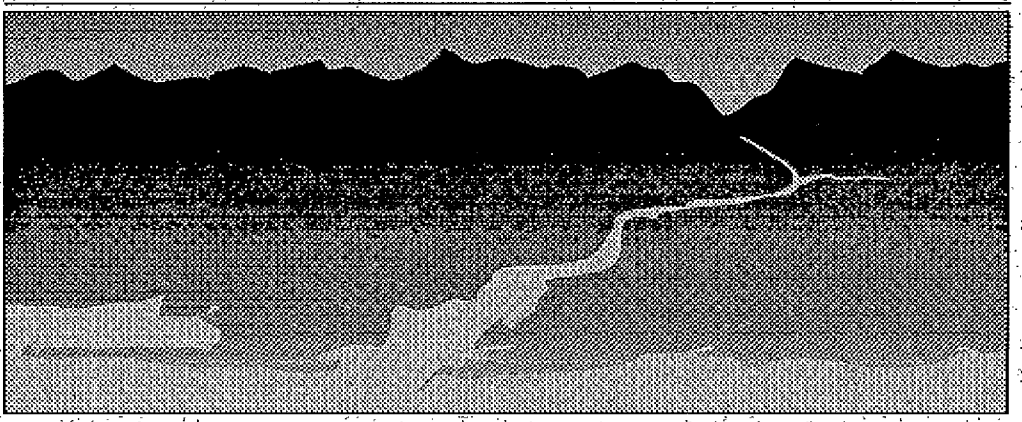
FINAL REPORT
VOLUME 2: APPENDIX A, DATA VALIDATION REPORTS

LOWER COLUMBIA RIVER



BI-STATE PROGRAM

RECONNAISSANCE SURVEY OF THE LOWER COLUMBIA RIVER

TASK 6: FINAL RECONNAISSANCE REPORT

JANUARY 1993

Prepared By:
TETRA TECH
In Association With:
EVS CONSULTANTS
DAVID EVANS & ASSOCIATES

TETRA TECH

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FINAL REPORT
VOLUME 2: APPENDIX A, DATA VALIDATION REPORTS

RECONNAISSANCE SURVEY OF THE LOWER COLUMBIA RIVER

TASK 6 FINAL RECONNAISSANCE REPORT

JANUARY 1993

Prepared For:

The Lower Columbia River
Bi-State Water Quality Program

Prepared By:

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APPENDIX A

QUALITY ASSURANCE/QUALTIY CONTROL MEMORANDA

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APPENDIX A-2	TOC/TBT/AVS/GRAIN SIZE/PERCENT SOLIDS ANALYSES
APPENDIX A-3	METALS ANALYSES
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Data Validation Report
Conventional Water Quality Variables Analyses

Site: Lower Columbia River

Sample Numbers: Samples W1-W46, W48-W50, W52

Samples collected and reported by Tetra Tech, Inc.

Samples analyzed by: Precision Analytics, Inc.
Weyerhaeuser Analytical Laboratories

Data Reviewed by: Tad Deshler

INTRODUCTION

This report presents the results for the data validation review of 50 water samples collected for the Lower Columbia River Reconnaissance Survey, and analyzed for conventional water quality variables by Precision Analytics, Inc. The variables included nutrients [fluoride, chloride, nitrate + nitrite, sulfate, ammonia, total Kjeldahl nitrogen (TKN), and total phosphorous], cyanide, total suspended solids (TSS), and hardness. Forty-five of the samples were field samples (Samples W1-W45) and five samples were field replicates (Sample W46 for Sample W44, Sample W48 for Sample W30, Sample W49 for Sample W21, Sample W50 for Sample W8, and Sample W52 for Sample W26). Samples were analyzed using Standard Method 429 for chloride, fluoride, nitrate + nitrite, and sulfate; U.S. EPA Method 335.2 for cyanide; Standard Method 417F for ammonia; U.S. EPA Method 351.4 for TKN; U.S. EPA Method 365.2 for total phosphorous; U.S. EPA Method 160.2 for TSS; and U.S. EPA Method 130.2 for hardness. In addition, twenty water samples (Samples W5, W6, W11-W14, W17, W20, W22, W24, W26, W30, W33, W35-W37, W39, W42, W45, and W52) were analyzed for absorbable organic halides (AOX) by Weyerhaeuser Analytical Laboratories using a slightly modified version of Standard Method 506. The data validation review was conducted according to guidelines presented in the U.S. EPA Contract Laboratory Program Statement of Work (SOW) for inorganics analyses (U.S. EPA 1987), the Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analyses (U.S. EPA 1988), and the project QA/QC Plan (Tetra Tech 1991).

All water samples were collected, placed on ice in a cooler, and transported to Precision Analytics, Inc. within four days of collection, with the exception of the AOX samples, which were first transported to Alden Analytical Laboratories before being shipped to Weyerhaeuser within one week of collection. Sample numbers, dates of collection, and holding time for each of the parameters are given in Tables 1 and 10 (AOX only).

A. TOTAL SUSPENDED SOLIDS (TSS)

Holding Times

The U.S. EPA has established the holding time for TSS analyses in water as 28 days. All of the water samples were analyzed within the required holding time. No data qualifiers were assigned to TSS data based on holding time.

Method Blanks

Method blanks were analyzed on each of the four days on which TSS was analyzed (10/4/91, 10/5/91, 10/16/91, and 10/18/91). TSS was not detected in any of the four blanks. No data qualifiers were assigned to TSS sample data based on method blank results.

Laboratory Duplicates

Four laboratory duplicates were analyzed for TSS. The results of the duplicate analyses are

presented in Table 2A. No laboratory duplicate was analyzed for the sample batch analyzed on 10/16/91. The results of the laboratory duplicate analyses indicate acceptable laboratory precision. No data qualifiers were assigned to TSS values based on laboratory duplicate results.

Field Duplicates

Five field duplicates were analyzed for TSS. The results of the duplicate analyses are presented in Table 2B. Field variability between duplicate samples was relatively low, with the relative percent differences (RPDs) ranging from 0 to 26 percent, with the exception of Samples W21 and W49, for which the RPD was greater than 100%. Given the acceptable precision demonstrated for the laboratory duplicates, much of the variability between field duplicates, particularly Samples W21 and W49, can be attributed to incomplete homogenization of the composite sample.

Summary

Total suspended solids data were reported in mg/L and are presented in Table 3. No data qualifiers were assigned to any of the TSS results based on QC data. The data are acceptable for their intended use.

B. HARDNESS

Holding Times

The U.S. EPA has established the holding time for hardness analyses in water as 6 months. All of the samples were analyzed well within this holding time. No data qualifiers were assigned to hardness data based on holding times.

Calibration

For calibration and standardization purposes, a control concentration of 400 ppm was established using 9.75 ml of 0.20 N titrant. Four separate checks of this standard were performed during the analyses, all of which were performed in a single day. The results of these calibration analyses are presented in Table 4A. All of the measured values were within 3% of the control concentration, indicating acceptable accuracy for this method. No data qualifiers were assigned to hardness data based on calibration data.

Laboratory Duplicates

Four water samples were analyzed in duplicate for hardness. The results of the duplicate analyses are presented in Table 4B and indicate acceptable laboratory precision. No data qualifiers were assigned to hardness values based on laboratory duplicate results.

Field Duplicates

Five field duplicates were analyzed for hardness. The results of these analyses are presented in Table 4C. Field variability between duplicate samples was generally low, with RPDs ranging from 0 to 15 percent.

Summary

Hardness data were reported in mg/L $CaCO_3$ and are presented in Table 3. EPA Method 130.2 specifies that no more than 15 mL of titrant should be used for any sample. The lab used 57.5, 24.1, and 36.5 mL of titrant for samples W6, W8, and W3, respectively. The results for these were rejected as unusable (qualifier code 'R'). The data from all other samples are acceptable for their intended use.

C. NUTRIENTS BY ION CHROMATOGRAPHY (FLUORIDE, CHLORIDE, SULFATE, NITRATE/NITRITE)

The nutrients addressed in this section were all analyzed simultaneously using the same ion chromatography method (Standard Method 429).

Holding Time

The U.S. EPA has established the holding time for nutrient analyses in water as 28 days. Fifteen of the fifty water samples were analyzed 1-8 days outside the recommended holding time. Because the holding time exceedance for these samples was relatively minor, no data qualifiers were assigned to nutrient results based on holding times.

Calibration

Calibration checks of the chromatography apparatus were performed with every 10 samples analyzed. The results of these checks are given in Table 5A. Known concentrations of fluoride (2.50 ppm), chloride, nitrate, nitrite (5.00 ppm each), and sulfate (7.50 ppm) were injected into the apparatus between each of the five sample runs. The relative percent differences (RPDs) between the known and calculated amounts was less than 10 percent in all cases, indicating acceptable analytical accuracy. No data qualifiers were assigned to nutrient data based on calibration data.

Method Blanks

Four method blanks were analyzed during the analyses. The results are presented in Table 5B. Only chloride was detected above zero in any of the blank samples. The chloride concentrations reported by the laboratory for the blank samples, however, are below the estimated detection limit (EDL) of 0.5 ppm established for the field samples. No nutrient data were qualified based on method blank results.

Laboratory Duplicates

Five samples were analyzed in duplicate for fluoride, chloride, and sulfate. The duplicate results are presented in Table 5C. RPDs for all analyses were within 10 percent with the exception of the duplicate fluoride analysis for Sample W40, which resulted in a RPD of 18 percent. Given the fact that the fluoride values calculated for the laboratory duplicates were all below the EDL, a RPD of 18 percent represents a small absolute error. No data qualifiers were assigned to nutrient data based on laboratory duplicate results.

Field Duplicates
Five field duplicates were analyzed for nutrients. The results of these analyses are presented in Table 5D. RPDs could not be calculated for fluoride and nitrate/nitrite because no samples contained detectable levels of these nutrients. For chloride and sulfate, RPDs were generally low (0 to 16 percent), with the exception of Samples W21 and W49 for sulfate, which had a RPD of 172 percent. Given the acceptable precision demonstrated for the laboratory duplicates, much of the sulfate variability between field duplicates, particularly Samples W21 and W49, can be attributed to incomplete homogenization of the composite sample.

Detection Limits
Of the nutrients discussed in this section, only nitrate/nitrite and fluoride were required to be analyzed (Tetra Tech 1991). The methods specified in the QA Plan for these substances were both colorimetric methods, with detection limits of 0.05 mg/L for nitrate/nitrite and 0.1 mg/L for fluoride. The ion chromatographic method used for this project had a reporting limit of 0.5 mg/L for all analytes. This detection limit was greater than the expected concentration of nitrate/nitrite in a natural freshwater system such as the Columbia River (approximately 0.1 mg/l). Because of the high detection limit, all nitrate/nitrite data were qualified as unusable (qualifier code 'R').

Summary
All nutrient data were reported in mg/L and are presented in Table 3. Many of the samples have been qualified with a 'U' which indicates that the ion was not detected in the sample. Nitrate/nitrite data were qualified as unusable (qualifier code 'R/U') due to the unsuitably high detection limit. No other data qualifiers were assigned to nutrient data based on QC results.

D. TOTAL KJELDAHL NITROGEN (TKN)

Holding Times
The U.S. EPA has established the holding time for TKN analyses in water as 28 days. Six of the fifty water samples were analyzed 5-8 days outside the recommended holding time. Because the holding time exceedance for these samples was relatively minor, no data qualifiers were assigned to TKN results based on holding times.

Calibration
Calibration checks of the analytical apparatus were performed on four separate occasions during the sample analyses. The results of these checks are given in Table 6A. A known concentration of ammonia (20 ppm) was injected into the apparatus between each of the five sample runs. The percent accuracy between the known and calculated amounts was 80-107 percent, indicating acceptable analytical accuracy. No data qualifiers were assigned to TKN data based on calibration data.

Method Blanks
Method blank data was not provided by the laboratory for TKN. Because only seven of the fifty samples contained detectable levels of TKN, the lack of method blank results does not

compromise the assessment of data quality.

Laboratory Duplicates
Three laboratory duplicates were analyzed for TKN. The results of the duplicate analyses are presented in Table 6B and indicate acceptable laboratory precision. No data qualifiers were assigned to TKN values based on laboratory duplicate results.

Field Duplicates
Five field duplicates were analyzed for TKN. The results of the duplicate analyses are presented in Table 6C. Each of the field duplicate pairs contained at least one value at or below the detection limit, so quantitation of field variability was not possible.

Detection Limit
The detection limit achieved by the laboratory (0.2 mg/L) was higher than the detection limit specified in the QA Plan (0.03 mg/L). The method used by the laboratory (EPA 351.4) should have been capable of detecting TKN down to 0.03 mg/L. Because the expected concentration of TKN in the Columbia River is generally less than 0.2 mg/L, all results were qualified as unusable (qualifier code 'R').

Summary
TKN data were reported in mg/L and are presented in Table 3. All TKN results were qualified as unusable because of the unsuitably high detection limit.

E. AMMONIA

Holding Times
The U.S. EPA has established the holding time for ammonia analyses in water as 28 days. Nine of the fifty water samples were analyzed 3-6 days outside the recommended holding time. Because the holding time exceedance for these samples was relatively minor, no data qualifiers were assigned to ammonia results based on holding times.

Calibration
Calibration checks of the analytical apparatus were performed on two separate occasions during the sample analyses. The results of these checks are given in Table 7A. A known concentration of ammonium ion (1 ppm) was injected into the apparatus before and after the sample runs. The percent accuracy between the known and calculated amounts was 105-107 percent, indicating acceptable analytical accuracy. No data qualifiers were assigned to ammonia data based on calibration data.

Method Blanks
Method blank data was not provided by the laboratory for ammonia. Because only five of the fifty samples contained levels of ammonia greater than the MDL (0.1 mg/L), the lack of method blank results does not compromise the assessment of data quality.

Laboratory Duplicates
Two laboratory duplicates were analyzed for ammonia. The results of the duplicate analyses are presented in Table 7B and indicate acceptable laboratory precision. No data qualifiers were assigned to ammonia values based on laboratory duplicate results.

Field Duplicates
Five field duplicates were analyzed for ammonia. The results of the duplicate analyses are presented in Table 7C. All values for the field duplicates were at or below the MDL of 0.1 mg/L, indicating that field variability was less than the detection limit.

Detection Limits
The detection limit achieved by the laboratory (0.1 mg/L) was higher than the detection limit specified in the QA Plan (0.03 mg/L). Because the expected concentration of ammonia in the Columbia River is generally less than 0.1 mg/L, all results were qualified as unusable (qualifier code 'R').

Summary
Ammonia data were reported in mg/L and are presented in Table 3. All ammonia results were qualified as unusable because of the unsuitably high detection limit.

F. TOTAL PHOSPHORUS

Holding Times
The U.S. EPA has established the holding time for phosphorus analyses in water as 28 days. Forty-seven of the fifty water samples were analyzed 1-8 days outside the recommended holding time. Because the holding time exceedance for these samples was relatively minor, no data qualifiers were assigned to phosphorus results based on holding times.

Calibration
Calibration checks of the analytical apparatus were performed on four separate occasions during the sample analyses. The results of these checks are given in Table 8A. A known concentration of phosphorus (300 ppb) was injected into the apparatus between each sample run. The percent accuracy between the known and calculated amounts was 108-114 percent, indicating acceptable analytical accuracy. No data qualifiers were assigned to phosphorus data based on calibration data.

Method Blanks
Method blank data was not provided by the laboratory for phosphorus. Because none of the fifty samples contained levels of phosphorus greater than the MDL (0.2 mg/L), the lack of method blank results does not compromise the assessment of data quality.

Laboratory Duplicates
Three laboratory duplicates were analyzed for phosphorus. The results of the duplicate analyses are presented in Table 8B. Estimates of laboratory precision cannot be made given the lack of

positive values for phosphorus.

Field Duplicates
Five field duplicates were analyzed for phosphorus. The results of the duplicate analyses are presented in Table 8C. All values for the field duplicates were below the MDL of 0.2 mg/L, indicating that field variability was less than the detection limit.

Detection Limits
The detection limit achieved by the laboratory (0.2 mg/L) was higher than the detection limit specified in the QA Plan (0.1 mg/L). Because the expected concentration of phosphorus in the Columbia River is generally less than 0.2 mg/L, all results were qualified as unusable (qualifier code 'R').

Summary
Phosphorus data were reported in mg/L and are presented in Table 3. All phosphorus results were qualified as unusable because of the unsuitably high detection limit.

G. CYANIDE

Holding Times
The U.S. EPA has established the holding time for cyanide analyses in water as 14 days. Seven of the fifty water samples were analyzed 1-5 days outside the recommended holding time. Because the holding time exceedance for these samples was relatively minor, no data qualifiers were assigned to cyanide results based on holding times.

Calibration
Calibration checks of the analytical apparatus were performed on four separate occasions during the sample analyses. The results of these checks are given in Table 9A. A known concentration of cyanide (20 ppb) was injected into the apparatus between each sample run. The percent accuracy between the known and calculated amounts was 95-108 percent, indicating acceptable analytical accuracy. No data qualifiers were assigned to cyanide data based on calibration data.

Method Blanks
Method blank data was not provided by the laboratory for cyanide. Because none of the fifty samples contained levels of cyanide greater than the MDL (2 μg/L), the lack of method blank results does not compromise the assessment of data quality.

Laboratory Duplicates
Three laboratory duplicates were analyzed for cyanide. The results of the duplicate analyses are presented in Table 9B. Estimates of laboratory precision can not be made given the lack of positive values for cyanide.

Field Duplicates
Five field duplicates were analyzed for cyanide. The results of the duplicate analyses are

presented in Table 9C. All values for the field duplicates were below the MDL of 2 μg/L, indicating that field variability was less than the detection limit.

Summary

Cyanide data were reported in μg/L and are presented in Table 3. The detection limit achieved by the laboratory (2 μg/L) was identical to the detection limit specified in the QA Plan (Tetra Tech 1991). No data qualifiers were assigned to any of the cyanide results based on QC data. The data are acceptable for their intended use.

H. ABSORBABLE ORGANIC HALIDES (AOX)

Holding Times

The holding time given in the QA plan for AOX is 28 days. The sample numbers, dates of collection and analysis, and the holding times are given in Table 10. All of the water samples were analyzed within the required holding time. No data qualifiers were assigned to AOX data based on holding times.

Calibration

Two different standards were analyzed with every batch of up to eight samples. The laboratory analyzed samples from other projects concurrently with the Columbia River samples. At the beginning of each run, a 10 μL aliquot of inorganic chlorine was analyzed. Percent recovery of the first standard ranged from 96-104 percent. After analyzing a nitrate blank, a 20 μL standard (TCP) was analyzed. Percent recovery of the second standard ranged from 95-106 percent. The results of the standards analyses indicated that the analytical apparatus was in control prior to the analysis of any field samples.

Method Blanks

A nitrate method blank was analyzed between the two standards at the beginning of each sample run. The AOX concentration ranged from 2-4 μg/L in the blank. All sample concentrations have been corrected for the nitrate blank associated with that sample batch.

Laboratory Duplicates

Five samples were analyzed in duplicate by the laboratory. The duplicate results presented in Table 11A indicate acceptable laboratory precision.

Field Duplicates

One set of field duplicates (Sample W26 and W52) was analyzed by the laboratory. The duplicate results presented in Table 11B indicate there was little, if any, field variability.

Summary

AOX data are reported in μg/L and are reported in Table 12. AOX values have been rounded to the nearest 5 μg/L because that is the detection limit. The detection limit reported by the laboratory was one-half the detection limit specified in the QA plan (Tetra Tech 1991).

Only one sample (Sample W24) contained an undetectable level of AOX. Sample W5 contained solids. After filtering the sample on a 45-μm filter, the AOX concentration was reduced to 35 μg/L.

All of the AOX concentrations presented in Table 12 have been qualified with a 'Z' data qualifier, to indicate that they have been corrected for blank contribution. No other data qualifiers have been added to the AOX results. The data are acceptable for their intended use.

REFERENCES

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U.S. Environmental Protection Agency. 1987. U.S. EPA Contract Laboratory Program, statement of work for inorganics analysis, multi-media, multi-concentration. Revision July 1987. IFB WA87-K025. U.S. Environmental Protection Agency, Washington, DC.

U.S. Environmental Protection Agency. 1988. Laboratory data validation functional guidelines for evaluating inorganics analyses. U.S. Environmental Protection Agency/Hazardous Site Evaluation Division, Washington, DC.

TABLE 1. WATER CONVENTIONALS ANALYSIS SUMMARY
LOWER COLUMBIA RIVER RECONNAISSANCE SURVEY

Tetra Tech Sample No.	Precision Sample No.	Date Collected	Holding Times (days) Fluoride	Chloride	Sulfate	NO3/NO2	Cyanide	Ammonia	TKN	Total P	TSS	Hardness
W1	1523TTI001	10/8/91	36	36	36	36	6	19	21	35	8	13
W2	1538TTI001	10/15/91	29	29	29	29	5	12	15	29	3	6
W3	1538TTI002	10/15/91	29	29	29	29	5	12	15	29	3	6
W4	1529TTI001	10/10/91	34	34	34	34	10	17	20	34	8	11
W5	1523TTI002	10/9/91	35	35	35	35	5	18	20	34	7	12
W6	1529TTI002	10/10/91	34	34	34	34	10	17	20	34	8	11
W7	1523TTI003	10/9/91	35	35	35	35	5	18	20	34	7	12
W8	1527TTI001	10/10/91	34	34	34	34	10	17	20	34	6	11
W9	1529TTI004	10/10/91	34	34	34	34	10	17	20	34	8	11
W10	1527TTI002	10/11/91	33	33	33	33	9	16	19	33	5	10
W11	1529TTI005	10/12/91	32	32	32	32	8	15	18	32	6	9
W12	1523TTI004	10/7/91	37	37	37	37	7	20	22	36	9	14
W13	1529TTI006	10/11/91	33	33	33	33	9	16	19	33	7	10
W14	1507TTI001	10/6/91	8	8	8	8	7	21	23	31	10	15
W15	1507TTI002	10/6/91	8	8	8	8	7	21	23	31	10	15
W16	1538TTI003	10/15/91	29	29	29	29	5	12	15	29	3	6
W17	1507TTI003	10/6/91	8	8	8	8	7	21	23	31	10	15
W18	1507TTI004	10/5/91	9	9	9	9	8	22	24	32	11	16
W19	1507TTI005	10/5/91	9	9	9	9	8	22	24	32	11	16
W20	1507TTI006	10/4/91	10	10	10	10	9	23	25	33	12	17
W21	1507TTI007	10/4/91	10	10	10	10	9	23	25	33	12	17
W22	1502TTI010	10/3/91	12	12	12	12	10	24	21	32	2	18
W23	1502TTI002	10/3/91	12	12	12	12	10	24	21	32	2	18
W24	1502TTI011	10/3/91	12	12	12	12	10	24	21	32	2	18
W25	1502TTI009	10/3/91	12	12	12	12	10	24	21	32	2	18
W26	1502TTI001	10/2/91	13	13	13	13	11	25	22	33	3	19
W27	1502TTI008	10/2/91	13	13	13	13	11	25	22	33	3	19
W28	1502TTI007	10/1/91	14	14	14	14	12	26	23	34	4	20

Table 1 (cont.)

Tetra Tech Sample No.	Precision Sample No.	Date Collected	Holding Times (days) Fluoride	Chloride	Sulfate	NO3/NO2	Cyanide	Ammonia	TKN	Total P	TSS	Hardness
W29	1502TTI006	10/1/91	14	14	14	14	12	26	23	34	4	20
W30	1502TTI005	10/1/91	14	14	14	14	12	26	23	34	4	20
W31	1486TTI016	9/30/91	14	14	14	14	12	29	24	32	4	21
W32	1486TTI017	9/30/91	14	14	14	14	12	29	24	32	4	21
W33	1486TTI018	9/30/91	14	14	14	14	12	29	24	32	4	21
W34	1486TTI019	9/30/91	14	14	14	14	12	29	24	32	4	21
W35	1538TTI004	10/16/91	28	28	28	28	4	11	14	28	2	5
W36	1486TTI020	9/28/91	16	16	16	16	14	31	26	34	6	23
W37	1486TTI021	9/28/91	16	16	16	16	14	31	26	34	6	23
W38	1538TTI005	10/16/91	28	28	28	28	4	11	14	28	2	5
W39	1486TTI022	9/27/91	17	17	17	17	15	32	27	35	7	24
W40	1538TTI006	10/16/91	28	28	28	28	4	11	14	28	2	5
W41	1474TTI013	9/23/91	22	22	22	22	19	34	36	39	11	28
W42	1474TTI012	9/25/91	20	20	20	20	17	32	34	37	9	26
W43	1474TTI011	9/24/91	20	20	20	20	18	33	35	38	10	27
W44	1474TTI015	9/26/91	19	19	19	19	16	31	33	36	8	25
W45	1474TTI016	9/26/91	19	19	19	19	16	31	33	36	8	25
W46	1474TTI014	9/26/91	19	19	19	19	16	31	33	36	8	25
W48	1502TTI004	10/1/91	14	14	14	14	12	26	23	34	4	20
W49	1507TTI008	10/4/91	10	10	10	10	9	23	25	33	12	17
W50	1527TTI005	10/10/91	34	34	34	34	10	17	20	34	6	11
W52	1502TTI003	10/2/91	13	13	13	13	11	25	22	33	3	19

TABLE 2. QC ANALYSIS SUMMARY FOR TSS
LOWER COLUMBIA RIVER RECONNAISSANCE SURVEY

A. LABORATORY DUPLICATES

SAMPLE NUMBER	RESULT 1 (mg/L)	RESULT 2 (mg/L)	RPD	RSD
W44	6.8	6.5	4.51	5.82
W37	7.8	7.8	0.00	0.00
W27	6.3	6.8	7.63	7.63
W2	27.5	27.8	1.08	1.40

B. FIELD DUPLICATES

SAMPLE NUMBERS	RESULT 1 (mg/L)	RESULT 2 (mg/L)	RPD	RSD
W44 and W46	6.8	6.8	0.00	0.00
W30 and W48	5	4.5	10.53	10.53
W21 and W49	14.3	4	112.57	24.80
W8 and W50	16.8	16.3	3.02	3.02
W26 and W52	4.3	3.3	26.32	18.61

TABLE 3. MISCELLANEOUS WATER QUALITY PARAMETER ANALYSIS RESULTS
LOWER COLUMBIA RIVER RECONNAISSANCE SURVEY

Tetra Tech Sample Number	Chloride (mg/L)	Fluoride (mg/L)	Nitrate/ Nitrite (mg/L)	Sulfate (mg/L)	Cyanide (ug/L)	Ammonia (mg/L)	TKN (mg/L)	Total P (mg/L)	TSS (mg/L)	Hardness (mg/L)
W1	14380	0.5 U	24.9	1780	2 U	0.1 R	0.3 R	0.2 U/R	13	5292
W2	8220	0.5 U	12.2 R	1070	2 U	0.1 R	0.2 U/R	0.2 U/R	27.5	2626
W3	4430	0.5 U	13 R	585	2 U	0.2 R	0.2 U/R	0.2 U/R	60	1497 R
W4	6350	0.5 U	0.5 U/R	850	2 U	0.1 R	0.2 U/R	0.2 U/R	19.5	ND
W5	2810	0.5 U	0.5 U/R	362	2 U	0.1 R	0.2 U/R	0.2 U/R	18.8	1487
W6	8700	0.5 U	10 R	1080	2 U	0.1 R	0.3 R	0.2 U/R	30	2359 R
W7	3290	0.5 U	0.5 U/R	431	2 U	0.1 R	0.2 U/R	0.2 U/R	20.3	1108
W8	2577	0.5 U	0.5 U/R	393	2 U	0.1 R	0.2 U/R	0.2 U/R	16.8	989 R
W9	129	0.5 U	0.5 U/R	29	2 U	0.1 R	0.2 U/R	0.2 U/R	12.5	92
W10	7.8	0.5 U	0.5 U/R	12	2 U	0.2 R	0.4 R	0.2 U/R	5.3	57
W11	7.6	0.5 U	0.5 U/R	13	2 U	0.1 R	0.2 U/R	0.2 U/R	4	62
W12	5.5	0.5 U	0.5 U/R	11	2 U	0.1 R	0.2 U/R	0.2 U/R	3.8	51
W13	7.4	0.5 U	0.5 U/R	13	2 U	0.1 R	0.2 U/R	0.2 U/R	5	55
W14	4.9	0.5 U	0.5 U/R	11	2 U	0.1 R	0.2 U/R	0.2 U/R	5.8	57
W15	0.8	0.5 U	0.5 U/R	1.5	2 U	0.1 R	0.2 U/R	0.2 U/R	3.3	59
W16	5.5	0.5 U	0.5 U/R	11	2 U	0.1 R	0.2 U/R	0.2 U/R	45.8	59
W17	6.1	0.5 U	0.5 U/R	12	2 U	0.1 R	0.2 U/R	0.2 U/R	5.8	64
W18	4.1	0.5 U	0.5 U/R	10	2 U	0.1 R	0.3 R	0.2 U/R	8.8	57
W19	5.9	0.5 U	0.5 U/R	12	2 U	0.1 R	0.2 U/R	0.2 U/R	9	53
W20	5.6	0.5 U	0.5 U/R	13	2 U	0.1 R	0.2 U/R	0.2 U/R	0.5	62
W21	0.5 U	0.5 U	0.5 U/R	9	2 U	0.1 R	0.3 R	0.2 U/R	14.3	57
W22	5.9	0.5 U	0.5 U/R	12	2 U	0.1 R	0.2 U/R	0.2 R	5.5	53
W23	3.7	0.5 U	0.5 U/R	9.3	2 U	0.1 R	0.2 U/R	0.2 U/R	3.8	53
W24	7.7	0.5 U	0.5 U/R	18	2 U	0.1 R	0.2 U/R	0.2 U/R	3.5	35
W25	3.6	0.5 U	0.5 U/R	11	2 U	0.1 /	0.2 U/R	0.2 R	5.8	55
W26	3.5	0.5 U	0.5 U/R	10	2 U	0.1 /	0.2 U/R	0.2 U/R	4.3	66

Table 3 (cont.)

Tetra Tech Sample Number	Chloride (mg/L)	Fluoride (mg/L)		Nitrate/ Nitrite (mg/L)		Sulfate (mg/L)	Cyanide (ug/L)		Ammonia (mg/L)		TKN (mg/L)		Total P (mg/L)		TSS (mg/L)	Hardness (mg/L)
W27	4.7	0.5	U	0.5	U	9.5	2	U	0.1		0.2	U	0.2	U	4.3	62
W28	4.3	0.5	U	0.5	U	8.6	2	U	0.1		0.2	U	0.2	U	6.3	62
W29	3.3	0.5	U	0.5	U	9.7	2	U	0.1		0.2	U	0.2	U	7.5	66
W30	3.5	0.5	U	0.5	U	10	2	U	0.1		0.2	U	0.2	U	5	53
W31	1.9	0.5	U	0.5	U	2	2	U	0.1		0.2	U	0.2	U	1.3	10
W32	7.4	0.5	U	1.2		4.6	2	U	0.1		0.2	U	0.2	U	7.5	21
W33	2.8	0.5	U	0.5	U	11	2	U	0.1		0.2	U	0.2		4.3	57
W34	3.6	0.5	U	0.6		9.2	2	U	0.1		0.2	U	0.2	U	29.2	68
W35	4.3	0.5	U	0.5	U	11	2	U	0.1		0.2	U	0.2	U	6.8	51
W36	6.3	0.5	U	1		4.1	2	U	0.1		0.2	U	0.2	U	9	23
W37	2.5	0.5	U	0.5	U	11	2	U	0.1		0.2	U	0.2	U	7.8	53
W38	2.9	0.5	U	0.5	U	12	2	U	0.1		0.2	U	0.2	U	5.3	62
W39	2.1	0.5	U	0.5	U	9.5	2	U	0.1		0.2	U	0.2	U	6.5	55
W40	3.4	0.5	U	0.5	U	12	2	U	0.1		0.2	U	0.2	U	18	62
W41	1.6	0.5	U	0.5	U	8.8	2	U	0.1		0.2	U	0.2	U	8	59
W42	1.8	0.5	U	0.5	U	9.7	2	U	0.1		0.2	U	0.2	U	5	57
W43	1.9	0.5	U	0.5	U	10	2	U	0.1	U	0.3		0.2		3.5	53
W44	1.9	0.5	U	0.5	U	8.8	2	U	0.1		0.2	U	0.2	U	6.8	57
W45	2	0.5	U	0.5	U	10	2	U	0.1		0.2	U	0.2	U	7	62
W46	2	0.5	U	0.5	U	8.6	2	U	0.1	U	0.3		0.2	U	6.8	53
W48	3.5	0.5	U	0.5	U	10	2	U	0.1		0.2	U	0.2	U	4.5	57
W49	5.2	0.5	U	0.5	U	12	2	U	0.1		0.2	U	0.2	U	4	57
W50	3023	0.5	U	0.5	U	383	2	U	0.1		0.2	U	0.2	U	16.3	985
W52	3.6	0.5	U	0.5	U	10	2	U	0.1		0.2	U	0.2	U	3.3	57

ND = No data

Data Qualifiers:

U = Not detected. Value given is method detection limit.

R = Data are unusable

TABLE 4. QC ANALYSIS SUMMARY FOR HARDNESS
LOWER COLUMBIA RIVER RECONNAISSANCE SURVEY

A. STANDARDS ANALYSES

DATE ANALYZED	CONCENTRATION (ppm)	HARDNESS RESULT (ppm)	PERCENT ACCURACY
10/21/91	400	406	101.50
10/21/91	400	410	102.50
10/21/91	400	392	98.00
10/21/91	400	404	101.00

B. LABORATORY DUPLICATES

SAMPLE NUMBER	RESULT 1 (mg/kg)	RESULT 2 (mg/kg)	RPD	RSD
W45	62	62	0.00	0.00
W39	55	59	7.02	2.48
W22	53	53	0.00	0.00
W21	57	57	0.00	0.00

C. FIELD DUPLICATES

SAMPLE NUMBERS	RESULT 1 (mg/kg)	RESULT 2 (mg/kg)	RPD	RSD
W44 and W46	57	53	7.27	2.57
W30 and W48	53	57	7.27	2.57
W21 and W49	57	57	0.00	0.00
W8 and W50	989	985	0.41	0.14
W26 and W52	66	57	14.63	3.45

TABLE 5. QC ANALYSIS SUMMARY FOR NUTRIENTS LOWER COLUMBIA RIVER RECONNAISSANCE SURVEY

A. CALIBRATION ANALYSES

DATE ANALYZED	PERCENT ACCURACY FLUORIDE	CHLORIDE	NITRITE	NITRATE	SULFATE
10/14/91	97.56	90.70	91.46	97.12	96.39
10/14/91	101.00	94.70	94.82	99.32	97.71
10/15/91	100.20	92.04	93.04	102.18	96.39
11/13/91	102.88	98.34	108.82	100.38	96.67
11/13/91	99.92	94.94	107.22	98.24	93.36

B. METHOD BLANK RESULTS

DATE ANALYZED	NITRATE (ppm)	FLUORIDE (ppm)	CHLORIDE (ppm)	SULFATE (ppm)
10/14/91	0	0	0.058	0
10/14/91	0	0	0	0
11/12/91	0	0	0.401	0
11/13/91	0	0	0.215	0

C. LABORATORY DUPLICATES

SAMPLE NUMBER	FLUORIDE RPD	CHLORIDE RPD	SULFATE RPD
W13	2.23	0.61	0.05
W49	0.50	2.56	3.73
W39	1.94	6.90	7.30
W40	18.05	10.07	1.38
W35	0.45	0.34	0.64

D. FIELD DUPLICATES

SAMPLE NUMBERS	FLUORIDE RPD	CHLORIDE RPD	SULFATE RPD	NITRATE NITRITE RPD
W44 and W46	--	5.13	2.30	--
W30 and W48	--	0.00	0.00	--
W21 and W49	--	--	172.09	--
W8 and W50	--	15.93	2.58	--
W26 and W52	--	2.82	0.00	--

Duplicates with no RPD include at least one non-detected value

TABLE 6. QC ANALYSIS SUMMARY FOR TKN
LOWER COLUMBIA RIVER RECONNAISSANCE SURVEY

A. STANDARDS ANALYSES

SPIKED CONCENTRATION (ppm)	TKN RESULT (ppm)	PERCENT ACCURACY
20.0	21.36	106.80
20.0	18.82	94.10
20.0	17.09	85.45
20.0	16.09	80.45

B. LABORATORY DUPLICATES

SAMPLE NUMBER	RESULT 1 (ppm)	RESULT 2 (ppm)	RPD	RSD
W10	0.46	0.42	9.09	32.14
W34	0.18	0.19	5.41	38.22
W49	<0.2	<0.2	--	--

C. FIELD DUPLICATES

SAMPLE NUMBERS	RESULT 1 (ppm)	RESULT 2 (ppm)	RPD	RSD
W44 and W46	<0.2	0.3	--	--
W30 and W48	<0.2	<0.2	--	--
W21 and W49	0.3	<0.2	--	--
W8 and W50	<0.2	<0.2	--	--
W26 and W52	<0.2	<0.2	--	--

TABLE 7. QC ANALYSIS SUMMARY FOR AMMONIA LOWER COLUMBIA RIVER RECONNAISSANCE SURVEY

A. STANDARDS ANALYSES

SPIKED CONCENTRATION (ppm)	NH3 RESULT (ppm)	PERCENT ACCURACY
1.0	1.07	107.00
1.0	1.05	105.00

B. LABORATORY DUPLICATES

SAMPLE NUMBER	RESULT 1 (ppm)	RESULT 2 (ppm)	RPD	RSD
W19	0.12	0.109	9.61	64.77
W34	0.164	0.187	13.11	61.10

C. FIELD DUPLICATES

SAMPLE NUMBERS	RESULT 1 (ppm)	RESULT 2 (ppm)	RPD	RSD
W44 and W46	<0.1	0.1	--	--
W30 and W48	0.1	0.1	0.00	0.00
W21 and W49	0.1	0.1	0.00	0.00
W8 and W50	0.1	0.1	0.00	0.00
W26 and W52	<0.1	0.1	--	--

TABLE 8. QC ANALYSIS SUMMARY FOR PHOSPHORUS LOWER COLUMBIA RIVER RECONNAISSANCE SURVEY

A. STANDARDS ANALYSES

SPIKED CONCENTRATION (ppb)	P RESULT (ppb)	PERCENT ACCURACY
300	325	108.33
300	332	110.67
300	332	110.67
300	341	113.67

B. LABORATORY DUPLICATES

SAMPLE NUMBER	RESULT 1 (mg/L)	RESULT 2 (mg/L)	RPD	RSD
W16	<0.2	<0.2	--	--
W30	<0.2	<0.2	--	--
W31	<0.2	<0.2	--	--

C. FIELD DUPLICATES

SAMPLE NUMBERS	RESULT 1 (mg/L)	RESULT 2 (mg/L)	RPD	RSD
W44 and W46	<0.2	<0.2	--	--
W30 and W48	<0.2	<0.2	--	--
W21 and W49	<0.2	<0.2	--	--
W8 and W50	<0.2	<0.2	--	--
W26 and W52	<0.2	<0.2	--	--

TABLE 9. QC ANALYSIS SUMMARY FOR CYANIDE
LOWER COLUMBIA RIVER RECONNAISSANCE SURVEY

A. STANDARDS ANALYSES

SPIKED CONCENTRATION (ppb)	CN RESULT (ppb)	PERCENT ACCURACY
20.0	21.60	108.00
20.0	20.59	102.95
20.0	19.03	95.15
20.0	20.74	103.70
20.0	20.04	100.20

B. LABORATORY DUPLICATES

SAMPLE NUMBER	RESULT 1 (ug/L)	RESULT 2 (ug/L)	RPD	RSD
W45	<2.0	<2.0	--	--
W26	<2.0	<2.0	--	--
W49	<2.0	<2.0	--	--

C. FIELD DUPLICATES

SAMPLE NUMBERS	RESULT 1 (ug/L)	RESULT 2 (ug/L)	RPD	RSD
W44 and W46	<2.0	<2.0	--	--
W30 and W48	<2.0	<2.0	--	--
W21 and W49	<2.0	<2.0	--	--
W8 and W50	<2.0	<2.0	--	--
W26 and W52	<2.0	<2.0	--	--

TABLE 10. AOX ANALYSIS SUMMARY
LOWER COLUMBIA RIVER RECONNAISSANCE SURVEY

Tetra Tech Sample No.	Weyerhaeuser Sample No.	Date Collected	Date Analyzed	Holding Time (days)
W5	79695	10/9/91	10/22/91	13
W6	79972	10/10/91	10/25/91	15
W11	79973	10/12/91	10/28/91	16
W12	79694	10/7/91	10/18/91	11
W13	79974	10/11/91	10/28/91	17
W14	79393	10/6/91	10/14/91	8
W17	79394	10/6/91	10/14/91	8
W20	79395	10/4/91	10/18/91	14
W22	79261	10/3/91	10/14/91	11
W24	79262	10/3/91	10/14/91	11
W26	79258	10/2/91	10/14/91	12
W30	79260	10/1/91	10/14/91	13
W33	78914	9/30/91	10/10/91	10
W35	80161	10/16/91	10/29/91	13
W36	78912	9/28/91	10/8/91	10
W37	78911	9/28/91	10/8/91	10
W39	78913	9/27/91	10/10/91	13
W42	78820	9/25/91	10/10/91	15
W45	78821	9/26/91	10/10/91	14
W52	79259	10/2/91	10/14/91	12

TABLE 11. QC ANALYSIS SUMMARY FOR AOX
LOWER COLUMBIA RIVER RECONNAISSANCE SURVEY

A. LABORATORY DUPLICATES

SAMPLE NUMBER	RESULT 1 (ug/L)	RESULT 2 (ug/L)	RPD	RSD
W5	255	200	24.18	2.31
W12	55	55	0.00	0.00
W20	60	60	0.00	0.00
W11	50	40	22.22	4.97
W13	40	50	22.22	4.97

B. FIELD DUPLICATE

SAMPLE NUMBERS	RESULT 1 (ug/L)	RESULT 2 (ug/L)	RPD	RSD
W26 and W52	25	30	18.18	5.75

TABLE 12. AOX ANALYSIS RESULTS
LOWER COLUMBIA RIVER RECONNAISSANCE SURVEY

Tetra Tech Sample No.	Date Collected	AOX (ug/L)	Qual. Code
W5	10/9/91	255*	Z
W6	10/10/91	250	Z
W11	10/12/91	50	Z
W12	10/7/91	55	Z
W13	10/11/91	40	Z
W14	10/6/91	45	Z
W17	10/6/91	45	Z
W20	10/4/91	60	Z
W22	10/3/91	40	Z
W24	10/3/91	5	UZ
W26	10/2/91	25	Z
W30	10/1/91	20	Z
W33	9/30/91	25	Z
W35	10/16/91	20	Z
W36	9/28/91	35	Z
W37	9/28/91	20	Z
W39	9/27/91	15	Z
W42	9/25/91	10	Z
W45	9/26/91	15	Z
W52	10/2/91	30	Z

* Sample W5 contained solids. The AOX value on the filtered sample was 35 ug/L.

Data Qualifiers: U = Substance undetected. Value given is the method detection limit.
Z = Value corrected for blank contribution

Appendix A-2

Data Validation Report
TOC/TBT/AVS/Grain Size/Percent Solids/Radionuclides Analyses

Site: Lower Columbia River

Sample Numbers: Samples W6, W14, W26, W37, W45 (water)
Samples D1-D46, E1-E14 (sediment)

Samples collected and reported by Tetra Tech, Inc.

Samples analyzed by: Analytical Resources, Inc.
Precision Analytics
Washington Department of Health

Data Reviewed by: Tad Deshler

INTRODUCTION

This report presents the results for the data validation review of 5 water samples analyzed for total organic carbon (TOC) and 60 sediment samples analyzed for TOC, acid volatile sulfides, percent solids by Analytical Resources, Inc. of Seattle, WA. All of the sediment samples were analyzed for grain size by Precision Analytics of Pullman, WA. Eleven of the sixty sediment samples were also analyzed for tributyl tin by Analytical Resources, Inc. Six sediment samples were analyzed for radionuclides by the Washington Department of Health. All five of the water samples were field samples. Fifty-four of the sediment samples were field samples (Samples D1-D40 and E1-E14), while six of the samples were field replicates (Sample D41 for Sample D35, Sample D42 for Sample D28, Sample D43 for Sample D23, Sample D44 for Sample D17, Sample D45 for D11, and Sample D46 for Sample D3). Water samples were analyzed for TOC using U.S. EPA Method 415.2, while sediment samples were analyzed for TOC using U.S. EPA Method 9060, for TBT using selective ion monitoring on gas chromatography/mass spectrometry (GC/MS), for grain size using sieves and hydrometers (Method 43-5; American Society of Agronomy 1965), for AVS after the method of DiToro et. al (1989), for percent solids using a gravimetric method, and for radionuclides based on techniques developed by Radiological and Environmental Sciences Laboratory (RESL). The data validation review was conducted according to guidelines presented in the U.S. Environmental Protection Agency (U.S. EPA) Contract Laboratory Program Statement of Work (SOW) for inorganics analyses (U.S. EPA 1987), the Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analyses (U.S. EPA 1988), and the QA/QC Plan (Tetra Tech 1991).

A. TOTAL ORGANIC CARBON

Holding Times

Water and sediment samples were collected, placed on ice in a cooler, and transported to Alden Analytical Laboratories within 4 days of collection. Alden, in turn, delivered the samples under chain-of-custody to Analytical Resources, Inc., which performed the analysis. Holding times have not been established by U.S. EPA for TOC analysis. The holding time established for this project is 28 days for both sediment and water samples. This holding time is recommended by the Washington State Department of Ecology (1991). Sample numbers, dates of collection and analysis and actual holding times are given in Table 1. For all sediment and water samples, the actual holding time exceeded the project-established holding time by 7-14 days. Given the lack of U.S. EPA-established holding times for unfrozen samples, the degree to which data quality are affected by the exceedance of holding time is difficult to determine. Taking into account the generally acceptable results from other QA analyses, no data qualifiers were assigned to sample results based on holding times.

Calibration and Instrument Performance

TOC was analyzed using a Dohrmann DC-180 carbon analyzer. Approximately one-half of the samples were analyzed using a minimum of 3 replicate burns. The remainder of the sample results (presented in Table 3) are based on a single burn only.

Calibration of the carbon analyzer was conducted per instrument manufacturer's instructions using a two-point curve generated from the analysis of a blank and 2000 ppm standard for sediment and a 5 ppm standard for water. Each blank and standard analysis was a result of at least five replicate burns. Calibration was conducted at the required frequency and all calibrations showed less than 15 percent difference from the true value. The results of the standards analyses are given in Table 2A. The carbon analyzer automatically corrects the daily calibration factor and does not report results for samples that are quantitated at concentrations greater than the calibration range. Therefore, the sample must be diluted to a concentration within the calibration range of the instrument before results can be obtained.

Method Blanks

Method blank analyses were performed for each batch of samples received by the laboratory. Four method blanks were analyzed for water samples and five method blanks were analyzed for sediment samples. One batch of samples received by the laboratory did not contain any water samples, so only a method blank for sediment was analyzed. Raw data for all method blanks were examined. Method blank results are presented in Table 2B. All sample concentrations were corrected for the associated method blank. A qualifier code of 'Z' (blank corrected) was assigned to the TOC results for all samples in which TOC was detected based on the laboratory reporting procedure.

Matrix Spike Analyses

Six sediment samples (Samples E14, E10, E8, D14, D2, and D6) were analyzed as matrix spikes. Organic carbon was added to the spike samples at concentrations ranging from 4,800 ppm to 10,500 ppm, yielding spike sample concentrations ranging from 65 to 860 percent of sample concentration. Matrix spike sample results are presented in Table 2C. Percent recovery of TOC ranged from 92 to 123 percent, indicating the accuracy of the TOC analyses for sediment was acceptable.

Five water samples (Samples W45, W37, W26, W14, and W6) were analyzed as matrix spikes. Organic carbon was added to the spike samples at a concentration of 20 mg/L, representing approximately 1000 percent of the sample concentrations. Percent recovery ranged from 74 to 85 percent, indicating the accuracy of the TOC analyses for water was acceptable.

Laboratory Duplicates

Laboratory duplicate analyses were conducted on one sediment and one water sample from each

sample batch. Laboratory duplicate analyses results are given in Table 2D. For sediment samples, the relative percent difference (RPD) was less than 6 percent for all analyses. The calculation of a RPD for the laboratory duplicate analyses of the water samples was possible for only one sample, because of the lack of detected values. The RPD for Sample W6 was almost 19 percent. Laboratory duplicate results indicate the precision of the analyses for both sediment and water samples was acceptable.

Field Duplicates

Six pairs of field duplicate sediment samples were analyzed for TOC. Results of the field duplicate analyses are presented in Table 2E, and indicate maximum sample variability of approximately 50 percent.

Summary

TOC sample data, including all qualifier codes and the variability of replicate burns, are presented in Table 3. All sample data were reported as mg/kg Carbon for sediment samples and mg/L Carbon for water samples. The data package submitted by the laboratory contained all the required deliverables. Detection limits reported by the laboratory (usually 432 mg/kg for sediment and 2.41 mg/L for water) were slightly above the criteria established in the QA Plan (200 mg/kg for sediment and 1 mg/L for water), but should not compromise the acceptability of the data for their intended use.

All raw data for TOC analyses were reviewed for transcription and calculation errors, and none were noted. The accuracy and precision of the analyses indicate the results are acceptable for their intended use. A 'Z' (blank- corrected) data qualifier was assigned to all TOC results based on laboratory reporting procedure.

