270DSIM)	R	DNR
	Acenaphthene (SW8270DSIM)	R	DNR
	Acenaphthylene (SW8270DSIM)	R	DNR
	Anthracene (SW8270DSIM)	R	DNR
	Benzo(a)anthracene (SW8270DSIM)	R	DNR
	Benzo(a)pyrene (SW8270DSIM)	R	DNR
	Benzo(g,h,i)perylene (SW8270DSIM)	R	DNR
	Benzofluoranthenes (Total) (SW8270DSIM)	R	DNR
	Chrysene (SW8270DSIM)	R	DNR
	Dibenzo(a,h)anthracene (SW8270DSIM)	R	DNR
	Fluoranthene (SW8270DSIM)	R	DNR
	Fluorene (SW8270DSIM)	R	DNR
	Hexachlorobenzene (SW8270DSIM)	R	DNR
	Indeno(1,2,3-c,d)pyrene (SW8270DSIM)	R	DNR
	Naphthalene (SW8270DSIM)	R	DNR
	Phenanthrene (SW8270DSIM)	R	DNR
	Pyrene (SW8270DSIM)	R	DNR
DMMU-1F_COMP	Total PeCDF	U	CID
	Total TCDF	U	CID
	Sulfide	J	HT
	Dibutyl Phthalate (SW8270D)	U	MB
ST-102C_9.3-10.3	Total PeCDF	U	CID
	Total TCDF	U	CID
	Sulfide	UJ	HT
	Antimony	U	MB
	Dibutyl Phthalate (SW8270D)	U	MB
	4,4'-DDD	UJ	MS
	4,4'-DDE	UJ	MS

	4,4'-DDT	UJ	MS
	Aldrin	UJ	MS
	alpha-Chlordane (cis)	UJ	MS
	beta or gamma-Chlordane (trans)	UJ	MS
	cis-Nonachlor	UJ	MS
	Dieldrin	UJ	MS
	Heptachlor	UJ	MS
	Hexachlorobenzene	UJ	MS
	Oxychlordane	UJ	MS
	trans-Nonachlor	UJ	MS
ST-104C_10.3-11.3	Total PeCDF	U	CID
	Total TCDF	U	CID
	Sulfide	J	HT
	Dibutyl Phthalate (SW8270D)	U	MB
ST-106C_6.1-7.1	Total TCDF	U	CID
	Sulfide	J	HT
	Dibutyl Phthalate (SW8270D)	U	MB
ST-104C_10.3-11.3	2-Methylnaphthalene (SW8270DSIM)	R	DNR
	Acenaphthene (SW8270DSIM)	R	DNR
	Acenaphthylene (SW8270DSIM)	R	DNR
	Anthracene (SW8270DSIM)	R	DNR
	Benzo(a)anthracene (SW8270DSIM)	R	DNR
	Benzo(a)pyrene (SW8270DSIM)	R	DNR
	Benzo(g,h,i)perylene (SW8270DSIM)	R	DNR
	Benzofluoranthenes (Total) (SW8270DSIM)	R	DNR
	Chrysene (SW8270DSIM)	R	DNR
	Dibenzo(a,h)anthracene (SW8270DSIM)	R	DNR
	Fluoranthene (SW8270DSIM)	R	DNR
	Fluorene (SW8270DSIM)	R	DNR
	Indeno(1,2,3-c,d)pyrene (SW8270DSIM)	R	DNR
	Naphthalene (SW8270DSIM)	R	DNR
	Phenanthrene (SW8270DSIM)	R	DNR
	Pyrene (SW8270DSIM)	R	DNR

Below is a list of Qualifier Reason Code definitions:

- HT = Holding Time
- MB = Method Blank

- LCS = Laboratory Control Samples
- Pr = Laboratory Duplicates
- SRM = Standard Reference Material
- CCAL = Continuing Calibration Verification
- CID = Compound Identification (i.e., ion ratio, retention time, relative abundance, etc.)
- DNR = Do-Not-Report (Due to Sample/Analyte reduncancy; analyte reported more than once)

REFERENCES

U.S. Environmental Protection Agency (USEPA). "Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use," EPA-540-R-08-005. January 2009.

U.S. Environmental Protection Agency (USEPA). "National Functional Guidelines for Organic Superfund Methods Data Review" EPA-540-R-2017-002. January 2017.

U.S. Environmental Protection Agency (USEPA). "National Functional Guidelines for Inorganic Superfund Methods Data Review" EPA-540-R-2017-001. January 2017.

GeoEngineers 2018b. Dredged Material Characterization Sampling and Analysis Plan. Prepared for the Dredged Material Management Office and Washington Department of Ecology on behalf of the Port of Everett. October 12, 2018.

DATA VALIDATION REPORT

PORT OF EVERETT

SOUTH TERMINAL MAINTENANCE DREDGE PROJECT - DMMP

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PROJECT NARRATIVE

Basis for the Data Validation

This report summarizes the results of summary and full validation (EPA Stage 2B, EPA Stage 4) performed on sediment and quality control sample data for the Port of Everett – South Terminal Maintenance Dredge project. A complete list of samples is provided in the Sample Index.

Samples were analyzed by Frontier Analytical Laboratory, El Dorado Hills, California. The analytical methods and EcoChem project chemists are noted below:

ANALYSIS	METHOD	PRIMARY REVIEW	SECONDARY REVIEW
PCB Congeners	1668	E. Clayton	A. Bodkin
Dioxin/Furan Compounds	1613B		

The data were reviewed using guidance and quality control criteria documented in the analytical methods; the *Final Dredge Material Characterization Sampling and Analysis Plan* (GeoEngineers October 12, 2018); *National Functional Guidelines for Chlorinated Dioxin/Furan Data Review* (USEPA 2011); and *USEPA National Functional Guidelines for High Resolution Superfund Methods Data Review* (April 2016).

EcoChem's goal in assigning data assessment qualifiers is to assist in proper data interpretation. If values are estimated (J or UJ), data may be used for site evaluation and risk assessment purposes but reasons for data qualification should be taken into consideration when interpreting sample concentrations. If values are assigned an R, the data are to be rejected and should not be used for any site evaluation purposes. If values have no data qualifier assigned, then the data meet the data quality objectives as stated in the documents and methods referenced above.

Data qualifier definitions, reason codes, and validation criteria are included as APPENDIX A. A Qualified Data Summary Table is included in APPENDIX B. Data Validation Worksheets and project associated communications will be kept on file at EcoChem, Inc. A qualified laboratory electronic data deliverable (EDD) is also submitted with this report.

