

DATA VALIDATION REPORT

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 Project/Site: Siltronic Sediment Sampling
 Laboratory No: A9J0321, WO15638, B9S7115, 570-9906-1

This report presents the validation of the data obtained during the field activities for the above referenced work assignment. The purpose of this review is to provide a Level 2A technical validation and quality control review of the following samples and rinsate blank collected on October 8, 2019 and October 9, 2019 and submitted to APEX Laboratories, LLC. Portland, OR.

Field Sample Numbers	Laboratory ID	Analyses/Methods
SED-06-SB-2.0	A9J0321-01 15638001 LAG964 570-9906-1	Diesel and Oil Hydrocarbons by NWTPH-Dx Semivolatiles and PAHs by GC/MS SW8270D Alkylated PAH Homologs by 8270D (Modified) Total metals and mercury (ICP-MS) by SW6020A Cyanide - Total (solid) by ASTM D7511 Total Organic Carbon (solid) by EPA 9060A Mod Total Solid Determination by PSEP-TS Grain Size by ASTM D 422M/PSET Parameters Percent Dry Weight by SW8000C Chlorinated Herbicides by 8151A Percent Solids by EPA 160.3M Dioxins and Furans by Method 1613B PCB Congeners by Method 1668C Organochlorine Pesticides by BRL SOP 00014/1, GC/MS/MS (EPA Method 1699 Modified) Organotins (Tributyltin) by GC/MS SIM
SED-06-SB-5.5	A9J0321-03 15638002 LAG965 570-9906-2	
SED-06-SB-8.5	A9J0321-05 15638003 LAG966 570-9906-3	
SED-04-SB-2.0	A9J0321-07 15638005 LAG968 570-9906-5	
SED-04-SB-4.75	A9J0321-08 15638006 LAG969 570-9906-6	
SED-04-SB-7.75	A9J0321-11 15638007 LAG970 570-9906-7	

Field Sample Numbers	Laboratory ID	Analyses/Methods
SED-07-SB-2.0	A9J0321-12 15638008 LAG971 570-9906-8	Diesel and Oil Hydrocarbons by NWTPH-Dx Semivolatiles and PAHs by GC/MS SW8270D Alkylated PAH Homologs by 8270D (Modified) Total metals and mercury (ICP-MS) by SW6020A Cyanide - Total (solid) by ASTM D7511 Total Organic Carbon (solid) by EPA 9060A Mod Total Solid Determination by PSEP-TS Grain Size by ASTM D 422M/PSET Parameters Percent Dry Weight by SW8000C Chlorinated Herbicides by 8151A Percent Solids by EPA 160.3M Dioxins and Furans by Method 1613B PCB Congeners by Method 1668C Organochlorine Pesticides by BRL SOP 00014/1, GC/MS/MS (EPA Method 1699 Modified) Organotins (Tributyltin) by GC/MS SIM
SED-07-SB-4.35	A9J0321-13 15638009 LAG972 570-9906-9	
SED-07-SB-6.35	A9J0321-14 15638010 LAG973 570-9906-10	
SED-01-SB-2.0	A9J0321-15 15638011 LAG974 570-9906-11	
SED-01-SB-5.5	A9J0321-17 15638012 LAG975 570-9906-12	
SED-02-SB-2.0	A9J0321-19 15638013 LAG976 570-9906-13	
SED-01-SB-8.65	A9J0321-20 15638014 LAG977 570-9906-14	
SED-02-SB-5.0	A9J0321-21 15638015 LAG978 570-9906-15	
SED-02-SB-8.25	A9J0321-24 15638016 LAG979 570-9906-16	

Field Sample Numbers	Laboratory ID	Analyses/Methods
SED-SB-RB	A9J0321-06 15638004 LAG967 570-9906-4	Diesel and Oil Hydrocarbons by NWTPH-Dx Semivolatiles and PAHs by GC/MS SW8270D Total metals and mercury (ICP-MS) by SW6020A Cyanide – Total (aqueous) by EPA 335.4 Total Organic Carbon by SM5310C Chlorinated Herbicides by 8151A Dioxins and Furans by Method 1613B PCB Congeners by Method 1668C Organochlorine Pesticides by BRL SOP 00014/1, GC/MS/MS (EPA Method 1699 Modified) Organotins (Tributyltin) by GC/MS SIM