B. TRIBUTYL TIN

Holding Times

Sediment samples were collected, placed on ice in a cooler, and transported to Alden Analytical Laboratories within 4 days of collection. Alden, in turn, delivered the samples under chain-of-custody to Analytical Resources, Inc., which performed the analysis. Holding times have not been established by U.S. EPA for TBT analysis. The holding time established for this project is 10 days. Although it was not explicitly stated in the QA Plan (Tetra Tech 1991), the 10 day holding time represents the time until extraction. The holding time until analysis was not stated in the QA Plan, but the laboratory has established their holding time as 40 days (Mitchell, D., 20 December 1991, personal communication). Sample numbers, dates of collection and analysis and actual holding times are given in Table 4. The actual holding times for the eleven sediment samples analyzed for TBT ranged from 15 to 30 days to extraction, and 23 to 38 days to analysis. Although all samples were analyzed within the 40 day holding time, the holding time for extraction was exceeded by 5 to 20 days for all samples. Because of holding time

exceedance, all sample results will be qualified as estimates (qualifier code 'E').

Calibration and Instrument Performance

TBT analyses were performed using a Finnigan MAT Incos 50 gas chromatograph/ mass spectrometer (GC/MS) with selective ion monitoring (SIM). This instrument requires tuning based on mass spectral abundance criteria and initial calibration. Tuning and calibration data were not provided by the laboratory. The internal standard d_{10}-Acenaphthene was used to calculated the relative response factors (RRF) for each compound.

Method Blanks

One method blank was performed for the batch of eleven sediment samples. In addition to TBT (Ethyl tributyl tin), the analytes MBT (Triethyl butyl tin) and DBT (Diethyl dibutyl tin) were also quantified using the same GC/MS analyses. None of the three analytes were detected in the blank sample, down to the detection limit of 6.7 μg/kg. No data qualifiers were assigned to sample results for TBT based on method blank results.

Surrogate Recoveries

Each field and blank sample was spiked with the surrogate compound Ethyl tripropyl tin. Percent recoveries for the surrogate ranged from 54 percent for the blank sample to 117 percent for Sample D19. Although there is no U.S. EPA-established control limit for the surrogate recovery of Ethyl tripropyl tin, the recoveries calculated for these samples are within the range established for other GC/MS organic surrogates (e.g., Dibutylchlorendate). No data qualifiers were assigned to sample results for TBT based on surrogate recoveries.

Field Duplicates

One set of field duplicates was analyzed for TBT. Samples D3 and D46 were duplicate samples collected at Station D3. None of the three analytes were detected in either of the samples. Given the lack of positive values, valid conclusions about field variability are not possible.

Summary

Sample results were reported by the laboratory in both μg/kg and μg Tin/kg and are presented in Table 5. None of the samples required dilution due to quantified values falling outside the calibration curve.

Detection limits reported by the laboratory (approximately 7-11 μg/kg) were well below the 50 μg/kg detection limit criterion established in the QA Plan (Tetra Tech 1991).

An 'E' (estimated value) data qualifier was assigned to all sample results based on the exceedance of extraction holding times for all samples. Despite the qualifier, these data are acceptable for their intended use.

C. ACID VOLATILE SULFIDES

Holding Times

Sediment samples were collected, placed on ice in a cooler, and transported to Alden Analytical Laboratories within 4 days of collection. Alden, in turn, delivered the samples under chain-of-custody to Analytical Resources, Inc. (ARI), who performed the analysis. Holding times have not been established by U.S. EPA for AVS analysis. The holding time established for this project is 14 days. Sample numbers, dates of collection and analysis and actual holding times are given in Table 1. For all sediment samples, the actual holding time exceeded the project-established holding time by 20-28 days. Given the lack of established holding times, the degree to which data quality are affected by the exceedance of holding time is difficult to determine. One of the sample batches analyzed by ARI (Batch Number 9147) was originally analyzed on 18 October. It was determined that there were seal leaks in the analytical apparatus, so the analyses for this batch were repeated on 1 November. A comparison of the AVS values for the two analyses indicates that the effect of an additional 14 days of holding time was not significant for most samples, although this conclusion is necessarily qualitative due to the suspected malfunction of the sample apparatus on the original sample date. Based on holding times and other QC data, all sample results will be qualified as estimated as described in the summary section.

Calibration and Instrument Performance

The spectrophotometer used to analyze each batch of sediment samples for AVS was calibrated using a six-point curve created from a working standard solution of Na_2S9H_2O. The concentration of the six points ranged from 0 to 0.7 mg S/L. The MDL for each batch was calculated as 3X the absorbance of the blank and read off of the calibration curve. The calibration curves bracketed the sample concentrations of sulfide for the majority of the samples, although some of the samples were diluted 10X so the concentration would be within the calibration range. No data qualifiers were assigned to AVS sample results based on calibration data.

Method Blanks

One method blank analysis was performed for each of the six batches of sediment samples. None of the blanks contained detectable levels of AVS (detection limit 0.001 mg S). No data qualifiers were assigned to AVS sample results based on method blank analyses.

Standards Analyses

Nine separate standards analyses were performed and are presented in Table 6A. The known concentration of the standards ranged from 0.093 to 0.623 mg S. The measured AVS values for these standards ranged from 14 to 89 percent of the "true" value. Only the analyses associated with the first two batches of samples were within 80 percent of the known value. The analyses performed on 5 November were concluded by the lab to be in error due to the use of incorrect reagents. Thus the 81 percent accuracy determined on 5 November can be discounted. The results of these analyses indicate poor analytical accuracy. Based on standards analyses

results and other QC data, all sample results will be qualified as estimated as unusable as described in the summary section.

Matrix Spike Analyses

Six sediment samples were each spiked with 158-407 mg/kg AVS and analyzed for AVS. The first batch of samples received did not have a matrix spike associated with it. Two of the matrix spikes were analyzed in duplicate. The results of the matrix spike analyses are presented in Table 6B. The percent recovery ranged from 21 to 133 percent. There are no established control limits for matrix spikes of AVS. Assuming an acceptable range for AVS is similar to ranges established for other inorganics analyses (e.g., metals, 75 to 125 percent), then five of the six analyses can be considered outside the acceptable range. Only Sample E5 had a percent recovery (92 percent) which unequivocally indicates acceptable accuracy. Based on matrix spike results and other QC data, all sample results will be qualified as unusable as described in the summary section.

Laboratory Duplicates

At least one sample from each of the six sample batches was analyzed in duplicate by the laboratory. The results of the laboratory duplicate analyses are presented in Table 6C. Of the five samples which contained detectable levels of AVS, three had an RPD of greater than 25 percent. Only the laboratory duplicate analyses of Sample D1 (RPD = 7.8 percent) and Sample E3 (RPD = 22.4 percent) indicated acceptable precision. Based on laboratory duplicate results and other QC data, all sample results will be qualified as unusable as described in the summary section.

Field Duplicates

The results of six sets of field duplicate analyses are presented in Table 4D. Three of the six pairs had detectable levels of AVS. Variability was high, ranging from 88 to 171 percent. By comparing the results of the field duplicate analyses with the laboratory duplicate analyses, it can be determined that most of the variability observed in the field duplicate analyses is field variability.

Summary

Sample results were reported by the laboratory in mg/kg and are presented in Table 7. Detection limits reported by the laboratory (approximately 0.2-0.9 mg/kg) were below the 1 mg/kg detection limit criterion established in the QA Plan (Tetra Tech 1991).

Of the QC analyses performed for AVS, only the method blank analyses consistently indicated acceptable performance. All sample results were qualified as unusable (qualifier code 'R') based on holding time exceedances, poor precision of laboratory duplicate analysis, matrix spike recoveries, and low check standard recovery. Each sample batch demonstrated deviations from quality control guidelines for at least three of the above categories.

The analytical method used to determine AVS (Di Toro et al. 1989) is relatively new and has proved somewhat difficult to perform. Low percent recoveries for standards and matrix spike

analyses are typical due to sulfide's strong tendency to oxidize. ARI considers these results typical. However, because all of the AVS results were qualified as unusable, these data did not satisfy program objectives.

D. GRAIN SIZE ANALYSES

Holding Times

Sediment samples were collected, placed on ice in a cooler, and transported to Precision Analytics, Inc. within 4 days of collection. The holding time for grain size determination established for this project is 28 days. Sample numbers, dates of collection and analysis and actual holding times are given in Table 8. For all sediment samples, the actual holding time exceeded the project-established holding time by 43-61 days. However, given the unnecessarily restrictive holding time established for this project, the holding time exceedance was not deemed serious enough to warrant qualifying any of the data.

Laboratory Replicates

Analytical replicates were not performed by the laboratory as was required in the QA plan (Tetra Tech 1991) and the Puget Sound Protocols (PSEP 1989). The absence of laboratory replicate data makes the degree of analytical precision attained by the laboratory impossible to determine.

Field Duplicates

Six pairs of field duplicate sediment samples were analyzed for grain size. Results of the field duplicate analyses are presented in Table 9. RPD calculations indicate the field variability was quite high, ranging up to 100% for those size ranges with non-zero values for both samples. The high variability was most pronounced for fractions with low measured weights of sediment. The precision of the results generally increased with increasing fraction weight.

Summary

The sediment grain size results are presented in Table 10 in the form of percent gravel, sand, and fines (silt and clay). The calculations performed for the hydrometer method employed by the laboratory did not allow for a quantitation of percent clay, because the boundary between clay and silt (8 phi or 3.9 μm) falls in the middle of the smallest quantified size range (2.9 - 5.0 μm).

All laboratory benchsheets were examined for calculation or transcription errors. No errors were noted. Because no laboratory replicates were performed, the analytical precision achieved by the laboratory is difficult to quantitate. Field replicate samples were collected from the identical field composite. Variability observed in the field duplicate analyses can be partially attributed to laboratory variability, although it is not possible to determine how this laboratory bias relates to sample heterogeneity (field bias).

Without an estimate of analytical precision, the grain size results reported in Table 10 should be considered estimates. However, given that the primary function of grain size data is to classify sediment types for use with other chemical data, the qualification of the data should not

prevent it from being utilized for its intended function.

E. PERCENT SOLIDS

Holding Times

Sediment samples were collected, placed on ice in a cooler, and transported to Alden Analytical Laboratories within 4 days of collection. Holding times have for percent solids analysis were not given in the QA plan (Tetra Tech 1991). The holding time recommended for conventionals analyses in the Puget Sound Estuary Protocols is 6 months (PSEP 1989). Sample numbers, dates of collection and analysis and actual holding times are given in Table 1. For all sediment samples, the actual holding times were well within the PSEP holding time of 6 months. No data qualifiers were assigned to percent solids results based on holding times.

Field Duplicates

Six sets of field duplicates were analyzed for percent solids. The results are given in Table 11. All RPD calculations between field duplicates are less than 3 percent, indicating excellent laboratory precision and/or low sample heterogeneity.

Summary

The laboratory benchsheets on which the calculations were recorded were examined for accuracy. No calculation or transcription errors were noted. The data are reported in percent to the nearest hundredth and are given in Table 12.

No laboratory replicates were performed, making the analytical precision achieved by the laboratory difficult to quantitate. However, analysis of field replicate samples collected from the same field composite indicated good precision even if it is assumed that all of the variability calculated can partially attributed to the laboratory and not to sample heterogeneity (field bias). No data qualifiers were assigned to percent solids data. The data are acceptable for their intended use.

F. RADIONUCLIDES

Summary

No formal QC criteria have been developed for the radionuclide method used by the Washington Department of Health. No holding time for sediment samples has been established. An error associated with the alpha spectrometer used to quantify isotope levels was calculated for each sample. The error associated with each measurement was large (up to 100%) in a relative sense, but was frequently comparable to the lower limit of detection (LLD). The results have been reproduced in Table 13. The LLD ranged from 0.001 to 0.1 pCi/g, well below the 0.5 pCi/g specified in the QA/QC Plan (Tetra Tech 1991).

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TABLE 1. AVS AND TOC ANALYSIS SUMMARY
LOWER COLUMBIA RIVER RECONNAISSANCE SURVEY

Tetra Tech Sample Number	ARI Sample Number	Date Collected	Date Analyzed AVS	Holding Time (d) AVS	Date Analyzed TOC	Holding Time (d) TOC
SEDIMENT						
D1	9233A	10/8/91	11/15/91	38	11/19/91	42
D2	9233B	10/8/91	11/15/91	38	11/19/91	42
D3	9233J	10/9/91	11/15/91	37	11/19/91	41
D4	9233C	10/8/91	11/15/91	38	11/19/91	42
D5	9252B	10/11/91	11/15/91	35	11/18/91	38
D6	9252C	10/10/91	11/15/91	36	11/18/91	39
D7	9252D	10/11/91	11/15/91	35	11/18/91	38
D8	9252E	10/12/91	11/15/91	34	11/18/91	37
D9	9252F	10/12/91	11/15/91	34	11/18/91	37
D10	9233D	10/7/91	11/15/91	39	11/19/91	43
D11	9233K	10/7/91	11/15/91	39	11/19/91	43
D12	9233E	10/7/91	11/15/91	39	11/19/91	43
D13	9196F	10/6/91	11/14/91	39	11/10/91	35
D14	9196B	10/6/91	11/14/91	39	11/10/91	35
D15	9196C	10/5/91	11/14/91	40	11/10/91	36
D16	9196D	10/4/91	11/14/91	41	11/10/91	37
D17	9196E	10/4/91	11/14/91	41	11/10/91	37
D18	9193I	10/3/91	11/12/91	40	11/8/91	36
D19	9193H	10/3/91	11/12/91	40	11/8/91	36
D20	9193E	10/2/91	11/12/91	41	11/8/91	37
D21	9193D	10/2/91	11/12/91	41	11/8/91	37
D22	9193C	10/2/91	11/12/91	41	11/8/91	37
D23	9193F	10/1/91	11/12/91	42	11/8/91	38
D24	9162I	9/30/91	11/7/91	38	11/8/91	39
D25	9162L	9/29/91	11/7/91	39	11/8/91	40
D26	9162K	9/29/91	11/7/91	39	11/8/91	40
D27	9162J	9/29/91	11/7/91	39	11/8/91	40
D28	9162M	9/29/91	11/7/91	39	11/8/91	40
D29	9162E	9/29/91	11/7/91	39	11/8/91	40
D30	9162D	9/28/91	11/7/91	40	11/8/91	41
D31	9162C	9/27/91	11/7/91	41	11/8/91	42
D32	9162G	9/27/91	11/7/91	41	11/8/91	42
D33	9162B	9/27/91	11/7/91	41	11/8/91	42
D34	9162A	9/27/91	11/7/91	41	11/8/91	42
D35	9147K	9/26/91	11/1/91	36	10/31/91	35
D36	9147B	9/26/91	11/1/91	36	10/31/91	35
D37	9147H	9/25/91	11/1/91	37	10/31/91	36
D38	9147I	9/25/91	11/1/91	37	10/31/91	36
D39	9147E	9/24/91	11/1/91	38	10/31/91	37
D40	9147F	9/24/91	11/1/91	38	10/31/91	37
D41	9147J	9/26/91	11/1/91	36	10/31/91	35
D42	9162N	9/29/91	11/7/91	39	11/8/91	40
D43	9193G	10/1/91	11/12/91	42	11/8/91	38

TABLE 1. (cont.)

Tetra Tech Sample Number	ARI Sample Number	Date Collected	Date Analyzed AVS	Holding Time (d) AVS	Date Analyzed TOC	Holding Time (d) TOC
D44	9196G	10/4/91	11/14/91	41	11/10/91	37
D45	9233F	10/7/91	11/15/91	39	11/19/91	43
D46	9233G	10/9/91	11/15/91	37	11/19/91	41
E1	9233H	10/9/91	11/15/91	37	11/19/91	41
E2	9233I	10/9/91	11/15/91	37	11/19/91	41
E3	9252G	10/11/91	11/15/91	35	11/18/91	38
E4	9252H	10/12/91	11/15/91	34	11/18/91	37
E5	9196H	10/5/91	11/14/91	40	11/5/91	31
E6	9196I	10/4/91	11/14/91	41	11/5/91	32
E7	9193J	10/3/91	11/12/91	40	11/8/91	36
E8	9193B	10/1/91	11/12/91	42	11/8/91	38
E9	9162H	9/30/91	11/7/91	38	11/8/91	39
E10	9162O	9/29/91	11/7/91	39	11/8/91	40
E11	9162F	9/28/91	11/7/91	40	11/8/91	41
E12	9147A	9/26/91	11/1/91	36	10/31/91	35
E13	9147C	9/25/91	11/1/91	37	10/31/91	36
E14	9147G	9/24/91	11/1/91	38	10/31/91	37

Tetra Tech Sample Number	ARI Sample Number	Date Collected	Date Analyzed TOC	Holding Time (d) TOC
WATER				
W6	9252A	10/10/91	11/18/91	39
W14	9196A	10/6/91	11/10/91	35
W26	9193A	10/2/91	11/8/91	37
W37	9162P	9/28/91	11/8/91	41
W45	9147D	9/26/91	10/31/91	35

TABLE 2. QC ANALYSIS SUMMARY FOR TOC - LOWER COLUMBIA RIVER RECONAISSANCE SURVEY

A. STANDARDS ANALYSIS

SEDIMENT

DATE ANALYZED	CONCENTRATION (mg/kg Carbon)	TOC RESULT (mg/kg Carbon)	PERCENT ACCURACY
10/31/91	2000	1922	96.10
11/8/91	2000	1741	87.05
11/10/91	2000	1787	89.35
11/18/91	2000	1966	98.30
11/19/91	2000	2060	103.00

WATER

DATE ANALYZED	CONCENTRATION (mg/L Carbon)	TOC RESULT (mg/L Carbon)	PERCENT ACCURACY
10/31/91	5.00	4.32	86.40
11/8/91	5.00	4.32	86.40
11/10/91	5.00	4.32	86.40
11/19/91	5.00	4.44	88.80

B. METHOD BLANK RESULTS

DATE ANALYZED	SEDIMENT TOC RESULT (mg/kg Carbon)	WATER TOC RESULT (mg/L Carbon)
10/31/91	<432	<2.41
11/8/91	<257	<2.41
11/10/91	276	<2.41
11/18/91	298	--
11/19/91	316	<0.37

C. MATRIX SPIKE SAMPLE RESULTS

SEDIMENT SAMPLE NUMBER	ORIGINAL VALUE (mg/kg)	SPIKE AMOUNT (mg/kg)	TOTAL AMOUNT (mg/kg)	PERCENT RECOVERY
E14	776	6672	8371	113.83
E10	3802	5575	8938	92.13
E8	1676	5193	6531	93.49
D14	2567	4813	7573	104.01
D2	16312	10526	29252	122.93
D6	4576	6250	11804	115.65

Table 2 (cont.)

C. MATRIX SPIKE SAMPLE RESULTS (cont.)

WATER SAMPLE NUMBER	ORIGINAL VALUE (mg/l)	SPIKE AMOUNT (mg/l)	TOTAL AMOUNT (mg/l)	PERCENT RECOVERY
W45	<2.41	20.00	16.13	80.65
W37	<2.41	20.00	16.96	84.80
W26	<2.41	20.00	17.07	85.35
W14	<2.41	20.00	16.73	83.65
W6	0.75	20.00	15.49	73.70

D. LABORATORY DUPLICATES

	SAMPLE NUMBER	RESULT 1 (mg/kg)	RESULT 2 (mg/kg)	RPD	RSD
Sediment	E14	776	786	1.28	0.29
	E10	3802	3673	3.45	0.21
	E8	1676	1773	5.62	0.40
	D14	2567	2692	4.75	0.30
	D2	16312	16862	3.32	0.10
	D6	4576	4605	0.63	0.08
Water	W45	<2.41	<2.41	--	--
	W37	<2.41	<2.41	--	--
	W26	<2.41	<2.41	--	--
	W14	<2.41	<2.41	--	--
	W6	0.75	0.62	18.98	37.22

E. FIELD DUPLICATES

SAMPLE NUMBERS	RESULT 1 (mg/kg)	RESULT 2 (mg/kg)	RPD	RSD
D35 and D41	30042	51154	52.00	0.25
D28 and D42	7180	5865	20.16	0.39
D23 and D43	6873	6575	4.43	0.18
D17 and D44	4491	4223	6.15	0.27
D11 and D45	7909	8100	2.39	0.12
D3 and D46	5977	5991	0.23	0.04

TABLE 3. TOC RESULTS
LOWER COLUMBIA RIVER RECONNAISSANCE SURVEY

Tetra Tech Sample Number	TOC (mg/kg)	Qual. Code	Standard Deviation	Percent RSD
SEDIMENT				
D1	13642	Z	--	--
D2	16312	Z	--	--
D3	5977	Z	--	--
D4	11282	Z	--	--
D5	3690	Z	--	--
D6	4576	Z	--	--
D7	3513	Z	--	--
D8	2552	Z	--	--
D9	5113	Z	--	--
D10	7872	Z	--	--
D11	7909	Z	--	--
D12	7726	Z	--	--
D13	3664	Z	--	--
D14	2567	Z	82	3.19
D15	6796	Z	--	--
D16	7296	Z	--	--
D17	4491	Z	--	--
D18	6875	Z	157	2.28
D19	1821	Z	59	3.24
D20	8486	Z	202	2.38
D21	8669	Z	646	7.45
D22	15424	Z	217	1.41
D23	6873	Z	214	3.11
D24	7495	Z	--	--
D25	5123	Z	--	--
D26	1946	Z	--	--
D27	4075	Z	--	--
D28	7180	Z	--	--
D29	4102	Z	--	--
D30	5834	Z	226	3.87
D31	4289	Z	160	3.73
D32	2449	Z	--	--
D33	4832	Z	244	5.05
D34	2070	Z	141	6.81
D35	30042	Z	1777	5.92
D36	7315	Z	529	7.23
D37	4665	Z	130	2.79
D38	702	Z	144	20.51
D39	589	Z	43	7.30
D40	4488	Z	274	6.11

Data Qualifiers: U = Not detected. Value given is MDL
Z = Value is corrected for blank contribution

TABLE 3. (cont.)

Tetra Tech Sample Number	TOC (mg/kg)	Qual. Code	Standard Deviation	Percent RSD
D41	51154	Z	4275	8.36
D42	5865	Z	343	5.85
D43	6575	Z	234	3.56
D44	4223	Z	--	--
D45	8100	Z	--	--
D46	5991	Z	--	--
E1	1309	Z	--	--
E2	1012	Z	--	--
E3	2075	Z	--	--
E4	502	UZ	--	--
E5	259	Z	--	--
E6	3068	Z	--	--
E7	257	UZ	25	9.73
E8	1676	Z	116	6.92
E9	6809	Z	--	--
E10	3802	Z	42	1.10
E11	6355	Z	--	--
E12	432	UZ	25	5.79
E13	432	UZ	104	24.07
E14	776	Z	77	9.92

Tetra Tech Sample Number	TOC (mg/l)	Qual. Code	Standard Deviation	Percent RSD
WATER				
W6	0.75	Z	0.35	46.67
W14	2.41	UZ	0.05	2.07
W26	2.41	UZ	0.01	0.41
W37	2.41	UZ	0.01	0.41
W45	2.41	UZ	0.04	1.66

Data Qualifiers: U = Not detected. Value given is MDL
Z = Value is corrected for blank contribution

TABLE 4. TBT ANALYSIS SUMMARY
LOWER COLUMBIA RIVER RECONNAISSANCE SURVEY

Tetra Tech Sample Number	ARI Sample Number	Date Collected	Date Extracted	Date Analyzed	Holding Time (d) Extraction	Holding Time (d) Analysis
SEDIMENT						
D2	9233B	10/8/91	10/24/91	11/1/91	16	24
D3	9233J	10/9/91	10/24/91	11/1/91	15	23
D12	9233E	10/7/91	10/24/91	11/1/91	17	25
D19	9193H	10/3/91	10/24/91	11/1/91	21	29
D22	9193C	10/2/91	10/24/91	11/1/91	22	30
D24	9162I	9/30/91	10/24/91	11/1/91	24	32
D29	9162E	9/29/91	10/24/91	11/1/91	25	33
D31	9162C	9/27/91	10/24/91	11/1/91	27	35
D37	9147H	9/25/91	10/24/91	11/1/91	29	37
D40	9147F	9/24/91	10/24/91	11/1/91	30	38
D46	9233G	10/9/91	10/24/91	11/1/91	15	23

TABLE 5. TRIBUTYL TIN ANALYSES RESULTS
LOWER COLUMBIA RIVER RECONNAISSANCE SURVEY

Tetra Tech Sample Number	Triethyl Butyl Tin (ug/kg)		Diethyl Dibutyl Tin (ug/kg)		Ethyl Tributyl Tin (ug/kg)	
D2	11	EU	11	EU	11	EU
D3	6.9	EJ	6.6	EJ	7.8	EU
D12	5.2	EJ	10	E	21	E
D19	110	E	7.4	EU	28	E
D22	6	EJ	11	E	12	EM
D24	6.8	EJ	13	E	27	E
D29	2.9	EJ	6.3	EJ	7.1	EM
D31	3.4	EJ	6.1	EJ	7.1	EU
D37	7.5	EU	7.5	EU	7.5	EU
D40	7.2	EU	7.2	EU	7.2	EU
D46	4.3	EJ	7.8	EU	7.8	EU

Data Qualifiers:

U = Compound not detected. Value is lower quantitation limit
J = Estimated value less than the specified detection limit
M = Estimated value because of low spectral match parameters
E = Estimated value due to holding time exceedance

TABLE 6. QC ANALYSIS SUMMARY FOR AVS
LOWER COLUMBIA RIVER RECONAISSANCE SURVEY

A. STANDARDS ANALYSES

DATE ANALYZED	CONCENTRATION (mg S)	AVS RESULT (mg S)	PERCENT ACCURACY
10/18/91	0.623	0.187	30.02
11/1/91	0.477	0.423	88.68
11/5/91	0.093	0.075	80.65
11/7/91	0.461	0.156	33.84
11/12/91	0.428	0.073	17.06
11/13/91	0.431	0.203	47.10
11/14/91	0.444	0.197	44.37
11/15/91	0.437	0.059	13.50
11/18/91	0.405	0.210	51.85

B. MATRIX SPIKE SAMPLE RESULTS

SAMPLE NUMBER	ORIGINAL VALUE (mg/kg)	SPIKE AMOUNT (mg/kg)	TOTAL AMOUNT (mg/kg)	PERCENT RECOVERY	RPD
D32	<0.5	175.7	43.9	24.95	--
E10	<0.5	175.7	81.2	46.20	--
	<0.5	175.7	54.9	31.24	38.64
D22	4.8	164.3	71.0	42.00	--
	4.8	164.3	66.7	39.44	6.29
E5	<0.5	406.9	373.9	91.89	--
D3	3.2	208.6	44.6	21.05	--
E4	<0.5	158.4	210.4	132.84	--

C. LABORATORY DUPLICATES

SAMPLE NUMBER	RESULT 1 (mg/kg)	RESULT 2 (mg/kg)	RPD	RSD
D41	6.2	17.9	97.10	20.07
D35	15.4	21.8	34.41	9.62
D32	<0.3	<0.3	--	--
D22	6.6	4.8	31.58	16.64
D13	<0.7	<0.6	--	--
D1	61.9	66.9	7.76	2.46
E2	<0.5	<0.5	--	--
E3	109.8	87.7	22.38	3.37

Table 6 (cont.)

D. FIELD DUPLICATES

SAMPLE NUMBERS	RESULT 1 (mg/kg)	RESULT 2 (mg/kg)	RPD	RSD
D35 and D41	15.4	6	87.85	20.26
D28 and D42	<0.5	<0.6	--	--
D23 and D43	<0.9	<0.8	--	--
D17 and D44	<0.5	<0.5	--	--
D11 and D45	11.2	1.4	155.56	35.14
D3 and D46	3.2	41.5	171.36	19.58

TABLE 7. ACID VOLATILE SULFIDES ANALYSIS RESULTS
LOWER COLUMBIA RIVER RECONNAISSANCE SURVEY

Tetra Tech Sample Number	AVS (mg/kg)		Tetra Tech Sample Number	AVS (mg/kg)	
D1	61.9	R	D31	6.5	R
D2	101.9	R	D32	0.3	RU
D3	3.2	R	D33	13.5	R
D4	89.9	R	D34	39.0	R
D5	0.5	RU	D35	12.4	R
D6	0.5	RU	D36	0.7	RU
D7	0.4	RU	D37	0.5	RU
D8	0.4	RU	D38	0.3	RU
D9	0.5	RU	D39	0.4	RU
D10	0.6	RU	D40	0.5	RU
D11	11.2	R	D41	6.2	R
D12	0.7	RU	D42	0.6	RU
D13	0.7	RU	D43	0.8	RU
D14	0.6	RU	D44	0.5	RU
D15	0.8	RU	D45	1.4	R
D16	0.7	RU	D46	41.5	R
D17	0.5	RU	E1	20.7	R
D18	0.5	RU	E2	0.5	RU
D19	0.3	RU	E3	109.8	R
D20	0.6	R	E4	0.5	RU
D21	0.7	R	E5	0.5	RU
D22	4.8	R	E6	0.4	RU
D23	0.9	RU	E7	0.6	R
D24	0.8	RU	E8	0.4	RU
D25	0.5	RU	E9	0.9	RU
D26	0.5	RU	E10	0.5	RU
D27	0.5	RU	E11	0.6	RU
D28	0.5	RU	E12	0.6	RU
D29	0.5	RU	E13	0.5	RU
D30	0.8	RU	E14	0.4	RU

Data Qualifiers:

R = Data are unusable

U = Compound not detected. Value given is MDL

TABLE 8. GRAIN SIZE ANALYSIS SUMMARY
LOWER COLUMBIA RIVER RECONNAISSANCE SURVEY

Tetra Tech Sample Number	Precision Sample Number	Date Collected	Date Analyzed	Holding Time (d)
D1	1523TTI005	10/8/91	12/22/91	75
D2	1523TTI006	10/8/91	12/22/91	75
D3	1523TTI007	10/9/91	12/22/91	74
D4	1523TTI008	10/8/91	12/22/91	75
D5	1527TTI006	10/11/91	12/22/91	72
D6	1527TTI007	10/10/91	12/22/91	73
D7	1527TTI008	10/11/91	12/22/91	72
D8	1527TTI009	10/12/91	12/22/91	71
D9	1527TTI010	10/12/91	12/22/91	71
D10	1523TTI009	10/7/91	12/22/91	76
D11	1523TTI010	10/7/91	12/22/91	76
D12	1523TTI011	10/7/91	12/22/91	76
D13	1507TTI013	10/6/91	12/22/91	77
D14	1507TTI009	10/6/91	12/22/91	77
D15	1507TTI010	10/5/91	12/22/91	78
D16	1507TTI011	10/4/91	12/22/91	79
D17	1507TTI012	10/4/91	12/22/91	79
D18	1502TTI019	10/3/91	12/22/91	80
D19	1502TTI018	10/3/91	12/22/91	80
D20	1502TTI015	10/2/91	12/22/91	81
D21	1502TTI014	10/2/91	12/22/91	81
D22	1502TTI013	10/2/91	12/22/91	81
D23	1502TTI016	10/1/91	12/22/91	82
D24	1486TTI004	9/30/91	12/22/91	83
D25	1486TTI005	9/29/91	12/22/91	84
D26	1486TTI006	9/29/91	12/22/91	84
D27	1486TTI007	9/29/91	12/22/91	84
D28	1486TTI008	9/29/91	12/22/91	84
D29	1486TTI009	9/29/91	12/22/91	84
D30	1486TTI010	9/28/91	12/22/91	85
D31	1486TTI011	9/27/91	12/22/91	86
D32	1486TTI012	9/27/91	12/22/91	86
D33	1486TTI013	9/27/91	12/22/91	86
D34	1486TTI014	9/27/91	12/22/91	86
D35	1474TTI004	9/26/91	12/22/91	87
D36	1474TTI007	9/26/91	12/22/91	87
D37	1474TTI001	9/25/91	12/22/91	88
D38	1474TTI006	9/25/91	12/22/91	88
D39	1474TTI003	9/24/91	12/22/91	89
D40	1474TTI002	9/24/91	12/22/91	89
D41	1474TTI005	9/26/91	12/22/91	87
D42	1486TTI015	9/29/91	12/22/91	84
D43	1502TTI017	10/1/91	12/22/91	82

Table 8 (cont.)

Tetra Tech Sample Number	Precision Sample Number	Date Collected	Date Analyzed	Holding Time (d)
D44	1507TTI014	10/4/91	12/22/91	79
D45	1523TTI012	10/7/91	12/22/91	76
D46	1523TTI013	10/9/91	12/22/91	74
E1	1523TTI014	10/9/91	12/22/91	74
E2	1523TTI015	10/9/91	12/22/91	74
E3	1527TTI011	10/11/91	12/22/91	72
E4	1527TTI012	10/12/91	12/22/91	71
E5	1507TTI015	10/5/91	12/22/91	78
E6	1507TTI016	10/4/91	12/22/91	79
E7	1502TTI020	10/3/91	12/22/91	80
E8	1502TTI012	10/1/91	12/22/91	82
E9	1486TTI001	9/30/91	12/22/91	83
E10	1486TTI002	9/29/91	12/22/91	84
E11	1486TTI003	9/28/91	12/22/91	85
E12	1474TTI009	9/26/91	12/22/91	87
E13	1474TTI010	9/25/91	12/22/91	88
E14	1474TTI008	9/24/91	12/22/91	89

TABLE 9. GRAIN SIZE FIELD DUPLICATE RESULTS
LOWER COLUMBIA RIVER RECONNAISSANCE SURVEY

Size Range (um)	Sample D3 (%)	Sample D46 (%)	RPD	Sample D11 (%)	Sample D45 (%)	RPD
2360 - 4000	0.0	0.0	0.0	0.0	0.0	0.0
2000 - 2360	0.0	0.0	0.0	0.0	0.0	0.0
1000 - 2000	0.2	0.1	66.7	0.2	0.2	0.0
500 - 1000	0.3	0.5	50.0	0.3	0.2	40.0
250 - 500	4.1	3.5	15.8	0.7	0.3	80.0
125 - 250	19.3	29.4	41.5	18.3	35.7	64.4
63 - 125	48.2	35.4	30.6	53.8	34.7	43.2
44.8 - 63.0	7.8	14.1	57.5	13.9	19.4	33.0
26.5 - 44.8	8.6	8.5	1.2	6.4	3.2	66.7
14.9 - 26.5	8.6	2.8	101.8	3.2	3.2	0.0
8.7 - 14.9	0.0	2.8	200.0	0.0	0.0	0.0
5.0 - 8.7	0.0	0.0	0.0	0.0	3.2	200.0
2.9 - 5.0	0.0	0.0	0.0	0.0	0.0	0.0

Size Range (um)	Sample D17 (%)	Sample D44 (%)	RPD	Sample D23 (%)	Sample D43 (%)	RPD
2360 - 4000	0.0	0.0	0.0	0.0	0.0	0.0
2000 - 2360	0.0	0.0	0.0	0.0	0.0	0.0
1000 - 2000	0.4	0.5	22.2	0.0	0.0	0.0
500 - 1000	0.6	0.5	18.2	0.4	0.5	22.2
250 - 500	1.2	1.2	0.0	1.9	2.4	23.3
125 - 250	22.9	26.0	12.7	9.0	11.2	21.8
63 - 125	53.2	54.6	2.6	46.6	45.6	2.2
44.8 - 63.0	10.5	5.7	59.3	17.6	18.6	5.5
26.5 - 44.8	5.6	2.9	63.5	15.3	12.4	20.9
14.9 - 26.5	2.8	5.8	69.8	3.1	3.1	0.0
8.7 - 14.9	2.8	2.9	3.5	3.1	0.0	200.0
5.0 - 8.7	0.0	0.0	0.0	0.0	0.0	0.0
2.9 - 5.0	0.0	0.0	0.0	0.0	3.1	200.0

Size Range (um)	Sample D28 (%)	Sample D42 (%)	RPD	Sample D35 (%)	Sample D41 (%)	RPD
2360 - 4000	0.0	0.0	0.0	0.0	0.0	0.0
2000 - 2360	0.0	0.0	0.0	0.4	0.0	200.0
1000 - 2000	2.2	2.5	12.8	0.8	5.2	146.7
500 - 1000	5.3	6.3	17.2	1.9	1.5	23.5
250 - 500	14.2	14.1	0.7	3.9	2.9	29.4
125 - 250	41.9	46.0	9.3	21.1	28.0	28.1
63 - 125	16.6	16.9	1.8	47.0	45.2	3.9
44.8 - 63.0	11.7	6.1	62.9	14.1	6.3	76.5
26.5 - 44.8	2.7	2.7	0.0	3.6	3.6	0.0
14.9 - 26.5	0.0	0.0	0.0	3.6	3.6	0.0
8.7 - 14.9	2.7	2.7	0.0	0.0	3.6	200.0
5.0 - 8.7	0.0	2.7	200.0	0.0	0.0	0.0
2.9 - 5.0	2.7	0.0	200.0	3.6	0.0	200.0

TABLE 10. GRAIN SIZE ANALYSIS RESULTS
LOWER COLUMBIA RIVER RECONNAISSANCE SURVEY

Sample Number	Percent Gravel (< -1 Phi)	Percent Sand (-1 to +3 Phi)	Percent Fines (> 3 Phi)
D1	0	23.7	76.2
D2	0	2.0	98.0
D3	0	23.9	73.2
D4	0	14.7	81.9
D5	0	81.1	18.9
D6	0	74.5	25.6
D7	0	67.4	32.5
D8	0	49.6	50.4
D9	0	74.9	25.1
D10	0	46.3	53.8
D11	0	19.5	77.3
D12	0	6.4	93.7
D13	0	10.8	89.1
D14	0	22.9	77.0
D15	0	57.1	42.9
D16	0	1.9	98.0
D17	0	27.1	72.9
D18	0	68.3	31.6
D19	0	43.3	56.7
D20	0	15.7	84.5
D21	0	35.6	61.2
D22	0	19.9	76.5
D23	0	14.1	82.8
D24	0	26.2	70.8
D25	0	17.2	79.8
D26	0	76.7	23.4
D27	0	78.7	21.2
D28	0	63.6	36.4
D29	0	79.1	21.0
D30	0	31.5	68.6
D31	0	58.9	41.2
D32	0	82.0	18.1
D33	0	62.5	37.5
D34	0	83.1	16.9
D35	0.4	49.2	50.4
D36	0	71.6	28.2
D37	0	50.1	50.0
D38	0	83.9	16.1
D39	0	69.5	30.5
D40	0	63.6	36.4
D41	0	37.6	62.3
D42	0	68.9	31.1

Table 10 (cont.)

Sample Number	Percent Gravel (< -1 Phi)	Percent Sand (-1 to +3 Phi)	Percent Fines (> 3 Phi)
D43	0	11.3	85.7
D44	0	28.2	71.9
D45	0	36.4	63.7
D46	0	33.5	63.6
E1	0	96.0	4.1
E2	0	75.6	24.5
E3	0	85.8	14.2
E4	0	97.8	2.2
E5	1.3	96.2	2.4
E6	0	76.8	23.3
E7	0	97.0	3.0
E8	0	91.6	8.4
E9	0	55.0	44.9
E10	0	73.4	26.5
E11	0	56.1	41.2
E12	10.5	88.8	0.8
E13	0	97.1	2.9
E14	0	99.0	1.0

TABLE 11. PERCENT SOLIDS FIELD DUPLICATE RESULTS LOWER COLUMBIA RIVER RECONNAISSANCE SURVEY

Sample Number 1	Result (%)	Sample Number 2	Result (%)	RPD
D3	61.79	D46	61.79	0.00
D11	53.75	D45	52.43	2.49
D17	61.67	D44	62.15	0.78
D23	53.70	D43	53.99	0.54
D28	64.96	D42	63.78	1.83
D35	49.57	D41	48.96	1.24

TABLE 12. PERCENT SOLIDS ANALYSIS RESULTS LOWER COLUMBIA RIVER RECONNAISSANCE SURVEY

Tetra Tech Sample Number	%Solids	Tetra Tech Sample Number	%Solids
D1	44.96	D31	66.12
D2	40.45	D32	71.48
D3	61.79	D33	68.46
D4	48.15	D34	73.36
D5	64.90	D35	49.57
D6	63.28	D36	63.55
D7	66.69	D37	65.74
D8	66.64	D38	74.04
D9	62.81	D39	74.27
D10	53.99	D40	67.47
D11	53.75	D41	48.96
D12	51.87	D42	63.78
D13	60.35	D43	53.99
D14	59.94	D44	62.15
D15	59.98	D45	52.43
D16	46.12	D46	61.79
D17	61.67	E1	73.15
D18	65.85	E2	69.56
D19	68.47	E3	74.93
D20	52.24	E4	74.94
D21	52.03	E5	85.64
D22	44.56	E6	74.29
D23	53.70	E7	76.16
D24	52.85	E8	79.13
D25	56.81	E9	55.22
D26	72.68	E10	72.18
D27	70.78	E11	61.44
D28	64.96	E12	84.20
D29	70.06	E13	77.50
D30	54.18	E14	89.15

TABLE 13. RADIONUCLIDES ANALYSIS RESULTS
LOWER COLUMBIA RIVER RECONNAISSANCE SURVEY

	D8 (pCi/g)	LLD* (pCi/g)	D14 (pCi/g)	LLD* (pCi/g)
Americium-241	0.000 +/- 0.003	0.006	0.002 +/- 0.003	0.004
Cesium-137	0.07 +/- 0.03	NA	0.07 +/- 0.02	NA
Cobalt-60	0.03 +/- 0.02	0.03	0.02 +/- 0.02	0.03
Europium-152	-0.02 +/- 0.05	0.09	0.02 +/- 0.05	0.08
Europium-155	0.04 +/- 0.05	0.09	-0.01 +/- 0.04	0.07
Plutonium-239/240	0.001 +/- 0.001	0.001	0.002 +/- 0.001	0.001
Plutonium-238	0.000 +/- 0.001	0.002	-0.001 +/- 0.001	0.002
	D20 (pCi/g)	LLD* (pCi/g)	**D28** (pCi/g)	LLD* (pCi/g)
Americium-241	0.000 +/- 0.002	0.003	0.000 +/- 0.002	0.003
Cesium-137	0.19 +/- 0.03	NA	0.11 +/- 0.02	NA
Cobalt-60	0.02 +/- 0.02	0.04	-0.001 +/- 0.002	0.05
Europium-152	0.04 +/- 0.06	0.1	-0.003 +/- 0.052	0.09
Europium-155	0.03 +/- 0.05	0.09	0.08 +/- 0.05	0.1
Plutonium-239/240	0.003 +/- 0.001	0.001	0.001 +/- 0.001	0.001
Plutonium-238	0.000 +/- 0.001	0.002	0.000 +/- 0.001	0.002
	D35 (pCi/g)	LLD* (pCi/g)	**D40** (pCi/g)	LLD* (pCi/g)
Americium-241	0.000 +/- 0.002	0.003	0.000 +/- 0.001	0.003
Cesium-137	0.25 +/- 0.04	NA	0.29 +/- 0.03	NA
Cobalt-60	0.05 +/- 0.03	0.05	0.03 +/- 0.02	0.04
Europium-152	0.11 +/- 0.08	NA	0.14 +/- 0.06	NA
Europium-155	0.07 +/- 0.06	0.1	0.04 +/- 0.05	0.08
Plutonium-239/240	0.002 +/- 0.002	0.002	0.005 +/- 0.002	0.001
Plutonium-238	0.000 +/- 0.003	0.006	0.000 +/- 0.001	0.003

NA = Not available
LLD = Lower Limit of Detection

Appendix A-3

Data Validation Report
Metals Analyses

Site: Lower Columbia River

Sample Numbers: Samples W1-W46, W48-W50, W52 (water)

Samples D1-D46, E1-E14 (sediment)

Samples ST-1-2-D, ST-1-3, ST-1-4, ST-1-5-D, ST-2-1-D, ST-2-2-D, ST-2-3, ST-2-4, ST-3-1-D, ST-3-3-D, ST-3-4, ST-3-6, ST-4-1-D, ST-4-2, ST-4-3-D, ST-4-4, ST-1-5-dup (sturgeon)

Samples D6, D8, D10, D12, D15, D15d, D16, D19, D20, D22, D23, D24, D26, D26d, D28, D29, D31, D35, D38, D40 (crayfish)

Samples D6S, D8S, D10S, D12S, D15S, D16S, D19S, D20S, D22S, D23S, D24S, D26S, D28S, D29S, D31S, D35S, D38S, D40S (sucker)

Samples D24C, D26C, D28C, D29C, D31C, D35C, D38C, D40C (carp)

Samples D3P, D10P, D12P, D15P, D16P, D19P, D21P, D23P, D24P, D28P (peamouth chub)

Samples collected and reported by: Tetra Tech, Inc.

Samples were analyzed by: Precision Analytics, Inc.
Lauck's Testing Laboratories
Washington State University

Data Reviewed by: M.R. Mulholland

INTRODUCTION

This report presents the results for the data validation review of 50 water samples, 60 sediment samples, and 73 tissue samples collected for the Lower Columbia River Reconnaissance Survey, and analyzed for metals by Precision Analytics, Inc, Lauck's Testing Laboratories, and Washington State University. The sediment samples were also analyzed for cyanide. Forty-five of the water samples were field samples (W1-W45) while five of the samples were field replicates (Sample W46 for Sample W44, Sample W48 for Sample W30, Sample W49 for W21, Sample W50 for W21, Sample W50 for Sample W8, and Sample 52 for Sample W26). Fifty-four of the sediment samples were field samples (Samples D1-D40 and E1-E14), while six of the samples were field replicates (Sample D41 for Sample D35, Sample D42 for Sample D28, Sample D43 for Sample D23, Sample D44 for Sample D17, Sample D45 for D11, and Sample D46 for Sample D3). Seventeen sturgeon samples, twenty crayfish samples, eighteen sucker samples, eight carp samples, and ten peamouth chub samples were analyzed for metals. All of the sucker, carp, and chub tissue samples were field samples. Eighteen of the twenty crayfish samples were field samples while two of the crayfish samples were lab duplicates (Samples D15d for D15 and D26d for D26). Sixteen of the seventeen sturgeon samples were field samples while one sturgeon sample (ST-1-5-Dup) was a field duplicate for the Sample ST-1-5.

Water samples were analyzed using Inductively Coupled Plasma (ICP) by U.S. EPA Method 200.7 (silver, aluminum, barium, copper, chromium, iron, nickel, antimony, thallium, and zinc); Graphite Furnace Atomic Absorption (GFAA) by U.S. EPA Method 206.2 (arsenic), EPA 210.2 (Beryllium), EPA 213.2 (cadmium), EPA 239.2 (lead), and EPA 270.2 (selenium); and Cold Vapor Atomic Absorption (CVAA) by EPA 245.2 (mercury). Sediment samples were analyzed using ICP by EPA 6010 (silver, aluminum, barium, copper, chromium, iron, nickel, antimony, thallium, and zinc); GFAA by EPA 7060 (arsenic), EPA 7091 (Beryllium), EPA 7131 (cadmium), EPA 7421 (lead), and EPA 7740 (selenium); CVAA by EPA 7471 (mercury); and colorimetry by EPA 9010 (cyanide). Tissue samples were analyzed using ICP by EPA Method 6010 (silver, nickel, copper, barium, antimony, zinc); ICP/Mass Spectroscopy (MS) by EPA 200.8 (lead); GFAA by EPA 7060 (arsenic), and EPA 7740 (selenium); and CVAA by EPA 245.2 (mercury). All GFAA analyses were performed by Precision Analytics, ICP-MS analyses by Washington State University, and the rest of the ICP analyses by Lauck's Testing Laboratory. The data validation review was conducted according to guidelines presented in the U.S. EPA Contract Laboratory Program SOW for inorganics analyses (U.S. EPA 1987) and the Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analyses (U.S. EPA 1988) and the QA/QC Plan established for this project (Tetra Tech 1991).

A. HOLDING TIMES

Sediment/Water

Water and sediment samples were collected, placed on ice in a cooler, and transported to the laboratory within 4 days of collection. The maximum holding times (time of collection to time of analysis) for metals (except mercury) in water and sediment/soil matrices have been established as 6 months to analysis (from the time of collection). The maximum recommended holding time for mercury in water and sediment/soil matrices has been established as 28 days from collection to analysis. The maximum recommended holding time for cyanide analysis in water and sediment/soil matrices is 14 days until extraction. Table 1 presents a summary of sample numbers, dates collected, dates of analyses, and holding times for specific analyses. All metals analyses for all water and sediment were conducted within the required holding time except for mercury. Recommended holding times for mercury analysis were exceeded by one day in four sediment samples (D39, D40, D44, and E14). These violations of recommended holding times were considered minor and so these data were not qualified based on holding time exceedances. The recommended holding time for cyanide analysis was exceeded in all sediment samples by 82 to 127 days. All of the cyanide data for sediments were qualified with an "R" to indicate that the data are unusable due to unacceptably long holding times. The laboratory did not qualify any of the metal and mercury results based on holding time exceedances.

Tissue

Tissue samples were wrapped in aluminum foil and stored on dry ice in the field, with the exception of sturgeon, which were stored on ice. All samples were transported to Keystone/NEA Laboratories in Portland, Oregon and stored in freezers within three days of collection. Keystone/NEA was responsible for homogenizing the tissue samples before sending them to Precision Analytics Inc. for metals analyses. The maximum recommended holding times for frozen tissue samples is 6 months for metals and 28 days for mercury. All of the tissue samples were analyzed for metals within 6 months, with the exception of samples of samples for arsenic and selenium, which were reanalyzed using GFAA. The holding time for these samples was exceeded by 17-50 days. Because the six-month holding time is only recommended, no data qualifiers were assigned to tissue data for arsenic and selenium. The recommended holding time for mercury analysis was exceeded by four days in two sturgeon samples (ST-1-5-D and ST-1-5-dup), by five days in one sturgeon sample (ST-1-4), by one day in two crayfish samples (D28 and D29), and by two days in four crayfish samples (D31, D35, D38, D40). These holding time violations were not excessive and so data was not qualified based on holding time exceedances for these samples. The recommended holding times for mercury analyses were exceeded in all of the sucker, carp, and peamouth chub samples by 3 to 91 days (Table 1). Holding time exceedances of 5 days or less were not considered to be significant and data generated from mercury analyses conducted within 33 days of sample collection were not qualified. Mercury levels reported in samples with holding time violations of more than 5 days were flagged with an "E" to indicate that these values should be considered as estimates. Further, these values should be considered minimum estimates due to storage effects and

possible loss of the target analyte during storage. The laboratory did not qualify data based on holding time exceedances.

