PREMIER

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TECHNICAL MEMORANDUM

TO: **J. Stephen Barnett**
COMPANY: **Premier Environmental Services, Inc.**
FROM: **Kathy J. Gunderson, Senior QA Chemist**
TOPIC: **Sediment Sampling Results – Baxter Eugene, Oregon Facility**
DATE: **June 17, 2003**

This memorandum discusses the results of the sediment samples collected from Roosevelt Channel at the J.H. Baxter Wood Preserving Facility in Eugene, Oregon. The sediment samples were collected in accordance with the *Revised Sediment Sampling Plan*, dated January 31, 2003.

Included with this memo are a sample location map (Figure 1), a tabular summary of the laboratory results (Table 1), the Quality Assurance Review (Appendix A), and the laboratory results sheets (Appendix B).

Four sediment samples were collected February 21, 2003. The samples were collected by Premier personnel. The samples were analyzed by the following methods:

- Polycyclic aromatic hydrocarbons (PAHs) by EPA Method 8270C
- Polychlorinated dibenzodioxins and polychlorinated dibenzofurans (PCDDs and PCDFs) by EPA Method 8290
- Metals (arsenic, chromium, copper, and zinc) by EPA 6000/7000 series methods
- Simultaneously extractable metals (arsenic, chromium, copper, mercury, and zinc) by EPA 6000/7000 series methods

- Total solids by EPA Method 160.3, pH by EPA Method 9045C, total organic carbon by ASTM Method D4129-82M, acid volatile sulfide by draft EPA 1991 Method, and particle size determination by ASTM Method D422M

The analyses were preformed by Columbia Analytical Services, Inc. located in Kelso, Washington. The PCDD and PCDF analyses were performed at Columbia Analytical Service's Houston, Texas laboratory.

PAHs, PCDDs and PCDFs, metals, and simultaneously extractable chromium, copper, and zinc were detected in all the samples. Simultaneously extractable arsenic was detected in sediment samples SD13, SD14, SD15. The analytical results are presented in Table 1, including the total PAH calculations and PCDD and PCDF toxic equivalents. The Quality Assurance Review of the data is attached as Appendix A. The laboratory results are presented in Appendix B.