The data submitted by the laboratory has been reviewed and verified for compliance with the Sediment Sampling Work Plan Willamette River Mile 6.55 to 6.9 West Siltronic Corporation Portland, Oregon prepared by Maul Foster & Alongi, Inc. (MFA) (May 2019) and the analytical procedures listed in the Test Methods for Evaluating Solid Wastes, SW-846, 3rd Edition and other referenced analytical methods. Data validation/data quality review was conducted in accordance with the current or most applicable versions of the National Functional Guidelines (NFG) for Superfund Organics Method Data Review (January 2017), the NFG for Superfund Inorganics Method Data Review (January 2017), and the NFG for High Resolution Superfund Methods Data Review (April 2016), along with the Region 10 Data Validation and Review Guidelines for Polychlorinated Dibenzo-p-Dioxin and Polychlorinated Dibenzofuran Data (PCDD/PCDF) Using Method 1613B, and SW846 Method 8290A, May 2014, modified for the method criteria. Laboratory QC limits/acceptance limits were used to evaluate the data unless where noted. Based on discussions with the data users, AlterEcho did not verify the toxic equivalencies (TEQs) listed for Dioxins and Furans in the laboratory reports since these factors will not be used for data reporting. Also, AlterEcho did not verify the Total PCB Congener concentrations listed in the laboratory reports since the data user plans to recalculate the Total PCB Congener concentrations using the validated data.

The herbicide samples were subcontracted to Weck Laboratories, Inc. and reported in the Apex Laboratories report. The Dioxins and Furans and PCB Congener samples were subcontracted to Cape Fear Analytical, LLC (Work Order WO15638) while the Organotins samples were subcontracted to Eurofins Calscience (Work Order 570-9906-1). The samples were subcontracted to Bureau Veritas Laboratories (formerly Maxxam Analytics International (Data Package B9S7115) for Organochlorine Pesticides by BRL SOP 00014/1, GC/MS/MS (EPA Method 1699 Modified). Samples were shipped and received under proper custody and preservation.

A Stage 2A Manual Validation as defined in the Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use, EPA-540-R-08-005, January 2009 USEPA, was performed on the samples. The data were evaluated based on the following parameters:

- Chain-of-Custody
- Case Narrative
- Field and Sample ID's
- Holding Time, including sample receipt, Preservation and Cooler Temperature
- Laboratory Blanks (method blank; reagent/preparation blanks)
- Field Blanks
- Laboratory Control Samples
- Matrix Spike/Matrix Spike Duplicates
- Post Digestion Spikes
- Laboratory Duplicates
- Field Duplicates
- Serial Dilution Samples (Metals)
- Surrogate (DMC) Recovery (Organics)
- Labeled Compounds and Clean-Up Standards (Dioxins/Furans, PCB Congeners, and Organochlorine Pesticides and Toxaphene)
- Sample Results

Data Completeness (Chain-of-Custody, Case Narrative, Field and Sample IDs)

The Level 2A data package was reviewed and included chain-of-custody (COC) forms, a case narrative, identification of field and sample numbers, sample results, laboratory quality control results, and sample receipt information. Raw data and instrument performance and calibration data are not evaluated for Level 2A data validation.

The COC forms were properly filled out including signatures, date and time of sampling, sampling identification, analyses requested, and custody transfers between different parties were signed and dated. The samples collected were appropriately identified and analyzed as per the COC.

Case narratives or a list of laboratory flags (Notes and Definitions) were provided and QC anomalies and QC outliers were noted.

Holding Times, Preservation and Cooler Temperature

The samples were received by the laboratory in good condition and within the recommended temperature range of $4 \pm 2^{\circ}\text{C}$ or just below, but not frozen.

Analytical holding times were assessed to determine whether the method holding time requirements were met by the laboratory. The holding times were met as all samples were prepared and/or analyzed within the method suggested holding times, including the analysis described below.

Alkylated PAH Homologs by 8270D (Modified)

Upon arrival at the laboratory, the alkylated PAH homologs volume was frozen to a temperature of -18°C rather than being stored at a temperature of $4 \pm 2^{\circ}\text{C}$ because it was unknown whether the alkylated PAH homologs analysis would be needed. The eventual extraction of the alkylated PAH homologs analysis was performed within the one year holding time for frozen samples as indicated by Table 4-2 of the Sediment Sampling Work Plan. No qualification of the results was required because the extraction was performed within the extended, one year holding time.

Laboratory Blanks (method blank; reagent/preparation blank)

The method blanks and preparation blanks were prepared and analyzed as appropriate and at the required frequency. No contaminants were found in the laboratory method blanks and preparation blanks associated with these sample analyses with the exceptions noted below.

Semivolatile Organic Compounds

Naphthalene was detected in the method blank for QC Batch 9101003. However, the associated sample result was non-detected and therefore data are not qualified.

Chlorinated Herbicides

Dichloroprop; Dicamba; Picloram; Pentachlorophenol and 2,4,5-TP (Silvex) were detected in the initial analysis of the method blank for QC Batch W9J0915.