Sample Index
Port of Everett - DMMP

SDG	Sample ID	Laboratory ID	Dioxins	Laboratory ID	PCB Congeners
11986	ST-101C_13.2-14.2	11986-008-SA	✓	11986-001-SA	✓
11986	ST-102C_6.3-7.3	11986-009-SA	✓	11986-002-SA	✓
11986	DMMU-1A-COMP	11986-010-SA	✓	11986-003-SA	✓
11986	DMMU-1B-COMP	11986-011-SA	✓	11986-004-SA	✓
11986	DMMU-1C-COMP	11986-012-SA	✓	11986-005-SA	✓
11986	DMMU-1D-COMP	11986-013-SA	✓	11986-006-SA	✓
11986	DMMU-2D-COMP	11986-014-SA	✓	11986-007-SA	✓
11987	ST-104C_7.3-8.3	11987-008-SA	✓	11987-001-SA	✓
11987	ST-105C_11-12	11987-009-SA	✓	11987-002-SA	✓
11987	ST-107C_4.2-5.2	11987-011-SA	✓	11987-004-SA	✓
11987	ST-107C_9.3-10.3	11987-012-SA	✓	11987-005-SA	✓
11987	ST-108C_6.6-7.6	11987-013-SA	✓	11987-006-SA	✓
11987	ST-109C_8.3-9.3	11987-014-SA	✓	11987-007-SA	✓
11988	ST-101S_0-10	11988-010-SA	✓	11988-001-SA	✓
11988	ST-102S_0-10	11988-011-SA	✓	11988-002-SA	✓
11988	ST-103S_0-10	11988-012-SA	✓	11988-003-SA	✓
11988	ST-104S_0-10	11988-013-SA	✓	11988-004-SA	✓
11988	ST-105S_0-10	11988-014-SA	✓	11988-005-SA	✓
11988	ST-106S_0-10	11988-015-SA	✓	11988-006-SA	✓
11988	ST-107S_0-10	11988-016-SA	✓	11988-007-SA	✓
11988	ST-108S_0-10	11988-017-SA	✓	11988-008-SA	✓
11988	ST-109S_0-10	11988-018-SA	✓	11988-009-SA	✓
12064	DMMP-1KEYWAY	12064-008-SA	✓	12064-001-SA	✓
12064	DMMP-1E	12064-009-SA	✓	12064-002-SA	✓
12064	ST-102C_7.3-8.3	12064-010-SA	✓	12064-003-SA	✓
12064	ST-104C_8.3-9.3	12064-011-SA	✓	12064-004-SA	✓
12064	ST-106C_4.1-5.1	12064-012-SA	✓	12064-005-SA	✓
12064	ST-108C_8.6-9.6	12064-013-SA	✓	12064-006-SA	✓
12064	ST-109C_11.3-12.3	12064-014-SA	✓	12064-007-SA	✓

DATA VALIDATION REPORT
Port of Everett - South Terminal Maintenance Dredge Project DMMP
Dioxin/Furan Compounds by Method 1613B

This report documents the review of analytical data from the analysis of sediment samples and the associated laboratory and field quality control (QC) samples. Samples were analyzed by Frontier Analytical Laboratory., El Dorado Hills, California. Refer to the SAMPLE INDEX for a complete list of samples.

SDG	NUMBER OF SAMPLES	VALIDATION LEVEL
11986	7 Sediment	EPA Stage 4
11987	7 Sediment	EPA Stage 2B
11988	9 Sediment	EPA Stage 2B
12064	7 Sediment	EPA Stage 2B

DATA PACKAGE COMPLETENESS

The laboratory submitted all required deliverables. The laboratory followed adequate corrective action processes and all anomalies were discussed in the case narrative.

SDG 11986: The summary form for the standard reference material (SRM) was missing from the laboratory report. The same SRM was provided in SDG 11987.

SDG 12064: The initial calibration and continuing calibration information were missing from the laboratory report. The laboratory was contacted and submitted the missing documentation.

EDD TO HARDCOPY VERIFICATION

Sample results and related quality control data were received as an electronic data deliverable (EDD) and laboratory report. The EDD was verified against the laboratory report (10%). The following discrepancies were noted:

SDG 11987: The ID for Sample ST-107C_6.6-7.6, as listed on the COC, was changed later to ST-108C_6.6-7.6. The hardcopy has the original sample ID; the database EDD has the revised ID.

TECHNICAL DATA VALIDATION

The quality control (QC) requirements reviewed are summarized in the following table:

✓	Sample Receipt, Preservation, and Holding Times	✓	Ongoing Precision and Recovery (OPR)
✓	System Performance and Resolution Checks	1	Standard Reference Material (SRM)
✓	Initial Calibration (ICAL)	1	Field Duplicates
✓	Calibration Verification	✓	Target Analyte List
✓	Blanks (Laboratory and Field)	✓	Reported Results
✓	Labeled Compound Recovery	2	Compound Identification
1	Matrix Spike/Matrix Spike Duplicates (MS/MSD)	1	Calculation Verification

✓ ***Stated method quality objectives (MQO) and QC criteria have been met. No outliers are noted or discussed.***
1 ***Quality control results are discussed below, but no data were qualified.***
2 ***Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed below.***

Matrix Spike/Matrix Spike Duplicates

Matrix spike/matrix spike duplicates (MS/MSD) were not analyzed and are not required by the method. Accuracy was assessed using labeled compound, reference material, and OPR recoveries. Precision is monitored by the laboratory by comparing the OPR results between extraction batches.

Field Duplicates

No field duplicates were submitted.

Standard Reference Material

The laboratory analyzed the Puget Sound Sediment Reference Material for organochlorine compounds. The criteria for standard reference material (SRM) recovery is that the reported result is within ±50% of the consensus average. All recoveries were acceptable.

Compound Identification

The method requires the confirmation of 2,3,7,8-TCDF using an alternate GC column if the column that is typically used cannot fully separate 2,3,7,8-TCDF from closely eluting non-target TCDF isomers. The laboratory performed a second column confirmation as necessary. Results reported from the confirmation column were flagged with an "F".

The laboratory assigned an "M" flag to one or more analytes to indicate that the ion ratio criterion for positive identification was not met. Since the ion abundance ratio is the primary identification criterion for high resolution mass spectroscopy, an outlier indicates that the reported result may be a false positive. These "M" flagged results were qualified as not detected (U-25) at the reported concentration. The laboratory also assigned "M" flags to total homolog groups. In these cases, the result for the group was estimated (J-25).

Diphenyl ether interferences were present in some samples. The laboratory assigned a "D" flag to the results affected by these interferences. These results were estimated (J/UJ-23) to indicate a potential high bias.

Calculation Verification

SDG 11986: Several results were verified by recalculation from the raw data. No calculation or transcription errors were found.

OVERALL ASSESSMENT

As determined by this evaluation, the laboratory followed the specified analytical method. Accuracy was acceptable as demonstrated by the labeled compound, reference material, and OPR recoveries and precision was acceptable as demonstrated by the OPR values. Precision within the analytical batch could not be assessed.

Detection limits were elevated based on ion ratio outliers. Results were estimated due to diphenyl ether interference. Results for total homolog groups with "M" flags were also estimated.

All data, as qualified, are acceptable for use.

DATA VALIDATION REPORT
Port of Everett – South Terminal Maintenance Dredge Project DMMP
Polychlorinated Biphenyl Compounds by Method 1668

This report documents the review of analytical data from the analysis of sediment samples and the associated laboratory and field quality control (QC) samples. Samples were analyzed by Frontier Analytical Laboratory., El Dorado Hills, California. Refer to the SAMPLE INDEX for a complete list of samples.