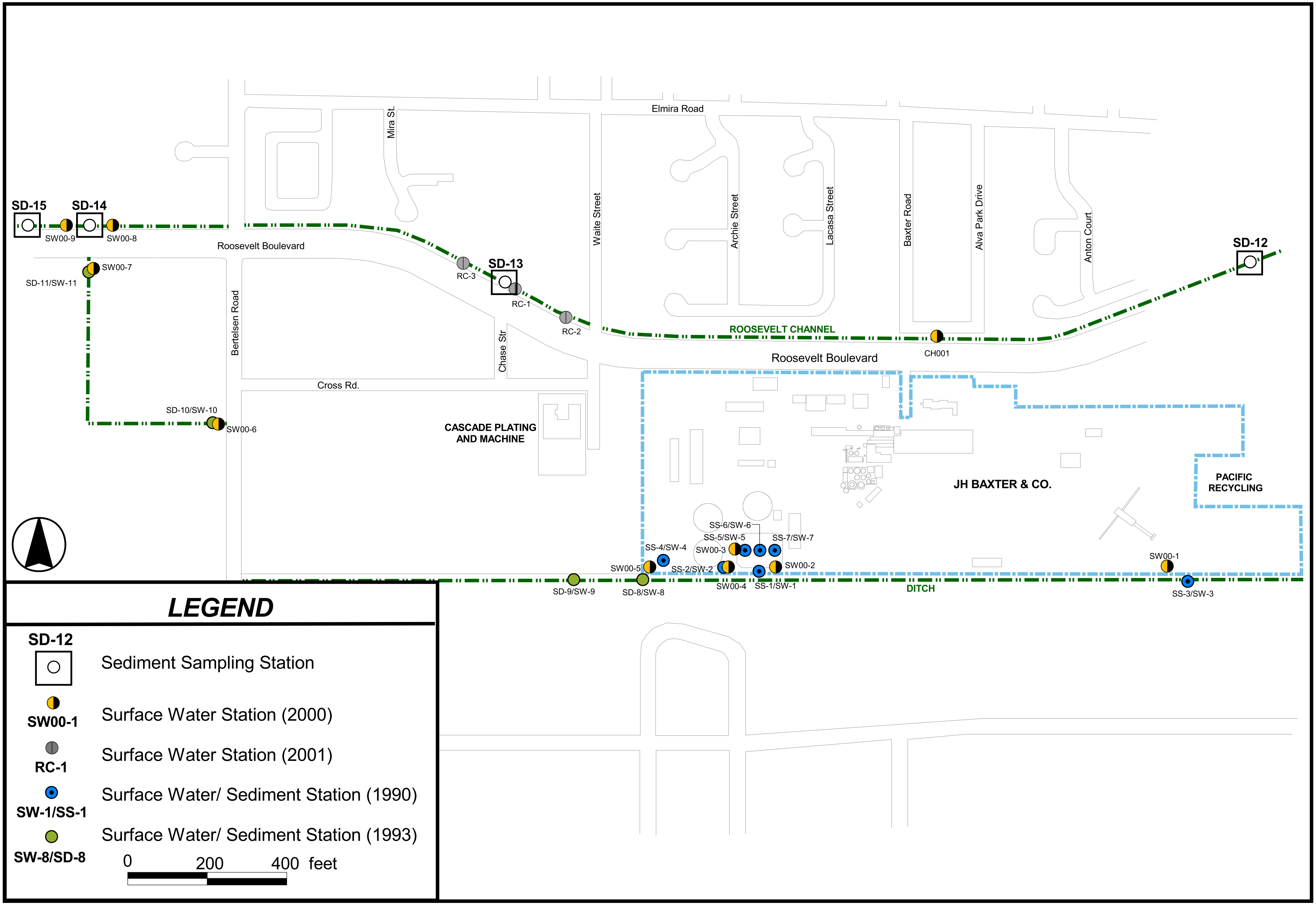

Figure 1. Sediment Sampling Stations (February 2003) - JH Baxter - Eugene, Oregon

Validated

Table 1 - Results of Sediment Analyses: February 2003
J.H. Baxter Wood Preserving Facility
Eugene, Oregon

			SD12	SD13	SD14	SD15
			2/21/2003	2/21/2003	2/21/2003	2/21/2003
Analyte	**Method**	**Units**	0 - 4 in	0 - 4 in	0 - 4 in	0 - 4 in
pH	9045C	PH	6.5	6.86	7.03	7.3
Carbon, Total Organic (TOC)	ASTM D4129-82M	%	11.9	7.89	4.23	6.13
Solids, Total	160.3M	%	21.7	28.2	47.8	39.2
Gravel, Medium	ASTM D422M	%	3.39	3.66	24.4	2.54
Gravel, Fine	ASTM D422M	%	1.82	2.93	5.68	1.27
Sand, Very Coarse	ASTM D422M	%	2.3	1.91	5.5	3.49
Sand, Coarse	ASTM D422M	%	1.58	2.43	7.25	6.91
Sand, Medium	ASTM D422M	%	1.48	3.05	19.9	12.8
Sand, Fine	ASTM D422M	%	3.23	3.5	18.8	15.6
Sand, Very Fine	ASTM D422M	%	1.86	1.84	2.39	4
Silt	ASTM D422M	%	66.1	86.3	13	36.2
Clay	ASTM D422M	%	19.6	8.96	1.97	17.3
Arsenic	7060A	mg/Kg	10.8	14.7	12.7	26
Chromium	6010B	mg/Kg	78	157	32.6	57.9
Copper	6010B	mg/Kg	139	181	83.5	236
Zinc	6010B	mg/Kg	1000	678	252	385
Arsenic, simultaneously extracted	6010B	mg/Kg	1.4 U	1.2 B	5.4	6.9
Chromium, simultaneously extracted	6010B	mg/Kg	30.9	65.9	54.1	18.7
Copper, simultaneously extracted	6010B	mg/Kg	112	154	151	184
Mercury, simultaneously extracted	7471A	mg/Kg	0.04 U	0.03 U	0.01 U	0.02 U
Zinc, simultaneously extracted	6010B	mg/Kg	955	682	312	374
Sulfide, Acid-Volatile	EPA Draft 1991	mg/Kg	468 J	270 J	322 J	467 J
2-Chlorophenol	8270C	ug/Kg	46 U	36 U	21 U	43 U
2,4-Dichlorophenol	8270C	ug/Kg	76 U	59 U	35 U	71 U
2,4,5-Trichlorophenol	8270C	ug/Kg	79 U	61 U	36 U	74 U
2,4,6-Trichlorophenol	8270C	ug/Kg	66 U	51 U	30 U	62 U
Pentachlorophenol (PCP)	8270C	ug/Kg	580 U	450 U	270 U	550 U
2-Methylnaphthalene	8270C	ug/Kg	160 J	150 J	32 J	180 J
Acenaphthene	8270C	ug/Kg	63 J	48 U	29 U	79 J
Acenaphthylene	8270C	ug/Kg	59 U	54 J	27 U	140 J
Anthracene	8270C	ug/Kg	110 J	66 J	52 J	200 J
Benz(a)anthracene	8270C	ug/Kg	180 J	200 J	93 J	420 J
Benzo(a)pyrene	8270C	ug/Kg	280 J	220 J	110 J	520 J
Benzo(b)fluoranthene	8270C	ug/Kg	360 J	380 J	190 J	870 J
Benzo(g,h,i)perylene	8270C	ug/Kg	730 J	460 J	180 J	520 J
Benzo(k)fluoranthene	8270C	ug/Kg	250 J	250 J	150 J	700 J
Chrysene	8270C	ug/Kg	530 J	490 J	200 J	1000 J
Dibenz(a,h)anthracene	8270C	ug/Kg	130 U	98 U	75 J	220 J
Dibenzofuran	8270C	ug/Kg	80 J	71 J	28 J	140 J
Fluoranthene	8270C	ug/Kg	530 J	390 J	180 J	840 J
Fluorene	8270C	ug/Kg	140 J	67 J	28 U	110 J
Indeno(1,2,3-cd)pyrene	8270C	ug/Kg	320 J	280 J	160 J	500 J
Naphthalene	8270C	ug/Kg	150 J	230 J	93 J	570 J