Dichloroprop; Dicamba; Picloram; Pentachlorophenol; MCPP; 2,4,5-TP (Silvex); 2,4,5-T; MCPA and 2,4-D were detected in the reanalysis of this method blank. However, the associated sample results were all non-detected and therefore data are not qualified.

Dioxin/Furan

Numerous Dioxin/Furans were detected in the method blanks for QC Prep Batch 42063 and 42203. The majority of these blank results were reported as Estimated Maximum Possible Concentrations (EMPCs). The following results less than five times the method blank concentration are qualified as Non-Detected (U) at the sample concentration due to method blank contamination.

- 1,2,3,4,7,8-HxCDD in samples SED-04-SB-2.0, SED-06-SB-2.0, and SED-07-SB-6.35
- 2,3,7,8-TCDF in samples SED-04-SB-7.75, SED-07-SB-2.0, SED-07-SB-4.35, and SED-07-SB-6.35
- 1,2,3,7,8-PeCDF in samples SED-04-SB-7.75 and SED-07-SB-2.0
- 1,2,3,4,7,8-HxCDF, 1,2,3,4,6,7,8-HpCDF, Total TCDF, Total PeCDF, Total HxCDF, and Total HpCDF in sample SED-04-SB-7.75
- 1,2,3,7,8,9-HxCDF in samples SED-04-SB-4.75 and SED-07-SB-6.35

PCB Congeners

Various PCB congeners were detected in the method blanks for QC Prep Batches 42073, 42173, 42292, and 42197. The following sample results are less than five times the method blank concentration (adjusted for sample size) and are qualified as Non-Detects (U) at the sample concentration due to method blank contamination.

- 11-DiCB, 18/30-TrCB, 20/28-TrCB, 21/33-TrCB, 31-TrCB, 44/47/65-TeCB, 49/69-TeCB, 52-TeCB, 61/66/70/76-TeCB, 66-TeCB, 86/87/97/109/119/125-PeCB, 90/101/113-PeCB, 95-PeCB, 105-PeCB, 110/115-PeCB, 118-PeCB, 129/138/163-HxCB, 132-HxCB, 135/151-HxCB, 147/149-HxCB, 153/168-HxCB, 156/157-HxCB, 174-HpCB, 180/193-HpCB, 183/185-HpCB, 187-HpCB, and 194-OcCB in sample SED-SB-RB (associated with MB - 42073)
- 11-DiCB in sample SED-07-SB-6.35 (associated with MB - 42173)
- 20-TrCB, 21/33-TrCB, 31-TrCB, 52-TeCB, 61/66/70/76-TeCB, 66-TeCB,

86/87/97/109/119/125-PeCB, 90/101/113-PeCB, 95-PeCB, 105-PeCB, 110/115-PeCB, 118-PeCB, 129/138/163-HxCB, 147/149-HxCB, 153/168-HxCB, 180/193-HpCB, and 187-HpCB in sample SED-04-SB-7.75 (associated with MB - 42292)

Note that the blank action level for sample SED-04-SB-7.75 is adjusted for the 1.24 gram sample size.

Note: Several of the sample results in the bullet items above were qualified as Estimated Maximum Possible Concentrations (EMPCs) by the laboratory. Since these results were qualified as not detected (U) due to method blank contamination, no additional action was required.

Field Blanks

Sample SED-SB-RB was an equipment rinsate blank collected with these samples. No sample results were qualified for rinsate blank contamination because the associated sample results were greater than the reporting limit and 5 times the blank value or were non-detected.

Laboratory Control Samples

At least one laboratory control sample (LCS) analysis was analyzed per QC batch and for each analysis. A laboratory control sample duplicate (LCSD) was also analyzed with several methods if laboratory duplicates or matrix spikes were not performed. Accuracy and precision were evaluated using these analyses.

All LCS and LCSD recoveries were within the laboratory QC limits and all precision criteria were met as the RPDs were within laboratory QC limits with the exceptions noted below.

Semivolatile Organic Compounds

The RPD between LCS and LCSD recoveries for 1,2,4-trichlorobenzene; 1,2-dichlorobenzene; 1,3-dichlorobenzene; 1,4-dichlorobenzene; hexachlorobutadiene; hexachlorocyclopentadiene and hexachloroethane in analytical batch 9101003 were above the control limit of less than 30%. Qualification was not appropriate because these compounds were not detected in the affected sample.

The LCS recoveries of carbazole; 4-nitroaniline and 3,3'-dichlorobenzidine in analytical batch 9101307 were above the control limits. The following detections were qualified as estimated and biased high (J+) due to LCS recovery anomalies.