B. CALIBRATION AND INSTRUMENT PERFORMANCE

Metals analyses were conducted using either ICP or GFAA. Mercury analyses were conducted using CVAA. For GFAA analyses, calibration curves were generated using a blank and a minimum of three standards. All initial calibration curves showed excellent precision (correlation coefficient > 0.995). No continuing calibration data were available. Check standard data were also examined for GFAA metals (cadmium in all media, lead in water, and arsenic and selenium in tissue). For check standard data that did not agree within $\pm$ 20% of the true value, a new calibration curve was generated. Check standard data are presented in Table 2. All available check standard data indicated excellent precision. No calibration or check standard data were available for CVAA or ICP analyses. Without these data, the accuracy of the reported numbers can not be verified. Sample data for all ICP metals were qualified as estimates because of the lack of calibration and check standard data.

C. METHOD BLANKS

Method blank analyses were performed for each analyte in each sample media. One method blank was reported for each analyte analyzed in water, sediment, and tissue samples. Results from the method blank analyses are reported in Table 3. Aluminum and iron were detected in the water and sediment blank. Copper was detected in the tissue blank. The laboratory did not state whether corrective actions were taken to eliminate possible contamination or any instrument memory effects that may have been causing these detections. For water samples, all aluminum and iron values less than 5X the value detected in the blank were qualified as undetected. Data were not blank corrected since the source of contamination to the method blank could not be identified to assess whether samples were all contaminated uniformly or whether only the method blank was contaminated. Data should not be blank corrected for these analyses (U.S. EPA 1987, 1988).

D. MATRIX SPIKE/MATRIX SPIKE DUPLICATE ANALYSIS

Selected samples were spiked with analyte to check the efficiency of analyte recovery in each sample matrix. The percent recovery of matrix spikes and matrix spike duplicates and the relative percent difference between these recoveries are reported in Table 4.

Sediment

Matrix spikes and matrix spike duplicates were analyzed in four sediment samples for arsenic, beryllium, cadmium, lead, selenium, chromium, nickel, zinc, and barium; two sediment samples for copper; and five sediment samples for mercury. The percent recovery of cyanide was

measured in four laboratory control samples. Percent recoveries for a number of spiked analytes were outside the advisory recovery limits of 75-125% for sediment as specified in SW-846 (U.S. EPA 1986). The percent recovery of arsenic spiked in sample E13 was 74.8%. The recovery of selenium was 74.5% in the matrix spike (MS) and 69.5% in the matrix spike duplicate (MSD) in sample E7 and in sample D10 selenium recovery was 65% in the MS and 70% in the MSD. Chromium recovery in sample D10 was 70% (MS). Nickel recovery for sample D10 was 65% (MS) and 70% (MSD). Zinc recovery from sample D10 was 49.5% for both the MS and MSD while in sample E7, zinc recovery was 14.9% (MS) and 44.6% (MSD). Barium recovery in sample D10 was 0% in both the MS and MSD while in sample D32 recovery was 72.8% (MSD) and in sample E13 recovery was 63.1% (MS). An "E" qualifier was assigned to zinc and barium results from sample batches associated with MS/MSD results well outside the acceptable range (< 60% recovery of spiked analyte) to indicate that sample results should be considered as estimates. Matrix spike recovery of beryllium, cadmium, lead, mercury, and cyanide were all within the CLP accepted recovery ranges of 75-125%.

The relative percent difference (RPD) between matrix spike and matrix spike duplicate results was greater than 20% for zinc in sample E7 (99.83%) and for barium in sample E13 (55.61%). The percent RPD is a measure of the laboratories ability to reproduce analytical results. RPDs greater than 20% are considered poor reproducibility. Sample results from analytical batches associated with these MS/MSD results were qualified as estimates to indicate that results should be considered as estimates due to poor laboratory QA performance.

Because of the low spike recoveries for a number of analytes in a number of samples and high RPDs for two analytes in one sample each, the results from samples associated with these QA samples may underestimate the actual level of analyte present in the sample. Sample results associated with MS/MSD samples with unacceptable recoveries of spiked analyte (<60%) or unacceptably high RPDs were qualified as estimates during this review. The laboratory did not qualify any of the data as estimates based on results of matrix spike recoveries.

Water

Table 4 also gives the results of MS/MSD analyses for water samples. MS/MSD analyses with the spiked metals were performed on 4 samples for beryllium, cadmium, lead, selenium, chromium, nickel, zinc, and barium. MS/MSD analyses were performed on 3 samples spiked with arsenic, copper, iron, and mercury, and on 2 samples spiked with antimony and thallium. For arsenic, the percent recovery of spiked analyte in sample W43 was 126.7% (MS) and 134.7% (MSD) and for sample W52 the recovery of the spiked analyte was 59% (MS) and 60.2% (MSD). The percent recovery of beryllium in sample W52 was 141% (MS). For lead, the percent recovery of spiked analyte in sample W18 was 143.8% (MSD) and in sample W1, the recovery of spiked analyte was 62.9% (MS). Spiked selenium recovery was lower than the acceptable range of 75-125% for sample W43 (39% for the MS and 44% for the MSD). For iron, spiked analyte recovery was unacceptably high for sample W7 (180% for the MS) and sample W52 (180% for both the MS and MSD) and unacceptably low for sample W18 (40% for the MS). Recovery of spiked chromium was 72% for sample W52 (MSD). The recovery of antimony was lower than the acceptable range for both MS/MSD analyses. The recovery of

spiked antimony was 40% for sample W52 (MS and MSD) and for sample W18, spiked antimony recovery was 38% for the MS and 30% for the MSD. Spiked thallium recovery was 142% in sample W18 (MS). For aluminum, the percent recovery of spiked analyte in sample W52 was 135.9% (MS and MSD). Samples in analytical batches associated with MS/MSD results outside of the acceptable range (iron, arsenic, antimony, and selenium in selected sample batches) were qualified as estimates to indicate that results should be considered to be estimates.

The RPDs calculated for MS/MSD analyses were higher than 20% for a number of analytes in a number of samples. The RPD for spiked beryllium recovery in sample W52 was 34.22%. For cadmium, the RPD for MS/MSD analysis in sample W52 was 24.35%. RPDs for selenium recovery for MS/MSDs were 22.75% for sample W18 and 26.62 for sample W1. The RPDs calculated for iron recovery in sample W7 and W18 were 76.92% and 66.67%, respectively. For antimony the RPD calculated from MS/MSD analysis in sample W18 was 23.53% and for thallium the RPD calculated from MS/MSD analyses was 28% for sample W52 and 20.16% for sample W18. For aluminum, the RPD calculated from MS/MSD analysis was 22.2% for sample W18. Only iron samples in sample batches associated with the W7 and W18 MS/MSD QA samples were qualified as estimates based on these results. All of the other RPD results for MS/MSD samples were considered to be of acceptable quality for this study. A 15% exceedance of the QA performance criteria for RPDs was considered minor and so data associated with QA samples with less than 35% RPD were not qualified.

A number of spiked analytes were recovered outside the acceptable range of 75-125% for the recovery of metals in matrix spikes indicating poor recovery of target analyte and possible inaccuracy of test results associated with these samples. Further, the RPDs calculated for a number of MS/MSD analyses were greater than the acceptable level of 20%, indicating poor laboratory reproducibility of results. Based on the results from MS/MSD analyses for selected metals, sample results associated with these QA/QC samples may be biased due to poor recovery of target analyte and/or poor laboratory precision. The laboratory did not qualify sample data based on results from MS/MSD analyses.

Tissue

The results of MS/MSD analyses for tissue samples are presented in Table 4. MS/MSD analyses with the spiked metals were performed on 4 tissue samples for cadmium and mercury, and on 2 tissue samples for antimony, nickel, copper, and zinc. An MS analysis (with no MSD) was performed on 3 samples spiked with antimony, nickel, copper, and zinc. For antimony, the percent recovery of spiked analyte in crayfish sample D29 was 44% (MS), in sample D38S recovery was 42% (MS), and in sample D31S, recovery of antimony was 48% (MS). For copper, recovery of spiked analyte in crayfish sample D29 was 220% in the MS and 260% in the MSD. For zinc the recovery of spiked analyte in crayfish sample D29 was 130% in the MS and 150% in the MSD. MS and MSD percent recoveries of spiked analyte were within the acceptable range of 75-125% in all of the other tissue samples. Sample results associated with the above MS/MSD results were qualified as estimates.

The RPD calculated from the MS/MSD analysis of antimony in crayfish sample D29 was 53.33%, thus exceeding the acceptable level of 20%. All of the other calculated RPDs were less than 20% indicating good laboratory precision. Sample results associated with this QA sample were qualified as estimates.

A number of the QA/QC samples did not meet acceptable QA/QC criteria and may therefore have biased results for samples associated with this sample group. Poor recovery of spiked analyte from tissue matrices may indicate inaccurate sample results due to poor recovery of the target analyte from unspiked samples. RPDs greater than 20% may indicate poor laboratory precision in reproducing analytical results. The laboratory did not qualify any of the metals data based on MS/MSD results.

E. LABORATORY DUPLICATES

Tissue

Two crayfish samples (D15 and D26) were analyzed in duplicate by the laboratory to assess variability associated with sample compositing and analytical methods. The analytical results and calculated RPDs for duplicate sample results are presented in Table 5. There are no established protocols for determining unacceptable results from duplicate sample analyses. In this report, RPDs will be compared with the level of variability acceptable for laboratory QA samples ($\leq$ 20%). For the crayfish sample from station D15, barium, copper, silver, zinc, arsenic, cadmium, lead, selenium, and mercury were detected in both duplicates. Antimony and nickel were undetected in both duplicates. The RPDs calculated for detected metals are reported in Table 5. High RPDs (e.g. for barium, cadmium, and mercury) indicate that variability may be associated with inhomogeneous sample compositing and/or analytical methods. Results of duplicate analyses generally show fairly good agreement between duplicate samples.

The crayfish sample from station D26 was also analyzed in duplicate by the laboratory to assess analytical variability. Barium, copper, nickel, zinc, arsenic, cadmium, and selenium were detected in both duplicates. Mercury and lead were detected in one of the duplicates only. The RPDs calculated for detected metals are reported in Table 5. The high RPD calculated for mercury indicates high variability associated with sample compositing and/or analytical methods for this analysis. Other RPDs for duplicate analyses were good.

In general, laboratory duplicates of tissue sample composites showed low variability (relative to the acceptable level of variability for MS/MSD samples to meet QA performance standards) associated with sample homogenization and analysis for the tissue sample duplicates. No data qualifiers were assigned based on laboratory duplicate results.

F. FIELD DUPLICATES

Field duplicates were collected at sediment and water stations to assess variability associated with compositing samples in the field, sample collection, storage, and handling. Results of duplicate analyses are presented in Table 6 along with the relative percent difference (RPD) between the two station duplicates. There are no established protocols for assessing field variability. In this report, field variability will be compared with the acceptable laboratory variability for QA/QC samples. This will allow a qualitative assessment of the compounded variability introduced by field and laboratory methods combined.

Sediment

Six field duplicate samples were collected and analyzed for metals. Samples D35 and D41 were replicate samples collected at station D35. Aluminum, barium, chromium, copper, iron, nickel, zinc, arsenic, cadmium, lead, and mercury were detected in both duplicates. The RPD calculated for cadmium was 43.04%. All of the other detected metals had RPDs of less than 20% indicating low variability associated with field collection, handling, and storage.

Samples D28 and D42 were duplicate field samples collected at station D28. Aluminum, barium, chromium, copper, iron, nickel, zinc, arsenic, cadmium, and lead were detected in both duplicates. The RPDs calculated for chromium and lead were 20.94% and 26.81%, respectively. All of the other detected metals had RPDs of less than 20% indicating low field variability for sample collection, handling, and storage for these metals.

Samples D23 and D43 were duplicate field samples collected at station D23. Aluminum, barium, chromium, copper, iron, nickel, zinc, arsenic, cadmium, and lead were detected in both duplicates. The RPDs calculated all of detected metals had RPDs of less than 20% indicating low variability associated with field methods for these metals.

Samples D17 and D44 were duplicate samples collected at station D17. Aluminum, barium, chromium, copper, iron, nickel, zinc, arsenic, cadmium, and lead were detected in both duplicates. Silver was detected in sample D44 only. The RPDs calculated for chromium and silver were 21.42% and 43.9%, respectively. All of the other detected metals had RPDs of less than 20% indicating good field reproducibility of results.

Samples D11 and D45 were duplicate samples collected at station D11. Aluminum, barium, chromium, copper, iron, nickel, zinc, arsenic, cadmium, and lead were detected in both duplicates. Silver was detected in sample D45 only. The RPDs calculated for aluminum, chromium, iron, nickel, and silver were 29.47%, 30.79%, 23.92%, 20.97%, and 28.57%, respectively. All of the other detected metals had RPDs of less than 20% indicating low variability associated with field methods for those metals.

Samples D3 and D46 were duplicate field samples collected at station D3. Aluminum, barium, chromium, copper, iron, nickel, zinc, arsenic, cadmium, and lead were detected in both duplicates. Silver was detected in sample D46 only and mercury was detected in sample D3

only. The RPD calculated for silver was 35.9%. All of the other detected metals had RPDs of less than 20% indicating low variability associated with field methods for those metals.

In general, variability associated with sample collection, handling and storage was comparable to variability associated with laboratory methods ($\leq$ 20 %). However, valid conclusions about field variability were not possible for metals that were undetected in samples at the method detection limits. The detection limit varied by an order of magnitude for some undetected compounds. No data qualifiers were assigned based on field duplicate results.

Water

Five field duplicate samples were collected and analyzed for metals and mercury. Samples W44 and W46 were duplicate samples collected at station W44. Aluminum, barium, and iron were detected in both samples. Lead and zinc were detected in sample W46 only, however the lead concentration reported was equal to the detection limit reported for sample W44. All of the detected compounds had RPDs of less than 20% between field duplicates indicating variability in the field was comparable to acceptable laboratory variability (20% RPD).

Samples W30 and W48 were duplicate samples collected at station W30. Aluminum, barium, copper, iron, lead, and selenium were detected in both field duplicates from this station. The RPD for measured copper levels between replicate samples was 58.82%. The RPDs calculated for the other detected compounds in these two duplicate samples were less than 20% indicating little variability associated with field collection for these metals.

Samples W21 and W49 were duplicate field samples collected at station W21. Aluminum, barium, copper, iron, and lead were detected in both samples. The RPDs calculated for aluminum, iron, and lead were 66.67%, 30.77%, and 26.09%, respectively, while the RPDs calculated for aluminum and copper were less than 20%. This variability between field duplicates is comparable to acceptable laboratory variability for QA samples.

Samples W8 and W50 were duplicate field samples collected at station W8. Aluminum, barium, and iron were measured in both of the duplicates. The RPDs calculated for these 3 metals were less than 20%.

Samples W26 and W52 were duplicate samples collected at Station W26. Aluminum, barium, iron, lead, and selenium were detected in both samples. Copper was detected in sample W26 only. The RPDs for lead and selenium were 40% and 93.52%, respectively indicating some variability associated with field methods for these compounds. The RPDs calculated for the other two detected metals were less than 20%, the level acceptable for laboratory QA samples.

Tissue

The sturgeon sample ST-1-5 was analyzed in duplicate by the analytical laboratory to assess analytical variability. Zinc, arsenic, lead, selenium, and mercury were detected in both duplicates while copper was detected in one of the duplicates. The RPDs calculated for this duplicate analysis were all less than 20% indicating low variability associated with sample

homogenization and/or analytical methods for detected metals.

In general, variability associated with sample collection, handling and storage was comparable to variability associated with laboratory methods ($\leq$ 20 %). However, valid conclusions about field variability were not possible for metals that were undetected in samples at the method detection limits. The detection limit varied by an order of magnitude for some undetected compounds. No data qualifiers were assigned based on field duplicate results.

G. DETECTION LIMITS

Sediment

Method detection limits were reported by the laboratory for all of the undetected metals. The detection limits reported for undetected concentrations for antimony, thallium, and selenium analyses and for two of the undetected concentrations for beryllium analyses exceeded the detection limits specified in the QA/QC Plan approved for this study (Table 7). The detection limits specified in the QA Plan (Tetra Tech 1991) may have been unreasonably low for some of these metals. Contract laboratory program required detection limits for metals were met for all metals except for thallium. Detection limits reported for thallium in sediment matrices were less than 30 ppm. (Detection limits of 0.08 ppm and 10 ppm are specified in the QA/QC Plan and the U.S. EPA's Functional Guidelines for Evaluating Inorganics Analyses (1988)). There are no sediment quality criteria for these metals. Other detection limits achieved by the laboratory met the requirements of the QA/QC Plan.

Water

Analytical results are reported in Table 8. Detection limits were reported by the laboratory for undetected compounds. The detection limit for silver reported by the laboratory was 2.0 ug/L for all of the silver samples. This was greater than the 1.0 ug/L detection limit for silver specified in the QA/QC Plan approved for this study but less than the contract required detection limit of 10 ug/L specified in the U.S. EPA's Functional Guidelines for Evaluating Inorganics Analyses (1988). The detection limits reported for thallium analyses were 36.0 and 360.0 ug/L, these exceeded both the 4.0 ug/L detection limit specified for this metal in the QA/QC Plan and the 10.0 ug/L contract required detection limit (U.S. EPA 1988). Acute and chronic water quality criteria for thallium are 1,400 ug/L and 40 ug/L, respectively. Detection limits for cadmium, lead, antimony, and selenium exceeded the detection limits specified in the QA/QC plan for some of the samples reported as non-detects for these metals. The achieved detection limits for selenium, cadmium, silver, and thallium measured in some samples exceed some of the freshwater quality criteria and therefore make comparisons with these criteria impossible. Other detection limits achieved by the laboratory met the requirements specified in the QA/QC Plan and were below the applicable water quality criteria.

Tissue

Detection limits reported by the laboratory for all of the undetected concentrations of antimony and some of the undetected concentrations of barium, copper, nickel, silver, zinc, and selenium

exceed the detection limits specified in the QA/QC Plan for sediment matrices (Table 9). These exceedances, however, were not significant relative to detection limits achieved in other matrices and approved for the contract laboratory program. There are no criteria for metal concentrations in fish tissue.

No data qualifiers were assigned to sediment, water, and tissue data based on reported detection limits.

SUMMARY

Sample data were reported as μg/L for water samples and mg/kg for sediment and tissue samples. Tissue samples are reported on a wet weight basis. Sample results with the appropriate qualifiers are presented in Tables 7, 8, and 9 for sediment, water, and tissue, respectively. The data package submitted by the laboratory contained most of the required deliverables, with the exception of calibration and check standard data for ICP and mercury analyses. All ICP metals and mercury were qualified as estimates based on the lack of calibration and check standard data. The laboratory provided Tetra Tech with data sheets listing the concentration of individual metals measured in each sample analyzed. If a compound was undetected, the method detection limit was reported and the value was qualified with a "U" to indicate that the compound was undetected. The laboratory did not supply an assessment of data quality, laboratory analytical procedures, and corrective actions taken to improve the results of QA/QC analyses.

Holding times for mercury analyses for numerous tissue samples exceeded the established holding time of 28 days by more than 5 days. These results were qualified with an "E" to indicate that the reported concentrations should be considered estimates. Loss of analyte or other storage effects may result from excessive storage times. These data should be considered minimum estimates of actual sample concentrations. The recommended holding time of 14 days was greatly exceeded for all of the sediment samples designated for cyanide analysis. All of the sediment cyanide data was qualified with an "R" to indicate that the data are unusable due to excessive holding times.

Only one method blank was reported for each sample matrix. Aluminum and iron were detected in the water and sediment method blanks while copper was detected in the tissue method blank. Sample results may be biased due to possible contamination. It is not recommended that data from these analyses be blank corrected.

The percent recoveries of spiked analyte from sample matrices were outside of the acceptable range of 75-125% in a number of the QA samples. Further, the RPD between MS and MSD recoveries was in some cases in excess of 20%. Failure to meet QA/QC criteria for MS/MSD analyses may indicate poor laboratory accuracy and precision. Samples for which the MS/MSD results were outside the acceptable range of performance were qualified as estimates.

Laboratory duplicates for 3 tissue samples showed some degree of analytical variability for some metals. There was good agreement between duplicate samples for most metals. High analytical variability may result from laboratory imprecision or from inadequate homogenization of composited samples. Field duplicates from six sediment stations and five water stations showed

little variability associated with field collection, handling, and storage for most metals. Due to a large number of undetected compounds in water samples, it was difficult to assess field variability for a number of metals in water matrices.

Detection limits were reported by the laboratory for all undetected metals. Not all of the detection limits met the criteria established in the QA Plan (Tetra Tech 1991). Most of the achieved detection limits were adequate for the purposes of this study.

Data qualified in this report should be used cautiously since a number of the QA/QC criteria specified in the QA Plan for this project (Tetra Tech 1991), the EPA test methods (EPA 1986), the EPA-CLP program SOW (EPA 1987), and/or the EPA functional guidelines for evaluating inorganics analyses (EPA 1988) were not met by the analytical laboratories.

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TABLE 1. METALS ANALYSIS SUMMARY
LOWER COLUMBIA RIVER RECONNAISSANCE SURVEY

Tetra Tech Sample Number	Precision Sample Number	Date Collected	Date Analyzed Mercury (CVAA)	Date Analyzed ICP Metals	Date Analyzed Lead (GFAA)		Date Analyzed Arsenic (GFAA)	Date Analyzed Se, Be, As (GFAA)	Date Analyzed Cadmium (GFAA)
SEDIMENT									
D1	1523TTI005	10/8/91	10/23/91	1/16/92	2/1/92		1/28/92	1/30/92	2/3/92
D2	1523TTI006	10/8/91	10/23/91	1/16/92	2/1/92		1/28/92	1/30/92	2/3/92
D3	1523TTI007	10/9/91	10/23/91	1/16/92	2/1/92		1/28/92	1/30/92	2/3/92
D4	1523TTI008	10/8/91	10/23/91	1/16/92	2/1/92		1/28/92	1/30/92	2/3/92
D5	1527TTI006	10/11/91	10/23/91	1/16/92	2/1/92		1/28/92	1/30/92	2/3/92
D6	1529TTI008	10/10/91	10/23/91	1/16/92	2/1/92		1/28/92	1/30/92	2/3/92
D7	1527TTI008	10/11/91	10/23/91	1/16/92	2/1/92		1/28/92	1/30/92	2/3/92
D8	1527TTI009	10/12/91	10/23/91	1/16/92	2/1/92		1/28/92	1/30/92	2/3/92
D9	1527TTI010	10/12/91	10/23/91	1/16/92	2/1/92		1/28/92	1/30/92	2/3/92
D10	1523TTI009	10/7/91	10/23/91	1/16/92	2/1/92		1/28/92	1/30/92	2/3/92
D11	1523TTI010	10/7/91	10/23/91	1/16/92	2/1/92		1/28/92	1/30/92	2/3/92
D12	1523TTI011	10/7/91	10/23/91	1/16/92	2/1/92		1/28/92	1/30/92	2/3/92
D13	1507TTI013	10/6/91	10/23/91	1/16/92	2/1/92		1/28/92	1/30/92	2/3/92
D14	1507TTI009	10/6/91	10/23/91	1/16/92	2/1/92		1/28/92	1/30/92	2/3/92
D15	1507TTI010	10/5/91	10/23/91	1/16/92	2/1/92		1/28/92	1/30/92	2/3/92
D16	1507TTI011	10/4/91	10/23/91	1/16/92	2/1/92		1/28/92	1/30/92	2/3/92
D17	1507TTI012	10/4/91	10/23/91	1/16/92	2/1/92		1/28/92	1/30/92	2/3/92
D18	1502TTI019	10/3/91	10/23/91	1/16/92	2/1/92		1/28/92	1/30/92	2/3/92
D19	1502TTI018	10/3/91	10/23/91	1/16/92	2/1/92		1/28/92	1/30/92	2/3/92
D20	1502TTI015	10/2/91	10/23/91	1/16/92	2/1/92		1/28/92	1/30/92	2/3/92
D21	1502TTI014	10/2/91	10/23/91	1/16/92	2/1/92		1/28/92	1/30/92	2/3/92
D22	1502TTI013	10/2/91	10/23/91	1/16/92	2/1/92		1/28/92	1/30/92	2/3/92
D23	1502TTI016	10/1/91	10/23/91	1/16/92	2/1/92		1/28/92	1/30/92	2/3/92
D24	1486TTI004	9/30/91	10/23/91	1/16/92	2/1/92		1/28/92	1/30/92	2/3/92
D25	1486TTI005	9/29/91	10/23/91	1/16/92	2/1/92		1/28/92	1/30/92	2/3/92
D26	1486TTI006	9/29/91	10/23/91	1/16/92	2/1/92		1/28/92	1/30/92	2/3/92
D27	1486TTI007	9/29/91	10/23/91	1/16/92	2/1/92		1/28/92	1/30/92	2/3/92
D28	1486TTI008	9/29/91	10/23/91	1/16/92	2/1/92		1/28/92	1/30/92	2/3/92

TABLE 1 (cont.)

Tetra Tech Sample Number	Date Analyzed Cyanide	Holding Time (d) Mercury	Holding Time (d) Lead	Holding Time (d) ICP Metals	Holding Time (d) As	Holding Time (d) Se, Be	Holding Time (d) Cadmium	Holding Time (d) Cyanide
SEDIMENT								
D1	2/11-12/92	15	116	100	112	114	118	126-127
D2	2/11-12/92	15	116	100	112	114	118	126-127
D3	2/11-12/92	14	115	99	111	113	117	125-126
D4	2/11-12/92	15	116	100	112	114	118	126-127
D5	2/11-12/92	12	113	97	109	111	115	123-124
D6	2/11-12/92	13	114	98	110	112	116	124-125
D7	2/11-12/92	12	113	97	109	111	115	123-124
D8	2/11-12/92	11	112	96	108	110	114	122-123
D9	2/11-12/92	11	112	96	108	110	114	122-123
D10	2/11-12/92	16	117	101	113	115	119	127-128
D11	2/11-12/92	16	117	101	113	115	119	127-128
D12	2/11-12/92	16	117	101	113	115	119	127-128
D13	2/11-12/92	17	118	102	114	116	120	128-129
D14	2/11-12/92	17	118	102	114	116	120	128-129
D15	2/11-12/92	18	119	103	115	117	121	129-130
D16	2/11-12/92	19	120	104	116	118	122	130-131
D17	2/11-12/92	19	120	104	116	118	122	130-131
D18	2/11-12/92	20	121	105	117	119	123	131-132
D19	2/11-12/92	20	121	105	117	119	123	131-132
D20	2/11-12/92	21	122	106	118	120	124	132-133
D21	2/11-12/92	21	122	106	118	120	124	132-133
D22	2/11-12/92	21	122	106	118	120	124	132-133
D23	2/11-12/92	22	123	107	119	121	125	133-134
D24	2/11-12/92	23	124	108	120	122	126	134-135
D25	2/11-12/92	24	125	109	121	123	127	135-136
D26	2/11-12/92	24	125	109	121	123	127	135-136
D27	2/11-12/92	24	125	109	121	123	127	135-136
D28	2/11-12/92	24	125	109	121	123	127	135-136

TABLE 1. (cont.)

Tetra Tech Sample Number	Precision Sample Number	Date Collected	Date Analyzed Mercury (CVAA)	Date Analyzed ICP Metals	Date Analyzed Lead (GFAA)		Date Analyzed Arsenic (GFAA)	Date Analyzed Se, Be (GFAA)	Date Analyzed Cadmium (GFAA)
D29	1486TTI009	9/29/91	10/23/91	1/16/92	2/1/92		1/28/92	1/30/92	2/3/92
D30	1486TTI010	9/28/91	10/23/91	1/16/92	2/1/92		1/28/92	1/30/92	2/3/92
D31	1486TTI011	9/27/91	10/23/91	1/16/92	2/1/92		1/28/92	1/30/92	2/3/92
D32	1486TTI012	9/27/91	10/23/91	1/16/92	2/1/92		1/28/92	1/30/92	2/3/92
D33	1486TTI013	9/27/91	10/23/91	1/16/92	2/1/92		1/28/92	1/30/92	2/3/92
D34	1486TTI014	9/27/91	10/23/91	1/16/92	2/1/92		1/28/92	1/30/92	2/3/92
D35	1474TTI004	9/26/91	10/23/91	1/16/92	2/1/92		1/28/92	1/30/92	2/3/92
D36	1474TTI007	9/26/91	10/23/91	1/16/92	2/1/92		1/28/92	1/30/92	2/3/92
D37	1474TTI001	9/25/91	10/23/91	1/16/92	2/1/92		1/28/92	1/30/92	2/3/92
D38	1474TTI006	9/25/91	10/23/91	1/16/92	2/1/92		1/28/92	1/30/92	2/3/92
D39	1474TTI003	9/24/91	10/23/91	1/16/92	2/1/92		1/28/92	1/30/92	2/3/92
D40	1474TTI002	9/24/91	10/23/91	1/16/92	2/1/92		1/28/92	1/30/92	2/3/92
D41	1474TTI005	9/26/91	10/23/91	1/16/92	2/1/92		1/28/92	1/30/92	2/3/92
D42	1486TTI015	9/29/91	10/23/91	1/16/92	2/1/92		1/28/92	1/30/92	2/3/92
D43	1502TTI017	10/1/91	10/23/91	1/16/92	2/1/92		1/28/92	1/30/92	2/3/92
D44	1507TTI014	10/4/91	10/23/91	1/16/92	2/1/92		1/28/92	1/30/92	2/3/92
D45	1523TTI012	10/7/91	10/23/91	1/16/92	2/1/92		1/28/92	1/30/92	2/3/92
D46	1523TTI013	10/9/91	10/23/91	1/16/92	2/1/92		1/28/92	1/30/92	2/3/92
E1	1523TTI014	10/9/91	10/23/91	1/16/92	2/1/92		1/28/92	1/30/92	2/3/92
E2	1523TTI015	10/9/91	10/23/91	1/16/92	2/1/92		1/28/92	1/30/92	2/3/92
E3	1527TTI011	10/11/91	10/23/91	1/16/92	2/1/92		1/28/92	1/30/92	2/3/92
E4	1527TTI012	10/12/91	10/23/91	1/16/92	2/1/92		1/28/92	1/30/92	2/3/92
E5	1507TTI015	10/5/91	10/23/91	1/16/92	2/1/92		1/28/92	1/30/92	2/3/92
E6	1507TTI016	10/4/91	10/23/91	1/16/92	2/1/92		1/28/92	1/30/92	2/3/92
E7	1502TTI020	10/3/91	10/23/91	1/16/92	2/1/92		1/28/92	1/30/92	2/3/92
E8	1502TTI012	10/1/91	10/23/91	1/16/92	2/1/92		1/28/92	1/30/92	2/3/92
E9	1486TTI001	9/30/91	10/23/91	1/16/92	2/1/92		1/28/92	1/30/92	2/3/92
E10	1486TTI002	9/29/91	10/23/91	1/16/92	2/1/92		1/28/92	1/30/92	2/3/92
E11	1486TTI003	9/28/91	10/23/91	1/16/92	2/1/92		1/28/92	1/30/92	2/3/92
E12	1474TTI009	9/26/91	10/23/91	1/16/92	2/1/92		1/28/92	1/30/92	2/3/92
E13	1474TTI010	9/25/91	10/23/91	1/16/92	2/1/92		1/28/92	1/30/92	2/3/92
E14	1474TTI008	9/24/91	10/23/91	1/16/92	2/1/92		1/28/92	1/30/92	2/3/92

TABLE 1. (cont.)

Tetra Tech Sample Number	Date Analyzed Cyanide	Holding Time (d) Mercury	Holding Time (d) ICP Metals	Holding Time (d) Lead	Holding Time (d) As	Holding Time (d) Se, Be	Holding Time (d) Cadmium	Holding Time (d) Cyanide
D29	2/11-12/92	24	125	109	121	123	127	135-136
D30	2/11-12/92	25	126	110	122	124	128	136-137
D31	2/11-12/92	26	127	111	123	125	129	137-138
D32	2/11-12/92	26	127	111	123	125	129	137-138
D33	2/11-12/92	26	127	111	123	125	129	137-138
D34	2/11-12/92	26	127	111	123	125	129	137-138
D35	2/11-12/92	27	128	112	124	126	130	138-139
D36	2/11-12/92	27	128	112	124	126	130	138-139
D37	2/11-12/92	28	129	113	125	127	131	139-140
D38	2/11-12/92	28	129	113	125	127	131	139-140
D39	2/11-12/92	29	130	114	126	128	132	140-141
D40	2/11-12/92	29	130	114	126	128	132	140-141
D41	2/11-12/92	27	128	112	124	126	130	138-139
D42	2/11-12/92	24	125	109	121	123	127	135-136
D43	2/11-12/92	22	123	107	119	121	125	133-134
D44	2/11-12/92	29	120	104	116	118	122	130-131
D45	2/11-12/92	16	117	101	113	115	119	127-128
D46	2/11-12/92	14	115	99	111	113	117	125-126
E1	2/11-12/92	14	115	99	111	113	117	125-126
E2	2/11-12/92	14	115	99	111	113	117	125-126
E3	2/11-12/92	12	113	97	109	111	115	123-124
E4	2/11-12/92	11	112	96	108	110	114	122-123
E5	2/11-12/92	18	119	103	115	117	121	129-130
E6	2/11-12/92	19	120	104	116	118	122	130-131
E7	2/11-12/92	20	121	105	117	119	123	131-132
E8	2/11-12/92	22	123	107	119	121	125	133-134
E9	2/11-12/92	23	124	108	120	122	126	134-135
E10	2/11-12/92	24	125	109	121	123	127	135-136
E11	2/11-12/92	25	126	110	122	124	128	136-137
E12	2/11-12/92	27	128	112	124	126	130	138-139
E13	2/11-12/92	28	129	113	125	127	131	139-140
E14	2/11-12/92	29	130	114	126	128	132	140-141

TABLE 1 (cont.)
WATER

Tetra Tech Sample Number	Precision Sample Number	Date Collected	Date Analyzed Mercury (CVAA)	Date Analyzed ICP Metals	Date Analyzed Lead (GFAA)		Date Analyzed Selenium (GFAA)	Date Analyzed Beryllium (GFAA)	Date Analyzed Arsenic (GFAA)
W1	1523TTI001	10/8/91	10/21/91	1/14/92	1/12/92		1/25/92	1/28/92	1/13/92
W2	1538TTI001	10/15/91	10/21/91	1/14/92	1/12/92		1/25/92	1/28/92	1/13/92
W3	1538TTI002	10/15/91	10/21/91	1/14/92	1/12/92		1/25/92	1/28/92	1/13/92
W4	1529TTI001	10/10/91	10/21/91	1/14/92	1/12/92		1/25/92	1/28/92	1/13/92
W5	1523TTI002	10/9/91	10/21/91	1/14/92	1/12/92		1/25/92	1/28/92	1/13/92
W6	1529TTI002	10/10/91	10/21/91	1/14/92	1/12/92		1/25/92	1/28/92	1/13/92
W7	1523TTI003	10/9/91	10/21/91	1/14/92	1/12/92		1/25/92	1/28/92	1/13/92
W8	1529TTI003	10/10/91	10/21/91	1/14/92	1/12/92		1/25/92	1/28/92	1/13/92
W9	1529TTI004	10/10/91	10/21/91	1/14/92	1/12/92		1/25/92	1/28/92	1/13/92
W10	1527TTI002	10/11/91	10/21/91	1/14/92	1/12/92		1/25/92	1/28/92	1/13/92
W11	1527TTI003	10/12/91	10/21/91	1/14/92	1/12/92		1/25/92	1/28/92	1/13/92
W12	1523TTI004	10/7/91	10/21/91	1/14/92	1/12/92		1/25/92	1/28/92	1/13/92
W13	1529TTI006	10/11/91	10/21/91	1/14/92	1/12/92		1/25/92	1/28/92	1/13/92
W14	1507TTI001	10/6/91	10/21/91	1/14/92	1/12/92		1/25/92	1/28/92	1/13/92
W15	1507TTI002	10/6/91	10/21/91	1/14/92	1/12/92		1/25/92	1/28/92	1/13/92
W16	1538TTI003	10/15/91	10/21/91	1/14/92	1/12/92		1/25/92	1/28/92	1/13/92
W17	1507TTI003	10/6/91	10/21/91	1/14/92	1/12/92		1/25/92	1/28/92	1/13/92
W18	1507TTI004	10/5/91	10/21/91	1/14/92	1/12/92		1/25/92	1/28/92	1/13/92
W19	1507TTI005	10/5/91	10/21/91	1/14/92	1/12/92		1/25/92	1/28/92	1/13/92
W20	1507TTI006	10/4/91	10/21/91	1/14/92	1/12/92		1/25/92	1/28/92	1/13/92
W21	1507TTI007	10/4/91	10/21/91	1/14/92	1/12/92		1/25/92	1/28/92	1/13/92
W22	1502TTI010	10/3/91	10/21/91	1/14/92	1/12/92		1/25/92	1/28/92	1/13/92
W23	1502TTI002	10/3/91	10/21/91	1/14/92	1/12/92		1/25/92	1/28/92	1/13/92
W24	1502TTI011	10/3/91	10/21/91	1/14/92	1/12/92		1/25/92	1/28/92	1/13/92
W25	1502TTI009	10/3/91	10/21/91	1/14/92	1/12/92		1/25/92	1/28/92	1/13/92
W26	1502TTI001	10/2/91	10/21/91	1/14/92	1/12/92		1/25/92	1/28/92	1/13/92
W27	1502TTI008	10/2/91	10/21/91	1/14/92	1/12/92		1/25/92	1/28/92	1/13/92
W28	1502TTI007	10/1/91	10/21/91	1/14/92	1/12/92		1/25/92	1/28/92	1/13/92
W29	1502TTI006	10/1/91	10/21/91	1/14/92	1/12/92		1/25/92	1/28/92	1/13/92
W30	1502TTI005	10/1/91	10/21/91	1/14/92	1/12/92		1/25/92	1/28/92	1/13/92
W31	1486TTI016	9/30/91	10/21/91	1/14/92	1/12/92		1/25/92	1/28/92	1/13/92
W32	1486TTI017	9/30/91	10/21/91	1/14/92	1/12/92		1/25/92	1/28/92	1/13/92
W33	1486TTI018	9/30/91	10/21/91	1/14/92	1/12/92		1/25/92	1/28/92	1/13/92

TABLE 1 (cont.)
WATER

Tetra Tech Sample Number	Date Analyzed Cadmium (GFAA)	Date Analyzed Cyanide	Holding Time (d) Mercury	Holding Time (d) ICP Metals	Holding Time (d) Lead	Holding Time (d) Selenium	Holding Time (d) Beryllium	Holding Time (d) Arsenic	Holding Time (d) Cadmium	Holding Time (d) Cyanide
W1	1/27/92	10/14/91	13	98	96	109	112	97	111	**98**
W2	1/27/92	10/20/91	6	91	89	102	105	90	104	**97**
W3	1/27/92	10/20/91	6	91	89	102	105	90	104	**97**
W4	1/27/92	10/20/91	11	96	94	107	110	95	109	**102**
W5	1/27/92	10/14/91	12	97	95	108	111	96	110	**97**
W6	1/27/92	10/20/91	11	96	94	107	110	95	109	**102**
W7	1/27/92	10/14/91	12	97	95	108	111	96	110	**97**
W8	1/27/92	10/20/91	11	96	94	107	110	95	109	**102**
W9	1/27/92	10/20/91	11	96	94	107	110	95	109	**102**
W10	1/27/92	10/20/91	10	95	93	106	109	94	108	**101**
W11	1/27/92	10/20/91	9	94	92	105	108	93	107	**100**
W12	1/27/92	10/14/91	14	99	97	110	113	98	112	**99**
W13	1/27/92	10/20/91	10	95	93	106	109	94	108	**101**
W14	1/27/92	10/13/91	15	100	98	111	114	99	113	**99**
W15	1/27/92	10/13/91	15	100	98	111	114	99	113	**99**
W16	1/27/92	10/20/91	6	91	89	102	105	90	104	**97**
W17	1/27/92	10/13/91	15	100	98	111	114	99	113	**99**
W18	1/27/92	10/13/91	16	101	99	112	115	100	114	**100**
W19	1/27/92	10/13/91	16	101	99	112	115	100	114	**100**
W20	1/27/92	10/13/91	17	102	100	113	116	101	115	**101**
W21	1/27/92	10/13/91	17	102	100	113	116	101	115	**101**
W22	1/27/92	10/13/91	18	103	101	114	117	102	116	**102**
W23	1/27/92	10/13/91	18	103	101	114	117	102	116	**102**
W24	1/27/92	10/13/91	18	103	101	114	117	102	116	**102**
W25	1/27/92	10/13/91	18	103	101	114	117	102	116	**102**
W26	1/27/92	10/13/91	19	104	102	115	118	103	117	**103**
W27	1/27/92	10/13/91	19	104	102	115	118	103	117	**103**
W28	1/27/92	10/13/91	20	105	103	116	119	104	118	**104**
W29	1/27/92	10/13/91	20	105	103	116	119	104	118	**104**
W30	1/27/92	10/13/91	20	105	103	116	119	104	118	**104**
W31	1/27/92	10/12/91	21	106	104	117	120	105	119	**104**
W32	1/27/92	10/12/91	21	106	104	117	120	105	119	**104**
W33	1/27/92	10/12/91	21	106	104	117	120	105	119	**104**

TABLE 1 (cont.)

Tetra Tech Sample Number	Precision Sample Number	Date Collected	Date Analyzed Mercury (CVAA)	Date Analyzed ICP Metals	Date Analyzed Lead (GFAA)		Date Analyzed Selenium (GFAA)	Date Analyzed Beryllium (GFAA)	Date Analyzed Arsenic (GFAA)
W34	1486TTI019	9/30/91	10/21/91	1/14/92	1/12/92		1/25/92	1/28/92	1/13/92
W35	1538TTI004	10/16/91	10/21/91	1/14/92	1/12/92		1/25/92	1/28/92	1/13/92
W36	1486TTI020	9/28/91	10/21/91	1/14/92	1/12/92		1/25/92	1/28/92	1/13/92
W37	1486TTI021	9/28/91	10/21/91	1/14/92	1/12/92		1/25/92	1/28/92	1/13/92
W38	1538TTI005	10/16/91	10/21/91	1/14/92	1/12/92		1/25/92	1/28/92	1/13/92
W39	1486TTI022	9/27/91	10/21/91	1/14/92	1/12/92		1/25/92	1/28/92	1/13/92
W40	1538TTI006	10/16/91	10/21/91	1/14/92	1/12/92		1/25/92	1/28/92	1/13/92
W41	1474TTI013	9/23/91	10/21/91	1/14/92	1/12/92		1/25/92	1/28/92	1/13/92
W42	1474TTI012	9/25/91	10/21/91	1/14/92	1/12/92		1/25/92	1/28/92	1/13/92
W43	1474TTI011	9/24/91	10/21/91	1/14/92	1/12/92		1/25/92	1/28/92	1/13/92
W44	1474TTI015	9/26/91	10/21/91	1/14/92	1/12/92		1/25/92	1/28/92	1/13/92
W45	1474TTI016	9/26/91	10/21/91	1/14/92	1/12/92		1/25/92	1/28/92	1/13/92
W46	1474TTI014	9/26/91	10/21/91	1/14/92	1/12/92		1/25/92	1/28/92	1/13/92
W48	1502TTI004	10/1/91	10/21/91	1/14/92	1/12/92		1/25/92	1/28/92	1/13/92
W49	1507TTI008	10/4/91	10/21/91	1/14/92	1/12/92		1/25/92	1/28/92	1/13/92
W50	1529TTI007	10/10/91	10/21/91	1/14/92	1/12/92		1/25/92	1/28/92	1/13/92
W52	1502TTI003	10/2/91	10/21/91	1/14/92	1/12/92		1/25/92	1/28/92	1/13/92

TABLE 1 (cont.)

Tetra Tech Sample Number	Date Analyzed Cadmium (GFAA)	Date Analyzed Cyanide	Holding Time (d) Mercury	Holding Time (d) ICP Metals	Holding Time (d) Lead	Holding Time (d) Selenium	Holding Time (d) Beryllium	Holding Time (d) Arsenic	Holding Time (d) Cadmium	Holding Time (d) Cyanide
W34	1/27/92	10/12/91	21	106	104	117	120	105	119	104
W35	1/27/92	10/20/91	5	90	88	101	104	89	103	96
W36	1/27/92	10/12/91	23	108	106	119	122	107	121	106
W37	1/27/92	10/12/91	23	108	106	119	122	107	121	106
W38	1/27/92	10/20/91	5	90	88	101	104	89	103	96
W39	1/27/92	10/12/91	24	109	107	120	123	108	122	107
W40	1/27/92	10/20/91	5	90	88	101	104	89	103	96
W41	1/27/92	10/12/91	28	113	111	124	127	112	126	111
W42	1/27/92	10/12/91	26	111	109	122	125	110	124	109
W43	1/27/92	10/12/91	27	112	110	123	126	111	125	110
W44	1/27/92	10/12/91	25	110	108	121	124	109	123	108
W45	1/27/92	10/12/91	25	110	108	121	124	109	123	108
W46	1/27/92	10/12/91	25	110	108	121	124	109	123	108
W48	1/27/92	10/13/91	20	105	103	116	119	104	118	104
W49	1/27/92	10/13/91	17	102	100	113	116	101	115	101
W50	1/27/92	10/20/91	11	96	94	107	110	95	109	102
W52	1/27/92	10/13/91	19	104	102	115	118	103	117	103

TABLE 1 (cont.)
TISSUE

Tetra Tech Sample Number	Precision Sample Number	Date Collected	Date Analyzed Mercury (CVAA)	Date Analyzed ICP Metals	Date Analyzed Pb, Se, As (ICP/MS)	Date Analyzed Se, As (GFAA)	Date Analyzed Cadmium (GFAA)	Holding Time (d) Mercury	Holding Time (d) ICP Metals
STURGEON									
ST-1-2-D	1531TTI001	10/10/91	10/25/91	1/17/92	2/16/92	5/15/92	2/5/92	15	99
ST-1-3	1506TTI012	10/1/91	10/25/91	1/17/92	2/16/92	5/15/92	2/5/92	24	108
ST-1-4	1590TTI001	10/15/91	11/17/91	1/17/92	2/16/92	5/15/92	2/5/92	33	94
ST-1-5-D	1560TTI004	10/16/91	11/17/91	1/17/92	2/16/92	5/15/92	2/5/92	32	93
ST-2-1-D	1531TTI002	10/10/91	10/25/91	1/17/92	2/16/92	5/15/92	2/5/92	15	99
ST-2-2-D	1585TTI005	10/20/91	11/17/91	1/17/92	2/16/92	5/15/92	2/5/92	28	99
ST-2-3	1585TTI003	10/21/91	11/17/91	1/17/92	2/16/92	5/15/92	2/5/92	27	88
ST-2-4	1560TTI005	10/21/91	11/17/91	1/17/92	2/16/92	5/15/92	2/5/92	27	88
ST-3-1-D	1585TTI004	10/23/91	11/17/91	1/17/92	2/16/92	5/15/92	2/5/92	25	86
ST-3-3-D	1585TTI001	10/23/91	11/17/91	1/17/92	2/16/92	5/15/92	2/5/92	25	86
ST-3-4	1590TTI002	10/25/91	11/17/91	1/17/92	2/16/92	5/15/92	2/5/92	23	84
ST-3-6	1585TTI002	10/29/91	11/17/91	1/17/92	2/16/92	5/15/92	2/5/92	19	80
ST-4-1-D	1531TTI003	10/2/91	10/25/91	1/17/92	2/16/92	5/15/92	2/5/92	23	107
ST-4-2	1531TTI004	10/10/91	10/25/91	1/17/92	2/16/92	5/15/92	2/5/92	15	99
ST-4-3-D	1506TTI014	9/29/91	10/25/91	1/17/92	2/16/92	5/15/92	2/5/92	26	110
ST-4-4	1506TTI013	9/29/91	10/25/91	1/17/92	2/16/92	5/15/92	2/5/92	26	110
ST-1-5(dup)	1560TTI006	10/16/91	11/17/91	1/17/92	2/16/92	5/15/92	2/5/92	32	93

TABLE 1 (cont.)
TISSUE

Tetra Tech Sample Number	Holding Time (d) Se, As (GFAA)	Holding Time (d) Pb, Se, As	Holding Time (d) Cadmium
STURGEON			
ST-1-2-D	218	129	118
ST-1-3	227	138	127
ST-1-4	213	124	113
ST-1-5-D	212	123	112
ST-2-1-D	218	129	118
ST-2-2-D	208	119	108
ST-2-3	207	118	107
ST-2-4	207	118	107
ST-3-1-D	205	116	105
ST-3-3-D	205	116	105
ST-3-4	203	114	103
ST-3-6	199	110	99
ST-4-1-D	226	137	126
ST-4-2	218	129	118
ST-4-3-D	229	140	129
ST-4-4	229	140	129
ST-1-5(dup)	212	123	112

TABLE 1 (cont.)