Table 1 - Results of Sediment Analyses: February 2003
J.H. Baxter Wood Preserving Facility
Eugene, Oregon

			SD12	SD13	SD14	SD15
			2/21/2003	2/21/2003	2/21/2003	2/21/2003
Analyte	**Method**	**Units**	0 - 4 in	0 - 4 in	0 - 4 in	0 - 4 in
Phenanthrene	8270C	ug/Kg	560 J	280 J	130 J	370 J
Pyrene	8270C	ug/Kg	1500	930 J	260 J	1200 J
Total PAHs (calculated)[1]	8270C	ug/Kg	5703	4297	1873	8259
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	8290	pg/g	3.178	6.226	0.439 U	3.452
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	8290	pg/g	12.165	31.411	5.514	32.531
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	8290	pg/g	22.368	71.99	13.771	77.153
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	8290	pg/g	57.737	241.849	64.011	452.073
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	8290	pg/g	43.405	144.628	28.693	203.398
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	8290	pg/g	2923.758 B	6473.64 B	2223.989 B	12169.94 B
Octachlorodibenzo-p-dioxin (OCDD)	8290	pg/g	17196.91 J	41761.57 J	15377.11 J	87267.88 J
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	8290	pg/g	1.165 C	2.399 C	0.52 C	3.095 C
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	8290	pg/g	2.67 J	11.556	2.592	17.868
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	8290	pg/g	3.056 J	10.42	2.579	15.02
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	8290	pg/g	18.343	55.418	13.627	82.165
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	8290	pg/g	12.313	40.25	6.84	44.36
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	8290	pg/g	1.124 U	2.849 J	1.452 U	12.388 U
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	8290	pg/g	18.976	62.997	12.105	83.329
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)	8290	pg/g	324.632	909.07	220.748	1223.153
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	8290	pg/g	20.577	71.719	13.735	97.416
Octachlorodibenzofuran (OCDF)	8290	pg/g	913.908	3175.341 B	770.194	5865.646 B
Tetrachlorodibenzo-p-dioxins (TCDD), Total	8290	pg/g	5.878	32.556	2.869	37.14
Pentachlorodibenzo-p-dioxin (PeCDD), Total	8290	pg/g	55.195	177.287	30.581	240.332
Hexachlorodibenzo-p-dioxins (HxCDD), Total	8290	pg/g	357.755	1434.329	347.449	2571.64
Heptachlorodibenzo-p-dioxins (HpCDD), Total	8290	pg/g	5733.731	13930.34	5039.838	28495.51
Tetrachlorodibenzofurans (TCDF), Total	8290	pg/g	30.278	60.89	5.537	50.781
Pentachlorodibenzofurans (PeCDF), Total	8290	pg/g	126.042	415.58	75.299	495.459
Hexachlorodibenzofurans (HxCDF), Total	8290	pg/g	429.767	1502.803	332.027	2336.61
Heptachlorodibenzofurans (HpCDF), Total	8290	pg/g	995.535	3521.903	908.948	6020.777
2,3,7,8-TCDD TEQ (WHO)[2]	Calc	pg/g	68.84	184.4	47.01	282.6