- Carbazole detections in samples SED-01-SB-5.5, SED-01-SB-8.65, SED-02-SB-8.25, and SED-06-SB-2.0

Note that the qualification was not appropriate for the 4-nitroaniline and 3,3'-dichlorobenzidine non-detections associated with this elevated LCS recovery.

The laboratory indicated that due to erratic or low blank spike recoveries, results for 3,3'-dichlorobenzidine are considered Estimated Values. However, the LCS/LCSD recoveries of 3,3'-dichlorobenzidine were within the control limits for analytical batch 9101003 or above the control limits in analytical batch 9101307. Qualification was not appropriate because this compound was not detected in any of the samples.

Organochlorine pesticides

The LCS recoveries for Endosulfan II (13%) and Endosulfan sulfate (15%) were below the QC limits in the LCS associated with batch 6385055. The following analytes have been qualified as estimated (UJ) due to the low LCS recoveries.

- Endosulfan II and Endosulfan sulfate all sediment samples

The LCS recovery for Mirex (174%) was flagged as greater than the QC limits in the LCS associated with batch 6385055. However, qualification for high bias was not required as the analyte was not detected in the samples. Note that it appears that the incorrect QC limits of 50-200% were reported on the laboratory Quality Assurance Report.

Matrix Spike/Matrix Spike Duplicates (MS/MSD)

MS/MSD analyses were not requested on a sample from this SDG. However, the laboratory did perform a MS or MS/MSD on samples from this SDG for various analyses. All MS/MSD recoveries were within the laboratory QC limits and all precision criteria were met as the RPDs were within laboratory QC limits with the exceptions noted below.

Cyanide - Total (solid) by ASTM D7511

The MS and MSD recoveries of total cyanide in the MS/MSD performed on sample SED-02-SB-8.25 were outside the control limits. Qualification was not required because the concentration of total cyanide detected in the unspiked parent sample was greater than four times the spiked concentration.

Dioxin/Furan

The MS and/or MSD recoveries and MS/MSD RPDs for sample SED-06-SB-2.0 exceeded the QC limits (70-130%/20%) for several of the Dioxin/Furans. Additionally, the MSD recovery for 1,2,3,7,8,9-HxCDD (68.9%) was less than the QC limits. The

following detected results were qualified as estimated (J) due to the MS/MSD precision and accuracy anomalies.

- 1,2,3,7,8,9-HxCDD, 1,2,3,4,6,7,8-HpCDD, OCDD, 2,3,7,8-TCDF, 1,2,3,7,8-PeCDF, 2,3,4,7,8-PeCDF, 1,2,3,4,7,8-HxCDF, 1,2,3,4,6,7,8-HpCDF, and OCDF in sample SED-06-SB-2.0

Note that the result for 1,2,3,7,8,9-HxCDD is also qualified as an EMPC.

PCB Congeners

The MS and/or MSD recoveries for 19-TrCB, 156-HxCB, and 167-HxCB and the RPDs for 105-PeCB, 118-PeCB, 156-HxCB, and 167-HxCB were outside the QC limit (50-150%/35%) for sample SED-06-SB-2.0. The following detected results were qualified as estimated (J) due to the MS/MSD precision and accuracy anomalies.

- 19-TrCB, 105-PeCB, 118-PeCB, 156/157-HxCB, and 167-HxCB in sample SED-06-SB-2.0

Several additional MS or MSD recoveries flagged by the laboratory as not meeting the QC limits were not applicable due to the high native concentrations of these analytes in the unspiked parent sample. No data additional validation qualifiers are added to the data.

The laboratory also provided MS and/or MSD analyses that were performed on unknown samples from other SDGs or work orders for several analyses. Typically, sample data are not qualified using MS/MSD results from unknown samples or samples from other SDGs. Additionally, for organic analyses only the unspiked parent sample is usually qualified for the MS/MSD results unless a systematic issue is noted. Therefore, these MS/MSD analyses were not evaluated and no data in this SDG were qualified using only the matrix spike results from unknown non-site samples or site samples from other SDGs. Refer to the LCS/LCSD for precision and accuracy data.

Post Digestion Spikes (Metals)

A post digestion spike (PDS) was not provided or required.

Laboratory Duplicates

Duplicate analyses were not requested on the samples from this sample delivery group. The laboratory analyzed a laboratory duplicate on sample SED-01-SB-2.0 and SED-06-

SB-2.0 for several analyses. All laboratory duplicate criteria were met with the exception noted below.

Total Organic Carbon (solid) by EPA 9060A Mod

The RPD between parent and duplicate results at 36% for the laboratory duplicate performed on sample SED-06-SB-2.0 in analytical batch 9101348 was above the control limits of 20%. The following results have been qualified as estimated (J) for laboratory duplicate precision anomalies.