Tetra Tech Sample Number	Precision Sample Number	Date Collected	Date Analyzed Mercury (CVAA)	Date Analyzed ICP Metals	Date Analyzed Pb, Se, As (ICP/MS)	Date Analyzed Se, As (GFAA)	Date Analyzed Cadmium (GFAA)	Holding Time (d) Mercury	Holding Time (d) ICP Metals
CRAYFISH									
D6	1506TTI001	10/1/91	10/25/91	1/17/92	2/16/92	5/15/92	2/5/92	24	108
D8	1506TTI002	9/30/91	10/25/91	1/17/92	2/16/92	5/15/92	2/5/92	25	109
D10	1506TTI003	9/30/91	10/25/91	1/17/92	2/16/92	5/15/92	2/5/92	25	109
D12	1506TTI004	9/30/91	10/25/91	1/17/92	2/16/92	5/15/92	2/5/92	25	109
D15	1506TTI005	9/28/91	10/25/91	1/17/92	2/16/92	5/15/92	2/5/92	27	111
D15 DUP.	1506TTI005 DUP	9/28/91	10/25/91	1/17/92	2/16/92	5/15/92	2/5/92	27	111
D16	1506TTI006	9/28/91	10/25/91	1/17/92	2/16/92	5/15/92	2/5/92	27	111
D19	1506TTI007	9/29/91	10/25/91	1/17/92	2/16/92	5/15/92	2/5/92	26	110
D20	1506TTI008	10/1/91	10/25/91	1/17/92	2/16/92	5/15/92	2/5/92	24	108
D22	1516TTI001	9/29/91	10/25/91	1/17/92	2/16/92	5/15/92	2/5/92	26	110
D23	1516TTI002	9/28/91	10/25/91	1/17/92	2/16/92	5/15/92	2/5/92	27	111
D24	1516TTI003	9/30/91	10/25/91	1/17/92	2/16/92	5/15/92	2/5/92	25	109
D26	1516TTI004	9/27/91	10/25/91	1/17/92	2/16/92	5/15/92	2/5/92	28	112
D26 DUP.	1516TTI004 DUP	9/27/91	10/25/91	1/17/92	2/16/92	5/15/92	2/5/92	28	112
D28	1501TTI003	9/26/91	10/25/91	1/17/92	2/16/92	5/15/92	2/5/92	29	113
D29	1506TTI009	9/26/91	10/25/91	1/17/92	2/16/92	5/15/92	2/5/92	29	113
D31	1501TTI001	9/25/91	10/25/91	1/17/92	2/16/92	5/15/92	2/5/92	30	114
D35	1501TTI002	9/25/91	10/25/91	1/17/92	2/16/92	5/15/92	2/5/92	30	114
D38	1506TTI010	9/25/91	10/25/91	1/17/92	2/16/92	5/15/92	2/5/92	30	114
D40	1506TTI011	9/25/91	10/25/91	1/17/92	2/16/92	5/15/92	2/5/92	30	114

TABLE 1 (cont.)

Tetra Tech Sample Number	Holding Time (d) Se, As (GFAA)	Holding Time (d) Pb, Se, As	Holding Time (d) Cadmium
CRAYFISH			
D6	**227**	138	127
D8	**228**	139	128
D10	**228**	139	128
D12	**228**	139	128
D15	**230**	141	130
D15 DUP.	**230**	141	130
D16	**230**	141	130
D19	**229**	140	129
D20	**227**	138	127
D22	**229**	140	129
D23	**230**	141	130
D24	**228**	139	128
D26	**231**	142	131
D26 DUP.	**231**	142	131
D28	**232**	143	132
D29	**232**	143	132
D31	**233**	144	133
D35	**233**	144	133
D38	**233**	144	133
D40	**233**	144	133

TABLE 1 (cont.)

Tetra Tech Sample Number	Precision Sample Number	Date Collected	Date Analyzed Mercury (CVAA)	Date Analyzed ICP Metals	Date Analyzed Pb, Se, As (ICP/MS)	Date Analyzed Se, As (GFAA)	Date Analyzed Cadmium (GFAA)	Holding Time (d) Mercury	Holding Time (d) ICP Metals
SUCKER									
D6S	1668TTI004	10/26/91	1/4/92	1/17/92	2/16/92	5/15/92	2/5/92	**70**	83
D8S	1668TTI008	10/27/91	1/4/92	1/17/92	2/16/92	5/15/92	2/5/92	**69**	82
D10S	1668TTI007	10/25/91	1/4/92	1/17/92	2/16/92	5/15/92	2/5/92	**71**	84
D12S	1668TTI002	10/24/91	1/4/92	1/17/92	2/16/92	5/15/92	2/5/92	**72**	85
D15S	1653TTI001	10/23/91	1/4/92	1/17/92	2/16/92	5/15/92	2/5/92	**73**	86
D16S	1668TTI006	10/23/91	1/4/92	1/17/92	2/16/92	5/15/92	2/5/92	**73**	86
D19S	1653TTI003	10/21/91	1/4/92	1/17/92	2/16/92	5/15/92	2/5/92	**75**	87
D20S	1668TTI005	11/19/91	1/4/92	1/17/92	2/16/92	5/15/92	2/5/92	**46**	59
D22S	1653TTI008	11/19/91	1/4/92	1/17/92	2/16/92	5/15/92	2/5/92	**46**	59
D23S	1653TTI006	10/20/91	1/4/92	1/17/92	2/16/92	5/15/92	2/5/92	**76**	89
D24S	1668TTI001	10/19/91	1/4/92	1/17/92	2/16/92	5/15/92	2/5/92	**77**	90
D26S	1653TTI002	11/19/91	1/4/92	1/17/92	2/16/92	5/15/92	2/5/92	**46**	59
D28S	1653TTI009	10/17/91	1/4/92	1/17/92	2/16/92	5/15/92	2/5/92	**79**	92
D29S	1653TTI007	10/16/91	1/4/92	1/17/92	2/16/92	5/15/92	2/5/92	**80**	91
D31S	1653TTI005	10/17/91	1/4/92	1/17/92	2/16/92	5/15/92	2/5/92	**79**	92
D35S	1653TTI004	10/15/91	1/4/92	1/17/92	2/16/92	5/15/92	2/5/92	**81**	94
D38S	1668TTI003	10/15/91	1/4/92	1/17/92	2/16/92	5/15/92	2/5/92	**81**	94
D40S	1639TTI005	10/14/91	1/4/92	1/17/92	2/16/92	5/15/92	2/5/92	**82**	95

TABLE 1 (cont.)

Tetra Tech Sample Number	Holding Time (d) Se, As (GFAA)	Holding Time (d) Pb, Se, As	Holding Time (d) Cadmium
SUCKER			
D6S	**202**	113	102
D8S	**201**	112	101
D10S	**203**	114	103
D12S	**204**	115	104
D15S	**205**	116	105
D16S	**205**	116	105
D19S	**207**	118	107
D20S	178	89	78
D22S	178	89	78
D23S	**208**	119	108
D24S	**209**	120	109
D26S	178	89	78
D28S	**211**	122	111
D29S	**212**	121	110
D31S	**211**	122	111
D35S	**213**	124	113
D38S	**213**	124	113
D40S	**214**	125	114

TABLE 1. (cont.)

Tetra Tech Sample Number	Precision Sample Number	Date Collected	Date Analyzed Mercury (CVAA)	Date Analyzed ICP Metals	Date Analyzed Pb, Se, As (ICP/MS)	Date Analyzed Se, As (GFAA)	Date Analyzed Cadmium (GFAA)	Holding Time (d) Mercury	Holding Time (d) ICP Metals
CARP									
D24C	1639TTI002	10/19/91	1/4/92	1/17/92	2/16/92	5/15/92	2/5/92	77	90
D26C	1639TTI003	10/19/91	1/4/92	1/17/92	2/16/92	5/15/92	2/5/92	77	90
D28C	1560TTI002	10/17/91	11/17/91	1/17/92	2/16/92	5/15/92	2/5/92	31	92
D29C	1585TTI008	10/16/91	11/17/91	1/17/92	2/16/92	5/15/92	2/5/92	32	93
D31C	1560TTI003	10/17/91	11/17/91	1/17/92	2/16/92	5/15/92	2/5/92	31	92
D35C	1560TTI001	10/15/91	11/17/91	1/17/92	2/16/92	5/15/92	2/5/92	33	94
D38C	1585TTI007	10/15/91	11/17/91	1/17/92	2/16/92	5/15/92	2/5/92	33	94
D40C	1639TTI004	10/14/91	1/4/92	1/17/92	2/16/92	5/15/92	2/5/92	82	95
PEAMOUTH CHUB									
D3P	1674TTI009	10/26/91	1/4/92	1/17/92	2/16/92	5/15/92	2/5/92	70	83
D10P	1674TTI005	10/25/91	1/4/92	1/17/92	2/16/92	5/15/92	2/5/92	71	84
D12P	1674TTI003	10/25/91	1/4/92	1/17/92	2/16/92	5/15/92	2/5/92	71	84
D15P	1726TTI001	10/23/91	2/19/92	1/17/92	2/16/92	5/15/92	2/5/92	119	86
D16P	1674TTI008	10/27/91	1/4/92	1/17/92	2/16/92	5/15/92	2/5/92	69	82
D19P	1674TTI002	10/27/91	1/4/92	1/17/92	2/16/92	5/15/92	2/5/92	69	82
D21P	1674TTI001	10/21/91	1/4/92	1/17/92	2/16/92	5/15/92	2/5/92	75	88
D23P	1674TTI004	10/20/91	1/4/92	1/17/92	2/16/92	5/15/92	2/5/92	76	89
D24P	1674TTI006	10/19/91	1/4/92	1/17/92	2/16/92	5/15/92	2/5/92	77	90
D28P	1674TTI007	10/17/91	1/4/92	1/17/92	2/16/92	5/15/92	2/5/92	79	92

TABLE 1. (cont.)

Tetra Tech Sample Number	Holding Time (d) Se, As (GFAA)	Holding Time (d) Pb, Se, As	Holding Time (d) Cadmium
CARP			
D24C	**209**	120	109
D26C	**209**	120	109
D28C	**211**	122	111
D29C	**212**	123	112
D31C	**211**	122	111
D35C	**213**	124	113
D38C	**213**	124	113
D40C	**214**	125	114
PEAMOUTH CHUB			
D3P	**202**	113	102
D10P	**203**	114	103
D12P	**203**	114	103
D15P	**205**	116	105
D16P	**201**	112	101
D19P	**201**	112	101
D21P	**207**	118	107
D23P	**208**	119	108
D24P	**209**	120	109
D28P	**211**	122	109

TABLE 2. CHECK STANDARD DATA FOR METALS ANALYSES
LOWER COLUMBIA RIVER RECONNAISSANCE SURVEY

SEDIMENT

Cadmium
Date Analyzed: 2/2/92

	Result 1	Result 2	Average	SD	% Accuracy
0.9 ppb standard	0.941	0.935	0.938	0.004	104.2
4.5 ppb standard	4.79	4.54	4.66	0.18	103.7

WATER

Lead
Date Analyzed: 1/31/92

	Result 1	Result 2	Average	SD	% Accuracy
6 ppb standard	6.01	5.60	5.81	0.29	96.8
28 ppb standard	25.4	25.3	25.4	0.1	90.5

Cadmium
Date Analyzed: 1/27/92

	Result 1	Result 2	Average	SD	% Accuracy
0.8 ppb standard	0.891	0.863	0.877	0.02	109.6
4 ppb standard	4.23	3.77	4.00	0.32	100.0

TISSUE

Cadmium
Date Analyzed: 2/3/92

	Result 1	Result 2	Average	SD	% Accuracy
0.9 ppb standard	0.928	1.05	0.989	0.086	109.8
4.5 ppb standard	4.41	4.85	4.63	0.31	102.8

Arsenic
Date Analyzed: 5/15/92

	Result 1	Result 2	Average	SD	% Accuracy
15 ppb standard	14..44	15.07	14.75	0.45	98.4
50 ppb standard	NA	NA	51.56	5.45	103.1

Selenium
Date Analyzed: 5/14/92

	Result 1	Result 2	Average	SD	% Accuracy
15 ppb standard	15.31	14.21	14.76	0.78	98.4
50 ppb standard	46.60	52.61	49.60	4.25	99.2

TABLE 3. METHOD BLANKS FOR METALS ANALYSES
LOWER COLUMBIA RIVER RECONNAISSANCE SURVEY

COMPOUND	RESULTS SEDIMENT (ug/L)		WATER (ug/L)		TISSUE (ug/L)	
Trace Metals:						
Silver	2.0	U	2.0	U	2.0	U
Aluminum	**93.0**		**86.0**			
Arsenic	5.0	U	5.0	U	5.0	U
Barium	10.0	U	10.0	U	10.0	U
Beryllium	5.0	U	5.0	U		
Cadmium	0.5	U	0.5	U	0.5	U
Chromium	5.0	U	5.0	U	5.0	U
Copper	5.0	U	5.0	U	**6.0**	
Iron	**150.0**		**110.0**			
Mercury	0.5	U	0.5	U	0.5	U
Nickel	40.0	U	40.0	U	40.0	U
Lead	1.0	U	1.0	U	1.0	U
Antimony	15.0	U	15.0	U	15.0	U
Selenium	5.0	U	5.0	U	5.0	U
Thallium	36.0	U	36.0	U		
Zinc	20.0	U	20.0	U	20.0	U

Data Qualifiers: U = Compound was not detected. Value given is the lower quantification limit.

TABLE 4. TRACE METAL MS/MSD RESULTS
LOWER COLUMBIA RIVER RECONNAISSANCE SURVEY

A. SEDIMENTS

GFAA Metals

ARSENIC
Date Analyzed: 1/28/92

Field Sample Number	Lab Sample Number	Percent Recovery MS	MSD	RPD	QC Limits (CLP) % Rec.	RPD
E13	1474TTI010	74.8	79.7	6.34	75-125	20
D32	1486TTI012	85.8	85.8	0.00	75-125	20
E7	1502TTI020	87.1	87.1	0.00	75-125	20
D10	1523TTI009	81.2	81.2	0.00	75-125	20

BERYLLIUM
Date Analyzed: 1/30/92

Field Sample Number	Lab Sample Number	Percent Recovery MS	MSD	RPD	QC Limits (CLP) % Rec.	RPD
E12	1474TTI009	105.0	105.0	0.00	75-125	20
D32	1486TTI012	95.0	95.0	0.00	75-125	20
E7	1502TTI020	110.0	105.0	4.65	75-125	20
E1	1523TTI014	110.0	105.0	4.65	75-125	20

CADMIUM
Date Analyzed: 2/3/92

Field Sample Number	Lab Sample Number	Percent Recovery MS	MSD	RPD	QC Limits (CLP) % Rec.	RPD
E12	1474TTI009	98.0	96.0	2.06	75-125	20
D32	1486TTI012	90.0	90.0	0.00	75-125	20
E7	1502TTI020	90.0	90.0	0.00	75-125	20
E1	1523TTI014	96.0	96.0	0.00	75-125	20

LEAD
Date Analyzed: 2/1/92

Field Sample Number	Lab Sample Number	Percent Recovery MS	MSD	RPD	QC Limits (CLP) % Rec.	RPD
E12	1474TTI009	105.6	95.2	10.36	75-125	20
D32	1486TTI012	77.6	92.0	16.98	75-125	20
E7	1502TTI020	99.2	99.2	0.00	75-125	20
E1	1523TTI014	104.8	89.6	15.64	75-125	20

TABLE 4 (cont.)

SELENIUM
Date Analyzed: 1/30/92

Field Sample Number	Lab Sample Number	Percent Recovery MS	Percent Recovery MSD	RPD	QC Limits (CLP) % Rec.	QC Limits (CLP) RPD
E13	1474TTI010	80.0	85.0	6.06	75-125	20
D32	1486TTI012	85.0	80.0	6.06	75-125	20
E7	1502TTI020	74.5	69.5	6.94	75-125	20
D10	1523TTI009	65.0	70.0	7.41	75-125	20

ICP Metals

COPPER
Date Analyzed: 1/14/92

Field Sample Number	Lab Sample Number	Percent Recovery MS	Percent Recovery MSD	RPD	QC Limits (CLP) % Rec.	QC Limits (CLP) RPD
D10	1523TTI009	65.0	75.0	14.29	75-125	20
E7	1502TTI020	75.0	80.0	6.45	75-125	20

CHROMIUM
Date Analyzed: 1/14/92

Field Sample Number	Lab Sample Number	Percent Recovery MS	Percent Recovery MSD	RPD	QC Limits (CLP) % Rec.	QC Limits (CLP) RPD
D10	1523TTI009	70.0	75.0	6.90	75-125	20
E7	1502TTI020	77.5	77.5	0.00	75-125	20
D32	1486TTI012	93.5	93.5	0.00	75-125	20
E13	1474TTI010	96.5	96.5	0.00	75-125	20

NICKEL
Date Analyzed: 1/14/92

Field Sample Number	Lab Sample Number	Percent Recovery MS	Percent Recovery MSD	RPD	QC Limits (CLP) % Rec.	QC Limits (CLP) RPD
D10	1523TTI009	65.0	70.0	7.41	75-125	20
E7	1502TTI020	85.0	80.0	6.06	75-125	20
D32	1486TTI012	89.0	89.0	0.00	75-125	20
E13	1474TTI010	93.0	93.0	0.00	75-125	20

TABLE 4 (cont.)

ZINC
Date Analyzed: 1/14/92

Field Sample Number	Lab Sample Number	Percent Recovery MS	MSD	RPD	QC Limits (CLP) % Rec.	RPD
D10	1523TTI009	49.5	49.5	0.00	75-125	20
E7	1502TTI020	14.9	44.6	99.83	75-125	20
D32	1486TTI012	108.9	89.1	20.00	75-125	20
E13	1474TTI010	108.9	108.9	0.00	75-125	20

BARIUM
Date Analyzed: 1/14/92

Field Sample Number	Lab Sample Number	Percent Recovery MS	MSD	RPD	QC Limits (CLP) % Rec.	RPD
D10	1523TTI009	0.0	0.0	0.00	75-125	20
E7	1502TTI020	87.4	87.4	0.00	75-125	20
D32	1486TTI012	82.5	72.8	12.49	75-125	20
E13	1474TTI010	63.1	111.7	55.61	75-125	20

CVAA - Mercury

MERCURY
Date Analyzed: 10/23/91

Field Sample Number	Lab Sample Number	Percent Recovery MS	MSD	RPD	QC Limits (CLP) % Rec.	RPD
D41	1474TTI005	110.3	104.3	5.59	75-125	20
E5	1507TTI015	103.7	100.2	3.43	75-125	20
D12	1523TTI011	98.2	97.3	0.92	75-125	20
D8	1527TTI009	93.8	95.2	1.48	75-125	20
D6	1529TTI008	90.5	87.8	3.03	75-125	20

CYANIDE
Analyzed

Sample	Percent Recovery	CLP QC Limits % Rec.
Control #1	96	85-115
Control #2	97	85-115
Control #3	102	85-115
Control #4	95	85-115

TABLE 4 (cont.)

Laboratory batch 1474 includes samples D35, D36, D37, D38, D39, D40, D41, E12, E13, and E14.
Laboratory batch 1486 includes samples D24, D25, D26, D27, D28, D29, D30, D31, D32, D33, D34, D42, E9, E10, and E11.
Laboratory batch 1502 includes samples D18, D19, D20, D21, D22, D23, D43, E7, and E8.
Laboratory batch 1523 includes samples D1, D2, D3, D4, D10, D11, D12, D45, D46, E1, and E2.
No MS/MSD samples associated with samples D5, D6, D7, D8, D9, D13, D14, D15, D16, D17, E3, E4, E5, and E6 (Laboratory batches 1507, 1529, and 1527).

TABLE 4 (cont.)
B. WATER
GFAA Metals

ARSENIC
Date Analyzed: 1/13/92

Field Sample Number	Lab Sample Number	Percent Recovery MS	MSD	RPD	QC Limits (CLP) % Rec.	RPD
W43	1474TTI011	126.7	134.7	6.12	75-125	20
W52	1502TTI003	59.0	60.2	2.01	75-125	20
W18	1507TTI004	82.0	91.0	10.40	75-125	20

BERYLLIUM
Date Analyzed: 1/28/92

Field Sample Number	Lab Sample Number	Percent Recovery MS	MSD	RPD	QC Limits (CLP) % Rec.	RPD
W43	1474TTI011	104.0	106.0	1.90	75-125	20
W52	1502TTI003	141.0	99.8	34.22	75-125	20
W15	1507TTI002	115.0	111.9	2.73	75-125	20
W1	1523TTI001	105.9	108.9	2.79	75-125	20

CADMIUM
Date Analyzed: 1/27/92

Field Sample Number	Lab Sample Number	Percent Recovery MS	MSD	RPD	QC Limits (CLP) % Rec.	RPD
W43	1474TTI011	82.0	91.0	10.40	75-125	20
W52	1502TTI003	121.6	95.2	24.35	75-125	20
W15	1507TTI002	88.9	86.1	3.20	75-125	20
W1	1523TTI001	83.8	89.7	6.80	75-125	20

LEAD
Date Analyzed: 1/12/92

Field Sample Number	Lab Sample Number	Percent Recovery MS	MSD	RPD	QC Limits (CLP) % Rec.	RPD
W43	1474TTI011	82.2	97.0	16.52	75-125	20
W52	1502TTI003	97.8	109.7	11.47	75-125	20
W18	1507TTI004	122.4	143.8	16.08	75-125	20
W1	1523TTI001	62.9	75.3	17.95	75-125	20

TABLE 4 (cont.)

SELENIUM
Date Analyzed: 1/25/92

Field Sample Number	Lab Sample Number	Percent Recovery MS	Percent Recovery MSD	RPD	QC Limits (CLP) % Rec.	QC Limits (CLP) RPD
W43	1474TTI011	**39.0**	44.0	12.05	75-125	20
W52	1502TTI003	99.8	106.2	6.21	75-125	20
W18	1507TTI004	122.4	97.4	**22.75**	75-125	20
W1	1523TTI001	76.2	**58.3**	**26.62**	75-125	20

ICP Metals

COPPER
Date Analyzed: 1/14/92

Field Sample Number	Lab Sample Number	Percent Recovery MS	Percent Recovery MSD	RPD	QC Limits (CLP) % Rec.	QC Limits (CLP) RPD
W7	1523TTI003	94.0	94.0	0.00	75-125	20
W52	1502TTI003	80.0	84.0	4.88	75-125	20
W18	1507TTI004	104.0	104.0	0.00	75-125	20

IRON
Date Analyzed: 1/14/92

Field Sample Number	Lab Sample Number	Percent Recovery MS	Percent Recovery MSD	RPD	QC Limits (CLP) % Rec.	QC Limits (CLP) RPD
W7	1523TTI003	**180.0**	80.0	**76.92**	75-125	20
W52	1502TTI003	**180.0**	**180.0**	0.00	75-125	20
W18	1507TTI004	80.0	**40.0**	**66.67**	75-125	20

CHROMIUM
Date Analyzed: 1/14/92

Field Sample Number	Lab Sample Number	Percent Recovery MS	Percent Recovery MSD	RPD	QC Limits (CLP) % Rec.	QC Limits (CLP) RPD
W7	1523TTI003	84.0	80.0	4.88	75-125	20
W52	1502TTI003	76.0	**72.0**	5.41	75-125	20
W18	1507TTI004	78.0	76.0	2.60	75-125	20
W36	1486TTI020	100.0	100.0	0.00	75-125	20

TABLE 4 (cont.)

ANTIMONY
Date Analyzed: 1/14/92

Field Sample Number	Lab Sample Number	Percent Recovery			QC Limits (CLP)	
			MSD	RPD	% Rec.	RPD
W52	1502TTI003	40.0	40.0	0.00	75-125	20
W18	1507TTI004	38.0	30.0	23.53	75-125	20

THALLIUM
Date Analyzed: 1/14/92

Field Sample Number	Lab Sample Number	Percent Recovery			QC Limits (CLP)	
		MS	MSD	RPD	% Rec.	RPD
W52	1502TTI003	114.0	86.0	28.00	75-125	20
W18	1507TTI004	142.0	116.0	20.16	75-125	20

NICKEL
Date Analyzed: 1/14/92

Field Sample Number	Lab Sample Number	Percent Recovery			QC Limits (CLP)	
		MS	MSD	RPD	% Rec.	RPD
W7	1523TTI003	79.2	85.1	7.18	75-125	20
W52	1502TTI003	85.1	85.1	0.00	75-125	20
W18	1507TTI004	89.1	89.1	0.00	75-125	20
W36	1486TTI020	99.0	99.0	0.00	75-125	20

ZINC
Date Analyzed: 1/14/92

Field Sample Number	Lab Sample Number	Percent Recovery			QC Limits (CLP)	
		MS	MSD	RPD	% Rec.	RPD
W7	1523TTI003	97.0	110.9	13.37	75-125	20
W52	1502TTI003	81.2	89.1	9.28	75-125	20
W18	1507TTI004	83.2	75.2	10.10	75-125	20
W36	1486TTI020	104.6	104.6	0.00	75-125	20

TABLE 4 (cont.)

ALUMINUM
Date Analyzed: 1/14/92

Field Sample Number	Lab Sample Number	Percent Recovery MS	MSD	RPD	QC Limits (CLP) % Rec.	RPD
W7	1523TTI003	116.5	116.5	0.00	75-125	20
W52	1502TTI003	135.9	135.9	0.00	75-125	20
W18	1507TTI004	97.1	77.7	22.20	75-125	20

BARIUM
Date Analyzed: 1/14/92

Field Sample Number	Lab Sample Number	Percent Recovery MS	MSD	RPD	QC Limits (CLP) % Rec.	RPD
W7	1523TTI003	104.9	102.9	1.92	75-125	20
W52	1502TTI003	91.3	89.3	2.21	75-125	20
W18	1507TTI004	81.6	79.6	2.48	75-125	20
W36	1486TTI020	87.2	87.2	0.00	75-125	20

CVAA - Mercury

MERCURY
Date Analyzed: 1/21/92

Field Sample Number	Lab Sample Number	Percent Recovery MS	MSD	RPD	QC Limits (CLP) % Rec.	RPD
W34	1486TTI019	102.0	94.5	7.63	75-125	20
W9	1529TTI004	111.3	115.3	3.53	75-125	20
W38	1538TTI005	111.3	110.7	0.54	75-125	20

Laboratory batch 1474 includes samples W41, W42, W43, W44, W45, and W46.
Laboratory batch 1502 includes samples W22, W23, W24, W25, W26, W27, W28, W29, W30, W48, and
Laboratory batch 1507 includes samples W14, W15, W17, W18, W19, W20, W21, and W49.
Laboratory batch 1523 includes samples W1, W5, W7, and W12.
No MS/MSD samples associated with samples W2, W3, W4, W6, W8, W9, W10, W11, W13, W16, W31, W32, W33, W34, W35, W36, W37, W38, W39, W40, and W50.

TABLE 4 (cont.)
C. TISSUE
GFAA Metals

CADMIUM
Date Analyzed: 2/5/92

Field Sample Number	Lab Sample Number	Percent Recovery MS	MSD	RPD	QC LIMITS CLP % Rec.	RPD
D29 CF	1506TTI009	84.5	77.0	9.29	75-125	20
ST-1-2-D	1531TTI001	98.5	91.5	7.37	75-125	20
D40 S	1639TTI005	90.0	82.0	9.30	75-125	20
D31 S	1654TTI005	75.5	79.5	5.16	75-125	20

ICP Metals

ANTIMONY
Date Analyzed: 1/17/92

Field Sample Number	Lab Sample Number	Percent Recovery MS	MSD	RPD	QC Limits (CLP) % Rec.	RPD
D29 CF	1506TTI009	44.0	76.0	53.33	75-125	20
ST-1-2-D	1531TTI001	90.0	91.0	1.10	75-125	20
D38 S	1668TTI003	42.0			75-125	
ST-3-4	1590TTI002	91.0			75-125	
D31 S	1654TTI005	48.0			75-125	

NICKEL
Date Analyzed: 1/17/92

Field Sample Number	Lab Sample Number	Percent Recovery MS	MSD	RPD	QC Limits (CLP) % Rec.	RPD
D29 CF	1506TTI009	108.8	98.8	9.63	75-125	20
ST-1-2-D	1531TTI001	97.0	96.0	1.04	75-125	20
D38 S	1668TTI003	97.7			75-125	
ST-3-4	1590TTI002	98.1			75-125	
D31 S	1654TTI005	98.6			75-125	

TABLE 4 (cont.)

COPPER
Date Analyzed: 1/17/92

Field Sample Number	Lab Sample Number	Percent Recovery MS	MSD	RPD	QC Limits (CLP) % Rec.	RPD
D29 CF	1506TTI009	220.0	260.0	16.67	75-125	20
ST-1-2-D	1531TTI001	89.0	91.0	2.22	75-125	20
D38 S	1668TTI003	92.8			75-125	
ST-3-4	1590TTI002	88.8			75-125	
D31 S	1654TTI005	98.8			75-125	

ZINC
Date Analyzed: 1/17/92

Field Sample Number	Lab Sample Number	Percent Recovery MS	MSD	RPD	QC Limits (CLP) % Rec.	RPD
D29 CF	1506TTI009	130.0	150.0	14.29	75-125	20
ST-1-2-D	1531TTI001	95.0	95.0	0.00	75-125	20
D38 S	1668TTI003	100.0			75-125	
ST-3-4	1590TTI002	93.0			75-125	
D31 S	1654TTI005	102.0			75-125	

CVAA - Mercury

MERCURY
Date Analyzed: 10/25/91, 11/17/91, AND 1/4/92

Field Sample Number	Lab Sample Number	Date	Percent Recovery MS	MSD	RPD	QC Limits (CLP) % Rec.	RPD
D15 CF	1506TTI005	10/25/91	80.6	78.8	2.26	75-125	20
ST-3-4	1590KNE002	11/17/91	80.8	79.8	1.25	75-125	20
D29 S	1653TTI007	1/4/92	109.4	110.4	0.91	75-125	20
D19 P	1674TTI002	1/4/92	86.0	87.2	1.39	75-125	20

TABLE 4 (cont.)

Laboratory batch 1654 includes sample D31S only

Laboratory batch 1506 includes samples D6CF, D8CF, D10CF, D12CF, D15CF, C15CF dup D16CF, D19CF, D20CF, D29CF, D38CF, D40CF, ST-1-3, ST-4-4,and ST-4-3-D

Laboratory batch 1531 includes samples ST-1-2-D, ST-2-1-D, ST-4-1-D, and ST-4-2

Laboratory batch 1668 includes samples D24S, D12S, D38S, D6S, D20S, D16S, D10S, and D8S

Laboratory batch 1590 includes samples ST-1-4, and ST-3-4

No MS/MSD samples associated with laboratory batches 1501, 1516, 1560, 1639, 1653, 1674, and 1585

Laboratory batch 1501 includes samples D31CF, D35CF, and D28CF

Laboratory batch 1516 includes samples D22CF, D23CF, D24CF, D26CF, and D26CF dup.

Laboratory batch 1560 includes samples D35C, D28C, D31C, ST-1-5-D, ST-2-4, and ST-1-5-dup

Laboratory batch 1639 includes samples D24C, D26C, D40C, and D40S

Laboratory batch 1653 includes samples D15S, D26S, D19S, D35S, D31S, D23S, D29S, D22S, and D28S

Laboratory batch 1674 includes samples D21P, D19P, D12P, D23P, D10P, D24P, D28P, D16P, and D3P

Laboratory batch 1585 includes samples ST-3-3-D, ST-3-6, ST-2-3, ST-3-1-D, ST-2-2-D, D38C, and D29C

TABLE 5. LABORATORY DUPLICATE SUMMARY FOR METALS ANALYSES
LOWER COLUMBIA RIVER RECONNAISSANCE SURVEY

TRACE METALS	D15 (mg/kg)		D15d (mg/kg)		RPD
Antimony	9.43	U	12.50	U	
Barium	2.3		7.3		**104.17**
Copper	106.92		108.33		1.31
Nickel	2.20	U	2.92	U	
Silver	3.08		4.33		**33.74**
Zinc	94.3		80.8		15.42
Arsenic	7.92		8.67		9.04
Cadmium	0.31		0.50		**46.91**
Lead	0.06		0.08		**28.57**
Selenium	27.11		32.58		18.33
Mercury	0.085		0.234		**93.42**

TRACE METALS	D26 (mg/kg)		D26d (mg/kg)		RPD
Antimony	1.30	U	1.27	U	
Barium	8.7		8.5		2.33
Copper	160.00		154.24		3.67
Nickel	3.48		4.24		19.69
Silver	0.78	U	0.76	U	
Zinc	133.9		116.1		14.24
Arsenic	12.17		13.56		10.80
Cadmium	0.26		0.34		**26.67**
Lead	0.09		0.08	U	11.76
Selenium	44.35		47.46		6.77
Mercury	0.050	U	0.196		**118.70**

TABLE 6. FIELD DUPLICATE SUMMARY FOR METALS ANALYSES LOWER COLUMBIA RIVER RECONNAISSANCE SURVEY

A. SEDIMENT SAMPLES

TRACE METALS	D35 (mg/kg)		D41 (mg/kg)		RPD
Aluminum	10753		10850		0.90
Antimony	6.72	U	6.78	U	
Barium	125.4		126.6		0.95
Chromium	9.41		9.95		5.58
Copper	17.03		17.63		3.46
Iron	16129		16275		0.90
Nickel	12.54		12.66		0.95
Silver	0.40	U	0.41	U	
Thallium	16.13	U	16.27	U	
Zinc	161.3		158.2		1.94
Arsenic	3.99		3.89		2.54
Beryllium	4.64	U	4.24	U	
Cadmium	0.93		1.44		**43.04**
Lead	11.70		13.24		12.35
Selenium	0.45	U	0.90	U	
Mercury	0.090		0.107		17.26
Cyanide	1.0	U	1.0	U	
Percent Solids	0.558		0.553		0.90

TRACE METALS	D28 (mg/kg)		D42 (mg/kg)		RPD
Aluminum	5697		6766		17.15
Antimony	5.03	U	5.07	U	
Barium	90.5		94.7		4.54
Chromium	6.03		7.44		**20.94**
Copper	8.71		8.46		2.91
Iron	10724		11502		7.00
Nickel	8.71		9.13		4.71
Silver	0.30	U	0.30	U	
Thallium	12.06	U	12.18	U	
Zinc	87.1		81.2		7.01
Arsenic	2.58		2.44		5.58
Beryllium	3.40	U	3.32	U	
Cadmium	0.41		0.46		11.49
Lead	9.73		7.43		**26.81**
Selenium	0.34	U	0.34	U	
Mercury	0.067	U	0.068	U	
Cyanide	1.0	U	1.0	U	
Percent Solids	0.746		0.739		0.94

TABLE 6 (cont.)

TRACE METALS	D23 (mg/kg)		D43 (mg/kg)		RPD
Aluminum	10449		9571		8.77
Antimony	5.80	U	5.74	U	
Barium	127.7		126.3		1.10
Chromium	9.67		9.19		5.09
Copper	13.16		13.02		1.07
Iron	15480		14931		3.61
Nickel	11.22		11.10		1.08
Silver	0.35	U	0.34	U	
Thallium	13.93	U	13.78	U	
Zinc	92.9		91.9		1.08
Arsenic	4.64		4.59		1.08
Beryllium	4.30	U	4.05	U	
Cadmium	0.52		0.49		5.94
Lead	11.27		10.78		4.44
Selenium	0.77	U	0.77	U	
Mercury	0.077	U	0.077	U	
Cyanide	1.0	U	1.0	U	
Percent Solids	0.646		0.653		1.08

TRACE METALS	D17 (mg/kg)		D44 (mg/kg)		RPD
Aluminum	5610		5036		10.78
Antimony	5.26	U	5.40	U	
Barium	42.1		35.6		16.73
Chromium	4.91		3.96		21.42
Copper	11.22		9.35		18.18
Iron	8065		6835		16.51
Nickel	5.96		5.04		16.73
Silver	0.32	U	0.50		43.90
Thallium	12.62	U	12.95	U	
Zinc	35.1		31.3		11.45
Arsenic	1.37		1.40		2.17
Beryllium	3.37	U	3.71	U	
Cadmium	0.20		0.22		9.52
Lead	4.05		4.08		0.74
Selenium	0.70	U	0.36	U	
Mercury	0.070	U	0.072	U	
Cyanide	1.0	U	1.0	U	
Percent Solids	0.713		0.695		2.56

TABLE 6 (cont.)

TRACE METALS	D11 (mg/kg)		D45 (mg/kg)		RPD
Aluminum	8013		10783		**29.47**
Antimony	6.01	U	5.99	U	
Barium	80.1		95.8		17.85
Chromium	7.61		10.38		**30.79**
Copper	9.62		11.58		18.49
Iron	11619		14776		**23.92**
Nickel	8.41		10.38		**20.97**
Silver	0.48		0.36	U	**28.57**
Thallium	14.42	U	14.38	U	
Zinc	56.1		67.9		19.03
Arsenic	2.48		2.44		1.63
Beryllium	3.69	U	3.73	U	
Cadmium	0.37		0.37		0.00
Lead	8.57		8.73		1.85
Selenium	0.40	U	0.40	U	
Mercury	0.080	U	0.080	U	
Cyanide	1.0	U	1.0	U	
Percent Solids	0.624		0.626		0.32

TRACE METALS	D3 (mg/kg)		D46 (mg/kg)		RPD
Aluminum	8226		9220		11.40
Antimony	5.36	U	5.32	U	
Barium	39.3		39.0		0.77
Chromium	9.66		10.99		12.88
Copper	8.94		9.22		3.08
Iron	13591		14539		6.74
Nickel	8.94		9.22		3.08
Silver	0.32	U	0.46		**35.90**
Thallium	12.88	U	12.77	U	
Zinc	78.7		78.0		0.89
Arsenic	2.43		2.66		9.04
Beryllium	3.47	U	3.39	U	
Cadmium	0.49		0.48		2.06
Lead	12.78		11.40		11.41
Selenium	0.36	U	0.35	U	
Mercury	0.086		0.071	U	19.11
Cyanide	1.0	U	1.0	U	
Percent Solids	0.699		0.705		0.85

TABLE 6 (cont.)

B. WATER SAMPLES

TRACE METALS	W44 (ug/L)		W46 (ug/L)		RPD
Silver	2.0	U	2.0	U	
Aluminum	250.0		220.0		12.77
Arsenic	5.0	U	5.0	U	
Barium	27.0		28.0		3.64
Beryllium	5.0	U	5.0	U	
Cadmium	0.5	U	0.5	U	
Chromium	5.0	U	5.0	U	
Copper	5.0	U	5.0	U	
Iron	320.0		300.0		6.45
Mercury	0.5	U	0.5	U	
Nickel	40.0	U	40.0	U	
Lead	1.0	U	1.0		
Antimony	15.0	U	15.0	U	
Selenium	5.0	U	5.0	U	
Thallium	36.0	U	36.0	U	
Zinc	20.0	U	33.0		**49.06**

TRACE METALS	W30 (ug/L)		W48 (ug/L)		RPD
Silver	2.0	U	2.0	U	
Aluminum	210.0		220.0		4.65
Arsenic	5.0	U	5.0	U	
Barium	34.0		36.0		5.71
Beryllium	5.0	U	5.0	U	
Cadmium	0.5	U	0.5	U	
Chromium	5.0	U	5.0	U	
Copper	11.0		6.0		**58.82**
Iron	620.0		510.0		19.47
Mercury	0.5	U	0.5	U	
Nickel	40.0	U	40.0	U	
Lead	5.1		4.9		4.00
Antimony	15.0	U	15.0	U	
Selenium	5.9		5.6		5.22
Thallium	36.0	U	36.0	U	
Zinc	20.0	U	20.0	U	

TABLE 6 (cont.)

TRACE METALS	W21 (ug/L)		W49 (ug/L)		RPD
Silver	2.0	U	2.0	U	
Aluminum	230.0		220.0		4.44
Arsenic	5.0	U	5.0	U	
Barium	12.0		24.0		**66.67**
Beryllium	5.0	U	5.0	U	
Cadmium	0.5	U	0.5	U	
Chromium	5.0	U	5.0	U	
Copper	9.0		10.0		10.53
Iron	220.0		300.0		**30.77**
Mercury	0.5	U	0.5	U	
Nickel	40.0	U	40.0	U	
Lead	3.9		3.0		**26.09**
Antimony	15.0	U	150.0	U	
Selenium	5.0	U	5.0	U	
Thallium	36.0	U	360.0	U	
Zinc	20.0	U	20.0	U	

TRACE METALS	W8 (ug/L)		W50 (ug/L)		RPD
Silver	2.0	U	20.0	U	
Aluminum	340.0		400.0		16.22
Arsenic	5.0	U	5.0	U	
Barium	24.0		27.0		11.76
Beryllium	5.0	U	5.0	U	
Cadmium	5.0	U	5.0	U	
Chromium	5.0	U	5.0	U	
Copper	5.0	U	5.0	U	
Iron	420.0		450.0		6.90
Mercury	0.5	U	0.5	U	
Nickel	40.0	U	40.0	U	
Lead	1.0	U	1.0	U	
Antimony	150.0	U	150.0	U	
Selenium	100.0	U	100.0	U	
Thallium	360.0	U	360.0	U	
Zinc	20.0	U	20.0	U	

TABLE 6 (cont.)

TRACE METALS	W26 (ug/L)		W52 (ug/L)		RPD
Silver	2.0	U	2.0	U	
Aluminum	210.0		190.0		10.00
Arsenic	5.0	U	5.0	U	
Barium	30.0		30.0		0.00
Beryllium	5.0	U	5.0	U	
Cadmium	0.5	U	0.5	U	
Chromium	5.0	U	5.0	U	
Copper	7.0		5.0	U	**33.33**
Iron	550.0		460.0		17.82
Mercury	0.5	U	0.5	U	
Nickel	40.0	U	40.0	U	
Lead	9.0		6.0		**40.00**
Antimony	15.0	U	15.0	U	
Selenium	31.7		11.5		**93.52**
Thallium	36.0	U	36.0	U	
Zinc	20.0	U	20.0	U	

TABLE 6 (cont.)

C. TISSUE SAMPLES (STURGEON)

TRACE METALS	ST-1-5-D (mg/kg)		ST-1-5-DUP (mg/kg)		RPD
Antimony	0.99	U	1.00	U	
Barium	0.5	U	0.5	U	
Copper	2.25		2.00	U	11.76
Nickel	2.32	U	2.33	U	
Silver	0.60	U	0.60	U	
Zinc	17.2		16.0		7.23
Arsenic	4.44		5.33		18.22
Cadmium	0.07	U	0.07	U	
Lead	0.07		0.07		0.00
Selenium	4.90		4.40		10.75
Mercury	0.549		0.521		5.23

TABLE 7. TRACE METALS ANALYSIS RESULTS FOR SEDIMENT
LOWER COLUMBIA RIVER RECONNAISSANCE SURVEY

COMPOUND	SAMPLE RESULTS (mg/kg) D1		D2		D3		D4		D5		D6		D7		D8	
Trace Metals:																
Aluminum	10768	E	15060	E	8226	E	10250	E	8141	E	12630	E	4823	E	6155	E
Antimony	7.02	U/E	7.53	U/E	5.36	U/E	6.68	U/E	10.18	U/E	11.14	U/E	10.19	U/E	10.37	U/E
Arsenic	3.37	E	5.02	E	2.43	E	2.76	E	1.83	E	8.92	E	1.97	E	1.80	E
Barium	30.4	E	33.1	E	39.3	E	25.0	E	74.6	E	104.0	E	67.9	E	83.0	E
Beryllium	4.42	U/E	5.15	U/E	3.47	U/E	4.46	U/E	3.39	U/E	3.71	U/E	3.40	U/E	3.46	U/E
Cadmium	0.71		0.82		0.49		0.53		0.14		1.11		0.48		0.21	
Chromium	11.24	E	14.56	E	9.66	E	10.25	E	7.46	E	8.92	E	4.76	E	5.46	E
Copper	17.32	E	23.59	E	8.94	E	14.71	E	4.82	E	12.63	E	4.82	E	5.39	E
Iron	14981	E	20582	E	13591	E	14706	E	12212	E	22288	E	8152	E	8990	E
Lead	11.22	E	16.27	E	12.78	E	8.65	E	3.53	E	17.90	E	6.11	E	5.95	E
Mercury	0.094	U/E	0.120	E	0.086	E	0.089	U/E	0.068	U/E	0.074	U/E	0.068	U/E	0.069	U/E
Nickel	11.70	E	12.55	E	8.94	E	9.36	E	9.50	E	20.06	E	7.47	E	8.30	E
Selenium	0.47	U/E	0.50	U/E	0.36	U/E	0.45	U/E	0.68	U/E	0.74	U/E	0.68	U/E	0.69	U/E
Silver	0.42	U/E	0.45	U/E	0.32	U/E	0.40	U/E	0.61	U/E	1.49	E	0.68	E	0.83	E
Thallium	16.85	U/E	18.07	U/E	12.88	U/E	16.04	U/E	24.42	U/E	26.75	U/E	24.46	U/E	24.90	U/E
Zinc	79.6	E	100.4	E	78.7	E	66.8	E	44.8	E	104.0	E	46.9	E	42.2	E
Cyanide	1.0	U/R	1.0	U/R	1.0	U/R	1.0	U/R	1.0	U/R	1.0	U/R	1.0	U/R	1.0	U/R
Percent Solids	0.534		0.498		0.699		0.561		0.737		0.673		0.736		0.723	

Data Qualifiers:

U = Compound was not detected. Value given are the lower quantification limit.
E = Estimated value based on QA/QC results.
R = Data are unusable.

TABLE 7 (cont.)

COMPOUND	SAMPLE RESULTS (mg/kg) D9		D10		D11		D12		D13		D14		D15		D16	
Trace Metals:																
Aluminum	14053	E	7657	E	8013	E	9426	E	6747	E	5830	E	6653	E	9243	E
Antimony	11.09	U/E	5.74	U/E	6.01	U/E	6.15	U/E	5.33	U/E	5.14	U/E	5.25	U/E	6.60	U/E
Arsenic	3.25	E	2.14	E	2.48	E	2.05	E	1.63	E	1.95	E	2.10	E	3.17	E
Barium	74.0	E	84.2	E	80.1	E	69.7	E	49.7	E	54.9	E	73.5	E	70.4	E
Beryllium	3.70	U/E	3.75	U/E	3.69	U/E	4.10	U/E	3.37	U/E	3.38	U/E	3.59	U/E	4.13	U/E
Cadmium	2.66		0.38		0.37		0.41		0.20		0.27		0.22		0.41	
Chromium	7.40	E	8.04	E	7.61	E	7.38	E	5.33	E	4.80	E	5.95	E	8.36	E
Copper	13.31	E	10.34	E	9.62	E	16.39	E	10.65	E	10.29	E	8.40	E	17.17	E
Iron	24408	E	11868	E	11619	E	13934	E	9943	E	9259	E	10504	E	13644	E
Lead	5.70	E	7.88	E	8.57	E	7.79	E	4.85	E	4.80	E	5.67	E	7.93	E
Mercury	0.074	U/E	0.077	U/E	0.080	U/E	0.082	U/E	0.071	U/E	0.069	U/E	0.070	U/E	0.093	E
Nickel	10.36	E	9.19	E	8.41	E	8.61	E	7.10	E	6.52	E	8.05	E	7.92	E
Selenium	0.74	U/E	0.38	U/E	0.40	U/E	0.41	U/E	0.36	U/E	0.34	U/E	0.35	U/E	0.44	U/E
Silver	0.89	E	0.34	U/E	0.48	E	0.37	U/E	0.32	U/E	0.31	U/E	0.32	U/E	0.40	U/E
Thallium	26.63	U/E	13.78	U/E	14.42	U/E	14.75	U/E	12.78	U/E	12.35	U/E	12.61	U/E	15.85	U/E
Zinc	57.0	E	72.7	E	56.1	E	65.6	E	46.2	E	48.0	E	52.5	E	61.6	E
Cyanide	1.0	U/R	1.0	U/R	1.0	U/R	1.0	U/R	1.0	U/R	1.0	U/R	1.0	U/R	1.0	U/R
Percent Solids	0.676		0.653		0.624		0.61		0.704		0.729		0.714		0.568	

Data Qualifiers:

U = Compound was not detected. Value given are the lower quantification limit.
E = Estimated value based on QA/QC results.
R = Data are unusable.

TABLE 7 (cont.)

COMPOUND	SAMPLE RESULTS (mg/kg) D17		D18		D19		D20		D21		D22		D23		D24	
Trace Metals:																
Aluminum	5610	E	5945	E	4605	E	10252	E	9984	E	10676	E	10449	E	13033	E
Antimony	5.26	U/E	4.95	U/E	4.93	U/E	5.91	U/E	5.99	U/E	6.67	U/E	5.80	U/E	5.92	U/E
Arsenic	1.37	E	2.31	E	0.95	E	3.59	E	2.64	E	2.54	E	4.64	E	2.92	E
Barium	42.1	E	62.7	E	23.7	E	102.5	E	115.8	E	106.8	E	127.7	E	122.4	E
Beryllium	3.37	U/E	3.24	U/E	3.54	U/E	4.36	U/E	7.99	U/E	4.81	U/E	4.30	U/E	4.34	U/E
Cadmium	0.20		0.26		0.14		0.52		1.12		0.96		0.52		0.52	
Chromium	4.91	E	4.95	E	2.86	E	8.28	E	9.98	E	9.79	E	9.67	E	12.64	E
Copper	11.22	E	7.60	E	10.20	E	16.17	E	12.78	E	18.68	E	13.16	E	15.40	E
Iron	8065	E	9908	E	6579	E	14196	E	15176	E	15569	E	15480	E	17773	E
Lead	4.05	E	5.37	E	2.19	E	9.41	E	20.45	E	13.85	E	11.27	E	13.80	E
Mercury	0.070	U/E	0.066	U/E	0.066	U/E	0.079	U/E	0.080	U/E	0.117	E	0.077	U/E	0.125	E
Nickel	5.96	E	7.93	E	5.59	E	11.04	E	11.58	E	11.12	E	11.22	E	14.22	E
Selenium	0.70	U/E	0.33	U/E	0.33	U/E	0.39	U/E	0.80	U/E	0.44	U/E	0.77	U/E	0.79	U/E
Silver	0.32	U/E	0.30	U/E	0.30	U/E	0.35	U/E	0.36	U/E	0.40	U/E	0.35	U/E	0.36	U/E
Thallium	12.62	U/E	11.89	U/E	11.84	U/E	14.20	U/E	14.38	U/E	16.01	U/E	13.93	U/E	14.22	U/E
Zinc	35.1	E	59.4	E	28.3	E	90.7	E	99.8	E	124.6	E	92.9	E	110.6	E
Cyanide	1.0	U/R	1.0	U/R	1.0	U/R	1.0	U/R	1.0	U/R	1.0	U/R	1.0	U/R	1.0	U/R
Percent Solids	0.713		0.757		0.76		0.634		0.626		0.562		0.646		0.633	

Data Qualifiers:

U = Compound was not detected. Value given are the lower quantification limit.
E = Estimated value based on QA/QC results.
R = Data are unusable.