SDG	NUMBER OF SAMPLES	VALIDATION LEVEL
11986	7 Sediment	EPA Stage 4
11987	7 Sediment	EPA Stage 2B
11988	9 Sediment	EPA Stage 2B
12064	7 Sediment	EPA Stage 2B

DATA PACKAGE COMPLETENESS

The laboratory submitted all required deliverables. The laboratory followed adequate corrective action processes and all anomalies were discussed in the case narrative.

SDG 12064: The initial calibration and continuing calibration information were missing from the laboratory report. The laboratory was contacted and submitted the missing documentation.

EDD TO HARDCOPY VERIFICATION

Sample results and related quality control data were received as an electronic data deliverable (EDD) and laboratory report. The EDD was verified against the laboratory report (10%). The following discrepancies were noted:

SDG 11987: The ID for Sample ST-107C_6.6-7.6, as listed on the COC, was changed later to ST-108C_6.6-7.6. The hardcopy has the original sample ID; the database EDD has the revised ID.

TECHNICAL DATA VALIDATION

The quality control (QC) requirements reviewed are summarized in the following table:

✓	Sample Receipt, Preservation, and Holding Times	✓	Ongoing Precision and Recovery (OPR)
✓	System Performance and Resolution Checks	**1**	Standard Reference Materials
✓	Initial Calibration (ICAL)	**1**	Field Duplicates
✓	Calibration Verification	✓	Target Analyte List
✓	Blanks (Laboratory and Field)	**1**	Reported Results
✓	Labeled Compound Recovery	✓	Compound Identification
1	Matrix Spike/Matrix Spike Duplicates (MS/MSD)	**1**	Calculation Verification

✓ ***Stated method quality objectives (MQO) and QC criteria have been met. No outliers are noted or discussed.***

1 ***Quality control results are discussed below, but no data were qualified.***

2 ***Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed below.***

Matrix Spikes/Matrix Spike Duplicates

Matrix spike/matrix spike duplicates (MS/MSD) were not analyzed and are not required by the method. Accuracy was assessed using labeled compound, reference material, and OPR recoveries. Precision is monitored by the laboratory by comparing the OPR results between extraction batches.

Standard Reference Material

The laboratory extracted and analyzed Puget Sound Sediment Reference Material for organochlorine compounds. The criteria for standard reference material (SRM) recovery is that the reported result is within ±50% of the cons with reference concentrations greater than five times the detection limit. Because this is not a fully certified SRM, no action was taken based on recovery outliers. However, data users should consider outliers when interpreting sample data.

SDGs 11986, 11987, 12064: The recovery value for PCB 138/163/164 was greater than the upper control limit.

SDG 11988: The recovery values for PCB 138/163/164, PCB 206, PCB 207, and PCB 208 were greater than the upper control limit.

Field Duplicates

Field duplicates were not submitted.

Reported Results

The laboratory reported co-elutions differently in the hardcopy versus the EDD. In the hardcopy report, the co-elution result was reported for the lowest congener number; there was no result reported for the other congeners in the co-elution. The lab added flags indicating the associated congeners for a given co-elution. In the EDD, the same result was reported for every congener in a co-elution. No action was taken; however, data users should be aware of this reporting convention so that double counting does not occur when re-calculating total PCBs or TEQs.

Calculation Verification

SDG 11986: Several results were verified by recalculation from the raw data. No calculation or transcription errors were found.

OVERALL ASSESSMENT

As determined by this evaluation, the laboratory followed the specified analytical method. With the exceptions noted above, accuracy was acceptable as demonstrated by the labeled compound and OPR recoveries. Precision within the analytical batch could not be evaluated.

No data were qualified for any reason. All data, as reported, are acceptable for use.

ECOCHEM
Data Quality

APPENDIX A

DATA QUALIFIER DEFINITIONS
REASON CODES
AND CRITERIA TABLES

DATA VALIDATION QUALIFIER CODES
Based on National Functional Guidelines

The following definitions provide brief explanations of the qualifiers assigned to results in the data review process.

U	The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
J	The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
NJ	The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents the approximate concentration.
UJ	The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
R	The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

The following is an EcoChem qualifier that may also be assigned during the data review process:

DNR	Do not report; a more appropriate result is reported from another analysis or dilution.

DATA QUALIFIER REASON CODES

Group	Code	Reason for Qualification
Sample Handling	1	Improper Sample Handling or Sample Preservation (i.e., headspace, cooler temperature, pH, summa canister pressure); Exceeded Holding Times
Instrument Performance	24	Instrument Performance (i.e., tune, resolution, retention time window, endrin breakdown, lock-mass)
	5A	Initial Calibration (RF, %RSD, r^2)
	5B	Calibration Verification (CCV, CCAL; RF, %D, %R) Use bias flags (H,L)[1] where appropriate
	5C	Initial Calibration Verification (ICV %D, %R) Use bias flags (H,L)[1] where appropriate
Blank Contamination	6	Field Blank Contamination (Equipment Rinsate, Trip Blank, etc.)
	7	Lab Blank Contamination (i.e., method blank, instrument blank, etc.) Use low bias flag (L)[1] for negative instrument blanks
Precision and Accuracy	8	Matrix Spike (MS and/or MSD) Recoveries Use bias flags (H,L)[1] where appropriate
	9	Precision (all replicates: LCS/LCSD, MS/MSD, Lab Replicate, Field Replicate)
	10	Laboratory Control Sample Recoveries (a.k.a. Blank Spikes) Use bias flags (H,L)[1] where appropriate
	12	Reference Material Use bias flags (H,L)[1] where appropriate
	13	Surrogate Spike Recoveries (a.k.a. labeled compounds, recovery standards) Use bias flags (H,L)[1] where appropriate
Interferences	16	ICP/ICP-MS Serial Dilution Percent Difference
	17	ICP/ICP-MS Interference Check Standard Recovery Use bias flags (H,L)[1] where appropriate
	19	Internal Standard Performance (i.e., area, retention time, recovery)
	22	Elevated Detection Limit due to Interference (i.e., chemical and/or matrix)
	23	Bias from Matrix Interference (i.e. diphenyl ether, PCB/pesticides)
Identification and Quantitation	2	Chromatographic pattern in sample does not match pattern of calibration standard
	3	2nd column confirmation (RPD or %D)
	4	Tentatively Identified Compound (TIC) (associated with NJ only)
	20	Calibration Range or Linear Range Exceeded
	25	Compound Identification (i.e., ion ratio, retention time, relative abundance, etc.)
Miscellaneous	11	A more appropriate result is reported (multiple reported analyses i.e., dilutions, re-extractions, etc. Associated with "R" and "DNR" only)
	14	Other (See DV report for details)
	26	Method QC information not provided