- Total organic carbon for all sediment samples

The laboratory also provided duplicate analyses that were performed on unknown samples from other SDGs or work orders. Other duplicate results were not evaluated as they were performed on unknown or non-site samples.

Field Duplicates

A field duplicate was not collected with these samples.

Serial Dilution Samples (Metals)

A serial dilution was not provided for the total and dissolved metals for the level 2A review.

Surrogate (DMC) Recovery (Organics)

Surrogate compounds were appropriately added to all samples and QC samples for the organic analyses. The surrogate percent recoveries were within laboratory QC limits for all analyses.

Labeled Compounds and Clean-Up Standards (Dioxins/Furans, PCB Congeners, and Organochlorine Pesticides)

The recoveries of the labeled compounds and clean-up standards met the method or laboratory criteria with the exceptions noted below.

Dioxin/Furan

The recoveries for the labeled compound 13C-1,2,3,7,8,9-HxCDF were less than the QC limits (29-147%) for samples SED-06-SB-2.0, SED-01-SB-2.0, SED-01-SB-5.5, SED-

02-SB-2.0, SED-02-SB-5.0, and SED-02-SB-8.25 and the MS/MSD on sample SED-06-SB-2.0. As a result of the low recoveries, the following detected results were qualified as estimated (J-).

- 1,2,3,7,8,9-HxCDF and Total HxCDF in samples SED-06-SB-2.0, SED-01-SB-2.0, SED-01-SB-5.5, SED-02-SB-2.0, SED-02-SB-5.0, and SED-02-SB-8.25

The results for Total HxCDF in samples SED-01-SB-2.0, SED-02-SB-2.0, and SED-02-SB-5.0 have a final qualifier of “JK” as the concentration is also effected by EMPCs.

PCB Congeners

The recoveries for the labeled compounds 13C-126-PeCB for samples SED-01-SB-8.65 and SED-04-SB-4.75 and for 13C-77-TeCB and 13C-81-TeCB for sample SED-02-SB-8.25 exceeded the QC limits (10-145%). As a result of the elevated recoveries, the following detected results were qualified as estimated with high bias (J+) and non-detected results were qualified as estimated (UJ).

- 126-PeCB in samples SED-01-SB-8.65 and SED-04-SB-4.75
- All TeCB (40 to 81) congeners in sample SED-02-SB-8.25

Note that 58-TeCB in sample SED-02-SB-8.25 was qualified as an EMPC and has a final qualifier of “UJK”.

The laboratory noted that a few surrogate (labeled compound) ion ratios were outside the theoretical limits due to required dilution levels for samples SED-06-SB-2.0, SED-07-SB-2.0, SED-07-SB-4.35, SED-07-SB-6.35 and SED-01-SB-2.0 and one surrogate ion ratio was outside the theoretical limits for samples SED-04-SB-4.75 and SED-02-SB-2.0. The labeled compounds were not identified and no data were qualified.

Organochlorine pesticides

The recoveries for the labeled compounds C13-hexachlorobenzene in samples SED-06-SB-8.5, SED-04-SB-2.0, SED-04-SB-4.75, SED-07-SB-6.35, SED-01-SB-5.5, SED-02-SB-2.0, SED-01-SB-8.65, SED-02-SB-5.0, SED-02-SB-8.25; and 13C-Methoxychlor in samples SED-01-SB-5.5 and SED-01-SB-8.65; and 13C-pp-DDD and 13C-pp-DDT in sample SED-01-SB-8.65 were greater than the QC limits. As a result of the elevated labeled compound recoveries, the following detected results were qualified as estimated with high bias (J+) and non-detected results as (UJ):

- Hexachlorobenzene in samples SED-06-SB-8.5, SED-04-SB-2.0, SED-04-SB-4.75, SED-07-SB-6.35, SED-01-SB-5.5, SED-02-SB-2.0, SED-01-SB-8.65, SED-02-SB-5.0, and SED-02-SB-8.25
- Methoxychlor in samples SED-01-SB-5.5 and SED-01-SB-8.65
- p,p-DDT in sample SED-01-SB-8.65

- p,p-DDD, o,p-DDD, and o,p-DDT in sample SED-01-SB-8.65

The recoveries for C13-hexachlorobenzene in samples SED-06-SB-2.0 and SED-01-SB-2.0 and for 13C-pp-DDD in samples SED-01-SB-5.5 and SED-02-SB-8.25 were not applicable as the recoveries were reported from a 50 times dilution and the labeled compound is considered diluted below the calibration range

Sample Results

Raw data and sample quantitation were not evaluated for this 2A review. The results and reporting limits or detection limits were correctly reported with the correct units and appeared to be adjusted for sample size and dilution.