Notes:

[1] - Total PAH is based on detected concentrations of the following chemicals: 2-Methylnaphthalene, Acenaphthene, Acenaphthylene, Anthracene, Benz(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(g,h,i)perylene, Chrysene, Dibenzo(a,h)anthracene, Fluoranthene, Fluorene, Indeno(1,2,3,-cd)pyrene, Naphthalene, Phenanthrene, and Pyrene.

[2] - 2,3,7,8-TCDD TEQ calculated for detected concentrations using World Health Organization (WHO) toxicity equivalency factors (TEF)

U - not detected; detection limit shown
J - estimated concentration
B - analyte was found in the method blank at a level that is significant relative to the sample result
C - indicates the value for the TCDF analyte was obtained by analysis using a DB-225 confirmation column
in - inches

Memorandum

Date:	April 11, 2003
To:	J. Stephen Barnett, Premier Environmental Services, Inc.
From:	Kathy J. Gunderson, Premier Environmental Services, Inc.
Subject:	Quality Assurance Review
Project:	J. H. Baxter Wood Preserving Facility, Eugene, Oregon Sediment Samples collected February 21, 2003
Project Number:	203002.3004

1.0 Introduction

This memorandum presents the Level III validation of the sediment sample analyses listed in Table 1. With the exception of the polychlorinated dibenzodioxins (PCDDs) and polychlorinated dibenzofurans (PCDFs), the analyses were performed by Columbia Analytical Services, Inc., located in Kelso, Washington. The PCDD and PCDF analyses were performed by Columbia Analytical Services' Houston, Texas Laboratory. The criteria used to qualify data are from the *Contract Laboratory Program National Functional Guidelines for Inorganic and Organic Data Review* (USEPA 1994 and 1999), the *EPA Region 10 Functional Guidelines for the Validation of High Resolution Mass Spectrometry Analysis of Polychlorinated Dibenzodioxin and Polychlorinated Dibenzofuran Data* (EPA Region 10 2001), the analytical methods, or the professional judgment of the validation chemist. The following laboratory deliverables were reviewed during the validation process:

- Chain-of-custody (COC) documentation to assess holding times and verify report completeness
- Laboratory quality control (QC) sample results, including method blanks, surrogate spikes, laboratory control sample/laboratory control sample duplicates (LCS/LCSDs), matrix spike/matrix spike duplicates (MS/MSDs), and laboratory duplicates
- Analytical results to verify reporting limits
- Field QC samples for field blank contamination and field duplicate precision

In addition, the data quality indicators of precision, accuracy, representativeness, comparability, and completeness are evaluated. The qualified data are summarized in a table at the end of this memo.

Table 1—Sample Data Reviewed

Sample ID	Laboratory ID	PAH	Dioxin/Furan	Metals	Inorganics
SD15	K2301304-001	X	X	X	X
SD14	K2301304-002	X	X	X	X
SD12	K2301304-003	X	X	X	X
SD13	K2301304-004	X	X	X	X

PAH:	Polycyclic aromatic hydrocarbons by Method 8270C (EPA 1996)
Dioxin/Furan:	PCDDs and PCDFs by Method 8290 (USEPA 1996)
Metals:	Total arsenic, chromium, copper, and zinc by the 6000/7000 series Methods and simultaneously extractable metals arsenic, chromium, copper, mercury, and zinc by the 6000/7000 series Methods (USEPA 1996)
Inorganics:	Total solids by Method 160.3 (USEPA 1999a), pH by Method 9045C (USEPA 1996), total organic carbon by Method D4129-82M (ASTM 1989), acid volatile sulfide by draft EPA Method (USEPA 1991), and particle size determination by Method D422M (ASTM 1989)

2.0 Data Validation

2.1 Custody, Preservation, and Completeness - Acceptable

Sample custody was maintained as required from sample collection to receipt at the laboratory. The samples were received intact and were properly preserved. The report is complete and contains results for all samples and tests requested on the COC form.

2.2 Polycyclic Aromatic Hydrocarbon Analyses by Method 8270C

2.2.1 Holding Times - Acceptable

The samples were extracted and analyzed within the required holding time

2.2.2 Method Blank Analyses - Acceptable

Method blanks were analyzed at the required frequency and target analytes were not detected above the reporting limits.