[1] H = high bias indicated
L = low bias indicated

Dioxin/Furan Analysis by HRMS
(Based on Dioxin NFG 2011 and Methods EPA 1613B and SW-846 8290)

QC Element	Acceptance Criteria	Source of Criteria	Action for Non-Conformance	Reason Code	Discussion and Comments
Sample Handling					
Cooler/Storage Temperature Preservation	Waters/Solids ≤ 6°C & in the dark Tissues <-10°C & in the dark **Preservation Aqueous:** If Cl_2 is present Thiosulfate must be added and if pH > 9 it must be adjusted to 7 - 9	NFG [1] Method[2]	J(pos)/R(ND) if thiosulfate not added if Cl_2 present; J(pos)/UJ(ND) if pH not adjusted J(pos)/UJ(ND) if temp > 20°C	1	**EcoChem PJ, see TM-05**
Holding Time	**If properly stored, 1 year or:** **Extraction (all matrices):** 30 days from collection **Analysis (all matrices)**: 45 days from extraction	NFG [1] Method[2]	If not properly stored or HT exceedance: J(pos)/UJ(ND)	1	**EcoChem PJ, see TM-05** Gross exceedance = > 1 year 2011 NFG **Note:** Under CWA, SDWA, and RCRA the HT for H2O is 7 days.
Instrument Performance					
Mass Resolution (Tuning)	PFK (Perfluorokerosene) ≥10,000 resolving power at m/z 304.9824. Exact mass of m/z 380.9760 w/in 5 ppm of theoretical value (380.97410 to 380.97790) . Analyzed prior to ICAL and at the start and end of each 12 hr. shift.	NFG [1] Method [2]	R(pos/ND) all analytes in all samples associated with the tune	24	Notify PM
Windows Defining Mix	Peaks for first and last eluters must be within established retention time windows for each selector group (chlorination level)	NFG [1] Method [2]	If peaks are not completely within windows (clipped): If natives are ok, J(pos)/UJ(ND) homologs (Totals) If natives are affected, R all results for that selector group	24	Notify PM
Column Performance Mix	Both mixes must be analyzed before ICAL and CCAL Valley < 25% (valley = (x/y)*100%) where x = ht. of TCDD (or TCDF) & y = baseline to bottom of valley For all isomers eluting near the 2378-TCDD (TCDF) peak (TCDD only for 8290)	NFG [1] Method [2]	J(pos) if valley > 25%	24	**EcoChem PJ, see TM-05, Rev. 2**; Note: TCDF is evaluated only if second column confirmation is performed
Initial Calibration **Sensitivity**	S/N ratio > 10 for all native and labeled compounds in CS1 std.	NFG [1] Method [2]	If <10, elevate Det. Limit or R(ND)	5A	
Initial Calibration **Selectivity**	Ion Abundance ratios within QC limits (Table 8 of method 8290) (Table 9 of method 1613B)	NFG [1] Method [2]	If 2 or more ion ratios are out for one compound in ICAL, J(pos)	5A	**EcoChem PJ, see TM-05, Rev. 2**

Dioxin/Furan Analysis by HRMS
(Based on Dioxin NFG 2011 and Methods EPA 1613B and SW-846 8290)

QC Element	Acceptance Criteria	Source of Criteria	Action for Non-Conformance	Reason Code	Discussion and Comments
Instrument Performance (continued)					
Initial Calibration (Minimum 5 stds.) **Stability**	%RSD < 20% for native compounds %RSD <30% for labeled compounds (%RSD < 35% for labeled compounds under 1613b)	NFG [1] Method [2]	J(pos) natives if %RSD > 20%	5A	
	Absolute RT of $^{13}C_{12}$-1234-TCDD >25 min on DB5 & >15 min on DB-225	NFG [1] Method [2]	Narrate, no action		**EcoChem PJ, see TM-05, Rev. 2**
Continuing Calibration (Prior to each 12 hr. shift) **Sensitivity**	S/N ratio for CS3 standard > 10	NFG [1] Method [2]	If <10, elevate Det. Limit or R(ND)	5B	
Continuing Calibration (Prior to each 12 hr. shift) **Selectivity**	Ion Abundance ratios within QC limits (Table 8 of method 8290) (Table 9 of method 1613B)	NFG [1] Method [2]	For congener with ion ratio outlier, J(pos) natives in all samples associated with CCAL. No action for labeled congener ion ratio outliers.	25	**EcoChem PJ, see TM-05**
Continuing Calibration (Prior to each 12 hr. shift) **Stability**	%D+/-20% for native compounds %D +/-30% for labeled compounds **(Must meet limits in Table 6, Method 1613B)** If %D in the closing CCAL are within 25%/35%, the mean RF from the two CCAL may be used to calculate samples **(Section 8.3.2.4 of 8290)**.	NFG [1] Method [2]	**Labeled compounds:** Narrate, no action. **Native compounds:** 1613: J(pos)/UJ(ND)if %D is outside Table 6 limits J(pos)/R(ND) if %D is +/-75% of Table 6 limits 8290: J(pos)/UJ(ND) if %D = 20% - 75% J(pos)/R(ND) if %D > 75%	5B (H,L)[3]	
	Absolute RT of $^{13}C_{12}$-1234-TCDD and $^{13}C_{12}$-123789-HxCDD should be ± 15 seconds of ICAL RRT for all other compounds must meet criteria listed in Table 2 Method 1316.	NFG [1] Method [2]	Narrate, no action	5B	**EcoChem PJ, see TM-05**
Blank Contamination					
Method Blank (MB)	MB: One per matrix per batch of (of ≤ 20 samples) No detected compounds > RL	NFG [1] Method [2]	U(pos) if result is < 5X action level.	7	**Hierarchy of blank review:** **#1 - Review MB, qualify as needed** **#2 - Review FB , qualify as needed**
Field Blank (FB)	FB: frequency as per QAPP No detected compounds > RL		U(pos) if result is < 5X action level.	6	

Dioxin/Furan Analysis by HRMS
(Based on Dioxin NFG 2011 and Methods EPA 1613B and SW-846 8290)