According to the case narrative or lab notes, various analyses for these samples were diluted or re-extracted with reduced sample size due to high target concentrations, high non target matrix interference, sample matrix, or due to the appearance of the final extract. The non-detected results for these analyses are at elevated detection limits due to the dilutions performed on these samples. Additionally, the reporting limits for several individual analytes were raised to account for interference from co-eluting analytes present in the sample or dilution. These analytes are reported as not-detected at the raised detection limit/reporting limit.

Diesel Range Organics

The laboratory indicated that the detected oil results for several samples are elevated due to the presence of individual analyte peaks in the quantitation range that are not representative of the fuel pattern reported. No qualification is required.

Semivolatile Organic Compounds

The laboratory indicated that the benzo(k)fluoranthene results associated with samples SED-01-SB-2.0, SED-01-SB-5.5, SED-01-SB-8.65, SED-02-SB-2.0, SED-02-SB-5.0, SED-02-SB-8.25, SED-04-SB-2.0, SED-04-SB-4.75 and SED-06-SB-2.0 are estimated because the peak separation for structural isomers is insufficient for accurate quantification. The affected results have been qualified as estimated (J).

Dioxin/Furan

The results for OCDD in samples SED-01-SB-2.0 and SED-02-SB-5.0 were flagged for exceeding the instrument linear calibration range. These two results are considered estimated quantities and are qualified as estimated (J).

Several dioxin and furan results were reported as EMPCs and were qualified with the laboratory "K" flag denoting an EMPC value. All but one of the results were also below the PQL and were reported by the laboratory as estimated (JK) values. The following

EMPCs not previously qualified as non-detected due to method blank contamination were qualified as estimated non-detects (UJK or UK) at the reported concentration in accordance with EPA Region 10 PCDD/PCDF DV guidelines and NFG use of regional guidance and/or professional judgment in evaluating these results.

- 1,2,3,4,7,8-HxCDD in sample SED-01-SB-5.5
- 1,2,3,6,7,8-HxCDD, 1,2,3,7,8,9-HxCDD, and 1,2,3,7,8,9-HxCDF in sample SED-01-SB-8.65
- 2,3,7,8-TCDD in sample SED-02-SB-8.25
- 2,3,7,8-TCDD and 1,2,3,7,8,9-HxCDD in sample SED-04-SB-2.0
- 2,3,4,7,8-PeCDF in sample SED-04-SB-4.75
- 1,2,3,7,8,9-HxCDD in sample SED-06-SB-2.0
- 2,3,7,8-TCDD, 1,2,3,7,8-PeCDD, and 1,2,3,7,8,9-HxCDD in sample SED-06-SB-5.5
- 1,2,3,7,8-PeCDD in samples SED-06-SB-8.5 and SED-07-SB-4.35
- 1,2,3,7,8-PeCDD and 1,2,3,4,7,8,9-HpCDF in sample SED-07-SB-2.0

The following total dioxin and furan results were flagged (K) by the laboratory indicating the result was impacted by an EMPC. Results also below the PQL were flagged as (JK). These total results are considered estimated quantities and are qualified as an estimated value (JK).

- Total TeCDD, Total PeCDD, Total HxCDD, Total TeCDF, and Total PeCDF in samples SED-06-SB-2.0, SED-06-SB-5.5
- Total TeCDD, Total PeCDD, Total TeCDF, and Total HxCDF in sample SED-06-SB-8.5
- Total TeCDD, Total PeCDD, Total HxCDD, Total TeCDF, Total PeCDF, and Total HxCDF in samples SED-04-SB-2.0, SED-01-SB-2.0, SED-01-SB-8.65
- Total TeCDD, Total HxCDD, Total TeCDF, Total PeCDF, and Total HxCDF in sample SED-04-SB-4.75
- Total TeCDD and Total PeCDD samples SED-04-SB-7.75
- Total TeCDD, Total PeCDD, Total TeCDF, Total PeCDF, and Total HpCDF in sample SED-07-SB-2.0
- Total TeCDD, Total PeCDD, Total TeCDF, Total PeCDF, Total HxCDF and Total HpCDF in sample SED-07-SB-4.35
- Total TeCDD, Total PeCDD, Total TeCDF, Total PeCDF, and Total HxCDF in samples SED-07-SB-6.35, SED-02-SB-2.0, SED-02-SB-5.0
- Total TeCDD, Total PeCDD, Total HxCDD, Total TeCDF, Total PeCDF, and Total HpCDF in sample SED-01-SB-5.5
- Total TeCDD, Total PeCDD, Total TeCDF, and Total PeCDF in sample SED-02-SB-8.25

The above total results were greater than the results for the individual dioxin/furan congeners or were impacted by both EMPCs and confirmed homologues and the results were qualified as estimated (JK) rather than as not detected.