2.2.3 Surrogate Analyses - Acceptable

Surrogate compounds were added to all samples, blanks, and QC samples as required. All recovery values are within the laboratory’s control limits.

2.2.4 Matrix Spike/Matrix Spike Duplicate Analyses - Acceptable

Matrix spikes and duplicates were analyzed as required. All percent recovery and RPD values are within the laboratory's control limits.

2.2.5 Laboratory Control Sample Analyses - Acceptable

Laboratory control samples were analyzed as required. All percent recovery values are within the laboratory's control limits.

2.2.6 Field Duplicates

Field duplicates were not collected with the samples.

2.2.7 Overall Assessment of Data Useability

The usability of the data is based on the EPA guidance documents noted previously. Upon consideration of the information presented here, the data are acceptable.

2.3 PCDD and PCDF Analyses by Method 8290

2.3.1 Holding Times – Acceptable

The samples were extracted and analyzed within the required holding times.

2.3.2 Blank Analyses – Acceptable with Discussion

2.3.2.1 Method Blanks

Method blanks were analyzed at the required frequency. The method blanks contain reportable levels of target analytes as discussed below.

- The 3-3-03 method blank contains OCDD at 2.695 ng/kg. Data qualification is not required because the OCDD concentrations in the associated samples are greater than five times the method blank level.

- The 3-12-03 method blank contains 1,2,3,4,6,7,8-HpCDD, OCDD, 1,2,3,4,7,8-HxCDF, and OCDF at 0.238, 0.971, 0.124, and 0.638 ng/kg, respectively. Data qualification is not required because the concentrations in the associated samples are greater than five times the method blank concentrations.

2.3.2.2 Field Blanks

The field blanks are not associated with this sample set.

2.3.3 Isotope Dilution Internal Standard (Surrogate) Analyses – Acceptable with Qualifications

Labeled isotope dilution internal standard compounds were added to all samples, blanks, and QC samples as required. Except as noted below, all recovery values are within the Method 8290 criteria of 40 to 135 percent.

- The $^{13}C_{12}$-OCDD recovery values for the diluted analyses of samples SD15, SD12, and SD13 are below the method criteria at 33.9, 30.4, and 39.7 percent, respectively. Region 10 Functional Guidelines requires rejecting nondetected results or estimating positive results associated with a low recovery. Since the OCDD results of all samples are positive, they have been qualified as estimated (J) as shown in the following table.

Sample ID	Analyte	Qualification	Quality Control Exceedance
SD15 Dilution	OCDD	J	Labeled isotope dilution internal standard below method criteria
SD12 Dilution	OCDD	J	Labeled isotope dilution internal standard below method criteria
SD13 Dilution	OCDD	J	Labeled isotope dilution internal standard below method criteria

2.3.4 Cleanup Recovery Internal Standard Analyses – Acceptable

The labeled cleanup recovery internal standard was added to all samples (and associated QC samples) that required cleanup. All cleanup recovery internal standards meet the Method 1613B criteria of 35 to 197 percent. (The Method 1613B criterion is used because cleanup recovery internal standards are not required by Method 8290.)

2.3.5 Ongoing Precision and Recovery Analyses – Acceptable

LCSs were analyzed to monitor method performance. The percent recovery values are within the laboratory's control limits.

2.3.6 Compound Identification – Acceptable with Qualifications

Except as noted below, the ratio of the integrated ion peaks are within Method 8290 criteria. Second column confirmational analysis of 2,3,7,8-TCDF was performed as required.

- Several results in the diluted analyses have ion abundance ratios that are outside Method criteria. Data qualifiers are not required because these analytes are reported from the undiluted analyses.

- Since the confirmational analysis provides better resolution and identification of 2,3,7,8-TCDF, the confirmational results are used and the original and diluted analysis results are rejected (qualified R). The total TCDF results have been corrected to include the confirmational results.

Sample ID	Analyte	Qualifier	Quality Control Exceedance
SD15	2,3,7,8-TCDF	R	Rejected in favor of confirmational result
SD15 Dilution	2,3,7,8-TCDF	R	Rejected in favor of confirmational result
SD14	2,3,7,8-TCDF	R	Rejected in favor of confirmational result
SD14 Dilution	2,3,7,8-TCDF	R	Rejected in favor of confirmational result
SD12	2,3,7,8-TCDF	R	Rejected in favor of confirmational result
SD12 Dilution	2,3,7,8-TCDF	R	Rejected in favor of confirmational result
SD13	2,3,7,8-TCDF	R	Rejected in favor of confirmational result
SD13 Dilution	2,3,7,8-TCDF	R	Rejected in favor of confirmational result

2.3.7 Laboratory Reporting Limits – Acceptable with Qualification

Project specific detection limits were not required. The reporting limits used by the laboratory are reasonable for the analytical method.