TABLE 7 (cont.)

COMPOUND	SAMPLE RESULTS (mg/kg) D25		D26		D27		D28		D29		D30		D31		D32	
Trace Metals:																
Aluminum	9731	E	4950	E	6536	E	5697	E	6241	E	8065	E	6831	E	5814	E
Antimony	5.61	U/E	4.64	U/E	4.90	U/E	5.03	U/E	5.20	U/E	5.76	U/E	5.12	U/E	4.84	U/E
Arsenic	3.33	E	1.98	E	2.06	E	2.58	E	2.18	E	2.46	E	4.10	E	2.16	E
Barium	127.2	E	77.4	E	75.2	E	90.5	E	86.7	E	99.8	E	85.4	E	77.5	E
Beryllium	3.98	E	3.34	U/E	3.53	U/E	3.40	U/E	3.83	U/E	3.90	U/E	3.77	U/E	3.40	U/E
Cadmium	0.48		0.27		0.28		0.41		0.38		0.55		0.38		0.27	
Chromium	10.48	E	5.88	E	5.88	E	6.03	E	6.93	E	8.83	E	6.83	E	7.43	E
Copper	10.85	E	3.40	E	6.21	E	8.71	E	6.24	E	11.14	E	6.83	E	6.14	E
Iron	15344	E	10210	E	11111	E	10724	E	11096	E	12673	E	11954	E	11305	E
Lead	9.71	E	4.21	E	4.95	E	9.73	E	6.90	E	8.66	E	7.02	E	7.75	E
Mercury	0.075	E	0.062	U/E	0.065	U/E	0.067	U/E	0.069	U/E	0.086	E	0.068	U/E	0.065	U/E
Nickel	11.60	E	8.97	E	10.13	E	8.71	E	10.40	E	10.75	E	8.88	E	10.34	E
Selenium	0.75	E	0.31	U/E	0.33	U/E	0.34	U/E	0.35	U/E	0.38	U/E	0.34	U/E	0.32	U/E
Silver	0.34	U/E	0.28	U/E	0.29	U/E	0.30	U/E	0.31	U/E	0.35	U/E	0.31	U/E	0.29	U/E
Thallium	13.47	U/E	11.14	U/E	11.76	U/E	12.06	U/E	12.48	U/E	13.82	U/E	12.30	U/E	11.63	U/E
Zinc	74.9	E	49.5	E	55.6	E	87.1	E	76.3	E	76.8	E	78.6	E	77.5	E
Cyanide	1.0	U/R	1.0	U/R	1.0	U/R	1.0	U/R	1.0	U/R	1.0	U/R	1.0	U/R	1.0	U/R
Percent Solids	0.668		0.808		0.765		0.746		0.721		0.651		0.732		0.774	

Data Qualifiers:

U = Compound was not detected. Value given are the lower quantification limit.
E = Estimated value based on QA/QC results.
R = Data are unusable.

TABLE 7 (cont.)

COMPOUND	SAMPLE RESULTS (mg/kg) D33	D34	D35	D36	D37	D38	D39	D40
Trace Metals:								
Aluminum	6757 E	4747 E	10753 E	6338 E	7650 E	5122 E	5038 E	9336 E
Antimony	5.07 U/E	4.75 U/E	6.72 U/E	5.28 U/E	5.22 U/E	4.80 U/E	4.72 U/E	5.19 U/E
Arsenic	2.36 E	1.46 E	3.99 E	1.62 E	2.75 E	1.92 E	1.51 E	2.87 E
Barium	101.4 E	63.3 E	125.4 E	66.9 E	111.3 E	60.8 E	69.3 E	117.6 E
Beryllium	3.56 U/E	3.46 U/E	4.64 U/E	3.32 U/E	3.70 U/E	3.14 U/E	3.25 U/E	3.22 U/E
Cadmium	0.43	0.21	0.93	0.40	0.37	0.19	0.13	0.32
Chromium	7.43 E	6.65 E	9.41 E	7.39 E	8.69 E	6.72 E	8.82 E	9.34 E
Copper	6.76 E	3.80 E	17.03 E	7.39 E	7.30 E	4.16 E	2.39 E	12.79 E
Iron	11824 E	8861 E	16129 E	10211 E	13561 E	10243 E	11650 E	15214 E
Lead	7.33 E	4.01 E	11.70 E	5.85 E	12.95 E	8.03 E	5.19 E	12.35 E
Mercury	0.068 U/E	0.063 U/E	0.090 E	0.070 E	0.070 U/E	0.064 U/E	0.063 U/E	0.069 U/E
Nickel	10.47 E	9.18 E	12.54 E	8.80 E	11.13 E	9.28 E	10.71 E	12.45 E
Selenium	0.34 U/E	0.32 U/E	0.45 U/E	0.35 E	0.35 U/E	0.32 U/E	0.31 U/E	0.69 U/E
Silver	0.30 U/E	0.28 U/E	0.40 U/E	0.32 U/E	0.31 U/E	0.29 U/E	0.28 U/E	0.31 U/E
Thallium	12.16 U/E	11.39 U/E	16.13 U/E	12.68 U/E	12.52 U/E	11.52 U/E	11.34 U/E	12.45 U/E
Zinc	84.5 E	53.8 E	161.3 E	59.9 E	111.3 E	67.2 E	44.1 E	114.1 E
Cyanide	1.0 U/R	1.0 U/R	1.0 U/R	1.0 U/R	1.0 U/R	1.0 U/R	1.0 U/R	1.0 U/R
Percent Solids	0.74	0.79	0.558	0.71	0.719	0.781	0.794	0.723

Data Qualifiers:

U = Compound was not detected. Value given are the lower quantification limit.
E = Estimated value based on QA/QC results.
R = Data are unusable.

TABLE 7 (cont.)

COMPOUND	SAMPLE RESULTS (mg/kg) D41		D42		D43		D44		D45		D46		E1		E2	
Trace Metals:																
Aluminum	10850	E	6766	E	9571	E	5036	E	10783	E	9220	E	4611	E	6410	E
Antimony	6.78	U/E	5.07	U/E	5.74	U/E	5.40	U/E	5.99	U/E	5.32	U/E	4.94	U/E	5.06	U/E
Arsenic	3.89	E	2.44	E	4.59	E	1.40	E	2.44	E	2.66	E	2.04	E	1.18	E
Barium	126.6	E	94.7	E	126.3	E	35.6	E	95.8	E	39.0	E	24.4	E	47.2	E
Beryllium	4.24	U/E	3.32	U/E	4.05	U/E	3.71	U/E	3.73	U/E	3.39	U/E	3.33	U/E	3.36	U/E
Cadmium	1.44		0.46		0.49		0.22		0.37		0.48		0.07		0.07	
Chromium	9.95	E	7.44	E	9.19	E	3.96	E	10.38	E	10.99	E	3.62	E	6.07	E
Copper	17.63	E	8.46	E	13.02	E	9.35	E	11.58	E	9.22	E	1.84	E	3.71	E
Iron	16275	E	11502	E	14931	E	6835	E	14776	E	14539	E	9552	E	10459	E
Lead	13.24	E	7.43	E	10.78	E	4.08	E	8.73	E	11.40	E	5.46	E	4.16	E
Mercury	0.107	E	0.068	U/E	0.077	U/E	0.072	U/E	0.080	U/E	0.071	U/E	0.066	U/E	0.067	U/E
Nickel	12.66	E	9.13	E	11.10	E	5.04	E	10.38	E	9.22	E	6.92	E	8.43	E
Selenium	0.90	U/E	0.34	U/E	0.77	U/E	0.36	U/E	0.40	U/E	0.35	U/E	0.33	U/E	0.34	U/E
Silver	0.41	U/E	0.30	U/E	0.34	U/E	0.50	E	0.36	U/E	0.46	E	0.40	E	0.30	U/E
Thallium	16.27	U/E	12.18	U/E	13.78	U/E	12.95	U/E	14.38	U/E	12.77	U/E	11.86	U/E	12.15	U/E
Zinc	158.2	E	81.2	E	91.9	E	31.3	E	67.9	E	78.0	E	27.7	E	37.1	E
Cyanide	1.0	U/R	1.0	U/R	1.0	U/R	1.0	U/R	1.0	U/R	1.0	U/R	1.0	U/R	1.0	U/R
Percent Solids	0.553		0.739		0.653		0.695		0.626		0.705		0.759		0.741	

Data Qualifiers:

U = Compound was not detected. Value given are the lower quantification limit.
E = Estimated value based on QA/QC results.
R = Data are unusable.

TABLE 7 (cont.)

COMPOUND	SAMPLE RESULTS (mg/kg) E3		E4		E5		E6		E7		E8		E9	
Trace Metals:														
Aluminum	4619	E	3397	E	5137	E	4664	E	2887	E	4705	E	12673	E
Antimony	9.36	U/E	9.62	U/E	4.28	U/E	4.66	U/E	4.92	U/E	4.71	U/E	5.76	U/E
Arsenic	1.44	E	1.35	E	1.86	E	1.87	E	0.46	E	1.85	E	2.00	E
Barium	48.7	E	40.4	E	51.4	E	46.6	E	8.5	E	47.1	E	122.9	E
Beryllium	3.12	U/E	3.21	U/E	2.93	U/E	3.27	U/E	3.14	U/E	3.30	U/E	3.86	U/E
Cadmium	0.19		0.90		0.06		0.13		0.06	U	0.20		0.46	
Chromium	5.18	E	4.49	U/E	2.28	E	4.98	E	2.30	U/E	2.63	E	11.90	E
Copper	3.62	E	2.56	E	4.85	E	5.91	E	8.53	E	6.59	E	12.67	E
Iron	9988	E	7051	E	9989	E	9328	E	6234	E	8783	E	17281	E
Lead	3.87	E	2.37	E	2.17	E	4.26	E	0.63	E	3.10	E	10.81	E
Mercury	0.062	U/E	0.064	U/E	0.057	U/E	0.062	U/E	0.066	U/E	0.063	U/E	0.106	E
Nickel	6.87	E	4.87	E	5.99	E	9.02	E	5.91	E	5.65	E	13.44	E
Selenium	0.62	U/E	0.64	U/E	0.29	U/E	0.31	U/E	0.33	U/E	0.31	U/E	0.38	U/E
Silver	0.69	E	1.22	E	0.26	U/E	0.28	U/E	0.30	U/E	0.28	U/E	0.35	U/E
Thallium	22.47	U/E	23.08	U/E	10.27	U/E	11.19	U/E	11.81	U/E	11.29	U/E	13.82	U/E
Zinc	39.3	E	21.8	E	25.1	E	43.5	E	16.4	E	40.8	E	99.8	E
Cyanide	1.0	U/R	1.0	U/R	1.0	U/R	1.0	U/R	1.0	U/R	1.0	U/R	1.0	U/R
Percent Solids	0.801		0.78		0.876		0.804		0.762		0.797		0.651	

Data Qualifiers:

U = Compound was not detected. Value given are the lower quantification limit.
E = Estimated value based on QA/QC results.
R = Data are unusable.

TABLE 7 (cont.)

COMPOUND	SAMPLE RESULTS (mg/kg) E10		E11		E12		E13		E14				
Trace Metals:													
Aluminum	6519	E	7241	E	2794	E	9032	E	6904	E			
Antimony	4.89	U/E	5.17	U/E	4.51	U/E	4.84	U/E	4.32	U/E			
Arsenic	1.63	E	2.52	E	0.60	E	2.90	E	2.36	E			
Barium	71.7	E	110.3	E	28.2	E	164.5	E	132.3	E			
Beryllium	3.41	U/E	3.47	U/E	2.82	U/E	3.31	U/E	3.18	U/E			
Cadmium	0.27		0.55		0.11		0.46		0.32				
Chromium	6.19	E	7.93	E	2.34	E	5.48	E	5.47	E			
Copper	5.87	E	26.90	E	3.31	E	6.13	E	7.48	E			
Iron	10756	E	12414	E	3906	E	17742	E	13521	E			
Lead	5.67	E	9.36	E	1.41	E	7.15	E	4.83	E			
Mercury	0.065	U/E	0.069	U/E	0.060	U/E	0.065	U/E	0.058	U/E			
Nickel	8.47	E	10.34	E	4.21	E	14.19	E	12.95	E			
Selenium	0.33	U/E	0.34	U/E	0.30	U/E	0.32	U/E	0.29	U/E			
Silver	0.29	U/E	0.31	U/E	0.27	U/E	0.29	U/E	0.26	U/E			
Thallium	11.73	U/E	12.41	U/E	10.82	U/E	11.61	U/E	10.36	U/E			
Zinc	61.9	E	103.4	E	22.5	E	103.2	E	66.2	E			
Cyanide	1.0	U/R	1.0	U/R	1.0	U/R	1.0	U/R	1.0	U/R			
Percent Solids	0.767		0.725		0.832		0.775		0.869				

Data Qualifiers:

U = Compound was not detected. Value given are the lower quantification limit.
E = Estimated value based on QA/QC results.
R = Data are unusable.

TABLE 8. TRACE METALS ANALYSIS RESULTS FOR WATER
LOWER COLUMBIA RIVER RECONNAISSANCE SURVEY

COMPOUND	SAMPLE RESULTS (ug/L) W1		W2		W3		W4		W5		W6		W7		W8	
Trace Metals:																
Aluminum	120	U/E	270	U/E	1300	E	370	U/E	450	E	450	E	480	E	340	U/E
Antimony	150	U/E	150	U/E	150	U/E	150	U/E	150	U/E	150	U/E	150	U/E	150	U/E
Arsenic	5	U/E	5	U/E	5	U/E	5	U/E	5	U/E	5	U/E	5	U/E	5	U/E
Barium	14	E	19	E	22	E	23	E	42	E	20	E	38	E	24	E
Beryllium	5	U/E	5	U/E	5	U/E	5	U/E	5	U/E	5	U/E	5	U/E	5	U/E
Cadmium	0.5	U/E	5.0	U/E	5.0	U/E	5.0	U/E	0.5	U/E	5.0	U/E	0.5	U/E	5.0	U/E
Chromium	7	E	5	U/E	5	U/E	5	U/E	5	U/E	6	E	5	U/E	5	U/E
Copper	5	U/E	11	E	5	U/E	5	U/E	5	U/E	5	U/E	5	U/E	5	U/E
Iron	100	U/E	370	U/E	1800	E	460	E	570	E	500	U/E	580	E	420	U/E
Lead	1	U/E	20	U/E	20	U/E	20	U/E	1	U/E	1	U/E	20	U/E	1	U/E
Mercury	0.5	U/E	0.5	U/E	0.5	U/E	0.5	U/E	0.5	U/E	0.5	U/E	0.5	U/E	0.5	U/E
Nickel	40	U/E	40	U/E	40	U/E	40	U/E	40	U/E	40	U/E	40	U/E	40	U/E
Selenium	100	U/E	100	U/E	100	U/E	5	U/E	100	U/E	100	U/E	100	U/E	100	U/E
Silver	2	U/E	2	U/E	2	U/E	2	U/E	2	U/E	2	U/E	2	U/E	2	U/E
Thallium	360	U/E	360	U/E	360	U/E	360	U/E	360	U/E	360	U/E	360	U/E	360	U/E
Zinc	20	U/E	20	U/E	20	U/E	20	E	20	U/E	20	U/E	20	U/E	20	U/E

Data Qualifiers: U = Compound was not detected. Value given is the lower quantification limit.
E = Estimated value based on QA/QC results.

TABLE 8 (cont.)

COMPOUND	SAMPLE RESULTS (ug/L) W9		W10		W11		W12		W13		W14		W15		W16	
Trace Metals:																
Aluminum	490	E	220	U/E	220	U/E	160	U/E	240	U/E	250	U/E	230	U/E	1100	E
Antimony	15	U/E	15	U/E	15	U/E	15	U/E	15	U/E	15	U/E	15	U/E	15	U/E
Arsenic	5	U/E	5	U/E	5	U/E	5	U/E	5	U/E	5	U/E	5	U/E	5	U/E
Barium	17	E	25	E	26	E	13	E	25	E	28	E	28	E	32	E
Beryllium	5	U/E	5	U/E	5	U/E	5	U/E	5	U/E	5	U/E	5	U/E	5	U/E
Cadmium	5.0	U/E	0.5	U/E	0.5	U/E	0.5	U/E	5.0	U/E	0.5	U/E	0.5	U/E	0.5	U/E
Chromium	5	U/E	5	U/E	5	U/E	5	U/E	5	U/E	5	U/E	5	U/E	5	U/E
Copper	5	U/E	5	U/E	5	U/E	5	U/E	10	E	5	U/E	5	U/E	5	U/E
Iron	520	U/E	160	E	110	U/E	100	U/E	210	U/E	510	U/E	520	U/E	1300	E
Lead	1	U/E	1	U/E	1	U/E	1	U/E	1	U/E	2	E	5	E	2	E
Mercury	0.5	U/E	0.5	U/E	0.5	U/E	0.5	U/E	0.5	U/E	0.5	U/E	0.5	U/E	0.5	U/E
Nickel	40	U/E	40	U/E	40	U/E	40	U/E	40	U/E	40	U/E	40	U/E	40	U/E
Selenium	100	U/E	100	U/E	100	U/E	5	U/E	100	U/E	5	U/E	5	U/E	5	U/E
Silver	2	U/E	2	U/E	2	U/E	2	U/E	2	U/E	2	U/E	2	U/E	2	U/E
Thallium	36	U/E	36	U/E	36	U/E	36	U/E	36	U/E	36	U/E	36	U/E	36	U/E
Zinc	84	E	20	U/E	27	E	20	U/E	20	U/E	20	U/E	20	U/E	77	E

Data Qualifiers: U = Compound was not detected. Value given is the lower quantification limit.
E = Estimated value based on QA/QC results.

TABLE 8 (cont.)

COMPOUND	SAMPLE RESULTS (ug/L) W17		W18		W19		W20		W21		W22		W23		W24	
Trace Metals:																
Aluminum	270	U/E	260	U/E	340	U/E	340	U/E	230	U/E	220	U/E	230	U/E	210	U/E
Antimony	15	U/E	15	U/E	15	U/E	15	U/E	15	U/E	15	U/E	15	U/E	15	U/E
Arsenic	5	U/E	5	U/E	5	U/E	5	U/E	5	U/E	5	U/E	5	U/E	5	U/E
Barium	27	E	28	E	27	E	26	E	12	E	29	E	29	E	10	U/E
Beryllium	5	U/E	5	U/E	5	U/E	5	U/E	5	U/E	5	U/E	5	U/E	5	U/E
Cadmium	0.5	U/E	0.5	U/E	0.5	U/E	0.5	U/E	0.5	U/E	1.2	E	0.5	U/E	0.5	U/E
Chromium	5	U/E	5	U/E	5	U/E	5	U/E	5	U/E	5	U/E	5	U/E	5	U/E
Copper	5	U/E	5	U/E	5	U/E	5	U/E	9	E	5	U/E	8	E	5	U/E
Iron	580	E	530	U/E	430	U/E	400	U/E	220	U/E	400	U/E	580	E	410	E
Lead	4	E	6	E	5	E	4	E	4	E	2	E	9	E	2	E
Mercury	0.5	U/E	0.5	U/E	0.5	U/E	0.5	U/E	0.5	U/E	0.5	U/E	0.5	U/E	0.5	U/E
Nickel	40	U/E	40	U/E	40	U/E	40	U/E	40	U/E	40	U/E	40	U/E	40	U/E
Selenium	5	U/E	5	U/E	5	U/E	5	U/E	5	U/E	5	U/E	16	E	5	U/E
Silver	2	U/E	2	U/E	2	U/E	2	U/E	2	U/E	2	U/E	2	U/E	2	U/E
Thallium	36	U/E	36	U/E	36	U/E	36	U/E	36	U/E	36	U/E	36	U/E	36	U/E
Zinc	20	U/E	20	U/E	20	U/E	20	U/E	20	U/E	20	U/E	20	U/E	20	U/E

Data Qualifiers: U = Compound was not detected. Value given is the lower quantification limit.
E = Estimated value based on QA/QC results.

TABLE 8 (cont.)

COMPOUND	SAMPLE RESULTS (ug/L) W25		W26		W27		W28		W29		W30		W31		W32	
Trace Metals:																
Aluminum	240	U/E	210	U/E	230	U/E	250	U/E	270	U/E	210	U/E	540	E	540	E
Antimony	15	U/E	15	U/E	15	U/E	15	U/E	15	U/E	15	U/E	150	U/E	150	U/E
Arsenic	5	U/E	5	U/E	5	U/E	5	U/E	5	U/E	5	U/E	5	U/E	5	U/E
Barium	31	E	30	E	30	E	28	E	31	E	34	E	82	E	81	E
Beryllium	5	U/E	5	U/E	5	U/E	5	U/E	5	U/E	5	U/E	5	U/E	5	U/E
Cadmium	0.5	U/E	0.5	U/E	0.5	U/E	2.9	E	0.5	U/E	0.5	U/E	0.5	U/E	0.5	U/E
Chromium	5	U/E	5	U/E	5	U/E	5	U/E	5	U/E	5	U/E	42	E	40	E
Copper	5	U/E	7	E	5	U/E	54	E	5	E	11	E	47	E	47	E
Iron	410	U/E	550	U/E	370	U/E	470	U/E	570	E	620	E	670	E	620	E
Lead	5	E	9	E	3	E	4	E	4	E	5	E	1	E	2	E
Mercury	0.5	U/E	0.5	U/E	0.5	U/E	0.5	U/E	0.5	U/E	0.5	U/E	0.5	U/E	0.5	U/E
Nickel	40	U/E	40	U/E	40	U/E	40	U/E	40	U/E	40	U/E	40	E	43	E
Selenium	5	U/E	32	E	5	U/E	5	U/E	5	U/E	6	E	5	U/E	5	U/E
Silver	2	U/E	2	U/E	2	U/E	2	U/E	2	U/E	2	U/E	2	U/E	2	U/E
Thallium	36	U/E	36	U/E	36	U/E	36	U/E	36	U/E	36	U/E	360	U/E	360	U/E
Zinc	20	U/E	20	U/E	20	U/E	20	U/E	20	U/E	20	U/E	62	E	69	E

Data Qualifiers: U = Compound was not detected. Value given is the lower quantification limit.
E = Estimated value based on QA/QC results.

TABLE 8 (cont.)

COMPOUND	SAMPLE RESULTS (ug/L) W33		W34		W35		W36		W37		W38		W39		W40	
Trace Metals:																
Aluminum	220	U/E	220	U/E	260	U/E	370	U/E	450	E	220	U/E	250	U/E	250	U/E
Antimony	15	U/E	15	U/E	15	U/E	150	U/E	150	U/E	15	U/E	15	U/E	15	U/E
Arsenic	5	U/E	5	U/E	5	U/E	5	U/E	5	U/E	5	U/E	5	U/E	5	U/E
Barium	25	E	26	E	21	E	23	E	20	E	28	E	27	E	27	E
Beryllium	5	U/E	5	U/E	5	U/E	5	U/E	5	U/E	5	U/E	5	U/E	5	U/E
Cadmium	0.5	U/E	0.5	U/E	0.5	U/E	0.5	U/E	3.5	E	0.5	U/E	0.5	U/E	0.5	U/E
Chromium	5	U/E	5	U/E	5	U/E	5	U/E	6	E	5	U/E	5	U/E	5	U/E
Copper	5	U/E	5	U/E	5	U/E	5	U/E	5	U/E	5	U/E	13	E	5	U/E
Iron	160	U/E	110	U/E	250	E	460	E	500	U/E	300	U/E	190	U/E	320	U/E
Lead	2	E	2	E	1	U/E	1	U/E	2	E	1	U/E	4	E	1	U/E
Mercury	0.5	U/E	0.5	U/E	0.5	U/E	0.5	U/E	0.5	U/E	0.5	U/E	0.5	U/E	0.5	U/E
Nickel	40	U/E	40	U/E	40	U/E	40	U/E	40	U/E	40	U/E	40	U/E	40	U/E
Selenium	5	U/E	5	U/E	5	U/E	5	U/E	5	U/E	5	U/E	5	U/E	5	U/E
Silver	2	U/E	2	U/E	2	U/E	2	U/E	2	U/E	2	U/E	2	U/E	2	U/E
Thallium	36	U/E	36	U/E	36	U/E	360	U/E	360	U/E	36	U/E	36	U/E	36	U/E
Zinc	20	U/E	27	E	20	U/E	20	E	20	U/E	33	E	61	E	20	U/E

Data Qualifiers: U = Compound was not detected. Value given is the lower quantification limit.
E = Estimated value based on QA/QC results.

TABLE 8 (cont.)

COMPOUND	SAMPLE RESULTS (ug/L) W41		W42		W43		W44		W45		W46		W48	
Trace Metals:														
Aluminum	260	U/E	1100	E	1300	E	250	U/E	270	U/E	220	U/E	220	U/E
Antimony	15	U/E	15	U/E	150	U/E	15	U/E	15	U/E	15	U/E	15	U/E
Arsenic	5	U/E	5	U/E	5	U/E	5	U/E	5	U/E	5	U/E	5	U/E
Barium	21	E	32	E	22	E	27	E	28	E	28	E	36	E
Beryllium	5	U/E	5	U/E	5	U/E	5	U/E	5	U/E	5	U/E	5	U/E
Cadmium	0.5	U/E	0.5	U/E	0.5	U/E	0.5	U/E	0.5	U/E	0.5	U/E	0.5	U/E
Chromium	5	U/E	5	U/E	5	U/E	5	U/E	5	U/E	5	U/E	5	U/E
Copper	5	U/E	5	U/E	6	E	5	U/E	5	U/E	5	U/E	6	E
Iron	250	U/E	1300	E	1800	E	320	U/E	310	U/E	300	U/E	510	U/E
Lead	2	E	1	U/E	1	U/E	1	U/E	1	U/E	1	E	5	E
Mercury	0.5	U/E	0.5	U/E	0.5	U/E	0.5	U/E	0.5	U/E	0.5	U/E	0.5	U/E
Nickel	40	U/E	40	U/E	40	U/E	40	U/E	40	U/E	40	U/E	40	U/E
Selenium	5	U/E	5	U/E	5	U/E	5	U/E	5	U/E	5	U/E	6	E
Silver	2	U/E	2	U/E	2	U/E	2	U/E	2	U/E	2	U/E	2	U/E
Thallium	36	U/E	36	U/E	360	U/E	36	U/E	36	U/E	36	U/E	36	U/E
Zinc	20	U/E	77	E	20	U/E	20	U/E	20	U/E	33	E	20	U/E

Data Qualifiers: U = Compound was not detected. Value given is the lower quantification limit.
E = Estimated value based on QA/QC results.

TABLE 8 (cont.)

COMPOUND	SAMPLE RESULTS (ug/L) W49		W50		W52					
Trace Metals:										
Aluminum	220	U/E	400	U/E	190	U/E				
Antimony	150	U/E	150	U/E	15	U/E				
Arsenic	5	U/E	5	U/E	5	U/E				
Barium	24	E	27	E	30	E				
Beryllium	5	U/E	5	U/E	5	U/E				
Cadmium	0.5	U/E	5.0	U/E	0.5	U/E				
Chromium	5	U/E	5	U/E	5	U/E				
Copper	10	E	5	U/E	5	U/E				
Iron	300	U/E	450	U/E	460	U/E				
Lead	3	E	1	U/E	6	E				
Mercury	0.5	U/E	0.5	U/E	0.5	U/E				
Nickel	40	U/E	40	U/E	40	U/E				
Selenium	5	U/E	100	U/E	12	E				
Silver	2	U/E	20	U/E	2	U/E				
Thallium	360	U/E	360	U/E	36	U/E				
Zinc	20	U/E	20	U/E	20	U/E				

Data Qualifiers: U = Compound was not detected. Value given is the lower quantification limit.
E = Estimated value based on QA/QC results.

TABLE 9. TRACE METALS ANALYSIS RESULTS FOR TISSUE
LOWER COLUMBIA RIVER RECONNAISSANCE SURVEY

COMPOUND	SAMPLE RESULTS CRAYFISH (mg/kg wet weight) D6		D8		D10		D12		D15		D15d		D16	
Trace Metals:														
Antimony	2.80	U/E	2.89	U/E	2.48	U/E	2.72	U/E	2.45	U/E	3.25	U/E	2.30	U/E
Arsenic	0.37	U	0.38	U	0.33	U	0.36	U	0.33	U	NR	U	0.31	U
Barium	1.6	E	1.5	E	1.3	E	0.8	E	0.6	E	1.9	E	0.6	E
Cadmium	0.08		0.08		0.07		0.05		0.08		0.13		0.03	
Copper	37.33	E	30.77	E	41.39	E	19.93	E	27.80	E	28.17	E	21.47	E
Lead	0.02	E	0.02	E	0.02	E	0.04	E	0.02	E	0.02	E	0.02	U/E
Mercury	0.056	E	0.038	E	0.013	U/E	0.021	E	0.022	E	0.061	E	0.022	E
Nickel	0.65	U/E	0.67	U/E	0.58	U/E	0.63	U/E	0.57	U/E	0.76	U/E	0.54	U/E
Selenium	0.37	U	0.38	U	0.33	U	0.36	U	0.33	U	NR	U	0.31	U
Silver	0.17	U/E	1.17	E	0.94	E	0.82	E	0.80	E	1.13	E	1.03	E
Zinc	26.1	E	26.9	E	24.8	E	23.5	E	24.5	E	21.0	E	24.5	E

NR = Not Reported

Data Qualifiers: U = Compound was not detected. Value given is the lower quantification limit.
E = Estimated value based on QA/QC results.

TABLE 9 (cont.)

COMPOUND	SAMPLE RESULTS CRAYFISH (mg/kg wet weight) D19		D20		D22		D23		D24		D26		D26d	
Trace Metals:														
Antimony	2.72	U/E	4.05	U/E	0.35	U/E	0.31	U/E	0.37	U/E	0.38	U/E	0.37	U/E
Arsenic	0.36	U	0.54	U	0.46	U	0.42	U	0.49	U	0.48	U	NR	U
Barium	1.2	E	3.5	E	1.6	E	1.5	E	1.6	E	2.5	E	2.5	E
Cadmium	0.07		0.08		0.05		0.06		0.05		0.08		0.10	
Copper	38.05	E	27.00	E	17.94	E	25.00	E	24.55	E	46.40	E	44.73	E
Lead	0.02	U/E	0.03	U/E	0.05	E	0.02	E	0.02	E	0.03	E	0.02	U/E
Mercury	0.036	E	0.022	E	0.049	E	0.078	E	0.042	E	0.015	U/E	0.057	E
Nickel	0.63	U/E	0.95	U/E	0.81	U/E	0.73	U/E	0.86	U/E	1.01	E	1.23	E
Selenium	0.36	U	0.54	U	0.46	U	0.42	U	0.49	U	0.48	U	NR	U
Silver	0.16	U/E	1.54	E	0.48	E	0.38	E	0.34	E	0.23	U/E	0.22	U/E
Zinc	29.0	E	29.7	E	21.9	E	20.2	E	21.1	E	38.8	E	33.7	E

Data Qualifiers: U = Compound was not detected. Value given is the lower quantification limit.
E = Estimated value based on QA/QC results.

TABLE 9 (cont.)

COMPOUND	SAMPLE RESULTS CRAYFISH (mg/kg wet weight) D28		D29		D31		D35		D38		D40	
Trace Metals:												
Antimony	1.98	U/E	2.40	U/E	1.84	U/E	1.78	U/E	4.05	U/E	3.42	U/E
Arsenic	0.26	U	0.32	U	0.25	U	0.24	U	0.54	U	0.46	U
Barium	1.1	E	1.0	E	0.9	E	1.0	E	1.6	E	2.1	E
Cadmium	0.09		0.10		0.09		0.02		0.11		0.12	
Copper	35.73	E	25.60	E	37.99	E	26.17	E	29.70	E	29.60	E
Lead	0.01	E	0.02	U/E	0.03	E	0.01	E	0.03	E	0.05	E
Mercury	0.060	E	0.012	U/E	0.053	E	0.056	E	0.018	E	0.014	E
Nickel	0.46	U/E	0.56	U/E	0.43	U/E	1.02	E	0.95	U/E	0.80	U/E
Selenium	0.26	U	0.32	U	0.25	U	0.24	U	0.54	U	0.46	U
Silver	0.58	E	1.01	E	0.55	E	0.61	E	1.11	E	1.37	E
Zinc	26.5	E	27.2	E	25.7	E	27.4	E	29.7	E	34.2	E

Data Qualifiers: U = Compound was not detected. Value given is the lower quantification limit.
E = Estimated value based on QA/QC results.

TABLE 9 (cont.)

COMPOUND	SAMPLE RESULTS STURGEON (mg/kg wet weight) ST-1-2-D		ST-1-3		ST-1-4		ST-1-5-D		ST-2-1-D		ST-2-3		ST-2-2-D	
Trace Metals:														
Antimony	0.33	U/E	0.35	U/E	0.20	U/E	1.00	U/E	0.45	U/E	2.16	U/E	0.32	U/E
Arsenic	0.49		0.46	U	0.26	U	0.27	U	0.40		0.29	U	1.38	
Barium	0.2	U/E	0.2	U/E	0.1	U/E	0.5	U/E	0.2	U/E	0.1	U/E	0.2	U/E
Cadmium	0.02	U	0.02	U	0.01	U	0.07	U	0.03	U	0.02	U	0.02	U
Copper	0.66	U/E	0.69	U/E	0.45	U/E	2.00	E	0.90	U/E	0.43	U/E	0.63	U/E
Lead	0.06	E	0.02	E	0.01	E	0.07	E	0.03	E	0.02	E	0.02	E
Mercury	0.012	E	0.047	E	0.110	U/E	0.521	E	0.051	E	0.068	E	0.058	E
Nickel	0.76	U/E	0.81	U/E	0.46	U/E	2.33	U/E	1.05	U/E	0.50	U/E	0.74	U/E
Selenium	0.44	U	0.46	U	0.26	U	0.27	U	0.52	U	0.29	U	0.42	U
Silver	0.20	U/E	0.21	U/E	0.12	U/E	0.60	U/E	0.27	E	0.23	U/E	0.19	U/E
Zinc	5.0	U/E	1.8	E	3.4	E	16.0	E	6.3	E	2.3	E	3.8	E

Data Qualifiers: U = Compound was not detected. Value given is the lower quantification limit.
E = Estimated value based on QA/QC results.

TABLE 9 (cont.)

COMPOUND	SAMPLE RESULTS STURGEON (mg/kg wet weight) ST-2-4		ST-3-1-D		ST-3-3-D		ST-3-4		ST-3-6		ST-4-1-D		ST-4-2	
Trace Metals:														
Antimony	0.33	U/E	0.26	U/E	0.30	U/E	0.34	U/E	0.34	U/E	0.31	U/E	0.33	U/E
Arsenic	1.07		1.86		0.40	U	0.45	U	0.55	U	0.42	U	0.44	U
Barium	0.2	U/E	0.1	U/E	0.2	U/E	0.2	U/E	0.2	U/E	0.2	U/E	0.2	U/E
Cadmium	0.02	U	0.02		0.04	U	0.02	U	0.02	U	0.02	U	0.02	U
Copper	0.65	U/E	0.53	U/E	0.60	U/E	0.68	U/E	0.68	U/E	0.63	U/E	0.66	E
Lead	0.02	E	0.02	E	1.12	E	0.07	E	0.02	E	0.02	E	0.02	E
Mercury	0.106	E	0.094	E	0.347	E	0.094	U/E	0.013	E	0.127	E	0.021	E
Nickel	0.76	U/E	0.61	U/E	0.70	U/E	0.80	U/E	0.70	U/E	0.73	U/E	0.77	E
Selenium	0.40	U	0.35	U	0.40	U	0.45	U	0.40	U	0.42	U	0.44	U
Silver	0.20	U/E	0.16	U/E	0.18	U/E	0.21	U/E	0.18	U/E	0.19	U/E	0.20	U/E
Zinc	5.2	E	5.4	E	5.2	E	3.9	E	5.2	E	4.0	E	3.7	E

Data Qualifiers: U = Compound was not detected. Value given is the lower quantification limit.
E = Estimated value based on QA/QC results.

TABLE 9 (cont.)

COMPOUND	SAMPLE RESULTS STURGEON (mg/kg wet weight) ST-4-3-D		ST-4-4		ST-1-5-DUP					
Trace Metals:										
Antimony	0.33	U/E	2.40	U/E	2.20	U/E				
Arsenic	0.44	U	0.27		0.84					
Barium	0.2	U/E	0.1	U/E	0.1	U/E				
Cadmium	0.02		0.02	U	0.02	U				
Copper	0.66	U/E	0.48	U/E	0.50	U/E				
Lead	0.04	E	0.02	E	0.04	E				
Mercury	0.045	E	0.061	E	0.076	E				
Nickel	0.77	U/E	0.56	U/E	0.59	U/E				
Selenium	0.44	U	0.32	U	0.29	U				
Silver	0.20	U/E	0.14	U/E	0.13	U/E				
Zinc	5.7	E	3.8	E	4.2	E				

Data Qualifiers: U = Compound was not detected. Value given is the lower quantification limit.
E = Estimated value based on QA/QC results.

TABLE 9 (cont.)

COMPOUND	SAMPLE RESULTS CARP (mg/kg wet weight) D24C		D26C		D28C		D29C		D31C		D35C		D38C	
Trace Metals:														
Antimony	0.39	U/E	0.48	U/E	0.41	U/E	0.37	U/E	0.30	U/E	0.38	U/E	0.36	U/E
Arsenic	0.52	U	0.64	U	0.55	U	0.49	U	0.40	U	0.51	U	0.49	U
Barium	2.6	E	1.6	E	3.3	E	2.9	E	1.4	E	2.2	E	3.4	E
Cadmium	0.03		0.35		0.11		0.10		0.04		0.08		0.29	
Copper	1.48	E	1.82	E	1.47	E	1.20	E	1.46	E	1.37	E	1.68	E
Lead	0.10	E	0.13	E	0.22	E	0.07	E	0.02	E	0.18	E	0.22	E
Mercury	0.056	E	0.166	E	0.090	E	0.073	E	0.146	E	0.087	E	0.129	E
Nickel	0.91	U/E	1.12	U/E	1.85	E	0.86	U/E	0.70	U/E	1.17	E	17.29	E
Selenium	0.52	U	0.64	U	0.55	U	0.49	U	0.40	U	0.51	U	0.49	U
Silver	0.23	U/E	0.29	U/E	0.25	U/E	0.22	U/E	0.18	U/E	0.23	U/E	0.22	U/E
Zinc	88.4	E	112.0	E	133.7	E	78.5	E	100.0	E	109.5	E	109.6	E

Data Qualifiers: U = Compound was not detected. Value given is the lower quantification limit.
E = Estimated value based on QA/QC results.

TABLE 9 (cont.)

COMPOUND	SAMPLE RESULTS CARP (mg/kg wet weight) D40C		
Trace Metals:			
Antimony	0.44	U	
Arsenic	0.58	U	
Barium	1.3		
Cadmium	0.12		
Copper	1.51		
Lead	0.23		
Mercury	0.104	E	
Nickel	1.02	U	
Selenium	0.58	U	
Silver	0.26	U	
Zinc	89.9		

Data Qualifiers: U = Compound was not detected. Value given is the lower quantification limit.
E = Estimated value based on QA/QC results.

TABLE 9 (cont.)

COMPOUND	SAMPLE RESULTS SUCKER (mg/kg wet weight) D6S		D8S		D10S		D12S		D15S		D16S		D19S	
Trace Metals:														
Antimony	0.25	U/E	0.39	U/E	0.35	U/E	0.32	U/E	0.39	U/E	0.32	U/E	0.26	U/E
Arsenic	0.34	U	0.52	U	0.47	U	0.42	U	0.52	U	0.43	U	0.35	U
Barium	2.5	E	2.9	E	2.0	E	3.2	E	3.1	E	1.2	E	1.1	E
Cadmium	0.04		0.03		0.05		0.04		0.05		0.02		0.02	
Copper	1.23	E	1.13	E	1.16	E	1.18	E	0.99	E	0.90	E	0.92	E
Lead	0.23	E	0.08	E	0.22	E	0.16	E	0.10	E	0.12	E	0.02	U/E
Mercury	0.082	E	0.093	E	0.117	E	0.071	E	0.065	E	0.054	E	0.061	E
Nickel	0.59	U/E	0.92	U/E	0.82	U/E	0.74	U/E	0.91	U/E	0.75	U/E	0.61	U/E
Selenium	0.34	U	0.52	U	0.47	U	0.42	U	0.52	U	0.43	U	0.35	U
Silver	0.15	U/E	0.24	U/E	0.21	U/E	0.19	U/E	0.23	U/E	0.19	U/E	0.16	U/E
Zinc	22.0	E	23.3	E	20.7	E	18.7	E	28.6	E	18.0	E	17.3	E

Data Qualifiers: U = Compound was not detected. Value given is the lower quantification limit.
E = Estimated value based on QA/QC results.

TABLE 9 (cont.)

COMPOUND	SAMPLE RESULTS SUCKER (mg/kg wet weight) D20S		D22S		D23S		D24S		D26S		D28S		D29S	
Trace Metals:														
Antimony	0.32	U/E	0.34	U/E	0.31	U/E	0.35	U/E	0.28	U/E	0.30	U/E	0.37	U/E
Arsenic	0.42	U	0.45	U	0.42	U	0.46	U	0.37	U	0.40	U	0.49	U
Barium	2.5	E	1.9	E	3.6	E	2.5	E	3.0	E	2.4	E	3.2	E
Cadmium	0.04		0.02		0.02		0.05		0.04		0.04		0.05	
Copper	1.04	E	1.23	E	0.86	E	1.03	E	0.84	E	1.08	E	1.06	E
Lead	0.20	E	0.86	E	0.02	U/E	0.12	E	0.04	E	0.22	E	0.25	E
Mercury	0.072	E	0.094	E	0.137	E	0.038	E	0.137	E	0.071	E	0.022	E
Nickel	0.74	U/E	1.05	E	0.73	U/E	0.81	U/E	0.65	U/E	1.36	E	1.08	E
Selenium	0.42	U	0.45	U	0.42	U	0.46	U	0.37	U	0.40	U	0.49	U
Silver	0.19	U/E	0.21	U/E	0.19	U/E	0.21	U/E	0.17	U/E	0.18	U/E	0.22	U/E
Zinc	23.4	E	97.7	E	20.6	E	19.8	E	18.7	E	98.0	E	21.8	E

Data Qualifiers: U = Compound was not detected. Value given is the lower quantification limit.
E = Estimated value based on QA/QC results.

TABLE 9 (cont.)

COMPOUND	SAMPLE RESULTS SUCKER (mg/kg wet weight) D31S		D35S		D38S		D40S				
Trace Metals:											
Antimony	3.38	U/E	0.25	U/E	0.31	U/E	0.32	U/E			
Arsenic	0.45	U	0.33	U	0.42	U	0.43	U			
Barium	5.4	E	1.4	E	3.6	E	3.7	E			
Cadmium	0.05		0.03		0.04		0.06				
Copper	0.70	E	0.91	E	0.75	E	0.08	E			
Lead	0.02	U/E	0.02	U/E	0.41	E	0.17	E			
Mercury	0.087	E	0.070	E	0.051	E	0.131	E			
Nickel	0.79	U/E	0.96	E	0.73	U/E	0.75	U/E			
Selenium	0.45	U	0.33	U	0.42	U	0.43	U			
Silver	0.20	U/E	0.15	U/E	0.19	U/E	0.19	U/E			
Zinc	22.1	E	19.9	E	22.9	E	23.7	E			

Data Qualifiers: U = Compound was not detected. Value given is the lower quantification limit.
E = Estimated value based on QA/QC results.

TABLE 9 (cont.)

COMPOUND	SAMPLE RESULTS PEAMOUTH CHUB (mg/kg wet weight) D3P		D10P		D12P		D15P		D16P		D19P		D21P	
Trace Metals:														
Antimony	0.36	U/E	0.35	U/E	0.33	U/E	0.33	U/E	0.35	U/E	0.31	U/E	0.36	U/E
Arsenic	0.48	U	0.47	U	0.44	U	0.44	U	0.46	U	0.41	U	0.48	U
Barium	2.4	E	2.3	E	2.6	E	4.2	E	2.2	E	2.5	E	2.0	E
Cadmium	0.02		0.07		0.04		0.08		0.02		0.02		0.02	
Copper	1.60	E	1.73	E	1.27	E	27.81	E	0.90	E	1.20	E	1.65	E
Lead	0.12	E	0.09	E	0.10	E	1.35	E	0.06	E	0.10	E	0.08	E
Mercury	0.230	E	0.126	E	0.096	E	0.054	E	0.142	E	0.094	E	0.095	E
Nickel	0.84	U/E	0.82	U/E	0.77	U/E	1.97	E	0.81	U/E	0.72	U/E	0.83	U/E
Selenium	0.48	U	0.47	U	0.44	U	0.44	U	0.46	U	0.41	U	0.48	U
Silver	0.21	U/E	0.21	U/E	0.20	U/E	0.20	U/E	0.21	U/E	0.19	U/E	0.21	U/E
Zinc	23.9	E	23.9	E	30.8	E	44.2	E	23.1	E	22.7	E	28.6	E

Data Qualifiers: U = Compound was not detected. Value given is the lower quantification limit.
E = Estimated value based on QA/QC results.

TABLE 9 (cont.)

COMPOUND	SAMPLE RESULTS PEAMOUTH CHUB (mg/kg wet weight) D23P		D24P		D28P					
Trace Metals:										
Antimony	0.32	U/E	0.37	U/E	0.32	U/E				
Arsenic	0.43	U	0.49	U	0.42	U				
Barium	1.9	E	3.2	E	3.2	E				
Cadmium	0.02		0.05		0.04					
Copper	1.10	E	8.54	E	2.06	E				
Lead	0.07	E	0.34	E	0.05	E				
Mercury	0.088	E	0.212	E	0.075	E				
Nickel	0.75	U/E	3.42	E	0.74	U/E				
Selenium	0.43	U	0.49	U	0.42	U				
Silver	0.20	U/E	0.22	U/E	0.19	U/E				
Zinc	30.1	E	29.3	E	31.5	E				

Data Qualifiers: U = Compound was not detected. Value given is the lower quantification limit.
E = Estimated value based on QA/QC results.

Appendix A-4

Data Validation Report
Semi-volatile Organics Analyses

Site: Lower Columbia River

Sample Numbers: Samples W6, W14, W26, W37, W45, W47, W51, W52 (water)

Samples D1-D46, C1-C14 (sediment)

Samples ST-1-2-D, ST-1-3, ST-1-4, ST-1-5, ST-1-5-dup, ST-1-6, ST-2-1-D, ST-2-2-D, ST-2-3, ST-2-4, ST-3-1-D, ST-3-3-D, ST-3-4, ST-3-6, ST-4-1-D, ST-4-2, ST-4-3-D, ST-4-4 (sturgeon)

Samples D6, D8, D10, D12, D15, D16, D19, D20, D22, D23, D24, D26, D28, D29, D31, D35, D38, D40 (crayfish)

Samples D6S, D8S, D10S, D12S, D15S, D16S, D19S, D20S, D22S, D23S, D24S, D26S, D28S, D29S, D31S, D35S, D38S, D40S (sucker)

Samples D23C, D24C, D26C, D28C, D29C, D31C, D35C, D38C, D40C (carp)

Samples D3P, D10P, D12P, D15P, D16P, D19P, D21P, D23P, D24P, D28P (peamouth)

Samples collected and reported by Tetra Tech, Inc.

Samples analyzed by: Alden Analytical Laboratories, Inc.

Data Reviewed by: Tad Deshler

INTRODUCTION

This report presents the results for the data validation review of 8 water samples, 60 sediment samples, and 73 tissue samples collected for the Lower Columbia River Reconnaissance Survey, and analyzed for semi-volatile organics by Alden Analytical Laboratories, Inc. Five of the water samples were field samples (Samples W6, W14, W26, W37, and W45), one sample was a field replicate (Sample W52 for Sample W26) and two samples were carboy blanks (Sample W47 at the time of Sample W37, and Sample W51 at the time of Sample W41). Fifty-four of the sediment samples were field samples (Samples D1-D40 and E1-E14), while six of the samples were field replicates (Sample D41 for Sample D35, Sample D42 for Sample D28, Sample D43 for Sample D23, Sample D44 for Sample D17, Sample D45 for D11, and Sample D46 for Sample D3). All of the tissue samples were unique field samples, with the exception of Sample ST-1-5-dup, which was a field duplicate of Sample ST-1-5. Water samples were analyzed using U.S. Environmental Protection Agency (EPA) Method 625, while sediment and tissue samples were analyzed using U.S. EPA Method 8270. The data validation review was conducted according to guidelines presented in the U.S. EPA Contract Laboratory Program Statement of Work (SOW) for organics analyses (U.S. EPA 1987), the Laboratory Data Validation Functional Guidelines for Evaluating Organics Analyses (U.S. EPA 1988), and the project QA Plan (Tetra Tech 1991).

A. HOLDING TIMES

Sediment/Water

Water and sediment samples were collected, placed on ice in a cooler, and transported to the laboratory within 4 days of collection. The maximum holding times (time of collection to time of extraction and analysis) for semi-volatile organics in water matrices have been established as 7 days to extraction and 40 days to analysis (from the time of collection). The maximum holding times for semi-volatile organics in sediment/soil matrices has been established as 14 days to extraction and 40 days to analysis. Table 1 presents a summary of sample numbers, dates collected, dates extracted, dates of analyses, and holding times. Sediment samples E4 and E7 were both reextracted and reanalyzed, resulting in exceedances of holding times for both samples. Because the original analyses were performed within holding times, no data qualifiers will be assigned to sample results for these two samples based on holding times. Sediment samples D5, D6, and D7 were analyzed 41, 42, and 41 days, respectively, after the date of collection. Because these holding times are only 1-2 days outside the established holding time, and all other analyses were conducted within the required holding time, no data qualifiers were assigned to sediment or water sample results for semi-volatile organics based on holding times.