Various dioxin and furan and their associated labeled compounds were flagged as “Q” by the laboratory indicating that quantitative interference resulted in an estimated value. The following results that were not already qualified due to low labeled compound recoveries or as an EMPC are qualified as estimated (J).

- 2,3,7,8-TCDD in samples SED-01-SB-2.0, SED-01-SB-5.5, SED-02-SB-2.0, SED-02-SB-5.0, and SED-06-SB-2.0
- 1,2,3,7,8,9-HxCDF in samples SED-04-SB-2.0 and SED-06-SB-5.5
- Total HxCDF in sample SED-06-SB-5.5
- Total PeCDF in sample SED-06-SB-8.5
- Total PeCDD in sample SED-04-SB-4.75

Confirmatory runs for 2,3,7,8-TCDF were analyzed for these samples and the detected results for 2,3,7,8-TCDF greater than the PQLs were confirmed by the second analysis. The results for 2,3,7,8-TCDF from both analyses were reported on the EDD. The confirmation results which should be reported were reported from the November 8, 2019 analysis.

PCB Congeners

Several PCB Congener results were reported as EMPCs and were qualified with the laboratory “K” flag denoting an EMPC value. All but four of the results were also below the PQL and were reported by the laboratory as estimated (JK) values. The following EMPCs that were not previously qualified as non-detected due to method blank contamination are qualified as estimated non-detects (UK or UJK) at the reported concentration in accordance with EPA Region 10 PCDD/PCDF DV guidelines and NFG use of regional guidance and/or professional judgment in evaluating these results.

- 34-TrCB, 79-TeCB, 89-PeCB, 93/100-PeCB, 94-PeCB, 144-HxCB, 146-HxCB, 155-HxCB, 165-HxCB, 169-HxCB, 184-HpCB, and 188-HpCB in sample SED-01-SB-2.0
- 2-MoCB, 3-MoCB, 8-DiCB, 15-DiCB, 16-TrCB, 26/29-TrCB, 32-TrCB, 41-TeCB, 43-TeCB, 46-TeCB, 63-TeCB, 72-TeCB, 96-PeCB, 123-PeCB, 126-PeCB, 144-HxCB, 182-HpCB, and 188-HpCB in sample SED-01-SB-5.5
- 1-MoCB, 3-MoCB, 11-DiCB, 26/29-TrCB, 42-TeCB, 77-TeCB, 84-PeCB, 88/91-PeCB, 103-PeCB, 114-PeCB, and 167-HxCB in sample SED-01-SB-8.65
- 10-DiCB, 27-TrCB, 35-TrCB, 55-TeCB, 148-HxCB, 169-HxCB, 182-HpCB, and 188-HpCB in sample SED-02-SB-2.0

- 11-DiCB, 12/13-DiCB, 35-TrCB, 54-TeCB, 111-PeCB, and 188-HpCB in sample SED-02-SB-5.0
- 3-MoCB, 11-DiCB, 58-TeCB, 144-HxCB, 150-HxCB, 152-HxCB, 184-HpCB, and 186-HpCB in sample SED-02-SB-8.25
- 4-DiCB, 6-DiCB, 11-DiCB, 12/13-DiCB, 55-TeCB, 79-TeCB, 93/100-PeCB, 103-PeCB, 148-HxCB, and 150-HxCB in sample SED-04-SB-2.0
- 1-MoCB, 6-DiCB, 8-DiCB, 15-DiCB, 34-TrCB, 35-TrCB, 57-TeCB, 58-TeCB, 93/100-PeCB, 122-PeCB, 123-PeCB, and 182-HpCB in sample SED-04-SB-4.75
- 18/30-TrCB, 48-TeCB, 49/69-TeCB, 56-TeCB, 99-PeCB, and 135/151-HxCB in sample SED-04-SB-7.75
- 23-TrCB, 32-TrCB, 57-TeCB, 81-TeCB, and 188-HpCB in sample SED-06-SB-2.0
- 2-MoCB, 4-DiCB, 25-TrCB, 35-TrCB, 41-TeCB, 55-TeCB, 57-TeCB, 58-TeCB, 61/70/74/76-TeCB, 68-TeCB, 89-PeCB, 94-PeCB, 122-PeCB, and 182-HpCB in sample SED-06-SB-5.5
- 35-TrCB, 41-TeCB, 57-TeCB, 114-PeCB, 122-PeCB, 152-HxCB, and 169-HxCB in sample SED-06-SB-8.5
- 6-DiCB, 19-TrCB, 34-TrCB, 55-TeCB, 58-TeCB, 182-HpCB, and 189-HpCB in sample SED-07-SB-2.0
- 7-DiCB, 12/13-DiCB, 57-TeCB, 152-HxCB, and 182-HpCB in sample SED-07-SB-4.35
- 2-MoCB, 54-TeCB, 152-HxCB, 155-HxCB, 197/200-OcCB, and 207-NoCB HpCB in sample SED-07-SB-6.35
- 85/116/117-PeCB and 99-PeCB in sample SED-SB-RB