- The samples were analyzed at a dilution due to high levels of target compounds. In these instances the laboratory reported one analysis data sheet for the original analysis and one for the dilution. To condense the results to one result per analyte per sample, results above the calibration range (laboratory E flag) have been rejected (qualified R). Unnecessary results and elevated detection limits from the diluted analyses have also been rejected (qualified R). The total results have been condensed as well.

- The OCDD result in the diluted analysis of sample SD14 is above the calibration range. Since a secondary dilution was not preformed, the result has been qualified as estimated (J).

Sample ID	Analyte	Qualification	Quality Control Exceedance
SD15	All analytes flagged E by the laboratory	R	Result above the calibration range
SD14	All analytes flagged E by the laboratory	R	Result above the calibration range
SD12	All analytes flagged E by the laboratory	R	Result above the calibration range
SD13	All analytes flagged E by the laboratory	R	Result above the calibration range
SD15 Dilution	Analytes for which the dilution is not required	R	Unnecessary result or elevated RL
SD14 Dilution	Analytes for which the dilution is not required	R	Unnecessary result or elevated RL
SD12 Dilution	Analytes for which the dilution is not required	R	Unnecessary result or elevated RL
SD13 Dilution	Analytes for which the dilution is not required	R	Unnecessary result or elevated RL
SD14 Dilution	OCDD	J	Result above calibration range

2.3.8 Field Duplicates

Field duplicates were not collected with the samples.

2.3.9 Overall Assessment of Data Useability

The usability of the data is based on the EPA guidance documents noted previously. Upon consideration of the information presented here, the data are acceptable, except where flagged with data qualifiers that modify the usefulness of the individual values.

2.4 Total Metals and Simultaneously Extractable Metals Analyses by 6000/7000 Series Methods

2.4.1 Holding Times - Acceptable

The samples were analyzed within the required holding time.

2.4.2 Method Blank Analyses – Acceptable with Discussion

Method blanks were analyzed at the required frequency and, except as noted below, target analytes were not detected above the reporting limits.

- The simultaneously extractable method blank contains chromium, copper, and zinc at 0.10, 0.30, and 0.38 mg/kg, respectively. Data qualifiers are not required because the concentrations in the associated samples are greater than five times the method blank concentrations.

2.4.3 Duplicate Sample Analyses – Acceptable with Discussion

Sample duplicates were analyzed at the required frequency. With one exception, the RPD values are within Functional Guidelines criteria of less than or equal to 20 percent.

- The simultaneously extractable arsenic RPD value for the duplicate analysis of sample SD13 is above the Functional Guidelines criteria at 200 percent. Data qualifiers are not required because the sample results meet the alternative Functional Guidelines criteria of less than five times the reporting limit and within one reporting limit of each other.

2.4.4 Matrix Spike Analyses – Acceptable with Discussion

Matrix spike analyses were reported at the required frequency and, with one exception, the recovery values are within the Functional Guidelines criteria of 75 to 125 percent.

- The total zinc recovery value in the spiked analysis of sample SD15 is below Functional Guidelines criteria at 73 percent. Data qualifiers are not required because the native sample concentration is greater than four times the amount spiked.

2.4.5 Laboratory Control Sample Analyses - Acceptable

Laboratory control samples were reported at the required frequency. All percent recovery values are within Functional Guidelines criteria.

2.4.6 Field Duplicates

The field duplicates were not collected with the samples.

2.4.7 Overall Assessment of Data Useability

The usability of the data is based on the EPA guidance documents noted previously. Upon consideration of the information presented here, the data are acceptable.

2.5 Total Organic Carbon, pH, Acid Volatile Sulfide, Total Solids, and Particle Size Distribution

2.5.1 Holding Times - Acceptable

The samples were analyzed within the required holding times.

2.5.2 Method Blank Analyses - Acceptable

Method blanks were analyzed at the required frequency and target analytes were not detected above the reporting limits.

2.5.3 Duplicate Sample Analyses - Acceptable with Qualifications

Sample duplicates were analyzed at the required frequency. Except as noted below, the RPD values are within laboratory's control limits.