Tissue

Tissue samples were wrapped in aluminum foil and stored on dry ice in the

field, with the exception of sturgeon, which were stored on ice. All samples were transported to Keystone/NEA Laboratories in Portland, Oregon and stored in freezers within three days of collection. Keystone/NEA was responsible for homogenizing the tissue samples before sending them to Alden Analytical Laboratories. Although no holding time has been established by U.S. EPA for frozen tissue samples, a holding time of 60 days was established for this project. Only 7 of the 72 tissue samples were analyzed within 60 days of collection (See Table 1). The holding time established for this project is unnecessarily strict when compared to the protocol of the Puget Sound Estuary Program, which recommends that all frozen tissue samples be analyzed within 1 year of collection and no more than 40 days after extraction. All samples were analyzed within 125 days of collection and only one sample (Sample ST-4-2) was analyzed more than 40 days after extraction (44 days). No data qualifiers were assigned to tissue sample results for semi-volatile organics based on holding times.

B. CALIBRATION AND INSTRUMENT PERFORMANCE

Gas chromatograph/mass spectrometer (GC/MS) tuning was conducted prior to the analysis of each sample batch. All of the ion abundance criteria were satisfied for each analysis, indicating the GC/MS apparatus was performing adequately.

Initial 5-point calibrations were conducted on 27 October, 13 November, 2 December, 3 December, 4 December, and 5 December 1991. Calibration standard concentrations were 20, 50, 80, 120, and 160 ng/μL. For all system performance check compounds (n-Nitroso-di-n-propylamine, Hexachlorocyclopentadiene, 2,4-Dinitrophenol, and 4-Nitrophenol), average response factors (RF) were greater than 0.05. The percent relative standard deviations (%RSD) calculated from the initial calibration of the thirteen calibration check compounds (Acenapthene, 1,4-Dichlorobenzene, Hexachlorobutadiene, Di-n-octylphthalate, Fluoranthene, Benzo(a)pyrene, n-Nitroso-di-n-phenylamine, 4-Chloro-3-methylphenol, 2,4-Dichlorophenol, 2-Nitrophenol, Phenol, Pentachlorophenol, and 2,4,6-Trichlorophenol) were all less than 30 percent. Both the RF and %RSD results indicate all initial calibrations were valid.

Continuing calibration was conducted at the required frequency for Contract Lab Program (CLP) analyses (i.e., before and within 12 h of sample analyses). All compound RF were greater than 0.05 in the continuing calibrations. The percent difference between initial and continuing calibration response factors was within QC criteria (25 percent) for all calibration check compounds for each sample analysis.

Internal standard area counts were evaluated to determine instrument performance and as a check on continuing calibration for compound quantitation. All internal standard area counts were within a factor of 2 of the initial calibration area counts, indicating acceptable analytical accuracy.

No data qualifiers were assigned to semi-volatile organics sample results based on calibration and instrument performance data.

C. SURROGATE RECOVERIES

All field and blank samples were spiked with the internal standards Nitrobenzene-d_5, 2-Fluorobiphenyl, P-Terphenyl-d_{14}, Phenol-d_5, 2-Fluorophenol, and 2,4,6-Tribromophenol before analysis. Surrogate recovery data for the matrix spike samples were not provided by the laboratory as is required by the CLP protocol. Percent recoveries (%R) for all analyses were within the CLP recovery limits with the exception of those listed in Table 2. The number surrogate recoveries outside QC limits listed in Table 2 represents slightly more than 3 percent of all surrogate recoveries calculated for this project.

Sediment

Samples E4, E7, and E8 all had %R below QC limits for 2,4,6-Tribromophenol. The reanalysis of Sample E8 yielded similar results. Samples E4 and E7 were both reextracted and reanalyzed. All surrogate recoveries for the reanalysis were within acceptable limits for both samples. No data qualifiers were assigned to sediment sample results for semi-volatile organics based on surrogate recoveries.

Water

Phenol-d_5 was recovered below the QC limits for Sample W6. The laboratory could not perform a reextraction of Sample W6 because there was insufficient sample remaining. Because of the low surrogate recovery of Phenol-d_5 for Sample W6, all negative (undetected) results for the acid-extractable fraction were qualified as unusable (qualifier code 'R').

Tissue

Five of the seven analytical blanks performed for tissue samples had at least one surrogate compound which was recovered below its QC limit. These QC limits should be considered advisory limits because they are derived from soil analyses. In addition, 14 of the 72 tissue samples had at least one surrogate recovered outside its QC limits.

For the blank analysis performed on 11/29/91, Phenol-d_5 and 2-Fluorophenol were both recovered below QC limits. Because no surrogate recoveries were outside the advisory QC limits for any of the samples in the associated batch, none of the semi-volatile data from that batch were qualified.

For the blank analysis performed on 12/5/91, 2-Fluorophenol and Nitrobenzene-d_5 were recovered below QC limits. Sample ST-4-1-D, which was included in the 12/5 batch, had two surrogates recovered above the QC limits (2-Fluorobiphenyl and P-Terphenyl-d_{14}). Because the surrogate compound pairs were different for the blank and the associated sample, none of the sample results from Sample ST-4-1-D were qualified as estimates.

For the blank analysis performed on 2/25/92, 2-Fluorophenol and Phenol-d_5 were recovered below QC limits. Because no surrogate recoveries were outside the advisory QC limits for the sample associated with this blank (Sample D15P), none of the semi-volatile data for that sample were qualified.

For Sample ST-2-2-D, three compounds were recovered below the advisory QC

limits. One of the three compounds (2-Fluorophenol) was also recovered below QC limits in the blank associated with this sample (12/19/91). All of the sample results for Sample ST-2-2-D will be qualified as estimates.

None of the other tissue samples had more than one surrogate compound recovered outside QC limits. No data qualifiers were assigned to tissue samples with zero or one surrogate compound outside QC limits.

D. METHOD BLANKS

Method blank analyses were performed for each batch of samples received by the laboratory. Raw data for all method blanks were examined.

Sediment

Six method blanks were analyzed for sediment samples. The common laboratory contaminant bis(2-Ethylhexyl) phthalate was detected in one sediment blank. This sediment blank was associated with Samples D5, D6, D7, D8, D9, E3, and E4. Bis(2-Ethylhexyl) phthalate was detected at almost 9X the MDL. All detected values for bis(2-Ethylhexyl) phthalate in the associated samples will be qualified as undetected because they are less than 5X the concentration detected in the blank. Two additional method blank analyses were performed for the reanalyses of Samples E4 and E7. Bis(2-Ethylhexyl) phthalate was detected at 2X the detection limit in the blank associated with Sample E7. Because bis(2-Ethylhexyl) phthalate was detected in Sample E7 at less than 5X the detection limit, this value will be qualified as undetected.

Water

Five method blanks were analyzed for water samples. The common laboratory contaminant bis(2-Ethylhexyl) phthalate was detected in one water blank. The water blank was associated with Sample W6. Sample W6 contained a concentration of bis(2-Ethylhexyl) phthalate above the method detection limit, but below the value detected in the blank. The bis(2-Ethylhexyl) phthalate value for Sample W6 will be qualified as undetected. No data qualifiers were assigned to any other water sample results for semi-volatile organics based on method blank results.

Tissue

Eight method blanks were analyzed for tissue samples. The common laboratory contaminant bis(2-Ethylhexyl) phthalate was detected in one tissue blank. The blank was associated with Samples ST-3-6, ST-3-3-D, ST-3-1-D, ST-1-5-dup, ST-1-6, D38C, D35C, D29C, ST-1-5, ST-2-2-D, ST-2-3, ST-2-4, D28C, and D31C. Bis(2-Ethylhexyl) phthalate was detected in the blank at more than 4X the MDL. All detected values for bis(2-Ethylhexyl) phthalate in the associated samples will be qualified as undetected because they are less than 5X the concentration detected in the blank. Another phthalate compound (Di-n-butyl phthalate) was detected at just over the MDL for several of the samples in this batch. Although this compound was not detected in the blank, it is also a common laboratory contaminant. Given the presence of bis(2-Ethylhexyl) phthalate in the blank, the presence of Di-n-butyl phthalate in these samples is also likely due to contamination. The positive values for Di-n-butyl

phthalate in this sample batch will also be qualified as undetected. No other data qualifiers were assigned to any other tissue sample results based on method blank results.

E. MATRIX SPIKE/MATRIX SPIKE DUPLICATE ANALYSIS

Sediment

Table 3 gives the results of MS/MSD analyses for sediment samples. MS/MSD analyses with the normally spiked compounds (Phenol, 2-Chlorophenol, 1,4-Dichlorobenzene, N-Nitroso-di-n-propylamine, 1,2,4-Trichlorobenzene, 4-Chloro-3-methylphenol, Acenapthene, 4-Nitrophenol, 2,4-Dinitrotoluene, Pentachlorphenol, and Pyrene) were performed on each of the six batches of sediment samples received.

MS/MSD results for Sample E12 were within acceptable ranges, with the exception of 1,4-Dichlorobenzene and 1,2,4-Trichlorobenzene, which both had RPDs outside the acceptable range. However, both MS and MSD percent recoveries were within acceptable ranges for both compounds, so data qualifiers were not assigned to this sample batch based on these results.

MS/MSD results for Sample E8 were within acceptable ranges, with the exception of 4-Nitrophenol and Pentachlorophenol, which both had RPDs outside the acceptable range. However, both MS and MSD percent recoveries were within acceptable ranges for both compounds, so data qualifiers were not assigned to this sample batch based on these results.

For Sample E5, both MS and MSD percent recoveries for Pentachlorophenol were above the acceptable range. Pentachlorophenol was not detected in any of the samples in the batch, so data qualifiers were not assigned to any samples based on these results.

For Sample E4, both percent recoveries and RPDs for 1,4-Dichlorobenzene and 1,2,4-Trichlorobenzene were below and above acceptable ranges for %R and RPD, respectively. Also, %R was below the acceptable range for in both the MS and MSD for N-Nitroso-di-n-propylamine. All three of the compounds for which the %R is below the corresponding acceptable range are in the base/neutral fraction. Because it does not appear that the laboratory was having a systematic problem with the analysis of these analytes, the other samples included in this batch were not qualified based on these results.

A second MS/MSD analyses was performed for Sample E4 at the time the sample was reanalyzed. All %R were within acceptable limits. The RPD for Phenol, 2-Chlorophenol, 1,4-Dichlorobenzene, N-Nitroso-di-n-propylamine, 1,2,4-Trichlorobenzene, 4,-Chloro-3-methylphenol, and Acenaphthene were all above their respective advisory QC limits. Because all %R were within acceptable limits and there were no positive results for this sample, no data qualifiers were assigned to Sample E4.

Water

Table 4 gives the results of MS/MSD analyses for water samples. MS/MSD analyses with the normally spiked semi-volatile organics were performed on

three of the five batches which included water samples. One of the samples spiked (Sample W51) was a carboy blank, which is not a representative matrix.

MS/MSD results for Phenol in Sample W6 were below the acceptable range. The field sample result for Phenol in Sample W6 was qualified as unusable based on these results.

Several other analytes were slightly below the corresponding acceptable range for either the MS or MSD, but the results did not warrant qualification of any sample data.

Tissue
Table 5 gives the results of MS/MSD analyses for tissue samples. The QC limits presented in Table 5 should be considered advisory limits only because they are based on soil analyses. Given the complexity of tissue matrices, matrix spike recoveries within these advisory limits may not always be achievable. MS/MSD analyses with the normally spiked compounds were performed on each of the eight batches of tissue samples received. At least one of the spiked compounds was recovered outside the advisory limits for each of the spiked samples with the exception of Sample ST-1-3. All of the deviations noted in Table 5 can be considered minor. No data qualifiers were assigned to any of the tissue sample results based on MS/MSD results.

F. LABORATORY DUPLICATES

Tissue
Two crayfish samples (D15 and D26) were analyzed in duplicate by the laboratory. With the exception of the phthalate esters, which will be qualified as undetected, only isophorone was detected in Sample D26. Given the lack of positive values for these samples, conclusions about lab variability are not possible.

G. FIELD DUPLICATES

Sediment
Six field duplicate samples were collected and analyzed for semi-volatile organics. With the exception of bis(2-Ethylhexyl) phthalate in Sample D42, no compounds were detected in any of these samples. Given the paucity of positive results for these samples, valid conclusions about field variability are not possible.

Water
Samples W26 and W52 were duplicate samples collected at Station W26. The common laboratory contaminant bis(2-Ethylhexyl) phthalate was detected in both samples at 9 and 15 μg/L, respectively. No other semi-volatile organics were detected in either sample. Given the lack of positive values for these samples, conclusions about field variability are not possible.

Tissue
Two of the sturgeon samples (Samples ST-1-5 and ST-1-5-dup) were collected as

field duplicates. With the exception of the phthalate esters, which will be qualified as undetected, no compound was detected in either of these samples. Given the lack of positive values for these samples, conclusions about field variability are not possible.

SUMMARY

Sample data were reported in µg/L for water and in µg/kg for sediment and tissue. Sample results with the appropriate qualifiers are presented in Tables 6, 7, and 8 for sediment, water, and tissue, respectively. The data package submitted by the laboratory contained all the required deliverables, with the exception of surrogate recovery data for matrix spikes. Detection limits for water and sediment/tissue reported by the laboratory (2-40 µg/L for water and 40-1900 µg/kg for sediment/tissue) met the criteria established in the QA Plan (Tetra Tech 1991).

Very few data qualifiers other than 'U' (undetected) were added to the semi-volatile organics data. The sample results for Station W6 were qualified as unusable (qualifier code 'R') due to low surrogate recoveries. Since semi-volatile organics were generally undetected in all water samples, the qualification of Sample W6 as unusable should have minimal adverse impact on the utility of the semi-volatile organics data.

Matrix spike/matrix spike duplicate results were generally within QC limits. Minor deviations from QC limits did not warrant the qualifying of any sample results.

The precision, accuracy, and completeness of the semi-volatile organics analyses were within project guidelines and the data are considered acceptable for their intended use.

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TABLE 1. SEMIVOLATILE ORGANICS ANALYSIS SUMMARY
LOWER COLUMBIA RIVER RECONNAISSANCE SURVEY

Tetra Tech Sample Number	Alden Sample Number	Date Collected	Date Extracted	Date Analyzed	Holding Time (d) Extract	Holding Time (d) Analysis
SEDIMENT						
D1	8766A	10/8/91	10/19/91	11/15/91	11	38
D2	8767A	10/8/91	10/19/91	11/15/91	11	38
D3	8778A	10/9/91	10/19/91	11/15/91	10	37
D4	8768A	10/8/91	10/19/91	11/15/91	11	38
D5	8792A	10/11/91	10/24/91	11/21/91	13	***41***
D6	8793A	10/10/91	10/24/91	11/21/91	14	***42***
D7	8794A	10/11/91	10/24/91	11/21/91	13	***41***
D8	8795A	10/12/91	10/24/91	11/21/91	12	40
D9	8796A	10/12/91	10/24/91	11/21/91	12	40
D10	8769A	10/7/91	10/19/91	11/15/91	12	39
D11	8770A	10/7/91	10/19/91	11/15/91	12	39
D12	8771A	10/7/91	10/19/91	11/15/91	12	39
D13	8723A	10/6/91	10/16/91	11/13/91	10	38
D14	8719A	10/6/91	10/16/91	11/13/91	10	38
D15	8720A	10/5/91	10/16/91	11/13/91	11	39
D16	8721A	10/4/91	10/16/91	11/13/91	12	40
D17	8722A	10/4/91	10/16/91	11/13/91	12	40
D18	8681A	10/3/91	10/14/91	10/29/91	11	26
D19	8680A	10/3/91	10/14/91	10/29/91	11	26
D20	8675A	10/2/91	10/14/91	10/29/91	12	27
D21	8674A	10/2/91	10/14/91	10/29/91	12	27
D22	8673A	10/2/91	10/14/91	10/29/91	12	27
D23	8676A	10/1/91	10/14/91	10/29/91	13	28
D24	8621A	9/30/91	10/4/91	10/28/91	4	28
D25	8624A	9/29/91	10/4/91	10/28/91	5	29
D26	8623A	9/29/91	10/4/91	10/28/91	5	29
D27	8622A	9/29/91	10/4/91	10/28/91	5	29
D28	8627A	9/29/91	10/4/91	10/28/91	5	29
D29	8614A	9/29/91	10/4/91	10/28/91	5	29
D30	8613A	9/28/91	10/4/91	10/28/91	6	30
D31	8612A	9/27/91	10/4/91	10/28/91	7	31
D32	8618A	9/27/91	10/4/91	10/28/91	7	31
D33	8611A	9/27/91	10/4/91	10/28/91	7	31
D34	8610A	9/27/91	10/4/91	10/28/91	7	31
D35	8579A	9/26/91	10/4/91	10/27/91	8	31
D36	8568A	9/26/91	10/3/91	10/27/91	7	31
D37	8576A	9/25/91	10/3/91	10/27/91	8	32
D38	8577A	9/25/91	10/3/91	10/27/91	8	32
D39	8571A	9/24/91	10/3/91	10/27/91	9	33
D40	8572A	9/24/91	10/4/91	10/27/91	10	33
D41	8578A	9/26/91	10/4/91	10/27/91	8	31
D42	8628A	9/29/91	10/4/91	10/28/91	5	29

TABLE 1. (cont.)

Tetra Tech Sample Number	Alden Sample Number	Date Collected	Date Extracted	Date Analyzed	Holding Time (d) Extract	Holding Time (d) Analysis
D43	8677A	10/1/91	10/14/91	10/29/91	13	28
D44	8724A	10/4/91	10/16/91	11/13/91	12	40
D45	8772A	10/7/91	10/19/91	11/15/91	12	39
D46	8775A	10/9/91	10/19/91	11/15/91	10	37
E1	8776A	10/9/91	10/19/91	11/14/91	10	36
E2	8777A	10/9/91	10/19/91	11/15/91	10	37
E3	8797A	10/11/91	10/24/91	11/21/91	13	***41***
E4	8798A	10/12/91	10/24/91	11/20/91	12	39
E4*	8798A	10/12/91	12/4/91	12/19/91	***53***	***68***
E5	8725A	10/5/91	10/16/91	11/13/91	11	39
E6	8726A	10/4/91	10/16/91	11/13/91	12	40
E7	8682A	10/3/91	10/14/91	10/29/91	11	26
E7*	8682A	10/3/91	1/2/92	1/17/92	***91***	***106***
E8	8672A	10/1/91	10/14/91	10/29/91	13	28
E9	8620A	9/30/91	10/4/91	10/28/91	4	28
E10	8629A	9/29/91	10/4/91	10/28/91	5	29
E11	8616A	9/28/91	10/4/91	10/28/91	6	30
E12	8567A	9/26/91	10/3/91	10/27/91	7	31
E13	8569A	9/25/91	10/3/91	10/27/91	8	32
E14	8575A	9/24/91	10/4/91	10/27/91	10	33
* = Samples were reextracted and reanalyzed						
WATER						
W6	8789A	10/10/91	10/16/91	11/20/91	6	***41***
W14	8716A	10/6/91	10/9/91	11/13/91	3	38
W26	8669A	10/2/91	10/9/91	10/29/91	7	27
W37	8615D	9/28/91	10/3/91	10/27/91	5	29
W45	8570B	9/26/91	9/30/91	10/26/91	4	30
W47	8626A	9/28/91	10/3/91	10/27/91	5	29
W51	8573B	9/23/91	9/30/91	10/26/91	7	33
W52	8670A	10/2/91	10/9/91	10/29/91	7	27
STURGEON						
ST-1-2-D	8817	10/10/91	10/29/91	12/6/91	19	57
ST-1-3	8738	10/1/91	10/23/91	11/30/91	22	60
ST-1-4	9102	10/15/91	11/18/91	12/28/91	34	74
ST-1-5	9001	10/16/91	11/14/91	12/20/91	29	65
ST-1-5-dup	9041	10/16/91	11/14/91	12/20/91	29	65
ST-1-6	9042	10/20/91	11/14/91	12/20/91	25	61
ST-2-1-D	8818	10/10/91	10/29/91	12/5/91	19	56
ST-2-2-D	9002	10/20/91	11/14/91	12/20/91	25	61
ST-2-3	9003	10/21/91	11/14/91	12/20/91	24	60
ST-2-4	9004	10/21/91	11/14/91	12/19/91	24	59
ST-3-1-D	9040	10/23/91	11/14/91	12/20/91	22	58
ST-3-3-D	9039	10/23/91	11/14/91	12/20/91	22	58

TABLE 1. (cont.)

Tetra Tech Sample Number	Alden Sample Number	Date Collected	Date Extracted	Date Analyzed	Holding Time (d) Extract	Holding Time (d) Analysis
ST-3-4	9103	10/25/91	11/18/91	12/28/91	24	64
ST-3-6	9038	10/29/91	11/14/91	12/20/91	16	52
ST-4-1-D	8820	10/2/91	10/29/91	12/6/91	27	65
ST-4-2	8819	10/10/91	10/23/91	12/6/91	13	57
ST-4-3-D	8739	9/29/91	10/23/91	11/30/91	24	62
ST-4-4	8740	9/29/91	10/23/91	12/1/91	24	63
CRAYFISH						
D6	8737	10/1/91	10/23/91	11/30/91	22	60
D8	8732	9/30/91	10/23/91	11/30/91	23	61
D10	8735	9/30/91	10/23/91	11/30/91	23	61
D12	8728	9/30/91	10/23/91	12/1/91	23	62
D15	8734	9/29/91	10/23/91	11/30/91	24	62
D16	8733	9/29/91	10/23/91	11/30/91	24	62
D19	8730	9/29/91	10/23/91	11/30/91	24	62
D20	8727	10/1/91	10/23/91	11/30/91	22	60
D22	8741	9/29/91	10/29/91	12/6/91	30	68
D23	8742	9/28/91	10/29/91	12/6/91	31	69
D24	8743	9/30/91	10/29/91	12/6/91	29	67
D26	8744	9/27/91	10/29/91	12/6/91	32	70
D28	8663	9/26/91	10/23/91	11/30/91	27	65
D29	8731	9/26/91	10/23/91	11/30/91	27	65
D31	8665	9/25/91	10/23/91	11/30/91	28	66
D35	8664	9/25/91	10/23/91	11/30/91	28	66
D38	8729	9/26/91	10/23/91	11/30/91	27	65
D40	8736	9/27/91	10/23/91	11/30/91	26	64
SUCKER						
D6S	9342	10/26/91	1/8/92	1/23/92	74	89
D8S	9346	10/27/91	1/8/92	1/23/92	73	88
D10S	9345	10/25/91	1/8/92	1/23/92	75	90
D12S	9340	10/24/91	1/8/92	1/22/92	76	90
D15S	9270	10/23/91	1/3/92	1/19/92	72	88
D16S	9344	10/23/91	1/8/92	1/23/92	77	92
D19S	9272	10/21/91	1/3/92	1/19/92	74	90
D20S	9343	11/19/91	1/8/92	1/23/92	50	65
D22S	9277	11/19/91	1/3/92	1/20/92	45	62
D23S	9275	10/20/91	1/3/92	1/19/92	75	91
D24S	9339	10/19/91	1/8/92	1/23/92	81	96
D26S	9271	11/19/91	1/3/92	1/19/92	45	61
D28S	9278	10/17/91	1/3/92	1/20/92	78	95
D29S	9276	10/16/91	1/3/92	1/20/92	79	96
D31S	9274	10/17/91	1/3/92	1/19/92	78	94
D35S	9273	10/15/91	1/3/92	1/19/92	80	96
D38S	9341	10/15/91	1/8/92	1/23/92	85	100
D40S	9225	10/14/91	12/12/91	1/19/92	59	97

TABLE 1. (cont.)

Tetra Tech Sample Number	Alden Sample Number	Date Collected	Date Extracted	Date Analyzed	Holding Time (d) Extract	Holding Time (d) Analysis
CARP						
D23C	9223	10/20/91	12/12/91	1/17/92	53	89
D24C	9222	10/19/91	12/12/91	1/17/92	54	90
D26C	9221	10/19/91	12/12/91	1/17/92	54	90
D28C	9005	10/17/91	11/14/91	12/20/91	28	64
D29C	9045	10/16/91	11/14/91	12/20/91	29	65
D31C	9006	10/17/91	11/14/91	12/20/91	28	64
D35C	9044	10/15/91	11/14/91	12/20/91	30	66
D38C	9043	10/15/91	11/14/91	12/20/91	30	66
D40C	9224	10/14/91	12/12/91	1/17/92	59	95
PEAMOUTH						
D3P	9350	10/26/91	1/8/92	1/26/92	74	92
D10P	9351	10/25/91	1/8/92	1/26/92	75	93
D12P	9352	10/25/91	1/8/92	1/26/92	75	93
D15P	9427	10/23/91	1/31/92	2/25/92	100	125
D16P	9353	10/27/91	1/8/92	1/26/92	73	91
D19P	9354	10/27/91	1/8/92	1/26/92	73	91
D21P	9355	10/21/91	1/8/92	1/26/92	79	97
D23P	9356	10/20/91	1/8/92	1/26/92	80	98
D24P	9357	10/19/91	1/8/92	1/26/92	81	99
D28P	9358	10/17/91	1/8/92	1/26/92	83	101

TABLE 2. SURROGATE COMPOUNDS RECOVERED OUTSIDE RECOVERY LIMITS LOWER COLUMBIA RIVER RECONNAISSANCE SURVEY

Tetra Tech Sample Number	Surrogate	Percent Recovery	QC Limits
WATER			
W6	Phenol-d5	3	10-94
SEDIMENT			
E4	2,4,6-Tribromophenol	2	19-122
E7	2,4,6-Tribromophenol	ND	19-122
E8	2,4,6-Tribromophenol	17	19-122
TISSUE			
Blank (11/29)	Phenol-d5	18	24-113
Blank (11/29)	2-Fluorophenol	10	25-121
Blank (12/5)	2-Fluorophenol	21	25-121
Blank (12/5)	Nitrobenzene-d5	20	23-120
Blank (12/19)	2-Fluorophenol	21	25-121
Blank (1/17)	2-Fluorophenol	18	25-121
Blank (1/22)	2-Fluorophenol	21	25-121
Blank (2/25)	2-Fluorophenol	9	25-121
Blank (2/25)	Phenol-d5	21	24-113
ST-1-4	2-Fluorophenol	13	25-121
ST-1-5	2-Fluorophenol	22	25-121
ST-1-5-dup	2-Fluorophenol	23	25-121
ST-1-6	2-Fluorophenol	23	25-121
ST-2-2-D	2-Fluorophenol	11	25-121
ST-2-2-D	Phenol-d5	20	24-113
ST-2-2-D	Nitrobenzene-d5	18	23-120
ST-3-6	2-Fluorophenol	23	25-121
ST-4-1-D	2-Fluorobiphenyl	178	30-115
ST-4-1-D	P-Terphenyl-d14	172	18-137
D23	2-Fluorophenol	19	25-121
D24	2-Fluorophenol	22	25-121
D26	2-Fluorophenol	21	25-121
D23C	P-Terphenyl-d14	170	18-137
D26C	P-Terphenyl-d14	180	18-137
D38S	P-Terphenyl-d14	140	18-137
D40S	P-Terphenyl-d14	149	18-137

TABLE 3. BNA ORGANICS MS/MSD RESULTS - SEDIMENT
LOWER COLUMBIA RIVER RECONNAISSANCE SURVEY

Sample E12 Analyzed 10/27/91	(Samples D38, D36, E13, D40, E14, D37, D39 D35, and D41 also in batch)					
	Percent Recovery				QC LIMITS CLP	
	MS	MSD	RSD	RPD	% Rec.	RPD
Phenol	58	44	5.19	27.45	26-90	35
2-Chlorophenol	62	46	5.24	29.63	25-102	50
1,4-Dichlorobenzene	58	43	5.42	***29.70***	28-104	27
N-Nitroso-di-n-propylamine	62	45	5.45	31.78	41-126	38
1,2,4-Trichlorobenzene	69	50	5.18	***31.93***	38-107	23
4-Chloro-3-methylphenol	72	59	3.89	19.85	26-103	33
Acenapthene	65	54	3.94	18.49	31-137	19
4-Nitrophenol	79	68	3.19	14.97	11-114	50
2,4-Dinitrotoluene	55	47	3.92	15.69	28-89	47
Pentachlorophenol	94	77	3.41	19.88	17-109	47
Pyrene	63	55	3.39	13.56	35-142	36

Sample D34 Analyzed 10/28/91	(Samples E10, D33, D31, D29, E11, D32, E9 D24, D27, D26, D25, D28, and D42 also in batch)					
	Percent Recovery				QC LIMITS CLP	
	MS	MSD	RSD	RPD	% Rec.	RPD
Phenol	33	42	5.66	24.00	26-90	35
2-Chlorophenol	33	42	5.66	24.00	25-102	50
1,4-Dichlorobenzene	29	38	6.33	26.87	28-104	27
N-Nitroso-di-n-propylamine	48	48	0.00	0.00	41-126	38
1,2,4-Trichlorobenzene	***37***	46	5.11	21.69	38-107	23
4-Chloro-3-methylphenol	50	52	1.96	3.92	26-103	33
Acenapthene	41	44	2.88	7.06	31-137	19
4-Nitrophenol	50	52	1.96	3.92	11-114	50
2,4-Dinitrotoluene	37	39	2.63	5.26	28-89	47
Pentachlorophenol	51	53	1.92	3.85	17-109	47
Pyrene	42	44	2.33	4.65	35-142	36

Table 3 (cont.)

Sample E8 Analyzed 10/29/91	(Samples D22, D21, D20, D23, D43, D19 D18, and E7 also in batch)					
	Percent Recovery				QC LIMITS CLP	
	MS	MSD	RSD	RPD	% Rec.	RPD
Phenol	71	62	3.19	13.53	26-90	35
2-Chlorophenol	66	58	3.23	12.90	25-102	50
1,4-Dichlorobenzene	66	58	3.23	12.90	28-104	27
N-Nitroso-di-n-propylamine	79	74	2.07	6.54	41-126	38
1,2,4-Trichlorobenzene	69	62	2.86	10.69	38-107	23
4-Chloro-3-methylphenol	75	66	3.01	12.77	26-103	33
Acenapthene	80	74	2.25	7.79	31-137	19
4-Nitrophenol	52	31	7.81	***50.60***	11-114	50
2,4-Dinitrotoluene	67	69	1.47	2.94	28-89	47
Pentachlorophenol	24	43	9.20	***56.72***	17-109	47
Pyrene	74	73	0.96	1.36	35-142	36

Sample E5 Analyzed 11/13/91	(Samples D14, D15, D16, D17, D44 D13, and E6 also in batch)					
	Percent Recovery				QC LIMITS CLP	
	MS	MSD	RSD	RPD	% Rec.	RPD
Phenol	52	50	1.96	3.92	26-90	35
2-Chlorophenol	54	53	1.32	1.87	25-102	50
1,4-Dichlorobenzene	50	50	0.00	0.00	28-104	27
N-Nitroso-di-n-propylamine	54	53	1.32	1.87	41-126	38
1,2,4-Trichlorobenzene	59	60	1.19	1.68	38-107	23
4-Chloro-3-methylphenol	63	66	1.90	4.65	26-103	33
Acenapthene	61	61	0.00	0.00	31-137	19
4-Nitrophenol	83	81	1.22	2.44	11-114	50
2,4-Dinitrotoluene	57	58	1.23	1.74	28-89	47
Pentachlorophenol	***142***	***136***	1.25	4.32	17-109	47
Pyrene	69	64	2.38	7.52	35-142	36

Table 3 (cont.)

Sample E1 Analyzed 11/14/91	(Samples D1, D2, D4, D10, D11, D45, D12 D46, and E2 also in batch)					
	Percent Recovery				QC LIMITS CLP	
	MS	MSD	RSD	RPD	% Rec.	RPD
Phenol	62	59	2.02	4.96	26-90	35
2-Chlorophenol	59	58	1.21	1.71	25-102	50
1,4-Dichlorobenzene	49	53	2.77	7.84	28-104	27
N-Nitroso-di-n-propylamine	65	64	1.10	1.55	41-126	38
1,2,4-Trichlorobenzene	59	61	1.67	3.33	38-107	23
4-Chloro-3-methylphenol	75	76	0.94	1.32	26-103	33
Acenapthene	74	72	1.37	2.74	31-137	19
4-Nitrophenol	75	76	0.94	1.32	11-114	50
2,4-Dinitrotoluene	61	61	0.00	0.00	28-89	47
Pentachlorophenol	90	98	2.13	8.51	17-109	47
Pyrene	68	71	1.76	4.32	35-142	36

Sample E4 Analyzed 11/21/91	(Samples D5, D6, D7, D8, D9, and E3 also in batch)					
	Percent Recovery				QC LIMITS CLP	
	MS	MSD	RSD	RPD	% Rec.	RPD
Phenol	28	31	4.15	10.17	26-90	35
2-Chlorophenol	***24***	33	7.44	31.58	25-102	50
1,4-Dichlorobenzene	***7***	***22***	18.89	***103.45***	28-104	27
N-Nitroso-di-n-propylamine	***31***	***33***	3.13	6.25	41-126	38
1,2,4-Trichlorobenzene	***22***	***32***	8.28	***37.04***	38-107	23
4-Chloro-3-methylphenol	39	47	4.65	18.60	26-103	33
Acenapthene	42	43	1.66	2.35	31-137	19
4-Nitrophenol	40	43	2.95	7.23	11-114	50
2,4-Dinitrotoluene	39	47	4.65	18.60	28-89	47
Pentachlorophenol	60	94	5.35	44.16	17-109	47
Pyrene	46	58	4.71	23.08	35-142	36

Table 3 (cont.)

Sample E4 Re-analyzed 12/19/91	Percent Recovery				QC LIMITS CLP	
	MS	MSD	RSD	RPD	% Rec.	RPD
Phenol	52	82	5.78	***44.78***	26-90	35
2-Chlorophenol	43	67	6.30	***43.64***	25-102	50
1,4-Dichlorobenzene	41	68	6.74	***49.54***	28-104	27
N-Nitroso-di-n-propylamine	55	90	5.77	***48.28***	41-126	38
1,2,4-Trichlorobenzene	43	71	6.56	***49.12***	38-107	23
4-Chloro-3-methylphenol	69	98	4.56	***34.73***	26-103	33
Acenapthene	49	76	5.88	***43.20***	31-137	19
4-Nitrophenol	85	92	2.11	7.91	11-114	50
2,4-Dinitrotoluene	63	79	3.98	22.54	28-89	47
Pentachlorophenol	61	57	2.40	6.78	17-109	47
Pyrene	70	76	2.37	8.22	35-142	36

TABLE 4. BNA ORGANICS MS/MSD RESULTS - WATER
LOWER COLUMBIA RIVER RECONNAISSANCE SURVEY

Sample W37 Analyzed 10/27/91	Percent Recovery				QC LIMITS CLP	
	MS	MSD	RSD	RPD	% Rec.	RPD
Phenol	42	36	4.44	15.38	12-89	42
2-Chlorophenol	63	54	3.63	15.38	27-123	40
1,4-Dichlorobenzene	42	44	2.33	4.65	36-97	28
N-Nitroso-di-n-propylamine	46	48	2.13	4.26	41-116	38
1,2,4-Trichlorobenzene	52	54	1.89	3.77	39-98	28
4-Chloro-3-methylphenol	69	63	2.62	9.09	23-97	42
Acenapthene	63	64	1.11	1.57	46-118	31
4-Nitrophenol	40	39	1.79	2.53	10-80	50
2,4-Dinitrotoluene	50	48	2.04	4.08	24-96	38
Pentachlorophenol	38	40	2.56	5.13	9-103	50
Pyrene	63	60	1.99	4.88	26-127	31

Sample W51 Analyzed 10/27/91	(Sample W45 also in batch)					
	Percent Recovery				QC LIMITS CLP	
	MS	MSD	RSD	RPD	% Rec.	RPD
Phenol	35	30	4.87	15.38	12-89	42
2-Chlorophenol	68	72	2.02	5.71	27-123	40
1,4-Dichlorobenzene	*35*	36	1.99	2.82	36-97	28
N-Nitroso-di-n-propylamine	46	46	0.00	0.00	41-116	38
1,2,4-Trichlorobenzene	40	45	3.72	11.76	39-98	28
4-Chloro-3-methylphenol	55	57	1.79	3.57	23-97	42
Acenapthene	48	52	2.83	8.00	46-118	31
4-Nitrophenol	35	40	4.22	13.33	10-80	50
2,4-Dinitrotoluene	50	49	1.43	2.02	24-96	38
Pentachlorophenol	46	68	5.82	38.60	9-103	50
Pyrene	54	56	1.79	3.64	26-127	31

Table 4 (cont.)

Sample W6 Analyzed 11/20/91						
	Percent Recovery				QC LIMITS CLP	
	MS	MSD	RSD	RPD	% Rec.	RPD
Phenol	*4*	*8*	23.57	*66.67*	12-89	42
2-Chlorophenol	57	51	3.21	11.11	27-123	40
1,4-Dichlorobenzene	*34*	38	3.93	11.11	36-97	28
N-Nitroso-di-n-propylamine	*38*	42	3.54	10.00	41-116	38
1,2,4-Trichlorobenzene	39	44	3.81	12.05	39-98	28
4-Chloro-3-methylphenol	34	41	4.99	18.67	23-97	42
Acenapthene	44	52	4.17	16.67	46-118	31
4-Nitrophenol	20	21	3.45	4.88	10-80	50
2,4-Dinitrotoluene	34	40	4.68	16.22	24-96	38
Pentachlorophenol	28	29	2.48	3.51	9-103	50
Pyrene	47	52	3.19	10.10	26-127	31

TABLE 5. SEMIVOLATILE ORGANICS MS/MSD RESULTS - TISSUE
LOWER COLUMBIA RIVER RECONNAISSANCE SURVEY

Sample ST-1-3 sturgeon Analyzed 11/30/91	(Samples D20, D12, D38, D19, D29, D8, D16, D15, D10, D40, D6, ST-4-3-D, ST-4-4, D28, D35, and D31 also in batch)					
	Percent Recovery				QC LIMITS CLP	
	MS	MSD	RSD	RPD	% Rec.	RPD
Phenol	71	61	3.39	15.15	26-90	35
2-Chlorophenol	74	61	3.78	19.26	25-102	50
1,4-Dichlorobenzene	45	46	1.55	2.20	28-104	27
N-Nitroso-di-n-propylamine	52	50	1.96	3.92	41-126	38
1,2,4-Trichlorobenzene	80	71	2.81	11.92	38-107	23
4-Chloro-3-methylphenol	93	80	2.95	15.03	26-103	33
Acenapthene	86	77	2.60	11.04	31-137	19
4-Nitrophenol	77	86	2.60	11.04	11-114	50
2,4-Dinitrotoluene	29	36	5.76	21.54	28-89	47
Pentachlorophenol	55	47	3.92	15.69	17-109	47
Pyrene	122	112	1.91	8.55	35-142	36

Sample ST-2-1-D sturgeon Analyzed 12/5/91	(Samples D22, D23, D24, D26 ST-1-2-D, ST-4-2, and ST-4-1-D also in batch)					
	Percent Recovery				QC LIMITS CLP	
	MS	MSD	RSD	RPD	% Rec.	RPD
Phenol	57	50	3.50	13.08	26-90	35
2-Chlorophenol	55	54	1.30	1.83	25-102	50
1,4-Dichlorobenzene	51	62	4.15	19.47	28-104	27
N-Nitroso-di-n-propylamine	67	80	3.47	17.69	41-126	38
1,2,4-Trichlorobenzene	77	81	1.79	5.06	38-107	23
4-Chloro-3-methylphenol	61	60	1.17	1.65	26-103	33
Acenapthene	92	98	1.82	6.32	31-137	19
4-Nitrophenol	53	48	3.13	9.90	11-114	50
2,4-Dinitrotoluene	40	44	3.37	9.52	28-89	47
Pentachlorophenol	*3*	*4*	20.20	28.57	17-109	47
Pyrene	80	114	4.25	35.05	35-142	36

Table 5 (cont.)

Sample ST-2-4 sturgeon Analyzed 12/20/91	(Samples ST-2-2-D, ST-2-3, ST-1-5, D28C, D31C, ST-3-6, ST-3-3-D, ST-3-1-D, ST-1-5-dup, ST-1-6, D38C, D35C, and D29C also in batch)					
	Percent Recovery				QC LIMITS CLP	
	MS	MSD	RSD	RPD	% Rec.	RPD
Phenol	63	62	1.13	1.60	26-90	35
2-Chlorophenol	65	57	3.28	13.11	25-102	50
1,4-Dichlorobenzene	49	41	4.44	17.78	28-104	27
N-Nitroso-di-n-propylamine	72	69	1.74	4.26	41-126	38
1,2,4-Trichlorobenzene	71	70	1.00	1.42	38-107	23
4-Chloro-3-methylphenol	84	80	1.72	4.88	26-103	33
Acenapthene	84	90	1.99	6.90	31-137	19
4-Nitrophenol	53	48	3.13	9.90	11-114	50
2,4-Dinitrotoluene	31	28	4.15	10.17	28-89	47
Pentachlorophenol	*9*	*7*	12.50	25.00	17-109	47
Pyrene	78	83	1.96	6.21	35-142	36

Sample ST-3-4 sturgeon Analyzed 12/28/91	(Sample ST-1-4 also included in batch)					
	Percent Recovery				QC LIMITS CLP	
	MS	MSD	RSD	RPD	% Rec.	RPD
Phenol	63	74	3.42	16.06	26-90	35
2-Chlorophenol	46	64	5.45	32.73	25-102	50
1,4-Dichlorobenzene	62	45	5.45	***31.78***	28-104	27
N-Nitroso-di-n-propylamine	106	88	3.09	18.56	41-126	38
1,2,4-Trichlorobenzene	92	77	3.24	17.75	38-107	23
4-Chloro-3-methylphenol	67	78	3.23	15.17	26-103	33
Acenapthene	112	99	2.42	12.32	31-137	19
4-Nitrophenol	48	73	5.84	41.32	11-114	50
2,4-Dinitrotoluene	48	46	2.13	4.26	28-89	47
Pentachlorophenol	43	72	6.62	***50.43***	17-109	47
Pyrene	***147***	128	2.24	13.82	35-142	36

Table 5 (cont.)

Sample D24C carp Analyzed 1/19/92	(Samples D26C, D23C, D40C and D40S also included in batch)					
	Percent Recovery				QC LIMITS CLP	
	MS	MSD	RSD	RPD	% Rec.	RPD
Phenol	68	65	1.84	4.51	26-90	35
2-Chlorophenol	76	63	3.67	18.71	25-102	50
1,4-Dichlorobenzene	42	42	0.00	0.00	28-104	27
N-Nitroso-di-n-propylamine	89	86	1.40	3.43	41-126	38
1,2,4-Trichlorobenzene	93	92	0.76	1.08	38-107	23
4-Chloro-3-methylphenol	95	88	2.04	7.65	26-103	33
Acenapthene	113	113	0.00	0.00	31-137	19
4-Nitrophenol	90	79	2.78	13.02	11-114	50
2,4-Dinitrotoluene	55	57	1.79	3.57	28-89	47
Pentachlorophenol	***13***	***15***	7.14	14.29	17-109	47
Pyrene	***140***	134	1.26	4.38	35-142	36

Sample D12S sucker Analyzed 1/22/92	(Samples D24S, D38S, D6S, D20S, D16S, D10S, and D8S also included in batch)					
	Percent Recovery				QC LIMITS CLP	
	MS	MSD	RSD	RPD	% Rec.	RPD
Phenol	53	63	3.86	17.24	26-90	35
2-Chlorophenol	64	66	1.54	3.08	25-102	50
1,4-Dichlorobenzene	65	66	1.08	1.53	28-104	27
N-Nitroso-di-n-propylamine	91	93	1.09	2.17	41-126	38
1,2,4-Trichlorobenzene	91	89	1.11	2.22	38-107	23
4-Chloro-3-methylphenol	78	84	2.14	7.41	26-103	33
Acenapthene	99	98	0.72	1.02	31-137	19
4-Nitrophenol	58	66	3.23	12.90	11-114	50
2,4-Dinitrotoluene	***22***	***27***	6.45	20.41	28-89	47
Pentachlorophenol	18	***12***	11.55	40.00	17-109	47
Pyrene	119	102	2.64	15.38	35-142	36

Table 5 (cont.)

Sample D26S sucker Analyzed 1/19/92	(Samples D15S, D19S, D35S, D31S, D23S, D29S, D22S, and D28S also included in batch)					
	Percent Recovery				QC LIMITS CLP	
	MS	MSD	RSD	RPD	% Rec.	RPD
Phenol	44	58	5.19	27.45	26-90	35
2-Chlorophenol	54	63	3.63	15.38	25-102	50
1,4-Dichlorobenzene	73	67	2.47	8.57	28-104	27
N-Nitroso-di-n-propylamine	91	84	2.14	8.00	41-126	38
1,2,4-Trichlorobenzene	101	91	2.33	10.42	38-107	23
4-Chloro-3-methylphenol	57	69	3.89	19.05	26-103	33
Acenapthene	95	87	2.20	8.79	31-137	19
4-Nitrophenol	96	80	3.21	18.18	11-114	50
2,4-Dinitrotoluene	38	33	4.45	14.08	28-89	47
Pentachlorophenol	*14*	*13*	5.24	7.41	17-109	47
Pyrene	136	121	2.13	11.67	35-142	36

TABLE 6. SEMIVOLATILE ORGANICS ANALYSIS RESULTS FOR SEDIMENT LOWER COLUMBIA RIVER RECONNAISSANCE SURVEY

COMPOUND	SAMPLE RESULTS (ug/kg) D1	D2	D3	D4	D5	D6	D7	D8
B/N Extractable Compounds								
Acenaphthene	130 U	144 U	98 U	122 U	94 U	96 U	88 U	92 U
Acenaphthylene	130 U	144 U	98 U	122 U	94 U	96 U	88 U	92 U
Aniline	130 U	144 U	98 U	122 U	94 U	96 U	88 U	92 U
Anthracene	130 U	144 U	98 U	122 U	94 U	96 U	88 U	92 U
Azobenzene	130 U	144 U	98 U	122 U	94 U	96 U	88 U	92 U
Benzo(a)anthracene	130 U	144 U	98 U	122 U	94 U	96 U	88 U	92 U
Benzo(b)fluoranthene	260 U	288 U	196 U	244 U	188 U	192 U	176 U	184 U
Benzo(k)fluoranthene	260 U	288 U	196 U	244 U	188 U	192 U	176 U	184 U
Benzo(a)pyrene	260 U	288 U	196 U	244 U	188 U	192 U	176 U	184 U
Benzo(g,h,i)perylene	260 U	288 U	196 U	244 U	188 U	192 U	176 U	184 U
Benzyl alcohol	130 U	144 U	98 U	122 U	94 U	96 U	88 U	92 U
Benzyl butyl phthalate	130 U	144 U	98 U	122 U	94 U	96 U	88 U	92 U
bis(2-Chloroethyl) ether	130 U	144 U	98 U	122 U	94 U	96 U	88 U	92 U
bis(2-Chloroethoxy) methane	130 U	144 U	98 U	122 U	94 U	96 U	88 U	92 U
bis(2-Ethylhexyl) phthalate	200	310	98 U	170	500 U	510 U	250 U	260 U
bis(2-Chloroisopropyl) ether	130 U	144 U	98 U	122 U	94 U	96 U	88 U	92 U
4-Bromophenyl phenyl ether	260 U	288 U	196 U	244 U	188 U	192 U	176 U	184 U
4-Chloroaniline	260 U	288 U	196 U	244 U	188 U	192 U	176 U	184 U
2-Chloronaphthalene	130 U	144 U	98 U	122 U	94 U	96 U	88 U	92 U
4-Chlorophenyl phenyl ether	130 U	144 U	98 U	122 U	94 U	96 U	88 U	92 U
Chrysene	130 U	144 U	98 U	122 U	94 U	96 U	88 U	92 U
Dibenzo(a,h)anthracene	260 U	288 U	196 U	244 U	188 U	192 U	176 U	184 U
Dibenzofuran	130 U	144 U	98 U	122 U	94 U	96 U	88 U	92 U
Di-n-butyl phthalate	130 U	144 U	98 U	122 U	94 U	96 U	88 U	92 U
1,3-Dichlorobenzene	130 U	144 U	98 U	122 U	94 U	96 U	88 U	92 U
1,2-Dichlorobenzene	130 U	144 U	98 U	122 U	94 U	96 U	88 U	92 U
1,4-Dichlorobenzene	130 U	144 U	98 U	122 U	94 U	96 U	88 U	92 U
3,3'-Dichlorobenzidine	1300 U	1440 U	980 U	1220 U	940 U	960 U	880 U	920 U
Diethyl phthalate	260 U	288 U	196 U	244 U	188 U	192 U	176 U	184 U
Dimethyl phthalate	130 U	144 U	98 U	122 U	94 U	96 U	88 U	92 U
2,4-Dinitrotoluene	130 U	144 U	98 U	122 U	94 U	96 U	88 U	92 U
2,6-Dinitrotoluene	130 U	144 U	98 U	122 U	94 U	96 U	88 U	92 U
Di-n-octyl phthalate	260 U	288 U	196 U	244 U	188 U	192 U	176 U	184 U
Fluoranthene	130 U	144 U	98 U	122 U	94 U	96 U	88 U	92 U
Fluorene	130 U	144 U	98 U	122 U	94 U	96 U	88 U	92 U
Hexachlorobenzene	260 U	288 U	196 U	244 U	188 U	192 U	176 U	184 U
Hexachlorobutadiene	130 U	144 U	98 U	122 U	94 U	96 U	88 U	92 U
Hexachlorocyclopentadiene	650 U	720 U	490 U	610 U	470 U	480 U	440 U	460 U
Hexachloroethane	260 U	288 U	196 U	244 U	188 U	192 U	176 U	184 U
Indeno(1,2,3-c,d)pyrene	260 U	288 U	196 U	244 U	188 U	192 U	176 U	184 U
Isophorone	130 U	144 U	98 U	122 U	94 U	96 U	88 U	92 U

Data Qualifiers: U = Compound was not detected. Value given is the lower quantification limit

Table 6 (cont.)