QC Element	Acceptance Criteria	Source of Criteria	Action for Non-Conformance	Reason Code	Discussion and Comments
Precision and Accuracy					
MS/MSD (recovery)	**MS/MSD not typically required for HRMS analyses.** If lab analyzes MS/MSD then one set per matrix per batch (of ≤ 20 samples) Use most current laboratory control limits	EcoChem standard policy	J(pos) if both %R > UCL - high bias J(pos)/UJ(ND) if both %R < LCL - low bias J(pos)/R(ND) if both %R < 10% - very low bias J(pos)/UJ(ND) if one > UCL & one < LCL, with no bias **PJ if only one %R outlier**	8 (H,L)[3]	No action if only one spike %R is outside criteria. No action if parent concentration is >4x the amount spiked. Qualify parent sample only unless other QC indicates systematic problems.
MS/MSD (RPD)	**MS/MSD not typically required for HRMS analyses.** If lab analyzes MS/MSD then one set per matrix per batch (of ≤ 20 samples) Use most current laboratory control limits	EcoChem standard policy	J(pos) in parent sample if RPD > CL	9	Qualify parent sample only.
LCS (or OPR)	One per lab batch (of ≤ 20 samples) Use most current laboratory control limits **or** Limits from Table 6 of 1613B	NFG [1] Method [2]	J(pos) if %R > UCL - high bias J(pos)/UJ(ND) if %R < LCL - low bias J(pos)/R(ND) if %R < 10% - very low bias	10 (H,L)[3]	No action if only one spike %R is outside criteria, when LCSD is analyzed. Qualify all associated samples.
LCS/LCSD (RPD)	**LCSD not typically required for HRMS analyses.** One set per matrix and batch of 20 samples RPD < 35%	Method [2] Ecochem standard policy	J(pos) assoc. compound in all samples if RPD > CL	9	Qualify all associated samples.
Lab Duplicate (RPD)	**Lab Dup not typically required for HRMS analyses.** One per lab batch (of ≤ 20 samples) Use most current laboratory control limits	EcoChem standard policy	J(pos)/UJ(ND) if RPD > CL	9	
Labeled Compounds (Internal Standards)	Added to all samples %R = 40% - 135% in all samples 8290 %R must meet limits in Table 7 Method 1613B	NFG [1] Method [2]	J(pos) if %R > UCL - high bias J(pos)/UJ(ND) if %R < LCL - low bias J(pos)/R(ND) if %R < 10% - very low bias	13 (H,L)[3]	
Field Duplicates	Solids: RPD <50% OR difference < 2X RL (for results < 5X RL) Aqueous: RPD <35% OR difference < 1X RL (for results < 5X RL)	EcoChem standard policy	Narrate and qualify if required by project	9	**Use professional judgment**

Dioxin/Furan Analysis by HRMS
(Based on Dioxin NFG 2011 and Methods EPA 1613B and SW-846 8290)

QC Element	Acceptance Criteria	Source of Criteria	Action for Non-Conformance	Reason Code	Discussion and Comments
Compound ID and Calculation					
Quantitation/ Identification	All ions for each isomer must maximize within ± 2 seconds. S/N ratio >2.5 Ion ratios must meet criteria listed in Table 8 Method 8290, or Table 9 of 1613B; RRTs w/in limits in Table 2 of 1613B	NFG [1] Method [2]	Narrate in report; qualify if necessary NJ(pos) for retention time outliers. U(pos) for ion ratio outliers.	25	**EcoChem PJ, see TM-05**
EMPC (estimated maximum possible concentration)	If quantitation identification criteria are not met, laboratory should report an EMPC value.	NFG [1] Method [2]	If laboratory correctly reported an EMPC value, qualify the native compound U(pos) to indicate that the value is a detection limit and qualify total homolog groups J (pos)	25	**Use professional judgment See TM-18**
Interferences	Interferences from chlorodiphenyl ether compounds	NFG [1] Method [2]	J(pos)/UJ(ND) if present	23	**See TM-16**
	Lock masses must not deviate ± 20% from values in Table 8 of 1613B	Method [2]	J(pos)/UJ(ND) if present	24	**See TM-17**
Second Column Confirmation	All 2,3,7,8-TCDF hits must be confirmed on a DB-225 (or equiv) column. All QC criteria must also be met for the confirmation analysis.	NFG [1] Method [2]	Report the DB-225 value. If not performed use PJ.	3	DNR-11 DB5 result if both results from both columns are reported. **EcoChem PJ, see TM-05**
Calculation Check	Check 10% of field & QC sample results	EcoChem standard policy	Contact laboratory for resolution and/or corrective action	na	Full data validation only.
Electronic Data Deliverable (EDD)					
Verification of EDD to hardcopy data	EcoChem verify @ 10% unless problems noted; then increase level up to 100% for next several packages.		Depending on scope of problem, correct at EcoChem (minor issues) to resubmittal by laboratory (major issues).	na	EcoChem Project Manager and/or Database Administrator will work with lab to provide long-term corrective action.
Dilutions, Re-extractions and/or Reanalyses	Report only one result per analyte	Standard reporting policy	Use "DNR" to flag results that will not be reported.	11	

(pos) - positive (detected) results; (ND) - not detected results

[1] National Functional Guidelines for Chlorinated Dibenzo-p-Dioxins (CDDs) & Chlorinated Dibenzofurans (CDFs) Data Review, September 2011

[2] Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by High-Resolution Gas Chromatography/High-Resolution Mass Spectrometry (HRGC/HRMS), USEPA SW-846, Method 8290

[2] EPA Method 1613, Rev.B, Tetra-through Octa-Chlorinated Dioxins and Furans by Isotope Dilution HRGS/HRMS, October 1994

[3] NFG 2013 suggests using "+ / -" to indicate bias; EcoChem has chosen "H" = high bias indicated; "L" = low bias indicated.

PCB Congener Analysis by HRMS
(Based on EPA DV Guidance[1] and Method EPA 1668C)

QC Element	Acceptance Criteria	Source of Criteria	Action for Non-Conformance	Reason Code	Discussion and Comments
Sample Handling					
Cooler/Storage Temperature Preservation	Waters/Solids ≤ 6°C & in the dark Tissues <-10°C & in the dark **Preservation Aqueous:** If Cl_2 is present Thiosulfate must be added and if needed adjust pH to 2 - 3 (drinking water requirement)	EPA (1) Method (2)	J(pos)/R(ND) if thiosulfate not added if Cl_2 present and J(pos)/UJ(ND) if pH not adjusted; J(pos)/UJ(ND) if temp > 20°C	1	Note: EPA DV guidance documents use < 4°C, method uses ≤ 6°C. Info in EcoChem TM-05 also generally applies.
Holding Time	If properly stored, 1 year prior to extraction. If extracts properly stored (< -10°C & in dark), 1 year from extraction to analysis.	EPA (1) Method (2)	If not properly stored or HT exceeded: J(pos)/UJ(ND)	1	May **be dictated by QAPP** Info in EcoChem TM-05 also generally applies
Instrument Performance					
Mass Resolution (Tuning)	≥10,000 resolving power at m/z 330.9792 <5 ppm deviation from each m/z listed in **Table 7** of method. Analyzed prior to ICAL and at the beginning and end of each 12 hr. shift	EPA (1) Method (2)	R all analytes in all samples associated with a failed tune	24	PFK (Perfluorokerosene) tuning compound
Column Resolution	Mix of all 209 PCBs run prior to each ICAL/12 hours RT of PCB209 must be > 55 min PCB156 & 157 must coelute w/in 2 sec PCB34 & 23 and PCB187 & 182 must be resolved where ((x/y)*100%) < 40% x = ht of valley and y = ht of shortest peak RRT of all congeners must fall within the range in **Table 2** of the method	EPA (1) Method (2)	If criteria are not met, review sample chromatograms to determine if sample results are negatively impacted. If so, discuss with client for possible reanalyses, or J(pos) all data.	24	Criteria are for SPB-octyl column. If different column used, see Section 6.9.1.2 of method. Appendix A provides info for DB-1 column
Initial Calibration **Sensitivity**	S/N ratio > 10 for all native and labeled congeners in CS1 std.	EPA (1) Method (2)	If <10, elevate Det. Limit or R(ND)	5A	
Initial Calibration **Selectivity**	Ion Abundance ratios within QC limits (**Table 8** of Method 1668C)	EPA (1) Method (2)	If ion ratios are out for a given congener in 2 or more standards in ICAL, J(pos) results for that congener in all samples	5A	Professional judgement. The info in EcoChem TM-05 also generally applies
Initial Calibration (Minimum 5 stds.) **Stability**	%RSD < 20% for congeners listed in **Table 3** of method RRT of all congeners must meet **Table 2** of method	EPA (1) Method (2)	J(pos) natives if %RSD > 20% RRT outliers: narrate, no action	5A	RRT outliers: professional judgement. The info in EcoChem TM-05 also generally applies
Continuing Calibration (Prior to each 12 hr. shift) **Sensitivity**	S/N ratio for CS3 standard > 10	EPA (1) Method (2)	If <10, elevate Det. Limit to lowest calibration or R(ND)	5B	
Continuing Calibration (Prior to each 12 hr. shift) **Selectivity**	Ion Abundance ratios within QC limits (**Table 8** of Method 1668C)	EPA (1) Method (2)	No action if %D acceptable, review sample ion ratios, U(pos) if ion ratio outside limits	5B	Professional judgement. The info in EcoChem TM-05 also generally applies.