- The acid volatile sulfide RPD value for the duplicate analysis of sample SD13 is above the laboratory control limits at 24 percent. The laboratory attributed the imprecision to the heterogeneous nature of the sample as a triplicate analysis was performed with similar results. The sample results have been qualified as estimated (J).

Sample ID	Analyte	Qualification	Quality Control Exceedance
SD15	Acid Volatile Sulfide	J	Duplicate RPD above laboratory control limits
SD14	Acid Volatile Sulfide	J	Duplicate RPD above laboratory control limits
SD12	Acid Volatile Sulfide	J	Duplicate RPD above laboratory control limits
SD13	Acid Volatile Sulfide	J	Duplicate RPD above laboratory control limits

2.5.4 Matrix Spike Analyses - Acceptable

Matrix spikes were analyzed as required. All percent recovery values are within the laboratory's control limits.

2.5.5 Laboratory Control Sample Analyses - Acceptable

Laboratory control samples were analyzed as required. All percent recovery values are within the laboratory's control limits.

2.5.6 Field Duplicates

Field duplicates were not collected with the samples.

2.5.7 Overall Assessment of Data Useability

For the particle size distribution analysis of sample SD13, the percent of total weight recovered is above the laboratory's control limit. Reanalysis of this sample produced similar results. The high recovery was attributed to interference by organic material in the sample. No qualifications are required because the bias is high.

The usability of the data is based on the EPA guidance documents noted previously. Upon consideration of the information presented here, the data are acceptable, except where flagged with data qualifiers that modify the usefulness of the individual values.

3.0 Assessment of Data Quality Indicators

3.1 Precision

Precision is a measure of the mutual agreement among individual measurements of the same property, under prescribed similar conditions. Precision is determined through analysis of MS/MSDs, sample duplicates, and LCS/LCSDs. Duplicate samples are evaluated for precision in terms of relative percent difference. Relative percent difference is defined as the difference between the duplicate results divided by the mean and expressed as a percent.

The precision of the data is good, with the following exceptions. The acid volatile sulfide results are imprecise as shown by the high duplicate RPD value. The RPD values of the MS/MSDs and remaining laboratory duplicates are within criteria.

The precision of the PCDD/PCDF data set is unknown. Since the laboratory did not analyze matrix spike duplicates or sample duplicates and field duplicates were not collected, the precision of the data set cannot be determined.

3.2 Accuracy

Accuracy is the degree of agreement between a measurement and the accepted reference or true value. The level of accuracy is determined by examination of surrogates, MS/MSDs, LCS/LCSDs, and method blanks. The surrogate, matrix spike, and laboratory control sample recovery values were compared to the laboratory's control limits or Functional Guidelines criteria. Method blanks are analyzed to identify compounds that could be introduced during the sampling, laboratory extraction, or analysis phase (i.e., laboratory contaminants) and lead to inaccurate results.

The accuracy of the polycyclic aromatic hydrocarbon, pH, total organic carbon, and acid volatile sulfides data is very good. The MS, MSD, and LCS recovery values are acceptable and the method blanks are free of contamination.

The accuracy of the PCDD and PCDF data is acceptable, with the following exceptions. The low isotope dilution internal standard recovery exhibited by several samples indicates a low bias for the affected analytes. Detected results associated with a low isotope dilution internal standard recovery were qualified as estimated as prescribed by Region 10 Functional Guidelines. The method blanks contain reportable levels of target analytes. The data are not affected because the concentrations in the associated samples are greater than five times the method blank levels. The LCS recovery values are acceptable. Field blanks are not associated with the samples.

The accuracy of the total metals data is good. All MS and LCS recovery values are acceptable, with one exception. The low zinc recovery in the MS does not affect accuracy because the native sample concentration overwhelms the amount spiked. The method blanks are free of contamination.

The accuracy of the simultaneously extractable metals data is good. All MS and LCS recovery values are acceptable. The method blank contains detectable levels of chromium, copper, and zinc. The accuracy of the data set is not affected because the sample results are greater than five times method blank concentrations.

3.3 Representativeness

Representativeness is the extent to which the data reflect the actual contaminate levels present in the samples. Representativeness is assessed through method blanks, and proper preservation and handling. Method blank analyses allow for the detection of artifacts that may be reported as false positive results. Proper sample preservation and handling ensure that sample results reflect the actual sample concentrations.