COMPOUND	SAMPLE RESULTS (ug/kg) D1	D2	D3	D4	D5	D6	D7	D8
2-Methylnaphthalene	130 U	144 U	98 U	122 U	94 U	96 U	88 U	92 U
Naphthalene	130 U	144 U	98 U	122 U	94 U	96 U	88 U	92 U
2-Nitroaniline	260 U	288 U	196 U	244 U	188 U	192 U	176 U	184 U
3-Nitroaniline	260 U	288 U	196 U	244 U	188 U	192 U	176 U	184 U
4-Nitroaniline	260 U	288 U	196 U	244 U	188 U	192 U	176 U	184 U
Nitrobenzene	130 U	144 U	98 U	122 U	94 U	96 U	88 U	92 U
N-Nitrosodiphenylamine	130 U	144 U	98 U	122 U	94 U	96 U	88 U	92 U
N-Nitrosodi-n-propylamine	130 U	144 U	98 U	122 U	94 U	96 U	88 U	92 U
Phenanthrene	130 U	144 U	98 U	122 U	94 U	96 U	88 U	92 U
Pyrene	130 U	144 U	98 U	122 U	94 U	96 U	88 U	92 U
1,2,4-Trichlorobenzene	260 U	288 U	196 U	244 U	188 U	192 U	176 U	184 U
Acid Extractable compounds								
Benzoic acid	2600 U	2880 U	1960 U	2440 U	1880 U	1920 U	1760 U	1840 U
4-Chloro-3-methylphenol	260 U	288 U	196 U	244 U	188 U	192 U	176 U	184 U
2-Chlorophenol	130 U	144 U	98 U	122 U	94 U	96 U	88 U	92 U
2,4-Dichlorophenol	260 U	288 U	196 U	244 U	188 U	192 U	176 U	184 U
2,4-Dimethylphenol	130 U	144 U	98 U	122 U	94 U	96 U	88 U	92 U
2,4-Dinitrophenol	1300 U	1440 U	980 U	1220 U	940 U	960 U	880 U	920 U
2-Methylphenol	260 U	288 U	196 U	244 U	188 U	192 U	176 U	184 U
2-Methyl-4,6-dinitrophenol	1300 U	1440 U	980 U	1220 U	940 U	960 U	880 U	920 U
4-Methylphenol	260 U	288 U	196 U	244 U	188 U	192 U	176 U	184 U
2-Nitrophenol	260 U	288 U	196 U	244 U	188 U	192 U	176 U	184 U
4-Nitrophenol	1300 U	1440 U	980 U	1220 U	940 U	960 U	880 U	920 U
Pentachlorophenol	1300 U	1440 U	980 U	1220 U	940 U	960 U	880 U	920 U
Phenol	130 U	144 U	98 U	122 U	94 U	96 U	88 U	92 U
2,4,5-Trichlorophenol	260 U	288 U	196 U	244 U	188 U	192 U	176 U	184 U
2,4,6-Trichlorophenol	260 U	288 U	196 U	244 U	188 U	192 U	176 U	184 U

Data Qualifiers: U = Compound was not detected. Value given is the lower quantification limit

Table 6 (cont.)

COMPOUND	SAMPLE RESULTS (ug/kg) D9	D10	D11	D12	D13	D14	D15	D16
B/N Extractable Compounds								
Acenaphthene	46 U	104 U	110 U	112 U	98 U	100 U	98 U	124 U
Acenaphthylene	46 U	104 U	110 U	112 U	98 U	100 U	98 U	124 U
Aniline	46 U	104 U	110 U	112 U	98 U	100 U	98 U	124 U
Anthracene	46 U	104 U	110 U	112 U	98 U	100 U	98 U	124 U
Azobenzene	46 U	104 U	110 U	112 U	98 U	100 U	98 U	124 U
Benzo(a)anthracene	46 U	104 U	110 U	112 U	98 U	100 U	98 U	124 U
Benzo(b)fluoranthene	92 U	208 U	220 U	224 U	196 U	200 U	196 U	248 U
Benzo(k)fluoranthene	92 U	208 U	220 U	224 U	196 U	200 U	196 U	248 U
Benzo(a)pyrene	92 U	208 U	220 U	224 U	196 U	200 U	196 U	248 U
Benzo(g,h,i)perylene	92 U	208 U	220 U	224 U	196 U	200 U	196 U	248 U
Benzyl alcohol	46 U	104 U	110 U	112 U	98 U	100 U	98 U	124 U
Benzyl butyl phthalate	46 U	104 U	110 U	112 U	98 U	100 U	98 U	124 U
bis(2-Chloroethyl) ether	46 U	104 U	110 U	112 U	98 U	100 U	98 U	124 U
bis(2-Chloroethoxy) methane	46 U	104 U	110 U	112 U	98 U	100 U	98 U	124 U
bis(2-Ethylhexyl) phthalate	410 U	160	110 U	112 U	98 U	100 U	260	124 U
bis(2-Chloroisopropyl) ether	46 U	104 U	110 U	112 U	98 U	100 U	98 U	124 U
4-Bromophenyl phenyl ether	92 U	208 U	220 U	224 U	196 U	200 U	196 U	248 U
4-Chloroaniline	92 U	208 U	220 U	224 U	196 U	200 U	196 U	248 U
2-Chloronaphthalene	46 U	104 U	110 U	112 U	98 U	100 U	98 U	124 U
4-Chlorophenyl phenyl ether	46 U	104 U	110 U	112 U	98 U	100 U	98 U	124 U
Chrysene	46 U	104 U	110 U	112 U	98 U	100 U	98 U	124 U
Dibenzo(a,h)anthracene	92 U	208 U	220 U	224 U	196 U	200 U	196 U	248 U
Dibenzofuran	46 U	104 U	110 U	112 U	98 U	100 U	98 U	124 U
Di-n-butyl phthalate	46 U	104 U	110 U	112 U	98 U	100 U	98 U	124 U
1,3-Dichlorobenzene	46 U	104 U	110 U	112 U	98 U	100 U	98 U	124 U
1,2-Dichlorobenzene	46 U	104 U	110 U	112 U	98 U	100 U	98 U	124 U
1,4-Dichlorobenzene	46 U	104 U	110 U	112 U	98 U	100 U	98 U	124 U
3,3'-Dichlorobenzidine	460 U	1040 U	1100 U	1120 U	980 U	1000 U	980 U	1240 U
Diethyl phthalate	92 U	208 U	220 U	224 U	196 U	200 U	196 U	248 U
Dimethyl phthalate	46 U	104 U	110 U	112 U	98 U	100 U	98 U	124 U
2,4-Dinitrotoluene	46 U	104 U	110 U	112 U	98 U	100 U	98 U	124 U
2,6-Dinitrotoluene	46 U	104 U	110 U	112 U	98 U	100 U	98 U	124 U
Di-n-octyl phthalate	92 U	208 U	220 U	224 U	196 U	200 U	196 U	248 U
Fluoranthene	46 U	104 U	110 U	112 U	98 U	100 U	98 U	124 U
Fluorene	46 U	104 U	110 U	112 U	98 U	100 U	98 U	124 U
Hexachlorobenzene	92 U	208 U	220 U	224 U	196 U	200 U	196 U	184 U
Hexachlorobutadiene	46 U	104 U	110 U	112 U	98 U	100 U	98 U	124 U
Hexachlorocyclopentadiene	230 U	520 U	550 U	200 U	490 U	500 U	490 U	620 U
Hexachloroethane	92 U	208 U	220 U	224 U	196 U	200 U	196 U	248 U
Indeno(1,2,3-c,d)pyrene	92 U	208 U	220 U	224 U	196 U	200 U	196 U	248 U
Isophorone	46 U	104 U	110 U	112 U	98 U	100 U	98 U	124 U

Data Qualifiers: U = Compound was not detected. Value given is the lower quantification limit

Table 6 (cont.)

COMPOUND	SAMPLE RESULTS (ug/kg) D9	D10	D11	D12	D13	D14	D15	D16
2-Methylnaphthalene	46 U	104 U	110 U	112 U	98 U	100 U	98 U	124 U
Naphthalene	46 U	104 U	110 U	112 U	98 U	100 U	98 U	124 U
2-Nitroaniline	92 U	208 U	220 U	224 U	196 U	200 U	196 U	248 U
3-Nitroaniline	92 U	208 U	220 U	224 U	196 U	200 U	196 U	248 U
4-Nitroaniline	92 U	208 U	220 U	224 U	196 U	200 U	196 U	248 U
Nitrobenzene	46 U	104 U	110 U	112 U	98 U	100 U	98 U	124 U
N-Nitrosodiphenylamine	46 U	104 U	110 U	112 U	98 U	100 U	98 U	124 U
N-Nitrosodi-n-propylamine	46 U	104 U	110 U	112 U	98 U	100 U	98 U	124 U
Phenanthrene	46 U	104 U	110 U	112 U	98 U	100 U	98 U	124 U
Pyrene	46 U	104 U	110 U	112 U	98 U	100 U	98 U	124 U
1,2,4-Trichlorobenzene	92 U	208 U	220 U	224 U	196 U	200 U	196 U	248 U
Acid Extractable compounds								
Benzoic acid	920 U	2080 U	2200 U	2240 U	1960 U	2000 U	1960 U	2480 U
4-Chloro-3-methylphenol	92 U	208 U	220 U	224 U	196 U	200 U	196 U	248 U
2-Chlorophenol	46 U	104 U	110 U	112 U	98 U	100 U	98 U	124 U
2,4-Dichlorophenol	92 U	208 U	220 U	224 U	196 U	200 U	196 U	248 U
2,4-Dimethylphenol	46 U	104 U	110 U	112 U	98 U	100 U	98 U	124 U
2,4-Dinitrophenol	460 U	1040 U	1100 U	1120 U	980 U	1000 U	980 U	1240 U
2-Methylphenol	92 U	208 U	220 U	224 U	196 U	200 U	196 U	248 U
2-Methyl-4,6-dinitrophenol	460 U	1040 U	1100 U	1120 U	980 U	1000 U	980 U	1240 U
4-Methylphenol	92 U	208 U	220 U	224 U	196 U	200 U	196 U	248 U
2-Nitrophenol	92 U	208 U	220 U	224 U	196 U	200 U	196 U	248 U
4-Nitrophenol	460 U	1040 U	1100 U	1120 U	980 U	1000 U	980 U	1240 U
Pentachlorophenol	460 U	1040 U	1100 U	1120 U	980 U	1000 U	980 U	1240 U
Phenol	46 U	104 U	110 U	112 U	98 U	100 U	98 U	124 U
2,4,5-Trichlorophenol	92 U	208 U	220 U	224 U	196 U	200 U	196 U	248 U
2,4,6-Trichlorophenol	92 U	208 U	220 U	224 U	196 U	200 U	196 U	248 U

Data Qualifiers: U = Compound was not detected. Value given is the lower quantification limit

Table 6 (cont.)

COMPOUND	SAMPLE RESULTS (ug/kg) D17	D18	D19	D20	D21	D22	D23	D24
B/N Extractable Compounds								
Acenaphthene	98 U	92 U	88 U	110 U	110 U	136 U	108 U	134 U
Acenaphthylene	98 U	92 U	88 U	110 U	110 U	136 U	108 U	134 U
Aniline	98 U	92 U	88 U	110 U	110 U	136 U	108 U	134 U
Anthracene	98 U	92 U	88 U	110 U	110 U	136 U	108 U	134 U
Azobenzene	98 U	92 U	88 U	110 U	110 U	136 U	108 U	134 U
Benzo(a)anthracene	98 U	92 U	260	110 U	110 U	136 U	108 U	180
Benzo(b)fluoranthene	196 U	184 U	400	220 U	220 U	272 U	216 U	170 E
Benzo(k)fluoranthene	196 U	184 U	176 U	220 U	220 U	272 U	216 U	210 E
Benzo(a)pyrene	196 U	184 U	250	220 U	220 U	272 U	216 U	260 E
Benzo(g,h,i)perylene	196 U	184 U	176 U	220 U	220 U	272 U	216 U	200 E
Benzyl alcohol	98 U	92 U	88 U	110 U	110 U	136 U	108 U	134 U
Benzyl butyl phthalate	98 U	92 U	88 U	110 U	110 U	136 U	108 U	134 U
bis(2-Chloroethyl) ether	98 U	92 U	88 U	110 U	110 U	136 U	108 U	134 U
bis(2-Chloroethoxy) methane	98 U	92 U	88 U	110 U	110 U	136 U	108 U	134 U
bis(2-Ethylhexyl) phthalate	98 U	92 U	250 U	110 U	110 U	150	108 U	420
bis(2-Chloroisopropyl) ether	98 U	92 U	88 U	110 U	110 U	136 U	108 U	134 U
4-Bromophenyl phenyl ether	196 U	184 U	176 U	220 U	220 U	272 U	216 U	268 U
4-Chloroaniline	196 U	184 U	176 U	220 U	220 U	272 U	216 U	268 U
2-Chloronaphthalene	98 U	92 U	88 U	110 U	110 U	136 U	108 U	134 U
4-Chlorophenyl phenyl ether	98 U	92 U	88 U	110 U	110 U	136 U	108 U	134 U
Chrysene	98 U	92 U	630	110 U	110 U	136 U	108 U	280
Dibenzo(a,h)anthracene	196 U	184 U	176 U	220 U	220 U	272 U	216 U	268 U
Dibenzofuran	98 U	92 U	88 U	110 U	110 U	136 U	108 U	134 U
Di-n-butyl phthalate	98 U	92 U	88 U	110 U	110 U	136 U	108 U	134 U
1,3-Dichlorobenzene	98 U	92 U	88 U	110 U	110 U	136 U	108 U	134 U
1,2-Dichlorobenzene	98 U	92 U	88 U	110 U	110 U	136 U	108 U	134 U
1,4-Dichlorobenzene	98 U	92 U	88 U	110 U	110 U	136 U	108 U	134 U
3,3'-Dichlorobenzidine	980 U	920 U	880 U	1100 U	1100 U	1360 U	1080 U	1340 U
Diethyl phthalate	196 U	184 U	176 U	220 U	220 U	272 U	216 U	268 U
Dimethyl phthalate	98 U	92 U	88 U	110 U	110 U	136 U	108 U	134 U
2,4-Dinitrotoluene	98 U	92 U	88 U	110 U	110 U	136 U	108 U	134 U
2,6-Dinitrotoluene	98 U	92 U	88 U	110 U	110 U	136 U	108 U	134 U
Di-n-octyl phthalate	196 U	184 U	176 U	220 U	220 U	272 U	216 U	268 U
Fluoranthene	98 U	92 U	280	110 U	110 U	136 U	108 U	250
Fluorene	98 U	92 U	88 U	110 U	110 U	136 U	108 U	134 U
Hexachlorobenzene	196 U	184 U	176 U	220 U	220 U	272 U	216 U	184 U
Hexachlorobutadiene	98 U	92 U	88 U	110 U	110 U	136 U	108 U	134 U
Hexachlorocyclopentadiene	490 U	460 U	440 U	550 U	550 U	680 U	540 U	670 U
Hexachloroethane	196 U	184 U	176 U	220 U	220 U	272 U	216 U	268 U
Indeno(1,2,3-c,d)pyrene	196 U	184 U	140 E	220 U	220 U	272 U	216 U	170 E
Isophorone	98 U	92 U	88 U	110 U	110 U	136 U	108 U	134 U

Data Qualifiers: U = Compound was not detected. Value given is the lower quantification limit
E = Value reported as an estimate

Table 6 (cont.)

COMPOUND	SAMPLE RESULTS (ug/kg) D17	D18	D19	D20	D21	D22	D23	D24
2-Methylnaphthalene	98 U	92 U	88 U	110 U	110 U	136 U	108 U	134 U
Naphthalene	98 U	92 U	88 U	110 U	110 U	136 U	108 U	134 U
2-Nitroaniline	196 U	184 U	176 U	220 U	220 U	272 U	216 U	268 U
3-Nitroaniline	196 U	184 U	176 U	220 U	220 U	272 U	216 U	268 U
4-Nitroaniline	196 U	184 U	176 U	220 U	220 U	272 U	216 U	268 U
Nitrobenzene	98 U	92 U	88 U	110 U	110 U	136 U	108 U	134 U
N-Nitrosodiphenylamine	98 U	92 U	88 U	110 U	110 U	136 U	108 U	134 U
N-Nitrosodi-n-propylamine	98 U	92 U	88 U	110 U	110 U	136 U	108 U	134 U
Phenanthrene	98 U	92 U	110	110 U	110 U	136 U	108 U	210
Pyrene	98 U	92 U	360	110 U	110 U	136 U	108 U	420
1,2,4-Trichlorobenzene	196 U	184 U	176 U	220 U	220 U	272 U	216 U	268 U
Acid Extractable compounds								
Benzoic acid	1960 U	1840 U	1760 U	2200 U	2200 U	2720 U	2160 U	2680 U
4-Chloro-3-methylphenol	196 U	184 U	176 U	220 U	220 U	272 U	216 U	268 U
2-Chlorophenol	98 U	92 U	88 U	110 U	110 U	136 U	108 U	134 U
2,4-Dichlorophenol	196 U	184 U	176 U	220 U	220 U	272 U	216 U	268 U
2,4-Dimethylphenol	98 U	92 U	88 U	110 U	110 U	136 U	108 U	134 U
2,4-Dinitrophenol	980 U	920 U	880 U	1100 U	1100 U	1360 U	1080 U	1340 U
2-Methylphenol	196 U	184 U	176 U	220 U	220 U	272 U	216 U	268 U
2-Methyl-4,6-dinitrophenol	980 U	920 U	880 U	1100 U	1100 U	1360 U	1080 U	1340 U
4-Methylphenol	196 U	184 U	176 U	220 U	220 U	272 U	216 U	268 U
2-Nitrophenol	196 U	184 U	176 U	220 U	220 U	272 U	216 U	268 U
4-Nitrophenol	980 U	920 U	880 U	1100 U	1100 U	1360 U	1080 U	1340 U
Pentachlorophenol	980 U	920 U	880 U	1100 U	1100 U	1360 U	1080 U	1340 U
Phenol	98 U	92 U	88 U	110 U	110 U	136 U	108 U	134 U
2,4,5-Trichlorophenol	196 U	184 U	176 U	220 U	220 U	272 U	216 U	268 U
2,4,6-Trichlorophenol	196 U	184 U	176 U	220 U	220 U	272 U	216 U	268 U

Data Qualifiers: U = Compound was not detected. Value given is the lower quantification limit

Table 6 (cont.)

COMPOUND	SAMPLE RESULTS (ug/kg) D25	D26	D27	D28	D29	D30	D31	D32
B/N Extractable Compounds								
Acenaphthene	50 U	42 U	88 U	92 U	44 U	106 U	86 U	44 U
Acenaphthylene	50 U	42 U	88 U	92 U	44 U	106 U	86 U	44 U
Aniline	50 U	42 U	88 U	92 U	44 U	106 U	86 U	44 U
Anthracene	50 U	42 U	88 U	92 U	44 U	106 U	86 U	44 U
Azobenzene	50 U	42 U	88 U	92 U	44 U	106 U	86 U	44 U
Benzo(a)anthracene	50 U	42 U	88 U	92 U	44 U	106 U	86 U	44 U
Benzo(b)fluoranthene	100 U	84 U	176 U	184 U	88 U	212 U	172 U	88 U
Benzo(k)fluoranthene	100 U	84 U	176 U	184 U	88 U	212 U	172 U	88 U
Benzo(a)pyrene	100 U	84 U	176 U	184 U	88 U	212 U	172 U	88 U
Benzo(g,h,i)perylene	100 U	84 U	176 U	184 U	88 U	212 U	172 U	88 U
Benzyl alcohol	50 U	42 U	88 U	92 U	44 U	106 U	86 U	44 U
Benzyl butyl phthalate	50 U	42 U	88 U	92 U	44 U	106 U	86 U	44 U
bis(2-Chloroethyl) ether	50 U	42 U	88 U	92 U	44 U	106 U	86 U	44 U
bis(2-Chloroethoxy) methane	50 U	42 U	88 U	92 U	44 U	106 U	86 U	44 U
bis(2-Ethylhexyl) phthalate	50 U	42 U	88 U	92 U	44 U	106 U	470	58
bis(2-Chloroisopropyl) ether	50 U	42 U	88 U	92 U	44 U	106 U	86 U	44 U
4-Bromophenyl phenyl ether	100 U	84 U	176 U	184 U	88 U	212 U	172 U	88 U
4-Chloroaniline	100 U	84 U	176 U	184 U	88 U	212 U	172 U	88 U
2-Chloronaphthalene	50 U	42 U	88 U	92 U	44 U	106 U	86 U	44 U
4-Chlorophenyl phenyl ether	50 U	42 U	88 U	92 U	44 U	106 U	86 U	44 U
Chrysene	50 U	42 U	88 U	92 U	44 U	106 U	86 U	48
Dibenzo(a,h)anthracene	100 U	84 U	176 U	184 U	88 U	212 U	172 U	88 U
Dibenzofuran	50 U	42 U	88 U	92 U	44 U	106 U	86 U	44 U
Di-n-butyl phthalate	50 U	42 U	88 U	92 U	44 U	106 U	86 U	44 U
1,3-Dichlorobenzene	50 U	42 U	88 U	92 U	44 U	106 U	86 U	44 U
1,2-Dichlorobenzene	50 U	42 U	88 U	92 U	44 U	106 U	86 U	44 U
1,4-Dichlorobenzene	50 U	42 U	88 U	92 U	44 U	106 U	86 U	44 U
3,3'-Dichlorobenzidine	500 U	420 U	880 U	920 U	440 U	1060 U	860 U	440 U
Diethyl phthalate	100 U	84 U	176 U	184 U	88 U	212 U	172 U	88 U
Dimethyl phthalate	50 U	42 U	88 U	92 U	44 U	106 U	86 U	44 U
2,4-Dinitrotoluene	50 U	42 U	88 U	92 U	44 U	106 U	86 U	44 U
2,6-Dinitrotoluene	50 U	42 U	88 U	92 U	44 U	106 U	86 U	44 U
Di-n-octyl phthalate	100 U	84 U	176 U	184 U	88 U	212 U	172 U	88 U
Fluoranthene	50 U	42 U	88 U	92 U	44 U	106 U	86 U	72
Fluorene	50 U	42 U	88 U	92 U	44 U	106 U	86 U	44 U
Hexachlorobenzene	100 U	84 U	176 U	184 U	88 U	212 U	172 U	88 U
Hexachlorobutadiene	50 U	42 U	88 U	92 U	44 U	106 U	86 U	44 U
Hexachlorocyclopentadiene	250 U	210 U	440 U	460 U	220 U	530 U	430 U	220 U
Hexachloroethane	100 U	84 U	176 U	184 U	88 U	212 U	172 U	88 U
Indeno(1,2,3-c,d)pyrene	100 U	84 U	176 U	184 U	88 U	212 U	172 U	88 U
Isophorone	50 U	42 U	88 U	92 U	44 U	106 U	86 U	44 U

Data Qualifiers: U = Compound was not detected. Value given is the lower quantification limit

Table 6 (cont.)

COMPOUND	SAMPLE RESULTS (ug/kg) D25	D26	D27	D28	D29	D30	D31	D32
2-Methylnaphthalene	50 U	42 U	88 U	92 U	44 U	106 U	86 U	44 U
Naphthalene	50 U	42 U	88 U	92 U	44 U	106 U	86 U	44 U
2-Nitroaniline	100 U	84 U	176 U	184 U	88 U	212 U	172 U	88 U
3-Nitroaniline	100 U	84 U	176 U	184 U	88 U	212 U	172 U	88 U
4-Nitroaniline	100 U	84 U	176 U	184 U	88 U	212 U	172 U	88 U
Nitrobenzene	50 U	42 U	88 U	92 U	44 U	106 U	86 U	44 U
N-Nitrosodiphenylamine	50 U	42 U	88 U	92 U	44 U	106 U	86 U	44 U
N-Nitrosodi-n-propylamine	50 U	42 U	88 U	92 U	44 U	106 U	86 U	44 U
Phenanthrene	50 U	42 U	88 U	92 U	44 U	106 U	86 U	48
Pyrene	50 U	42 U	88 U	92 U	44 U	106 U	86 U	110
1,2,4-Trichlorobenzene	100 U	84 U	176 U	184 U	88 U	212 U	172 U	88 U
Acid Extractable compounds								
Benzoic acid	1000 U	840 U	1760 U	1840 U	880 U	2120 U	1720 U	880 U
4-Chloro-3-methylphenol	100 U	84 U	176 U	184 U	88 U	212 U	172 U	88 U
2-Chlorophenol	50 U	42 U	88 U	92 U	44 U	106 U	86 U	44 U
2,4-Dichlorophenol	100 U	84 U	176 U	184 U	88 U	212 U	172 U	88 U
2,4-Dimethylphenol	50 U	42 U	88 U	92 U	44 U	106 U	86 U	44 U
2,4-Dinitrophenol	500 U	420 U	880 U	920 U	440 U	1060 U	860 U	440 U
2-Methylphenol	100 U	84 U	176 U	184 U	88 U	212 U	172 U	88 U
2-Methyl-4,6-dinitrophenol	500 U	420 U	880 U	920 U	440 U	1060 U	860 U	440 U
4-Methylphenol	100 U	84 U	176 U	184 U	88 U	212 U	172 U	88 U
2-Nitrophenol	100 U	84 U	176 U	184 U	88 U	212 U	172 U	88 U
4-Nitrophenol	500 U	420 U	880 U	920 U	440 U	1060 U	860 U	440 U
Pentachlorophenol	500 U	420 U	880 U	920 U	440 U	1060 U	860 U	440 U
Phenol	50 U	42 U	88 U	92 U	44 U	106 U	86 U	44 U
2,4,5-Trichlorophenol	100 U	84 U	176 U	184 U	88 U	212 U	172 U	88 U
2,4,6-Trichlorophenol	100 U	84 U	176 U	184 U	88 U	212 U	172 U	88 U

Data Qualifiers: U = Compound was not detected. Value given is the lower quantification limit

Table 6 (cont.)

COMPOUND	SAMPLE RESULTS (ug/kg) D33	D34	D35	D36	D37	D38	D39	D40
B/N Extractable Compounds								
Acenaphthene	46 U	42 U	62 U	92 U	46 U	42 U	42 U	46 U
Acenaphthylene	46 U	42 U	62 U	92 U	46 U	42 U	42 U	46 U
Aniline	46 U	42 U	62 U	92 U	46 U	42 U	42 U	46 U
Anthracene	46 U	42 U	62 U	92 U	46 U	42 U	42 U	46 U
Azobenzene	46 U	42 U	62 U	92 U	46 U	42 U	42 U	46 U
Benzo(a)anthracene	46 U	42 U	62 U	92 U	46 U	42 U	42 U	46 U
Benzo(b)fluoranthene	92 U	84 U	124 U	184 U	92 U	84 U	84 U	92 U
Benzo(k)fluoranthene	92 U	84 U	124 U	184 U	92 U	84 U	84 U	92 U
Benzo(a)pyrene	92 U	84 U	124 U	184 U	92 U	84 U	84 U	92 U
Benzo(g,h,i)perylene	92 U	84 U	124 U	184 U	92 U	84 U	84 U	92 U
Benzyl alcohol	46 U	42 U	62 U	92 U	46 U	42 U	42 U	46 U
Benzyl butyl phthalate	46 U	42 U	62 U	92 U	46 U	42 U	42 U	46 U
bis(2-Chloroethyl) ether	46 U	42 U	62 U	92 U	46 U	42 U	42 U	46 U
bis(2-Chloroethoxy) methane	46 U	42 U	62 U	92 U	46 U	42 U	42 U	46 U
bis(2-Ethylhexyl) phthalate	46 U	42 U	62 U	92 U	46 U	42 U	42 U	46 U
bis(2-Chloroisopropyl) ether	46 U	42 U	62 U	92 U	46 U	42 U	42 U	46 U
4-Bromophenyl phenyl ether	92 U	84 U	124 U	184 U	92 U	84 U	84 U	92 U
4-Chloroaniline	92 U	84 U	124 U	184 U	92 U	84 U	84 U	92 U
2-Chloronaphthalene	46 U	42 U	62 U	92 U	46 U	42 U	42 U	46 U
4-Chlorophenyl phenyl ether	46 U	42 U	62 U	92 U	46 U	42 U	42 U	46 U
Chrysene	46 U	42 U	62 U	92 U	46 U	42 U	42 U	46 U
Dibenzo(a,h)anthracene	92 U	84 U	124 U	184 U	92 U	84 U	84 U	92 U
Dibenzofuran	46 U	42 U	62 U	92 U	46 U	42 U	42 U	46 U
Di-n-butyl phthalate	46 U	42 U	62 U	92 U	46 U	42 U	42 U	46 U
1,3-Dichlorobenzene	46 U	42 U	62 U	92 U	46 U	42 U	42 U	46 U
1,2-Dichlorobenzene	46 U	42 U	62 U	92 U	46 U	42 U	42 U	46 U
1,4-Dichlorobenzene	46 U	42 U	62 U	92 U	46 U	42 U	42 U	46 U
3,3'-Dichlorobenzidine	460 U	420 U	620 U	920 U	460 U	420 U	420 U	460 U
Diethyl phthalate	92 U	84 U	124 U	184 U	92 U	84 U	84 U	92 U
Dimethyl phthalate	46 U	42 U	62 U	92 U	46 U	42 U	42 U	46 U
2,4-Dinitrotoluene	46 U	42 U	62 U	92 U	46 U	42 U	42 U	46 U
2,6-Dinitrotoluene	46 U	42 U	62 U	92 U	46 U	42 U	42 U	46 U
Di-n-octyl phthalate	92 U	84 U	124 U	184 U	92 U	84 U	84 U	92 U
Fluoranthene	46 U	42 U	62 U	92 U	46 U	42 U	42 U	46 U
Fluorene	46 U	42 U	62 U	92 U	46 U	42 U	42 U	46 U
Hexachlorobenzene	92 U	84 U	124 U	184 U	92 U	84 U	84 U	92 U
Hexachlorobutadiene	46 U	42 U	62 U	92 U	46 U	42 U	42 U	46 U
Hexachlorocyclopentadiene	230 U	210 U	310 U	460 U	230 U	210 U	210 U	230 U
Hexachloroethane	92 U	84 U	124 U	184 U	92 U	84 U	84 U	92 U
Indeno(1,2,3-c,d)pyrene	92 U	84 U	124 U	184 U	92 U	84 U	84 U	92 U
Isophorone	46 U	42 U	62 U	92 U	46 U	42 U	42 U	46 U

Data Qualifiers: U = Compound was not detected. Value given is the lower quantification limit

Table 6 (cont.)

COMPOUND	SAMPLE RESULTS (ug/kg) D33	D34	D35	D36	D37	D38	D39	D40
2-Methylnaphthalene	46 U	42 U	62 U	92 U	46 U	42 U	42 U	46 U
Naphthalene	46 U	42 U	62 U	92 U	46 U	42 U	42 U	46 U
2-Nitroaniline	92 U	84 U	124 U	184 U	92 U	84 U	84 U	92 U
3-Nitroaniline	92 U	84 U	124 U	184 U	92 U	84 U	84 U	92 U
4-Nitroaniline	92 U	84 U	124 U	184 U	92 U	84 U	84 U	92 U
Nitrobenzene	46 U	42 U	62 U	92 U	46 U	42 U	42 U	46 U
N-Nitrosodiphenylamine	46 U	42 U	62 U	92 U	46 U	42 U	42 U	46 U
N-Nitrosodi-n-propylamine	46 U	42 U	62 U	92 U	46 U	42 U	42 U	46 U
Phenanthrene	46 U	42 U	62 U	92 U	46 U	42 U	42 U	46 U
Pyrene	46 U	42 U	62 U	92 U	46 U	42 U	42 U	46 U
1,2,4-Trichlorobenzene	92 U	84 U	124 U	184 U	92 U	84 U	84 U	92 U
Acid Extractable compounds								
Benzoic acid	920 U	840 U	1240 U	1840 U	920 U	840 U	840 U	920 U
4-Chloro-3-methylphenol	92 U	84 U	124 U	184 U	92 U	84 U	84 U	92 U
2-Chlorophenol	46 U	42 U	62 U	92 U	46 U	42 U	42 U	46 U
2,4-Dichlorophenol	92 U	84 U	124 U	184 U	92 U	84 U	84 U	92 U
2,4-Dimethylphenol	46 U	42 U	62 U	92 U	46 U	42 U	42 U	46 U
2,4-Dinitrophenol	460 U	420 U	620 U	920 U	460 U	420 U	420 U	460 U
2-Methylphenol	92 U	84 U	124 U	184 U	92 U	84 U	84 U	92 U
2-Methyl-4,6-dinitrophenol	460 U	420 U	620 U	920 U	460 U	420 U	420 U	460 U
4-Methylphenol	92 U	84 U	124 U	184 U	92 U	84 U	84 U	92 U
2-Nitrophenol	92 U	84 U	124 U	184 U	92 U	84 U	84 U	92 U
4-Nitrophenol	460 U	420 U	620 U	920 U	460 U	420 U	420 U	460 U
Pentachlorophenol	460 U	420 U	620 U	920 U	460 U	420 U	420 U	460 U
Phenol	46 U	42 U	62 U	92 U	46 U	42 U	42 U	46 U
2,4,5-Trichlorophenol	92 U	84 U	124 U	184 U	92 U	84 U	84 U	92 U
2,4,6-Trichlorophenol	92 U	84 U	124 U	184 U	92 U	84 U	84 U	92 U

Data Qualifiers: U = Compound was not detected. Value given is the lower quantification limit

Table 6 (cont.)

COMPOUND	SAMPLE RESULTS (ug/kg) D41	D42	D43	D44	D45	D46	E1	E2
B/N Extractable Compounds								
Acenaphthene	70 U	96 U	104 U	98 U	110 U	98 U	44 U	44 U
Acenaphthylene	70 U	96 U	104 U	98 U	110 U	98 U	44 U	44 U
Aniline	70 U	96 U	104 U	98 U	110 U	98 U	44 U	44 U
Anthracene	70 U	96 U	104 U	98 U	110 U	98 U	44 U	44 U
Azobenzene	70 U	96 U	104 U	98 U	110 U	98 U	44 U	44 U
Benzo(a)anthracene	70 U	96 U	104 U	98 U	110 U	98 U	44 U	44 U
Benzo(b)fluoranthene	140 U	192 U	208 U	196 U	220 U	196 U	88 U	88 U
Benzo(k)fluoranthene	140 U	192 U	208 U	196 U	220 U	196 U	88 U	88 U
Benzo(a)pyrene	140 U	192 U	208 U	196 U	220 U	196 U	88 U	88 U
Benzo(g,h,i)perylene	140 U	192 U	208 U	196 U	220 U	196 U	88 U	88 U
Benzyl alcohol	70 U	96 U	104 U	98 U	110 U	98 U	44 U	44 U
Benzyl butyl phthalate	70 U	96 U	104 U	98 U	110 U	98 U	44 U	44 U
bis(2-Chloroethyl) ether	70 U	96 U	104 U	98 U	110 U	98 U	44 U	44 U
bis(2-Chloroethoxy) methane	70 U	96 U	104 U	98 U	110 U	98 U	44 U	44 U
bis(2-Ethylhexyl) phthalate	200	150	104 U	98 U	110 U	98 U	47	95
bis(2-Chloroisopropyl) ether	70 U	96 U	104 U	98 U	110 U	98 U	44 U	44 U
4-Bromophenyl phenyl ether	140 U	192 U	208 U	196 U	220 U	196 U	88 U	88 U
4-Chloroaniline	140 U	192 U	208 U	196 U	220 U	196 U	88 U	88 U
2-Chloronaphthalene	70 U	96 U	104 U	98 U	110 U	98 U	44 U	44 U
4-Chlorophenyl phenyl ether	70 U	96 U	104 U	98 U	110 U	98 U	44 U	44 U
Chrysene	70 U	96 U	104 U	98 U	110 U	98 U	44 U	44 U
Dibenzo(a,h)anthracene	140 U	192 U	208 U	196 U	220 U	196 U	88 U	88 U
Dibenzofuran	70 U	96 U	104 U	98 U	110 U	98 U	44 U	44 U
Di-n-butyl phthalate	70 U	96 U	104 U	98 U	110 U	98 U	44 U	44 U
1,3-Dichlorobenzene	70 U	96 U	104 U	98 U	110 U	98 U	44 U	44 U
1,2-Dichlorobenzene	70 U	96 U	104 U	98 U	110 U	98 U	44 U	44 U
1,4-Dichlorobenzene	70 U	96 U	104 U	98 U	110 U	98 U	44 U	44 U
3,3'-Dichlorobenzidine	700 U	960 U	1040 U	980 U	1100 U	980 U	440 U	440 U
Diethyl phthalate	140 U	192 U	208 U	196 U	220 U	196 U	88 U	88 U
Dimethyl phthalate	70 U	96 U	104 U	98 U	110 U	98 U	44 U	44 U
2,4-Dinitrotoluene	70 U	96 U	104 U	98 U	110 U	98 U	44 U	44 U
2,6-Dinitrotoluene	70 U	96 U	104 U	98 U	110 U	98 U	44 U	44 U
Di-n-octyl phthalate	140 U	192 U	208 U	196 U	220 U	196 U	88 U	88 U
Fluoranthene	70 U	96 U	104 U	98 U	110 U	98 U	44 U	44 U
Fluorene	70 U	96 U	104 U	98 U	110 U	98 U	44 U	44 U
Hexachlorobenzene	140 U	192 U	208 U	196 U	220 U	196 U	88 U	88 U
Hexachlorobutadiene	70 U	96 U	104 U	98 U	110 U	98 U	44 U	44 U
Hexachlorocyclopentadiene	350 U	480 U	520 U	490 U	550 U	490 U	220 U	220 U
Hexachloroethane	140 U	192 U	208 U	196 U	220 U	196 U	88 U	88 U
Indeno(1,2,3-c,d)pyrene	140 U	192 U	208 U	196 U	220 U	196 U	88 U	88 U
Isophorone	70 U	96 U	104 U	98 U	110 U	98 U	44 U	44 U

Data Qualifiers: U = Compound was not detected. Value given is the lower quantification limit

Table 6 (cont.)

COMPOUND	SAMPLE RESULTS (ug/kg) D41	D42	D43	D44	D45	D46	E1	E2
2-Methylnaphthalene	70 U	96 U	104 U	98 U	110 U	98 U	44 U	44 U
Naphthalene	70 U	96 U	104 U	98 U	110 U	98 U	44 U	44 U
2-Nitroaniline	140 U	192 U	208 U	196 U	220 U	196 U	88 U	88 U
3-Nitroaniline	140 U	192 U	208 U	196 U	220 U	196 U	88 U	88 U
4-Nitroaniline	140 U	192 U	208 U	196 U	220 U	196 U	88 U	88 U
Nitrobenzene	70 U	96 U	104 U	98 U	110 U	98 U	44 U	44 U
N-Nitrosodiphenylamine	70 U	96 U	104 U	98 U	110 U	98 U	44 U	44 U
N-Nitrosodi-n-propylamine	70 U	96 U	104 U	98 U	110 U	98 U	44 U	44 U
Phenanthrene	70 U	96 U	104 U	98 U	110 U	98 U	44 U	44 U
Pyrene	70 U	96 U	104 U	98 U	110 U	98 U	44 U	44 U
1,2,4-Trichlorobenzene	140 U	192 U	208 U	196 U	220 U	196 U	88 U	88 U
Acid Extractable compounds								
Benzoic acid	1400 U	1920 U	2080 U	1960 U	2200 U	1960 U	880 U	880 U
4-Chloro-3-methylphenol	140 U	192 U	208 U	196 U	220 U	196 U	88 U	88 U
2-Chlorophenol	70 U	96 U	104 U	98 U	110 U	98 U	44 U	44 U
2,4-Dichlorophenol	140 U	192 U	208 U	196 U	220 U	196 U	88 U	88 U
2,4-Dimethylphenol	70 U	96 U	104 U	98 U	110 U	98 U	44 U	44 U
2,4-Dinitrophenol	700 U	960 U	1040 U	980 U	1100 U	980 U	440 U	440 U
2-Methylphenol	140 U	192 U	208 U	196 U	220 U	196 U	88 U	88 U
2-Methyl-4,6-dinitrophenol	700 U	960 U	1040 U	980 U	1100 U	980 U	440 U	440 U
4-Methylphenol	140 U	192 U	208 U	196 U	220 U	196 U	88 U	88 U
2-Nitrophenol	140 U	192 U	208 U	196 U	220 U	196 U	88 U	88 U
4-Nitrophenol	700 U	960 U	1040 U	980 U	1100 U	980 U	440 U	440 U
Pentachlorophenol	700 U	960 U	1040 U	980 U	1100 U	980 U	440 U	440 U
Phenol	70 U	96 U	104 U	98 U	110 U	98 U	44 U	44 U
2,4,5-Trichlorophenol	140 U	192 U	208 U	196 U	220 U	196 U	88 U	88 U
2,4,6-Trichlorophenol	140 U	192 U	208 U	196 U	220 U	196 U	88 U	88 U

Data Qualifiers: U = Compound was not detected. Value given is the lower quantification limit

Table 6 (cont.)

COMPOUND	SAMPLE RESULTS (ug/kg) E3	E4*	E5	E6	E7*	E8	E9	E10
B/N Extractable Compounds								
Acenaphthene	42 U	44 U	40 U	42 U	42 U	44 U	54 U	44 U
Acenaphthylene	42 U	44 U	40 U	42 U	42 U	44 U	54 U	44 U
Aniline	42 U	44 U	40 U	42 U	42 U	44 U	54 U	44 U
Anthracene	42 U	44 U	40 U	42 U	42 U	44 U	54 U	44 U
Azobenzene	42 U	44 U	40 U	42 U	42 U	44 U	54 U	44 U
Benzo(a)anthracene	42 U	44 U	40 U	42 U	42 U	44 U	65	44 U
Benzo(b)fluoranthene	84 U	88 U	80 U	84 U	84 U	88 U	63 E	88 U
Benzo(k)fluoranthene	84 U	88 U	80 U	84 U	84 U	88 U	108 U	88 U
Benzo(a)pyrene	84 U	88 U	80 U	84 U	84 U	88 U	100 E	88 U
Benzo(g,h,i)perylene	84 U	88 U	80 U	84 U	84 U	88 U	78 E	88 U
Benzyl alcohol	42 U	44 U	40 U	42 U	42 U	44 U	54 U	44 U
Benzyl butyl phthalate	42 U	44 U	40 U	42 U	42 U	44 U	54 U	44 U
bis(2-Chloroethyl) ether	42 U	44 U	40 U	42 U	42 U	44 U	54 U	44 U
bis(2-Chloroethoxy) methane	42 U	44 U	40 U	42 U	42 U	44 U	54 U	44 U
bis(2-Ethylhexyl) phthalate	240 U	44 U	40 U	58	88 U	180	210	790
bis(2-Chloroisopropyl) ether	42 U	44 U	40 U	42 U	42 U	44 U	54 U	44 U
4-Bromophenyl phenyl ether	84 U	88 U	80 U	84 U	84 U	88 U	108 U	88 U
4-Chloroaniline	84 U	88 U	80 U	84 U	84 U	88 U	108 U	88 U
2-Chloronaphthalene	42 U	44 U	40 U	42 U	42 U	44 U	54 U	44 U
4-Chlorophenyl phenyl ether	42 U	44 U	40 U	42 U	42 U	44 U	54 U	44 U
Chrysene	42 U	44 U	40 U	42 U	42 U	44 U	99	44 U
Dibenzo(a,h)anthracene	84 U	88 U	80 U	84 U	84 U	88 U	108 U	88 U
Dibenzofuran	42 U	44 U	40 U	42 U	42 U	44 U	54 U	44 U
Di-n-butyl phthalate	42 U	44 U	40 U	42 U	42 U	44 U	54 U	44 U
1,3-Dichlorobenzene	42 U	44 U	40 U	42 U	42 U	44 U	54 U	44 U
1,2-Dichlorobenzene	42 U	44 U	40 U	42 U	42 U	44 U	54 U	44 U
1,4-Dichlorobenzene	42 U	44 U	40 U	42 U	42 U	44 U	54 U	44 U
3,3'-Dichlorobenzidine	420 U	440 U	400 U	420 U	420 U	440 U	540 U	440 U
Diethyl phthalate	84 U	88 U	80 U	84 U	84 U	88 U	108 U	88 U
Dimethyl phthalate	42 U	44 U	40 U	42 U	42 U	44 U	54 U	44 U
2,4-Dinitrotoluene	42 U	44 U	40 U	42 U	42 U	44 U	54 U	44 U
2,6-Dinitrotoluene	42 U	44 U	40 U	42 U	42 U	44 U	54 U	44 U
Di-n-octyl phthalate	84 U	88 U	80 U	84 U	84 U	88 U	108 U	88 U
Fluoranthene	42 U	44 U	40 U	42 U	42 U	70	88	44 U
Fluorene	42 U	44 U	40 U	42 U	42 U	44 U	54 U	44 U
Hexachlorobenzene	84 U	88 U	80 U	84 U	84 U	88 U	108 U	88 U
Hexachlorobutadiene	42 U	44 U	40 U	42 U	42 U	44 U	54 U	44 U
Hexachlorocyclopentadiene	210 U	220 U	200 U	210 U	210 U	220 U	270 U	220 U
Hexachloroethane	84 U	88 U	80 U	84 U	84 U	88 U	108 U	88 U
Indeno(1,2,3-c,d)pyrene	84 U	88 U	80 U	84 U	84 U	88 U	62 E	88 U
Isophorone	42 U	44 U	40 U	42 U	42 U	44 U	54 U	44 U

* Results presented are from reextraction and reanalysis of sample

Data Qualifiers: U = Compound was not detected. Value given is the lower quantification limit
E = Value reported as an estimate

Table 6 (cont.)

COMPOUND	SAMPLE RESULTS (ug/kg) E3	E4*	E5	E6	E7*	E8	E9	E10
2-Methylnaphthalene	42 U	44 U	40 U	42 U	42 U	44 U	54 U	44 U
Naphthalene	42 U	44 U	40 U	42 U	42 U	44 U	54 U	44 U
2-Nitroaniline	84 U	88 U	80 U	84 U	84 U	88 U	108 U	88 U
3-Nitroaniline	84 U	88 U	80 U	84 U	84 U	88 U	108 U	88 U
4-Nitroaniline	84 U	88 U	80 U	84 U	84 U	88 U	108 U	88 U
Nitrobenzene	42 U	44 U	40 U	42 U	42 U	44 U	54 U	44 U
N-Nitrosodiphenylamine	42 U	44 U	40 U	42 U	42 U	44 U	54 U	44 U
N-Nitrosodi-n-propylamine	42 U	44 U	40 U	42 U	42 U	44 U	54 U	44 U
Phenanthrene	42 U	44 U	40 U	42 U	42 U	44 U	80	44 U
Pyrene	42 U	44 U	40 U	42 U	42 U	44	130	44 U
1,2,4-Trichlorobenzene	84 U	88 U	80 U	84 U	84 U	88 U	108 U	88 U
Acid Extractable compounds								
Benzoic acid	840 U	880 U	800 U	840 U	840 U	880 U	1080 U	880 U
4-Chloro-3-methylphenol	84 U	88 U	80 U	84 U	84 U	88 U	108 U	88 U
2-Chlorophenol	42 U	44 U	40 U	42 U	42 U	44 U	54 U	44 U
2,4-Dichlorophenol	84 U	88 U	80 U	84 U	84 U	88 U	108 U	88 U
2,4-Dimethylphenol	42 U	44 U	40 U	42 U	42 U	44 U	54 U	44 U
2,4-Dinitrophenol	420 U	440 U	400 U	420 U	420 U	440 U	540 U	440 U
2-Methylphenol	84 U	88 U	80 U	84 U	84 U	88 U	108 U	88 U
2-Methyl-4,6-dinitrophenol	420 U	440 U	400 U	420 U	420 U	440 U	540 U	440 U
4-Methylphenol	84 U	88 U	80 U	84 U	84 U	88 U	108 U	88 U
2-Nitrophenol	84 U	88 U	80 U	84 U	84 U	88 U	108 U	88 U
4-Nitrophenol	420 U	440 U	400 U	420 U	420 U	440 U	540 U	440 U
Pentachlorophenol	420 U	440 U	400 U	420 U	420 U	440 U	540 U	440 U
Phenol	42 U	44 U	40 U	42 U	42 U	44 U	54 U	44 U
2,4,5-Trichlorophenol	84 U	88 U	80 U	84 U	84 U	88 U	108 U	88 U
2,4,6-Trichlorophenol	84 U	88 U	80 U	84 U	84 U	250 U	108 U	88 U

* Results presented are from reextraction and reanalysis of sample

Data Qualifiers: U = Compound was not detected. Value given is the lower quantification limit

Table 6 (cont.)