PCB Congener Analysis by HRMS
(Based on EPA DV Guidance[1] and Method EPA 1668C)

QC Element	Acceptance Criteria	Source of Criteria	Action for Non-Conformance	Reason Code	Discussion and Comments
Continuing Calibration (Prior to each 12 hr. shift) **Stability**	Recoveries must meet VER% limits in **Table 6,** Method 1668C	EPA [(1)] Method [(2)]	**Labeled congeners:** Narrate, no action. **Native congeners:** J(pos)/UJ(ND) for low bias J(pos) for high bias	5B (H,L)[3]	
	Absolute RT of all Labeled congeners and Window Defining Congeners must be +/- 15 sec of RT in ICAL RRT of all congeners must be within range in **Table 2** of method	EPA [(1)] Method [(2)]	Narrate, no action	5B	Professional judgement. The info in EcoChem TM-05 also generally applies
Blank Contamination					
Method Blank (MB)	MB: One per matrix per batch of (of ≤ 20 samples) No detected congeners	EPA [(1)] Method [(2)]	U(pos) if sample result is < 5X blank concentration	7	**Heirarchy of blank review:** **#1 - Review MB, quaify as needed** **#2 - Review FB , qualify as needed** EMPC values in blanks as considered to be non-detects
Field Blank (FB)	FB: frequency as per QAPP No detected congeners		U(pos) if sample result is < 5X blank concentration	6	
Precision and Accuracy					
MS/MSD (recovery)	**MS/MSD not typically required for HRMS analyses.** If lab analyzes MS/MSD then one set per matrix per batch (of ≤ 20 samples) Use most current laboratory control limits	EcoChem standard policy	J(pos) if both %R > UCL - high bias J(pos)/UJ(ND) if both %R < LCL - low bias J(pos)/R(ND) if both %R < 10% - very low bias J(pos)/UJ(ND) if one > UCL & one < LCL, with no bias **PJ if only one %R outlier**	8 (H,L)[3]	No action if only one spike %R is outside criteria. No action if parent concentration is >4x the amount spiked. Qualify parent sample only unless other QC indicates systematic problems.
MS/MSD (RPD)	**MS/MSD not typically required for HRMS analyses.** If lab analyzes MS/MSD then one set per matrix per batch (of ≤ 20 samples) Use most current laboratory control limits	EcoChem standard policy	J(pos) in parent sample if RPD > CL	9	Qualify parent sample only.
LCS (or OPR)	One per lab batch (of ≤ 20 samples) %R must meet limits in **Table 6** Method 1668C	EPA [(1)] Method [(2)]	J(pos) if %R > UCL - high bias J(pos)/UJ(ND) if %R < LCL - low bias J(pos)/R(ND) if %R < 10% - very low bias	10 (H,L)[3]	No action if only one spike %R is outside criteria, when LCSD is analyzed. Qualify all associated samples.
LCS/LCSD (RPD)	**LCS/LCSD not typically required for HRMS analyses.** If lab analyzes LCS/LCSD then one set per matrix and batch of 20 samples RPD < 35%	EcoChem standard policy	J(pos) assoc. congener in all samples if RPD > CL	9	Qualify all associated samples.
Lab Duplicate (RPD) (if required)	**Lab Dup not typically required for HRMS analyses.** One per lab batch (of ≤ 20 samples) Use most current laboratory control limits	EcoChem standard policy	J(pos)/UJ(ND) if RPD > CL	9	Optional element. Qualify parent sample only.

PCB Congener Analysis by HRMS
(Based on EPA DV Guidance[1] and Method EPA 1668C)

QC Element	Acceptance Criteria	Source of Criteria	Action for Non-Conformance	Reason Code	Discussion and Comments
Labeled congeners (Internal Standards)	Added to all samples %R must meet limits in **Table 6** Method 1668C	EPA [(1)] Method [(2)]	J(pos) if %R > UCL - high bias J(pos)/UJ(ND) if %R < LCL - low bias J(pos)/R(ND) if %R <5% - very low bias J(pos)/UJ(ND) if %R between 5-10% for two or more labeled compounds in a substitution group (ie, mono, -di-, trichlorinated)- very low bias	13 (H,L)[3]	See next tab for labled congener associations as per **Table 2** Method 1668
Field Duplicates	Solids: RPD <50% OR difference < 2X RL (for results < 5X RL) Aqueous: RPD <35% OR difference < 1X RL (for results < 5X RL)	EcoChem standard policy	Narrate and qualify if required by project **(EcoChem PJ)**	9	**RPD values may be dictated by QAPP** 35% and 50% are EcoChem defaults
Compound ID and Calculation					
Quantitation/ Identification	All ions for each isomer must maximize within +/- 2 seconds. S/N ratio >2.5 Ion ratios must meet criteria listed in **Table 8** of 1668C; RRTs w/in limits in **Table 2** of 1668C	EPA [(1)] Method [(2)]	Narrate in report; qualify if necessary NJ(pos) for retention time outliers. U(pos) for ion ratio outliers.	25	The info in EcoChem TM-05 also generally applies
EMPC (estimated maximum possible concentration)	If quantitation identification criteria are not met, laboratory should report an EMPC value.	EPA [(1)] Method [(2)]	If laboratory correctly reported an EMPC value, qualify the native congener U to indicate that the value is an elevated detection limit and qualify total homolog groups J(+)	25	**Use professional judgment.** **See TM-18**
Interferences	Lock masses must not deviate +/- 20% from values in **Table 7** of 1668C	Method [(2)]	J(pos)/UJ(ND) if present	24	**Use professional judgment.** **See TM-17**
Calibration Range	Results greater than highest calibration standard	EcoChem standard policy	Qualify J (pos)	20	If result from dilution analysis is not reported.
Calculation Check	Check 10% of field & QC sample results	EcoChem standard policy	Contact laboratory for resolution and/or corrective action	na	Full data validation only.
Electronic Data Deliverable (EDD)					
Verification of EDD to hardcopy data	EcoChem verify @ 10% unless problems noted; then increase level up to 100% for next several packages.		Depending on scope of problem, correct at EcoChem (minor issues) to resubmittal by laboratory (major issues).	na	EcoChem Project Manager and/or Database Administrator will work with lab to provide long-term corrective action.
Dilutions, Re-extractions and/or Reanalyses	Report only one result per analyte	Standard reporting policy	Use "DNR" to flag results that will not be reported.	11	