The data are assumed to be representative because all samples were extracted and analyzed within the required holding times, and the samples were properly preserved and handled. The method blank contamination does not impact the representativeness of the data because the procedures in Functional Guidelines were followed to minimize the impact of the blank contamination.

3.4 Comparability

Comparability is a measure of how easily the data set can be compared and combined with other data sets. The data are assumed to be comparable since standard EPA methods were used to analyze the samples, the method QC criteria were generally met, and routine detection limits were reported.

3.5 Completeness

Completeness is expressed as the ratio of valid results to the amount of data expected to be obtained under normal conditions. Completeness is determined by assessing the number of samples for which valid results were obtained versus the number of samples that were submitted to the laboratory for analysis. Valid results are results that are determined to be usable during the data validation review process.

The completeness of this data set is 100 percent because all of the samples were analyzed and all the results were determined to be valid.

4.0 Data Qualifier Definitions

4.1 Inorganic Data Qualifiers

The following data validation qualifiers were used in the review of this data set. These qualifiers are from Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (USEPA 1994a).

U The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

J The associated value is an estimated quantity.

UJ The material was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

R The data are unusable. (Note: Analyte may or may not be present)

4.2 Organic Data Qualifiers

The following data validation qualifiers were used in the review of this data set. These qualifiers are from Contract Laboratory Program National Functional Guidelines for Organic Data Review (USEPA 1999).

U The analyte was analyzed for but 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.

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.

N The analysis indicates the presence of an analyte for which there is presumptive evidence to make a "tentative identification".

NJ The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.

R The sample results are rejected due to serious deficiencies in the ability to analyze the samples and meet quality control criteria. The presence or absence of the analyte cannot be verified.

5.0 References

ASTM. 1989. Annual book of ASTM standards. Volume 04.08. American Society for Testing and Materials, Philadelphia, PA.

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Protection Agency. Office of Solid Waste. December 1996.

USEPA. 1999. Contract Laboratory Program National Functional Guidelines for Organic Data Review. U.S. Environmental Protection Agency Office of Emergency and Remedial Response. EPA540/R-99/008. October 1999.

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Table 3-Summary of Qualified Data

Sample ID	Analyte	Qualification	Reason for Qualification
SD15 Dilution	OCDD	J	Labeled isotope dilution internal standard below method criteria
SD12 Dilution	OCDD	J	Labeled isotope dilution internal standard below method criteria
SD13 Dilution	OCDD	J	Labeled isotope dilution internal standard below method criteria
SD15	2,3,7,8-TCDF	R	Rejected in favor of confirmational result
SD15 Dilution	2,3,7,8-TCDF	R	Rejected in favor of confirmational result
SD14	2,3,7,8-TCDF	R	Rejected in favor of confirmational result
SD14 Dilution	2,3,7,8-TCDF	R	Rejected in favor of confirmational result
SD12	2,3,7,8-TCDF	R	Rejected in favor of confirmational result
SD12 Dilution	2,3,7,8-TCDF	R	Rejected in favor of confirmational result
SD13	2,3,7,8-TCDF	R	Rejected in favor of confirmational result
SD13 Dilution	2,3,7,8-TCDF	R	Rejected in favor of confirmational result
SD15	PCDD/PCDF analytes flagged E by the laboratory	R	Result above the calibration range
SD14	PCDD/PCDF analytes flagged E by the laboratory	R	Result above the calibration range
SD12	PCDD/PCDF analytes flagged E by the laboratory	R	Result above the calibration range
SD13	PCDD/PCDF analytes flagged E by the laboratory	R	Result above the calibration range
SD15 Dilution	PCDD/PCDF analytes for which the dilution is not required	R	Unnecessary result or elevated RL
SD14 Dilution	PCDD/PCDF analytes for which the dilution is not required	R	Unnecessary result or elevated RL
SD12 Dilution	PCDD/PCDF analytes for which the dilution is not required	R	Unnecessary result or elevated RL
SD13 Dilution	PCDD/PCDF analytes for which the dilution is not required	R	Unnecessary result or elevated RL
SD14 Dilution	OCDD	J	Result above calibration range
SD15	Acid Volatile Sulfide	J	Duplicate RPD above laboratory control limits
SD14	Acid Volatile Sulfide	J	Duplicate RPD above laboratory control limits
SD12	Acid Volatile Sulfide	J	Duplicate RPD above laboratory control limits
SD13	Acid Volatile Sulfide	J	Duplicate RPD above laboratory control limits