Note: The final Total PCB Congeners values should be adjusted based on blank contamination and EMPC actions noted in the previous sections.

Various PCBs and associated labeled compounds were flagged as “Q” by the laboratory indicating that quantitative interference resulted in an estimated value. The following results that were not already qualified due to labeled compound recoveries or as an EMPC are qualified as estimated (J or UJ).

- 8-DiCB and 54-TeCB in samples SED-01-SB-2.0 and SED-07-SB-4.35
- 54-TeCB in sample SED-01-SB-5.5
- 8-DiCB and 201-OcCB in sample SED-01-SB-8.65
- 32-TrCB and 144-HxCB in sample SED-02-SB-2.0
- 8-DiCB in sample SED-02-SB-5.0
- 8-DiCB, 32-TrCB, and 111-PeCB in sample SED-02-SB-8.25
- 12-DiCB in sample SED-06-SB-2.0

Organochlorine pesticides

The results for p,p-DDT in samples SED-01-SB-2.0 and SED-02-SB-2.0 were flagged for exceeding the instrument linear calibration range. These two results are considered estimated quantities and are qualified as estimated (J).

The laboratory indicated that several results were an EMPC / NDR as the peak detected does not meet ratio criteria and has resulted in an elevated detection limit. Results were reported as non-detected. The following results were qualified as estimated detection limit (UJK) to be consistent with the qualification of EMPCs:

- a-Chlordane, Aldrin and o,p-DDE in sample SED-06-SB-2.0
- Aldrin and o,p-DDE in sample SED-06-SB-5.5
- a-Chlordane, Aldrin, o,p-DDE, and Endrin, in samples SED-06-SB-8.5, SED-04-SB-2.0, SED-07-SB-4.35, SED-07-SB-6.35, SED-02-SB-5.0
- a-Chlordane, Aldrin, and Endrin in sample SED-04-SB-4.75
- Endrin in sample SED-04-SB-7.75
- Aldrin, o,p-DDE, and Endrin in sample SED-07-SB-2.0
- Aldrin and Endrin in sample SED-01-SB-2.0
- a-Chlordane, Aldrin, Endrin, cis-Nonachlor, and trans-Nonachlor in sample SED-01-SB-5.5
- a-Chlordane, Aldrin, o,p-DDE, Endrin aldehyde, and Methoxychlor in sample SED-02-SB-2.0
- Aldrin and g-Chlordane in sample SED-01-SB-8.65
- a-Chlordane, Aldrin, o,p-DDE, Dieldrin, cis-Nonachlor, and trans-Nonachlor in sample SED-02-SB-8.25
- Endosulfan II in sample SED-SB-RB

Grain Size by ASTM D 422M/PSET Parameters

The laboratory note/narrative for most samples indicated that the No. 4 sieve (gravel) and No. 10 sieve (coarse sand) grain size fractions contained organic materials. See the grain size case narratives included at the end of the Apex Laboratories report.

Overall Assessment

The analytical data are acceptable and usable as reported with the minor qualifications noted above. A few results were qualified due to LCS accuracy issues, laboratory duplicate precision issues or labeled compound recoveries. Results for Dioxin/Furans, Organochlorine Pesticides and PCB Congeners were qualified as not detected due to blank contamination or as EMPCs.

DATA QUALIFIER DEFINITIONS

For the purpose of Data Validation, the following validation qualifiers and associated definitions are provided for use by the data validator to summarize the data quality.

Data Qualifier	Description
Standard Data Qualifiers	
U	The analyte was analyzed for, but was not detected at or above the associated value.
UJ	The analyte was not detected. The reported sample quantitation limit is considered estimated for QC reasons.
J	The analyte was detected. The reported numerical value is considered estimated for QC reasons.
J+	The result is an estimated quantity, but the result may be biased high.
J-	The result is an estimated quantity, but the result may be biased low.
R	The sample result is rejected as unusable due to serious deficiencies in one or more QC criteria. The analyte may or may not be present in the sample.
K	Estimated Maximum Possible Concentration (EMPC)