[1] USEPA Region 2 Data Validation, Standard Operating Procedure for EPA Method 1668A, Revision 1, September 2008
USEPA Region 3 Interim Guidelines for the Validation of Data Generated Using Method 1668 PCB Congener Data, Revision 0, April 2004
USEPA Region 10 SOP For the Validation of Method 1668 Toxic, Dioxin-like, PCB Data, Revision 1, December 1995
[2] EPA Method 1668, Rev.C, Chlorinated Biphenyl Congeners in Water, Soil, Sediment, Biosolids, and Tissue by HRGC/HRMS, April 2010
[3] "H" = high bias indicated; "L" = low bias indicated

(pos): Positive Result(s)
(ND): Non-detects

PCB by 1668C

Labeled Compound

1L	3L	4L	15L	19L	37L	54L	77L	81L	104L	105L	114L	118L	123L	126L	155L	156L/ 157L	167L	169L	188L	189L	202L	205L	206L	208L	209L
1	2	**4**	5	16	16	40	40	40	82	82	82	82	82	**126**	128	128	128	128	170	170	194	194	**206**	207	**209**
2	**3**	5	6	17	17	41	41	41	83	83	83	83	83		129	129	129	129	171	171	195	195	207	**208**	
		6	7	18	18	42	42	42	84	84	84	84	84		130	130	130	130	172	172	196	196			
		7	8	**19**	20	43	43	43	85	85	85	85	85		131	131	131	131	173	173	197	197			
		8	9	20	21	44	44	44	86	86	86	86	86		132	132	132	132	174	174	198	198			
		9	10	21	22	45	45	45	87	87	87	87	87		133	133	133	133	175	175	199	199			
		10	11	22	23	46	46	46	88	88	88	88	88		134	134	134	134	176	176	200	200			
		11	12	23	24	47	47	47	89	89	89	89	89		135	135	135	135	177	177	201	201			
		12	13	24	25	48	48	48	90	90	90	90	90		136	136	136	136	178	178	**202**	203			
		13	14	25	26	49	49	49	91	91	91	91	91		137	137	137	137	179	179	203	204			
		14	**15**	26	27	50	50	50	92	92	92	92	92		138	138	138	138	180	180	204	**205**			
				27	28	51	51	51	93	93	93	93	93		139	139	139	139	181	181					
				28	29	52	52	52	94	94	94	94	94		140	140	140	140	182	182					
				29	30	53	53	53	95	95	95	95	95		141	141	141	141	183	183					
				30	31	**54**	55	55	96	96	96	96	96		142	142	142	142	184	184					
				31	32	55	56	56	97	97	97	97	97		143	143	143	143	185	185					
				32	33	56	57	57	98	98	98	98	98		144	144	144	144	186	186					
				33	34	57	58	58	99	99	99	99	99		145	145	145	145	187	187					
				34	35	58	59	59	100	100	100	100	100		146	146	146	146	**188**	**189**					
				35	36	59	60	60	101	101	101	101	101		147	147	147	147	190	190					
				36	**37**	60	61	61	102	102	102	102	102		148	148	148	148	191	191					
				38	38	61	62	62	103	103	103	103	103		149	149	149	149	192	192					
				39	39	62	63	63	**104**	**105**	106	106	106		150	150	150	150	193	193					
						63	64	64	106	106	107	107	107		151	151	151	151							
						64	65	65	107	107	108	108	108		152	152	152	152							
						65	66	66	108	108	109	109	109		153	153	153	153							
						66	67	67	109	109	110	110	110		154	154	154	154							
						67	68	68	110	110	111	111	111		**155**	**156**	158	158							
						68	69	69	111	111	112	112	112		158	**157**	159	159							
						69	70	70	112	112	113	113	113		159	158	160	160							
						70	71	71	113	113	**114**	115	115		160	159	161	161							
						71	72	72	115	115	115	116	116		161	160	162	162							
						72	73	73	116	116	116	117	117		162	161	163	163							
						73	74	74	117	117	117	**118**	119		163	162	164	164							
						74	75	75	119	119	119	119	120		164	163	165	165							
						75	76	76	120	120	120	120	121		165	164	166	166							
						76	**77**	78	121	121	121	121	122		166	165	**167**	168							
						78	78	79	122	122	122	122	**123**		168	166	168	**169**							
						79	79	80	124	124	124	124	124			168									
						80	80	**81**	125	125	125	125	125												
									127	127	127	127	127												

ECOCHEM
Data Quality

APPENDIX B

QUALIFIED DATA SUMMARY TABLE

Qualified Data Summary Table
Port of Everett - DMMP

SDG	Sample ID	Method	Analyte	Result	Units	Lab Flag	DV Qualifier	DV Reason
11986	DMMU-1A-COMP	EPA1613	Total PeCDF	9.43	pg/g	M	J	25
11986	DMMU-1A-COMP	EPA1613	Total TCDF	34.0	pg/g	M	J	25
11986	DMMU-1B-COMP	EPA1613	Total PeCDF	34.7	pg/g	D,M	J	23,25
11986	DMMU-1B-COMP	EPA1613	Total TCDF	136	pg/g	D,M	J	23,25
11986	DMMU-1C-COMP	EPA1613	Total PeCDF	39.4	pg/g	D,M	J	23,25
11986	DMMU-1C-COMP	EPA1613	Total TCDF	153	pg/g	D,M	J	23,25
11986	DMMU-1D-COMP	EPA1613	Total PeCDF	80.6	pg/g	D,M	J	23,25
11986	DMMU-1D-COMP	EPA1613	Total TCDF	223	pg/g	D,M	J	23,25
11986	DMMU-2D-COMP	EPA1613	Total PeCDF	110	pg/g	D,M	J	23,25
11986	DMMU-2D-COMP	EPA1613	Total TCDF	460	pg/g	D,M	J	23,25
11986	ST-101S_0-10	EPA1613	Total TCDD	11.4	pg/g	M	J	25
11986	ST-102C_6.3-7.3	EPA1613	Total PeCDF	89.1	pg/g	D,M	J	23,25
11986	ST-102C_6.3-7.3	EPA1613	Total TCDF	183	pg/g	D,M	J	23,25
11986	ST-102S_0-10	EPA1613	Total PeCDD	1.80	pg/g	J,M	J	25
11986	ST-103S_0-10	EPA1613	Total TCDF	6.17	pg/g	D,M	J	23,25
11986	ST-104S_0-10	EPA1613	Total PeCDF	3.19	pg/g	J,M	J	25
11986	ST-104S_0-10	EPA1613	Total TCDF	8.30	pg/g	D,M	J	23,25
11986	ST-105S_0-10	EPA1613	Total TCDF	27.9	pg/g	D,M	J	23,25
11986	ST-106S_0-10	EPA1613	Total TCDF	62.4	pg/g	D,M	J	23,25
11986	ST-107S_0-10	EPA1613	Total HxCDF	11.1	pg/g	D,M	J	23,25
11986	ST-107S_0-10	EPA1613	Total PeCDF	12.0	pg/g	D,M	J	23,25
11986	ST-107S_0-10	EPA1613	Total TCDF	31.6	pg/g	D,M	J	23,25
11986	ST-108S_0-10	EPA1613	Total HxCDF	47.1	pg/g	D,M	J	23,25
11986	ST-108S_0-10	EPA1613	Total PeCDF	52.2	pg/g	M	J	25
11986	ST-108S_0-10	EPA1613	Total TCDF	145	pg/g	D,M	J	23,25
11986	ST-109S_0-10	EPA1613	1,2,3,6,7,8-HxCD	2.30	pg/g	D,J,M	UJ	23,25
11986	ST-109S_0-10	EPA1613	Total HxCDF	41.1	pg/g	D,M	J	23,25
11986	ST-109S_0-10	EPA1613	Total PeCDD	1020	pg/g	M	J	25
11986	ST-109S_0-10	EPA1613	Total PeCDF	47.5	pg/g	D,M	J	23,25
11986	ST-109S_0-10	EPA1613	Total TCDF	173	pg/g	D,M	J	23,25
11987	ST-104C_7.3-8.3	EPA1613	Total TCDF	18.3	pg/g	M	J	25
11987	ST-106C_3.1-4.41	EPA1613	Total TCDF	14.7	pg/g	D,M	J	23,25
11987	ST-107C_4.2-5.2	EPA1613	Total PeCDD	2.59	pg/g	J,M	J	25
11987	ST-107C_4.2-5.2	EPA1613	Total PeCDF	0.923	pg/g	J,M	J	25
11987	ST-107C_4.2-5.2	EPA1613	Total TCDF	10.4	pg/g	D,M	J	23,25
11987	ST-108C_6.6-7.6	EPA1613	Total PeCDF	609	pg/g	D,M	J	23,25
11987	ST-108C_6.6-7.6	EPA1613	Total TCDF	1120	pg/g	D,M	J	23,25
11987	ST-109C_8.3-9.3	EPA1613	Total PeCDF	25.0	pg/g	D,M	J	23,25
11987	ST-109C_8.3-9.3	EPA1613	Total TCDF	76.1	pg/g	D,M	J	23,25
11988	ST-101S_0-10	EPA1613	Total TCDD	11.4	pg/g	M	J	25
11988	ST-102S_0-10	EPA1613	Total PeCDD	1.80	pg/g	J,M	J	25
11988	ST-103S_0-10	EPA1613	Total TCDF	6.17	pg/g	D,M	J	23,25

Qualified Data Summary Table
Port of Everett - DMMP

SDG	Sample ID	Method	Analyte	Result	Units	Lab Flag	DV Qualifier	DV Reason
11988	ST-104S_0-10	EPA1613	Total PeCDF	3.19	pg/g	J,M	J	25
11988	ST-104S_0-10	EPA1613	Total TCDF	8.30	pg/g	D,M	J	23,25
11988	ST-105S_0-10	EPA1613	Total TCDF	27.9	pg/g	D,M	J	23,25
11988	ST-106S_0-10	EPA1613	Total TCDF	62.4	pg/g	D,M	J	23,25
11988	ST-107S_0-10	EPA1613	Total HxCDF	11.1	pg/g	D,M	J	23,25
11988	ST-107S_0-10	EPA1613	Total PeCDF	12.0	pg/g	D,M	J	23,25
11988	ST-107S_0-10	EPA1613	Total TCDF	31.6	pg/g	D,M	J	23,25
11988	ST-108S_0-10	EPA1613	Total HxCDF	47.1	pg/g	D,M	J	23,25
11988	ST-108S_0-10	EPA1613	Total PeCDF	52.2	pg/g	M	J	25
11988	ST-108S_0-10	EPA1613	Total TCDF	145	pg/g	D,M	J	23,25
11988	ST-109S_0-10	EPA1613	1,2,3,6,7,8-HxCD	2.30	pg/g	D,J,M	UJ	23,25
11988	ST-109S_0-10	EPA1613	Total HxCDF	41.1	pg/g	D,M	J	23,25
11988	ST-109S_0-10	EPA1613	Total PeCDD	1020	pg/g	M	J	25
11988	ST-109S_0-10	EPA1613	Total PeCDF	47.5	pg/g	D,M	J	23,25
11988	ST-109S_0-10	EPA1613	Total TCDF	173	pg/g	D,M	J	23,25
12064	DMMP-1E	EPA1613	Total PeCDD	115	pg/g	M	J	25
12064	DMMP-1E	EPA1613	Total PeCDF	115	pg/g	D,M	J	23,25
12064	DMMP-1E	EPA1613	Total TCDD	147	pg/g	M	J	25
12064	DMMP-1E	EPA1613	Total TCDF	377	pg/g	D,M	J	23,25
12064	DMMP-1KEYWAY	EPA1613	Total TCDF	24.2	pg/g	M	J	25
12064	ST-102C_7.3-8.3	EPA1613	1,2,3,6,7,8-HxCD	2.36	pg/g	D,J,M	UJ	23,25
12064	ST-102C_7.3-8.3	EPA1613	Total HxCDF	26.5	pg/g	D,M	J	23,25
12064	ST-102C_7.3-8.3	EPA1613	Total PeCDF	50.5	pg/g	D,M	J	23,25
12064	ST-102C_7.3-8.3	EPA1613	Total TCDF	119	pg/g	D,M	J	23,25
12064	ST-104C_8.3-9.3	EPA1613	Total PeCDD	112	pg/g	M	J	25
12064	ST-104C_8.3-9.3	EPA1613	Total TCDF	502	pg/g	D,M	J	23,25
12064	ST-106C_4.1-5.1	EPA1613	Total PeCDD	32.3	pg/g	M	J	25
12064	ST-106C_4.1-5.1	EPA1613	Total TCDF	55.6	pg/g	D,M	J	23,25
12064	ST-108C_8.6-9.6	EPA1613	Total PeCDF	2.32	pg/g	J,M	J	25
12064	ST-108C_8.6-9.6	EPA1613	Total TCDF	25.7	pg/g	M	J	25