COMPOUND	SAMPLE RESULTS (ug/kg) E11	E12	E13	E14
B/N Extractable Compounds				
Acenaphthene	96 U	40 U	42 U	40 U
Acenaphthylene	96 U	40 U	42 U	40 U
Aniline	96 U	40 U	42 U	40 U
Anthracene	96 U	40 U	42 U	40 U
Azobenzene	96 U	40 U	42 U	40 U
Benzo(a)anthracene	96 U	40 U	42 U	40 U
Benzo(b)fluoranthene	192 U	80 U	84 U	80 U
Benzo(k)fluoranthene	192 U	80 U	84 U	80 U
Benzo(a)pyrene	192 U	80 U	84 U	80 U
Benzo(g,h,i)perylene	192 U	80 U	84 U	80 U
Benzyl alcohol	96 U	40 U	42 U	40 U
Benzyl butyl phthalate	96 U	40 U	42 U	40 U
bis(2-Chloroethyl) ether	96 U	40 U	42 U	40 U
bis(2-Chloroethoxy) methane	96 U	40 U	42 U	40 U
bis(2-Ethylhexyl) phthalate	490	40 U	42 U	40 U
bis(2-Chloroisopropyl) ether	96 U	40 U	42 U	40 U
4-Bromophenyl phenyl ether	192 U	80 U	84 U	80 U
4-Chloroaniline	192 U	80 U	84 U	80 U
2-Chloronaphthalene	96 U	40 U	42 U	40 U
4-Chlorophenyl phenyl ether	96 U	40 U	42 U	40 U
Chrysene	96 U	40 U	42 U	40 U
Dibenzo(a,h)anthracene	192 U	80 U	84 U	80 U
Dibenzofuran	96 U	40 U	42 U	40 U
Di-n-butyl phthalate	96 U	40 U	42 U	40 U
1,3-Dichlorobenzene	96 U	40 U	42 U	40 U
1,2-Dichlorobenzene	96 U	40 U	42 U	40 U
1,4-Dichlorobenzene	96 U	40 U	42 U	40 U
3,3'-Dichlorobenzidine	960 U	400 U	420 U	400 U
Diethyl phthalate	192 U	80 U	84 U	80 U
Dimethyl phthalate	96 U	40 U	42 U	40 U
2,4-Dinitrotoluene	96 U	40 U	42 U	40 U
2,6-Dinitrotoluene	96 U	40 U	42 U	40 U
Di-n-octyl phthalate	192 U	80 U	84 U	80 U
Fluoranthene	96 U	40 U	42 U	40 U
Fluorene	96 U	40 U	42 U	40 U
Hexachlorobenzene	192 U	80 U	84 U	80 U
Hexachlorobutadiene	96 U	40 U	42 U	40 U
Hexachlorocyclopentadiene	480 U	200 U	210 U	200 U
Hexachloroethane	192 U	80 U	84 U	80 U
Indeno(1,2,3-c,d)pyrene	192 U	80 U	84 U	80 U
Isophorone	96 U	40 U	42 U	40 U

Data Qualifiers: U = Compound was not detected. Value given is the lower quantification limit

Table 6 (cont.)

COMPOUND	SAMPLE RESULTS (ug/kg) E11	E12	E13	E14
2-Methylnaphthalene	96 U	40 U	42 U	40 U
Naphthalene	96 U	40 U	42 U	40 U
2-Nitroaniline	192 U	80 U	84 U	80 U
3-Nitroaniline	192 U	80 U	84 U	80 U
4-Nitroaniline	192 U	80 U	84 U	80 U
Nitrobenzene	96 U	40 U	42 U	40 U
N-Nitrosodiphenylamine	96 U	40 U	42 U	40 U
N-Nitrosodi-n-propylamine	96 U	40 U	42 U	40 U
Phenanthrene	96 U	40 U	42 U	40 U
Pyrene	96 U	40 U	42 U	40 U
1,2,4-Trichlorobenzene	192 U	80 U	84 U	80 U
Acid Extractable compounds				
Benzoic acid	1920 U	800 U	840 U	800 U
4-Chloro-3-methylphenol	192 U	80 U	84 U	80 U
2-Chlorophenol	96 U	40 U	42 U	40 U
2,4-Dichlorophenol	192 U	80 U	84 U	80 U
2,4-Dimethylphenol	96 U	40 U	42 U	40 U
2,4-Dinitrophenol	960 U	400 U	420 U	400 U
2-Methylphenol	192 U	80 U	84 U	80 U
2-Methyl-4,6-dinitrophenol	960 U	400 U	420 U	400 U
4-Methylphenol	192 U	80 U	84 U	80 U
2-Nitrophenol	192 U	80 U	84 U	80 U
4-Nitrophenol	960 U	400 U	420 U	400 U
Pentachlorophenol	960 U	400 U	420 U	400 U
Phenol	96 U	40 U	42 U	40 U
2,4,5-Trichlorophenol	192 U	80 U	84 U	80 U
2,4,6-Trichlorophenol	192 U	80 U	84 U	80 U

Data Qualifiers: U = Compound was not detected. Value given is the lower quantification limit

TABLE 7. SEMIVOLATILE ORGANICS ANALYSIS RESULTS FOR WATER
LOWER COLUMBIA RIVER RECONNAISSANCE SURVEY

COMPOUND	SAMPLE RESULTS (ug/L) W6	W14	W26	W37	W45	W47	W51	W52
B/N Extractable Compounds								
Acenaphthene	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Acenaphthylene	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Aniline	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Anthracene	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Azobenzene	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Benzo(a)anthracene	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Benzo(b)fluoranthene	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U
Benzo(k)fluoranthene	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U
Benzo(a)pyrene	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U
Benzo(g,h,i)perylene	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U
Benzyl alcohol	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Benzyl butyl phthalate	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
bis(2-Chloroethyl) ether	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
bis(2-Chloroethoxy) methane	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
bis(2-Ethylhexyl) phthalate	4.4 U	2 U	9	18	2 U	2 U	2 U	15
bis(2-Chloroisopropyl) ether	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
4-Bromophenyl phenyl ether	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U
4-Chloroaniline	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U
2-Chloronaphthalene	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
4-Chlorophenyl phenyl ether	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Chrysene	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Dibenzo(a,h)anthracene	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U
Dibenzofuran	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Di-n-butyl phthalate	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
1,3-Dichlorobenzene	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
1,2-Dichlorobenzene	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
1,4-Dichlorobenzene	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
3,3'-Dichlorobenzidine	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U
Diethyl phthalate	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U
Dimethyl phthalate	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
2,4-Dinitrotoluene	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
2,6-Dinitrotoluene	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Di-n-octyl phthalate	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U
Fluoranthene	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Fluorene	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Hexachlorobenzene	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U
Hexachlorobutadiene	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Hexachlorocyclopentadiene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Hexachloroethane	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U
Indeno(1,2,3-c,d)pyrene	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U
Isophorone	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U

Data Qualifiers:

U = Compound was not detected. Value given is the lower quantification limit
R = Data are unusable

Table 7 (cont.)

COMPOUND	SAMPLE RESULTS (ug/L) W6	W14	W26	W37	W45	W47	W51	W52
2-Methylnaphthalene	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Naphthalene	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
2-Nitroaniline	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U
3-Nitroaniline	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U
4-Nitroaniline	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U
Nitrobenzene	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
N-Nitrosodiphenylamine	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
N-Nitrosodi-n-propylamine	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Phenanthrene	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Pyrene	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
1,2,4-Trichlorobenzene	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U
Acid Extractable compounds								
Benzoic acid	40 R	40 U	40 U	40 U	40 U	40 U	40 U	40 U
4-Chloro-3-methylphenol	4 R	4 U	4 U	4 U	4 U	4 U	4 U	4 U
2-Chlorophenol	2 R	2 U	2 U	2 U	2 U	2 U	2 U	2 U
2,4-Dichlorophenol	4 R	4 U	4 U	4 U	4 U	4 U	4 U	4 U
2,4-Dimethylphenol	2 R	2 U	2 U	2 U	2 U	2 U	2 U	2 U
2,4-Dinitrophenol	20 R	20 U	20 U	20 U	20 U	20 U	20 U	20 U
2-Methylphenol	4 R	4 U	4 U	4 U	4 U	4 U	4 U	4 U
2-Methyl-4,6-dinitrophenol	20 R	20 U	20 U	20 U	20 U	20 U	20 U	20 U
4-Methylphenol	4 R	4 U	4 U	4 U	4 U	4 U	4 U	4 U
2-Nitrophenol	4 R	4 U	4 U	4 U	4 U	4 U	4 U	4 U
4-Nitrophenol	20 R	20 U	20 U	20 U	20 U	20 U	20 U	20 U
Pentachlorophenol	20 R	20 U	20 U	20 U	20 U	20 U	20 U	20 U
Phenol	2 R	2 U	2 U	2 U	2 U	2 U	2 U	2 U
2,4,5-Trichlorophenol	4 R	4 U	4 U	4 U	4 U	4 U	4 U	4 U
2,4,6-Trichlorophenol	4 R	4 U	4 U	4 U	4 U	4 U	4 U	4 U

Data Qualifiers:

U = Compound was not detected. Value given is the lower quantification limit
R = Data are unusable

TABLE 8. SEMIVOLATILE ORGANICS ANALYSIS RESULTS FOR TISSUE
LOWER COLUMBIA RIVER RECONNAISSANCE SURVEY

COMPOUND	SAMPLE RESULTS (STURGEON) (ug/kg) ST-1-2-D	ST-1-3	ST-1-4	ST-1-5	ST-1-6	ST-2-1-D	ST-2-2-D	ST-2-3
B/N Extractable Compounds								
Acenaphthene	100 U	100 U	100 U	100 U	100 U	100 U	100 UE	100 U
Acenaphthylene	100 U	100 U	100 U	100 U	100 U	100 U	100 UE	100 U
Aniline	100 U	100 U	100 U	100 U	100 U	100 U	100 UE	100 U
Anthracene	100 U	100 U	100 U	100 U	100 U	100 U	100 UE	100 U
Azobenzene	100 U	100 U	100 U	100 U	100 U	100 U	100 UE	100 U
Benzo(a)anthracene	100 U	100 U	100 U	100 U	100 U	100 U	100 UE	100 U
Benzo(b)fluoranthene	200 U	200 U	200 U	200 U	200 U	200 U	200 UE	200 U
Benzo(k)fluoranthene	200 U	200 U	200 U	200 U	200 U	200 U	200 UE	200 U
Benzo(a)pyrene	200 U	200 U	200 U	200 U	200 U	200 U	200 UE	200 U
Benzo(g,h,i)perylene	200 U	200 U	200 U	200 U	200 U	200 U	200 UE	200 U
Benzyl alcohol	100 U	100 U	100 U	100 U	100 U	100 U	100 UE	100 U
Benzyl butyl phthalate	100 U	100 U	100 U	100 U	100 U	100 U	100 UE	100 U
bis(2-Chloroethyl) ether	100 U	100 U	100 U	100 U	100 U	100 U	100 UE	100 U
bis(2-Chloroethoxy) methane	100 U	100 U	100 U	100 U	100 U	100 U	100 UE	100 U
bis(2-Ethylhexyl) phthalate	500	100 U	100 U	590 U	1500 U	100 U	1300 UE	500 U
bis(2-Chloroisopropyl) ether	100 U	100 U	100 U	100 U	100 U	100 U	100 UE	100 U
4-Bromophenyl phenyl ether	200 U	200 U	200 U	200 U	200 U	200 U	200 UE	200 U
4-Chloroaniline	200 U	200 U	200 U	200 U	200 U	200 U	200 UE	200 U
2-Chloronaphthalene	100 U	100 U	100 U	100 U	100 U	100 U	100 UE	100 U
4-Chlorophenyl phenyl ether	100 U	100 U	100 U	100 U	100 U	100 U	100 UE	100 U
Chrysene	100 U	100 U	100 U	100 U	100 U	100 U	100 UE	100 U
Dibenzo(a,h)anthracene	200 U	200 U	200 U	200 U	200 U	200 U	200 UE	200 U
Dibenzofuran	100 U	100 U	100 U	100 U	100 U	100 U	100 UE	100 U
Di-n-butyl phthalate	150 U	100 U	100 U	100 U	100 U	100 U	100 UE	110 U
1,3-Dichlorobenzene	100 U	100 U	100 U	100 U	100 U	100 U	100 UE	100 U
1,2-Dichlorobenzene	100 U	100 U	100 U	100 U	100 U	100 U	100 UE	100 U
1,4-Dichlorobenzene	100 U	100 U	100 U	100 U	100 U	100 U	100 UE	100 U
3,3'-Dichlorobenzidine	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 UE	1000 U
Diethyl phthalate	200 U	200 U	200 U	200 U	200 U	200 U	200 UE	200 U
Dimethyl phthalate	100 U	100 U	100 U	100 U	100 U	100 U	100 UE	100 U
2,4-Dinitrotoluene	100 U	100 U	100 U	100 U	100 U	100 U	100 UE	100 U
2,6-Dinitrotoluene	100 U	100 U	100 U	100 U	100 U	100 U	100 UE	100 U
Di-n-octyl phthalate	200 U	200 U	200 U	200 U	200 U	200 U	200 UE	200 U
Fluoranthene	100 U	100 U	100 U	100 U	100 U	100 U	100 UE	100 U
Fluorene	100 U	100 U	100 U	100 U	100 U	100 U	100 UE	100 U
Hexachlorobenzene	200 U	200 U	200 U	200 U	200 U	200 U	200 UE	200 U
Hexachlorobutadiene	100 U	100 U	100 U	100 U	100 U	100 U	100 UE	100 U
Hexachlorocyclopentadiene	500 U	500 U	500 U	500 U	500 U	500 U	500 UE	500 U
Hexachloroethane	200 U	200 U	200 U	200 U	200 U	200 U	200 UE	200 U
Indeno(1,2,3-c,d)pyrene	200 U	200 U	200 U	200 U	200 U	200 U	200 UE	200 U
Isophorone	100 U	100 U	100 U	100 U	100 U	100 U	100 UE	100 U

Data Qualifiers:

U = Compound was not detected. Value given is the lower quantification limit
E = Estimated value

Table 8 (cont.)

COMPOUND	SAMPLE RESULTS (STURGEON) (ug/kg) ST-1-2-D	ST-1-3	ST-1-4	ST-1-5	ST-1-6	ST-2-1-D	ST-2-2-D	ST-2-3
2-Methylnaphthalene	100 U	100 U	100 U	100 U	100 U	100 U	100 UE	100 U
Naphthalene	100 U	100 U	100 U	100 U	100 U	100 U	100 UE	100 U
2-Nitroaniline	200 U	200 U	200 U	200 U	200 U	200 U	200 UE	200 U
3-Nitroaniline	200 U	200 U	200 U	200 U	200 U	200 U	200 UE	200 U
4-Nitroaniline	200 U	200 U	200 U	200 U	200 U	200 U	200 UE	200 U
Nitrobenzene	100 U	100 U	100 U	100 U	100 U	100 U	100 UE	100 U
N-Nitrosodiphenylamine	100 U	100 U	100 U	100 U	100 U	100 U	100 UE	100 U
N-Nitrosodi-n-propylamine	100 U	100 U	100 U	100 U	100 U	100 U	100 UE	100 U
Phenanthrene	100 U	100 U	100 U	100 U	100 U	100 U	100 UE	100 U
Pyrene	100 U	100 U	100 U	100 U	100 U	100 U	100 UE	100 U
1,2,4-Trichlorobenzene	200 U	200 U	200 U	200 U	200 U	200 U	200 UE	200 U
Acid Extractable compounds								
Benzoic acid	2000 U	2000 U	2000 U	2000 U	2000 U	2000 U	2000 UE	2000 U
4-Chloro-3-methylphenol	200 U	200 U	200 U	200 U	200 U	200 U	200 UE	200 U
2-Chlorophenol	100 U	100 U	100 U	100 U	100 U	100 U	100 UE	100 U
2,4-Dichlorophenol	200 U	200 U	200 U	200 U	200 U	200 U	200 UE	200 U
2,4-Dimethylphenol	100 U	100 U	100 U	100 U	100 U	100 U	100 UE	100 U
2,4-Dinitrophenol	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 UE	1000 U
2-Methylphenol	200 U	200 U	200 U	200 U	200 U	200 U	200 UE	200 U
2-Methyl-4,6-dinitrophenol	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 UE	1000 U
4-Methylphenol	200 U	200 U	200 U	200 U	200 U	200 U	200 UE	200 U
2-Nitrophenol	200 U	200 U	200 U	200 U	200 U	200 U	200 UE	200 U
4-Nitrophenol	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 UE	1000 U
Pentachlorophenol	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 UE	1000 U
Phenol	100 U	100 U	100 U	100 U	100 U	100 U	100 UE	100 U
2,4,5-Trichlorophenol	200 U	200 U	200 U	200 U	200 U	200 U	200 UE	200 U
2,4,6-Trichlorophenol	200 U	200 U	200 U	200 U	200 U	200 U	200 UE	200 U

Data Qualifiers: U = Compound was not detected. Value given is the lower quantification limit
E = Estimated value

Table 8 (cont.)

COMPOUND	SAMPLE RESULTS (STURGEON) (ug/kg) ST-2-4	ST-3-1-D	ST-3-3-D	ST-3-4	ST-3-6	ST-4-1-D	ST-4-2	ST-4-3-D
B/N Extractable Compounds								
Acenaphthene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Acenaphthylene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Aniline	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Anthracene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Azobenzene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Benzo(a)anthracene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Benzo(b)fluoranthene	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Benzo(k)fluoranthene	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Benzo(a)pyrene	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Benzo(g,h,i)perylene	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Benzyl alcohol	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Benzyl butyl phthalate	100 U	100 U	990 U	100 U	100 U	100 U	100 U	100 U
bis(2-Chloroethyl) ether	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
bis(2-Chloroethoxy) methane	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
bis(2-Ethylhexyl) phthalate	190 U	1200 U	100 U	100 U	100 U	100 U	220	790
bis(2-Chloroisopropyl) ether	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
4-Bromophenyl phenyl ether	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
4-Chloroaniline	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
2-Chloronaphthalene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
4-Chlorophenyl phenyl ether	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Chrysene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Dibenzo(a,h)anthracene	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Dibenzofuran	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Di-n-butyl phthalate	100 U	170 U	190 U	100 U	100 U	160 U	160 U	160 U
1,3-Dichlorobenzene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
1,2-Dichlorobenzene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
1,4-Dichlorobenzene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
3,3'-Dichlorobenzidine	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U
Diethyl phthalate	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Dimethyl phthalate	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
2,4-Dinitrotoluene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
2,6-Dinitrotoluene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Di-n-octyl phthalate	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Fluoranthene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Fluorene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Hexachlorobenzene	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Hexachlorobutadiene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Hexachlorocyclopentadiene	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U
Hexachloroethane	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Indeno(1,2,3-c,d)pyrene	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Isophorone	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U

Data Qualifiers:

U = Compound was not detected. Value given is the lower quantification limit
E = Estimated value

Table 8 (cont.)

COMPOUND	SAMPLE RESULTS (STURGEON) (ug/kg) ST-2-4	ST-3-1-D	ST-3-3-D	ST-3-4	ST-3-6	ST-4-1-D	ST-4-2	ST-4-3-D
2-Methylnaphthalene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Naphthalene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
2-Nitroaniline	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
3-Nitroaniline	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
4-Nitroaniline	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Nitrobenzene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
N-Nitrosodiphenylamine	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
N-Nitrosodi-n-propylamine	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Phenanthrene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Pyrene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
1,2,4-Trichlorobenzene	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Acid Extractable compounds								
Benzoic acid	2000 U	2000 U	2000 U	2000 U	2000 U	2000 U	2000 U	2000 U
4-Chloro-3-methylphenol	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
2-Chlorophenol	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
2,4-Dichlorophenol	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
2,4-Dimethylphenol	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
2,4-Dinitrophenol	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U
2-Methylphenol	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
2-Methyl-4,6-dinitrophenol	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U
4-Methylphenol	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
2-Nitrophenol	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
4-Nitrophenol	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U
Pentachlorophenol	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U
Phenol	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
2,4,5-Trichlorophenol	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
2,4,6-Trichlorophenol	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U

Data Qualifiers: U = Compound was not detected. Value given is the lower quantification limit
E = Estimated value

Table 8 (cont.)

COMPOUND	SAMPLE RESULTS (ug/kg) STURGEON ST-4-4	STURGEON ST-1-5-dup	CRAYFISH D6	CRAYFISH D8	CRAYFISH D10	CRAYFISH D12	CRAYFISH D15	CRAYFISH D16
B/N Extractable Compounds								
Acenaphthene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Acenaphthylene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Aniline	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Anthracene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Azobenzene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Benzo(a)anthracene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Benzo(b)fluoranthene	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Benzo(k)fluoranthene	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Benzo(a)pyrene	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Benzo(g,h,i)perylene	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Benzyl alcohol	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Benzyl butyl phthalate	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
bis(2-Chloroethyl) ether	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
bis(2-Chloroethoxy) methane	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
bis(2-Ethylhexyl) phthalate	240	650 U	100 U	140	200	100 U	140	170
bis(2-Chloroisopropyl) ether	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
4-Bromophenyl phenyl ether	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
4-Chloroaniline	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
2-Chloronaphthalene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
4-Chlorophenyl phenyl ether	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Chrysene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Dibenzo(a,h)anthracene	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Dibenzofuran	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Di-n-butyl phthalate	100 U	150 U	100 U	100 U	100 U	100 U	100 U	100 U
1,3-Dichlorobenzene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
1,2-Dichlorobenzene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
1,4-Dichlorobenzene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
3,3'-Dichlorobenzidine	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U
Diethyl phthalate	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Dimethyl phthalate	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
2,4-Dinitrotoluene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
2,6-Dinitrotoluene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Di-n-octyl phthalate	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Fluoranthene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Fluorene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Hexachlorobenzene	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Hexachlorobutadiene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Hexachlorocyclopentadiene	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U
Hexachloroethane	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Indeno(1,2,3-c,d)pyrene	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Isophorone	100 U	100 U	100 U	120	100 U	100 U	100 U	100 U

Data Qualifiers: U = Compound was not detected. Value given is the lower quantification limit

Table 8 (cont.)

COMPOUND	STURGEON ST-4-4	STURGEON ST-1-5-dup	CRAYFISH D6	CRAYFISH D8	CRAYFISH D10	CRAYFISH D12	CRAYFISH D15	CRAYFISH D16
2-Methylnaphthalene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Naphthalene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
2-Nitroaniline	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
3-Nitroaniline	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
4-Nitroaniline	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Nitrobenzene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
N-Nitrosodiphenylamine	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
N-Nitrosodi-n-propylamine	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Phenanthrene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Pyrene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
1,2,4-Trichlorobenzene	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Acid Extractable compounds								
Benzoic acid	2000 U	2000 U	2000 U	2000 U	2000 U	2000 U	2000 U	2000 U
4-Chloro-3-methylphenol	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
2-Chlorophenol	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
2,4-Dichlorophenol	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
2,4-Dimethylphenol	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
2,4-Dinitrophenol	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U
2-Methylphenol	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
2-Methyl-4,6-dinitrophenol	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U
4-Methylphenol	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
2-Nitrophenol	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
4-Nitrophenol	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U
Pentachlorophenol	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U
Phenol	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
2,4,5-Trichlorophenol	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
2,4,6-Trichlorophenol	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U

Data Qualifiers: U = Compound was not detected. Value given is the lower quantification limit

Table 8 (cont.)

COMPOUND	SAMPLE RESULTS (CRAYFISH) (ug/kg) D19	D20	D22	D23	D24	D26	D28	D29
B/N Extractable Compounds								
Acenaphthene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Acenaphthylene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Aniline	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Anthracene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Azobenzene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Benzo(a)anthracene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Benzo(b)fluoranthene	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Benzo(k)fluoranthene	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Benzo(a)pyrene	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Benzo(g,h,i)perylene	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Benzyl alcohol	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Benzyl butyl phthalate	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
bis(2-Chloroethyl) ether	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
bis(2-Chloroethoxy) methane	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
bis(2-Ethylhexyl) phthalate	150	120	980	100 U	470	3100	260	100 U
bis(2-Chloroisopropyl) ether	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
4-Bromophenyl phenyl ether	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
4-Chloroaniline	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
2-Chloronaphthalene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
4-Chlorophenyl phenyl ether	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Chrysene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Dibenzo(a,h)anthracene	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Dibenzofuran	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Di-n-butyl phthalate	100 U	100 U	100 U	110	100 U	100 U	100 U	100 U
1,3-Dichlorobenzene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
1,2-Dichlorobenzene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
1,4-Dichlorobenzene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
3,3'-Dichlorobenzidine	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U
Diethyl phthalate	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Dimethyl phthalate	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
2,4-Dinitrotoluene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
2,6-Dinitrotoluene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Di-n-octyl phthalate	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Fluoranthene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Fluorene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Hexachlorobenzene	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Hexachlorobutadiene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Hexachlorocyclopentadiene	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U
Hexachloroethane	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Indeno(1,2,3-c,d)pyrene	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Isophorone	430	100 U	110	100 U	210	280	330	100 U

Data Qualifiers: U = Compound was not detected. Value given is the lower quantification limit

Table 8 (cont.)

COMPOUND	SAMPLE RESULTS (CRAYFISH) (ug/kg) D19	D20	D22	D23	D24	D26	D28	D29
2-Methylnaphthalene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Naphthalene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
2-Nitroaniline	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
3-Nitroaniline	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
4-Nitroaniline	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Nitrobenzene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
N-Nitrosodiphenylamine	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
N-Nitrosodi-n-propylamine	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Phenanthrene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Pyrene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
1,2,4-Trichlorobenzene	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Acid Extractable compounds								
Benzoic acid	2000 U	2000 U	2000 U	2000 U	2000 U	2000 U	2000 U	2000 U
4-Chloro-3-methylphenol	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
2-Chlorophenol	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
2,4-Dichlorophenol	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
2,4-Dimethylphenol	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
2,4-Dinitrophenol	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U
2-Methylphenol	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
2-Methyl-4,6-dinitrophenol	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U
4-Methylphenol	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
2-Nitrophenol	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
4-Nitrophenol	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U
Pentachlorophenol	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U
Phenol	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
2,4,5-Trichlorophenol	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
2,4,6-Trichlorophenol	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U

Data Qualifiers: U = Compound was not detected. Value given is the lower quantification limit

Table 8 (cont.)

COMPOUND	SAMPLE RESULTS (ug/kg) CRAYFISH D31	D35	D38	D40	SUCKER D6S	D8S	D10S	D12S
B/N Extractable Compounds								
Acenaphthene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Acenaphthylene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Aniline	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Anthracene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Azobenzene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Benzo(a)anthracene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Benzo(b)fluoranthene	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Benzo(k)fluoranthene	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Benzo(a)pyrene	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Benzo(g,h,i)perylene	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Benzyl alcohol	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Benzyl butyl phthalate	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
bis(2-Chloroethyl) ether	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
bis(2-Chloroethoxy) methane	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
bis(2-Ethylhexyl) phthalate	110	240	120	100 U	100 U	100 U	100 U	100 U
bis(2-Chloroisopropyl) ether	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
4-Bromophenyl phenyl ether	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
4-Chloroaniline	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
2-Chloronaphthalene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
4-Chlorophenyl phenyl ether	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Chrysene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Dibenzo(a,h)anthracene	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Dibenzofuran	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Di-n-butyl phthalate	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
1,3-Dichlorobenzene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
1,2-Dichlorobenzene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
1,4-Dichlorobenzene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
3,3'-Dichlorobenzidine	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U
Diethyl phthalate	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Dimethyl phthalate	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
2,4-Dinitrotoluene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
2,6-Dinitrotoluene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Di-n-octyl phthalate	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Fluoranthene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Fluorene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Hexachlorobenzene	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Hexachlorobutadiene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Hexachlorocyclopentadiene	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U
Hexachloroethane	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Indeno(1,2,3-c,d)pyrene	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Isophorone	310	100 U	100 U	100 U	100 U	100 U	100 U	100 U

Data Qualifiers: U = Compound was not detected. Value given is the lower quantification limit

Table 8 (cont.)

	SAMPLE RESULTS (ug/kg)							
	CRAYFISH				SUCKER			
COMPOUND	D31	D35	D38	D40	D6S	D8S	D10S	D12S
2-Methylnaphthalene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Naphthalene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
2-Nitroaniline	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
3-Nitroaniline	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
4-Nitroaniline	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Nitrobenzene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
N-Nitrosodiphenylamine	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
N-Nitrosodi-n-propylamine	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Phenanthrene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Pyrene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
1,2,4-Trichlorobenzene	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Acid Extractable compounds								
Benzoic acid	2000 U	2000 U	2000 U	2000 U	2000 U	2000 U	2000 U	2000 U
4-Chloro-3-methylphenol	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
2-Chlorophenol	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
2,4-Dichlorophenol	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
2,4-Dimethylphenol	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
2,4-Dinitrophenol	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U
2-Methylphenol	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
2-Methyl-4,6-dinitrophenol	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U
4-Methylphenol	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
2-Nitrophenol	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
4-Nitrophenol	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U
Pentachlorophenol	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U
Phenol	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
2,4,5-Trichlorophenol	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
2,4,6-Trichlorophenol	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U

Data Qualifiers: U = Compound was not detected. Value given is the lower quantification limit

Table 8 (cont.)

COMPOUND	SAMPLE RESULTS (SUCKER) (ug/kg) D15S	D16S	D19S	D20S	D22S	D23S	D24S	D26S
B/N Extractable Compounds								
Acenaphthene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Acenaphthylene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Aniline	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Anthracene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Azobenzene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Benzo(a)anthracene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Benzo(b)fluoranthene	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Benzo(k)fluoranthene	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Benzo(a)pyrene	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Benzo(g,h,i)perylene	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Benzyl alcohol	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Benzyl butyl phthalate	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
bis(2-Chloroethyl) ether	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
bis(2-Chloroethoxy) methane	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
bis(2-Ethylhexyl) phthalate	1100	100 U	800	100 U	850	370	100 U	100 U
bis(2-Chloroisopropyl) ether	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
4-Bromophenyl phenyl ether	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
4-Chloroaniline	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
2-Chloronaphthalene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
4-Chlorophenyl phenyl ether	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Chrysene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Dibenzo(a,h)anthracene	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Dibenzofuran	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Di-n-butyl phthalate	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
1,3-Dichlorobenzene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
1,2-Dichlorobenzene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
1,4-Dichlorobenzene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
3,3'-Dichlorobenzidine	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U
Diethyl phthalate	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Dimethyl phthalate	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
2,4-Dinitrotoluene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
2,6-Dinitrotoluene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Di-n-octyl phthalate	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Fluoranthene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Fluorene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Hexachlorobenzene	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Hexachlorobutadiene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Hexachlorocyclopentadiene	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U
Hexachloroethane	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Indeno(1,2,3-c,d)pyrene	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Isophorone	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U

Data Qualifiers: U = Compound was not detected. Value given is the lower quantification limit

Table 8 (cont.)

COMPOUND	SAMPLE RESULTS (SUCKER) (ug/kg) D15S	D16S	D19S	D20S	D22S	D23S	D24S	D26S
2-Methylnaphthalene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Naphthalene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
2-Nitroaniline	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
3-Nitroaniline	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
4-Nitroaniline	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Nitrobenzene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
N-Nitrosodiphenylamine	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
N-Nitrosodi-n-propylamine	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Phenanthrene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Pyrene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
1,2,4-Trichlorobenzene	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Acid Extractable compounds								
Benzoic acid	2000 U	2000 U	2000 U	2000 U	2000 U	2000 U	2000 U	2000 U
4-Chloro-3-methylphenol	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
2-Chlorophenol	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
2,4-Dichlorophenol	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
2,4-Dimethylphenol	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
2,4-Dinitrophenol	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U
2-Methylphenol	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
2-Methyl-4,6-dinitrophenol	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U
4-Methylphenol	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
2-Nitrophenol	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
4-Nitrophenol	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U
Pentachlorophenol	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U
Phenol	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
2,4,5-Trichlorophenol	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
2,4,6-Trichlorophenol	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U

Data Qualifiers: U = Compound was not detected. Value given is the lower quantification limit

Table 8 (cont.)

COMPOUND	SAMPLE RESULTS (ug/kg) SUCKER D28S	D29S	D31S	D35S	D38S	D40S	CARP D23C	D24C
B/N Extractable Compounds								
Acenaphthene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Acenaphthylene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Aniline	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Anthracene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Azobenzene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Benzo(a)anthracene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Benzo(b)fluoranthene	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Benzo(k)fluoranthene	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Benzo(a)pyrene	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Benzo(g,h,i)perylene	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Benzyl alcohol	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Benzyl butyl phthalate	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
bis(2-Chloroethyl) ether	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
bis(2-Chloroethoxy) methane	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
bis(2-Ethylhexyl) phthalate	100 U	470	680	440	100 U	1100	1100	530
bis(2-Chloroisopropyl) ether	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
4-Bromophenyl phenyl ether	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
4-Chloroaniline	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
2-Chloronaphthalene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
4-Chlorophenyl phenyl ether	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Chrysene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Dibenzo(a,h)anthracene	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Dibenzofuran	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Di-n-butyl phthalate	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
1,3-Dichlorobenzene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
1,2-Dichlorobenzene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
1,4-Dichlorobenzene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
3,3'-Dichlorobenzidine	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U
Diethyl phthalate	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Dimethyl phthalate	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
2,4-Dinitrotoluene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
2,6-Dinitrotoluene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Di-n-octyl phthalate	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Fluoranthene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Fluorene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Hexachlorobenzene	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Hexachlorobutadiene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Hexachlorocyclopentadiene	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U
Hexachloroethane	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Indeno(1,2,3-c,d)pyrene	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Isophorone	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U

Data Qualifiers: U = Compound was not detected. Value given is the lower quantification limit

Table 8 (cont.)

COMPOUND	SAMPLE RESULTS (ug/kg) SUCKER D28S	D29S	D31S	D35S	D38S	D40S	CARP D23C	D24C
2-Methylnaphthalene	100 U	100 U	100 U	140	100 U	100 U	100 U	100 U
Naphthalene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
2-Nitroaniline	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
3-Nitroaniline	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
4-Nitroaniline	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Nitrobenzene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
N-Nitrosodiphenylamine	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
N-Nitrosodi-n-propylamine	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Phenanthrene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Pyrene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
1,2,4-Trichlorobenzene	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Acid Extractable compounds								
Benzoic acid	2000 U	2000 U	2000 U	2000 U	2000 U	2000 U	2000 U	2000 U
4-Chloro-3-methylphenol	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
2-Chlorophenol	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
2,4-Dichlorophenol	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
2,4-Dimethylphenol	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
2,4-Dinitrophenol	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U
2-Methylphenol	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
2-Methyl-4,6-dinitrophenol	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U
4-Methylphenol	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
2-Nitrophenol	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
4-Nitrophenol	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U
Pentachlorophenol	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U
Phenol	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
2,4,5-Trichlorophenol	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
2,4,6-Trichlorophenol	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U

Data Qualifiers: U = Compound was not detected. Value given is the lower quantification limit

Table 8 (cont.)

COMPOUND	SAMPLE RESULTS (ug/kg) CARP D26C	D28C	D29C	D31C	D35C	D38C	D40C	PEA-MOUTH D3P
B/N Extractable Compounds								
Acenaphthene	100 U	100 U	3800	100 U	100 U	100 U	100 U	200 U
Acenaphthylene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	200 U
Aniline	100 U	100 U	100 U	100 U	100 U	100 U	100 U	200 U
Anthracene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	200 U
Azobenzene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	200 U
Benzo(a)anthracene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	200 U
Benzo(b)fluoranthene	200 U	200 U	200 U	200 U	200 U	200 U	200 U	400 U
Benzo(k)fluoranthene	200 U	200 U	200 U	200 U	200 U	200 U	200 U	400 U
Benzo(a)pyrene	200 U	200 U	200 U	200 U	200 U	200 U	200 U	400 U
Benzo(g,h,i)perylene	200 U	200 U	200 U	200 U	200 U	200 U	200 U	400 U
Benzyl alcohol	100 U	100 U	100 U	100 U	100 U	100 U	100 U	200 U
Benzyl butyl phthalate	100 U	100 U	100 U	100 U	100 U	100 U	100 U	200 U
bis(2-Chloroethyl) ether	100 U	100 U	100 U	100 U	100 U	100 U	100 U	200 U
bis(2-Chloroethoxy) methane	100 U	100 U	100 U	100 U	100 U	100 U	100 U	200 U
bis(2-Ethylhexyl) phthalate	100 U	450 U	680 U	480 U	850 U	790 U	1500	740
bis(2-Chloroisopropyl) ether	100 U	100 U	100 U	100 U	100 U	100 U	100 U	200 U
4-Bromophenyl phenyl ether	200 U	200 U	200 U	200 U	200 U	200 U	200 U	400 U
4-Chloroaniline	200 U	200 U	200 U	200 U	200 U	200 U	200 U	400 U
2-Chloronaphthalene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	200 U
4-Chlorophenyl phenyl ether	100 U	100 U	100 U	100 U	100 U	100 U	100 U	200 U
Chrysene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	200 U
Dibenzo(a,h)anthracene	200 U	200 U	200 U	200 U	200 U	200 U	200 U	400 U
Dibenzofuran	100 U	100 U	100 U	100 U	100 U	100 U	100 U	200 U
Di-n-butyl phthalate	100 U	130 U	100 U	100 U	100 U	160 U	100 U	200 U
1,3-Dichlorobenzene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	200 U
1,2-Dichlorobenzene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	200 U
1,4-Dichlorobenzene	100 U	100 U	1800	100 U	100 U	100 U	100 U	200 U
3,3'-Dichlorobenzidine	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	2000 U
Diethyl phthalate	200 U	200 U	200 U	200 U	200 U	200 U	200 U	400 U
Dimethyl phthalate	100 U	100 U	100 U	100 U	100 U	100 U	100 U	200 U
2,4-Dinitrotoluene	100 U	100 U	1000	100 U	100 U	100 U	100 U	200 U
2,6-Dinitrotoluene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	200 U
Di-n-octyl phthalate	200 U	200 U	200 U	200 U	200 U	200 U	200 U	400 U
Fluoranthene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	200 U
Fluorene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	200 U
Hexachlorobenzene	200 U	200 U	200 U	200 U	200 U	200 U	200 U	400 U
Hexachlorobutadiene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	200 U
Hexachlorocyclopentadiene	500 U	500 U	500 U	500 U	500 U	500 U	500 U	1000 U
Hexachloroethane	200 U	200 U	200 U	200 U	200 U	200 U	200 U	400 U
Indeno(1,2,3-c,d)pyrene	200 U	200 U	200 U	200 U	200 U	200 U	200 U	400 U
Isophorone	100 U	100 U	100 U	100 U	100 U	100 U	100 U	200 U

Data Qualifiers: U = Compound was not detected. Value given is the lower quantification limit

Table 8 (cont.)

COMPOUND	SAMPLE RESULTS (ug/kg) CARP D26C	D28C	D29C	D31C	D35C	D38C	D40C	PEA-MOUTH D3P
2-Methylnaphthalene	100 U	100 U	101	100 U	230	100 U	100 U	200 U
Naphthalene	100 U	100 U	100 U	100 U	220	100 U	100 U	200 U
2-Nitroaniline	200 U	200 U	200 U	200 U	200 U	200 U	200 U	400 U
3-Nitroaniline	200 U	200 U	200 U	200 U	200 U	200 U	200 U	400 U
4-Nitroaniline	200 U	200 U	200 U	200 U	200 U	200 U	200 U	400 U
Nitrobenzene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	200 U
N-Nitrosodiphenylamine	100 U	100 U	100 U	100 U	100 U	100 U	100 U	200 U
N-Nitrosodi-n-propylamine	100 U	100 U	2900	100 U	100 U	100 U	100 U	200 U
Phenanthrene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	200 U
Pyrene	100 U	100 U	5200	100 U	100 U	100 U	100 U	200 U
1,2,4-Trichlorobenzene	200 U	200 U	3100	200 U	200 U	200 U	200 U	400 U
Acid Extractable compounds								
Benzoic acid	2000 U	2000 U	2000 U	2000 U	2000 U	2000 U	2000 U	4000 U
4-Chloro-3-methylphenol	200 U	200 U	5600	200 U	200 U	200 U	200 U	400 U
2-Chlorophenol	100 U	100 U	4200	100 U	100 U	100 U	100 U	200 U
2,4-Dichlorophenol	200 U	200 U	200 U	200 U	200 U	200 U	200 U	400 U
2,4-Dimethylphenol	100 U	100 U	100 U	100 U	100 U	100 U	100 U	200 U
2,4-Dinitrophenol	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	2000 U
2-Methylphenol	200 U	200 U	200 U	200 U	200 U	200 U	200 U	400 U
2-Methyl-4,6-dinitrophenol	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	2000 U
4-Methylphenol	200 U	200 U	200 U	200 U	200 U	200 U	200 U	400 U
2-Nitrophenol	200 U	200 U	200 U	200 U	200 U	200 U	200 U	400 U
4-Nitrophenol	1000 U	1000 U	4000	1000 U	1000 U	1000 U	1000 U	2000 U
Pentachlorophenol	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	2000 U
Phenol	100 U	100 U	5000	100 U	100 U	100 U	100 U	200 U
2,4,5-Trichlorophenol	200 U	200 U	200 U	200 U	200 U	200 U	200 U	400 U
2,4,6-Trichlorophenol	200 U	200 U	200 U	200 U	200 U	200 U	200 U	400 U

Data Qualifiers: U = Compound was not detected. Value given is the lower quantification limit

Table 8 (cont.)

COMPOUND	SAMPLE RESULTS (PEAMOUTH) (ug/kg) D10P	D12P	D15P	D16P	D19P	D21P	D23P	D24P
B/N Extractable Compounds								
Acenaphthene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Acenaphthylene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Aniline	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Anthracene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Azobenzene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Benzo(a)anthracene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Benzo(b)fluoranthene	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Benzo(k)fluoranthene	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Benzo(a)pyrene	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Benzo(g,h,i)perylene	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Benzyl alcohol	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Benzyl butyl phthalate	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
bis(2-Chloroethyl) ether	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
bis(2-Chloroethoxy) methane	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
bis(2-Ethylhexyl) phthalate	190	260	100 U	270	200	180	770	310
bis(2-Chloroisopropyl) ether	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
4-Bromophenyl phenyl ether	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
4-Chloroaniline	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
2-Chloronaphthalene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
4-Chlorophenyl phenyl ether	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Chrysene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Dibenzo(a,h)anthracene	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Dibenzofuran	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Di-n-butyl phthalate	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
1,3-Dichlorobenzene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
1,2-Dichlorobenzene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
1,4-Dichlorobenzene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
3,3'-Dichlorobenzidine	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U
Diethyl phthalate	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Dimethyl phthalate	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
2,4-Dinitrotoluene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
2,6-Dinitrotoluene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Di-n-octyl phthalate	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Fluoranthene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Fluorene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Hexachlorobenzene	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Hexachlorobutadiene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Hexachlorocyclopentadiene	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U
Hexachloroethane	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Indeno(1,2,3-c,d)pyrene	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Isophorone	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U

Data Qualifiers: U = Compound was not detected. Value given is the lower quantification limit

Table 8 (cont.)

COMPOUND	SAMPLE RESULTS (PEAMOUTH) (ug/kg) D10P	D12P	D15P	D16P	D19P	D21P	D23P	D24P
2-Methylnaphthalene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Naphthalene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
2-Nitroaniline	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
3-Nitroaniline	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
4-Nitroaniline	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Nitrobenzene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
N-Nitrosodiphenylamine	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
N-Nitrosodi-n-propylamine	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Phenanthrene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Pyrene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
1,2,4-Trichlorobenzene	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Acid Extractable compounds								
Benzoic acid	2000 U	2000 U	2000 U	2000 U	2000 U	2000 U	2000 U	2000 U
4-Chloro-3-methylphenol	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
2-Chlorophenol	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
2,4-Dichlorophenol	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
2,4-Dimethylphenol	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
2,4-Dinitrophenol	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U
2-Methylphenol	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
2-Methyl-4,6-dinitrophenol	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U
4-Methylphenol	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
2-Nitrophenol	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
4-Nitrophenol	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U
Pentachlorophenol	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U
Phenol	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
2,4,5-Trichlorophenol	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
2,4,6-Trichlorophenol	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U

Data Qualifiers: U = Compound was not detected. Value given is the lower quantification limit

Table 8 (cont.)

COMPOUND	SAMPLE RESULTS (PEAMOUTH) (ug/kg) D28P								
B/N Extractable Compounds									
Acenaphthene	100	U							
Acenaphthylene	100	U							
Aniline	100	U							
Anthracene	100	U							
Azobenzene	100	U							
Benzo(a)anthracene	100	U							
Benzo(b)fluoranthene	200	U							
Benzo(k)fluoranthene	200	U							
Benzo(a)pyrene	200	U							
Benzo(g,h,i)perylene	200	U							
Benzyl alcohol	100	U							
Benzyl butyl phthalate	100	U							
bis(2-Chloroethyl) ether	100	U							
bis(2-Chloroethoxy) methane	100	U							
bis(2-Ethylhexyl) phthalate	210								
bis(2-Chloroisopropyl) ether	100	U							
4-Bromophenyl phenyl ether	200	U							
4-Chloroaniline	200	U							
2-Chloronaphthalene	100	U							
4-Chlorophenyl phenyl ether	100	U							
Chrysene	100	U							
Dibenzo(a,h)anthracene	200	U							
Dibenzofuran	100	U							
Di-n-butyl phthalate	100	U							
1,3-Dichlorobenzene	100	U							
1,2-Dichlorobenzene	100	U							
1,4-Dichlorobenzene	100	U							
3,3'-Dichlorobenzidine	1000	U							
Diethyl phthalate	200	U							
Dimethyl phthalate	100	U							
2,4-Dinitrotoluene	100	U							
2,6-Dinitrotoluene	100	U							
Di-n-octyl phthalate	200	U							
Fluoranthene	100	U							
Fluorene	100	U							
Hexachlorobenzene	200	U							
Hexachlorobutadiene	100	U							
Hexachlorocyclopentadiene	500	U							
Hexachloroethane	200	U							
Indeno(1,2,3-c,d)pyrene	200	U							
Isophorone	100	U							

Data Qualifiers: U = Compound was not detected. Value given is the lower quantification limit

Table 8 (cont.)

COMPOUND	SAMPLE RESULTS (PEAMOUTH) (ug/kg) D28P							
2-Methylnaphthalene	100 U							
Naphthalene	100 U							
2-Nitroaniline	200 U							
3-Nitroaniline	200 U							
4-Nitroaniline	200 U							
Nitrobenzene	100 U							
N-Nitrosodiphenylamine	100 U							
N-Nitrosodi-n-propylamine	100 U							
Phenanthrene	100 U							
Pyrene	100 U							
1,2,4-Trichlorobenzene	200 U							
Acid Extractable compounds								
Benzoic acid	2000 U							
4-Chloro-3-methylphenol	200 U							
2-Chlorophenol	100 U							
2,4-Dichlorophenol	200 U							
2,4-Dimethylphenol	100 U							
2,4-Dinitrophenol	1000 U							
2-Methylphenol	200 U							
2-Methyl-4,6-dinitrophenol	1000 U							
4-Methylphenol	200 U							
2-Nitrophenol	200 U							
4-Nitrophenol	1000 U							
Pentachlorophenol	1000 U							
Phenol	100 U							
2,4,5-Trichlorophenol	200 U							
2,4,6-Trichlorophenol	200 U							

Data Qualifiers: U = Compound was not detected. Value given is the lower quantification limit

Appendix A-5

Data Validation Report
Volatile Organics Analyses

Site: Lower Columbia River

Sample Numbers: Samples W6, W14, W26, W37, W45, W47, W51, W52

Samples collected and reported by Tetra Tech, Inc.

Samples analyzed by: Alden Analytical Laboratories, Inc.

Data Reviewed by: Tad Deshler

INTRODUCTION

This report presents the results for the data validation review of 8 water samples collected for the Lower Columbia River Reconnaissance Survey, and analyzed for volatile organics by Alden Analytical Laboratories, Inc. Five of the samples were field samples (Samples W6, W14, W26, W37, and W45), one sample was a field replicate (Sample W52 for Sample W26), and the remaining two samples (Sample W47 and W51) were carbuoy blanks. Samples were analyzed using U.S. Environmental Protection Agency (U.S. EPA) Method 624. The data validation review was conducted according to guidelines presented in the U.S. EPA Contract Laboratory Program Statement of Work (SOW) for organics analyses (U.S. EPA 1987), the Laboratory Data Validation Functional Guidelines for Evaluating Organics Analyses (U.S. EPA 1988), and the QA/QC plan (Tetra Tech 1991).

A. HOLDING TIMES

Samples were collected, placed on ice in a cooler, and transported to the laboratory within 4 days of collection. The maximum holding time (time of collection to time of analysis) for volatiles in water matrices has been established as 7 days. Table 1 presents a summary of sample numbers, dates collected, dates received by the laboratory, and dates of analyses. All samples were analyzed within 7 days of collection. Because all analyses were conducted within the required holding time, no data qualifiers were assigned to sample results for volatile organics based on holding times.

B. CALIBRATION AND INSTRUMENT PERFORMANCE

Gas chromatograph/mass spectrometer (GC/MS) tuning was conducted to the analysis of each sample batch. All of the ion abundance criteria were satisfied for each analysis, indicating the GC/MS was performing adequately.

Initial 5-point calibration was conducted on 9/26/91. Calibration standard concentrations were 20, 50, 100, 150, and 200 ng/μL. All system performance check compounds (Chloromethane, 1,1-Dichloroethane, Bromoform, 1,1,2,2-Tetrachloroethane, and Chlorobenzene) average relative response factors (RRF) were greater than 0.30 (0.25 for bromoform). The percent relative standard deviations (%RSD) calculated from the initial calibration of the six calibration check compounds (1,1-Dichloroethane, Chloroform, 1,2-Dichloropropane, Toluene, Ethyl benzene, and Vinyl chloride) were all less than 30 percent. Both the RRF and %RSD results indicate the initial calibration was valid.

Continuing calibration was conducted at the required frequency for Contract Lab Program (CLP) analyses (i.e., before and within 12 h of sample analyses). All compound RRF were greater than 0.30 (0.25 for bromoform) in the continuing

calibrations. The percent difference between initial and continuing calibration response factors was within QC criteria (25 percent) for all calibration check compounds.

Internal standard area counts were evaluated to determine instrument performance and as a check on continuing calibration for compound quantitation. All internal standard area counts were within a factor of 2 of the initial calibration area counts, indicating acceptable analytical precision.

No data qualifiers were assigned to volatile organics sample results based on calibration and instrument performance data.

C. SURROGATE RECOVERIES

All field, blank, and spike samples were spiked with 250 ng of each of the surrogates 1,2-Dichloroethane-d_4, Toluene-d_8, and Bromofluorobenzene before analysis. Percent recoveries for all analyses were within the recovery limits specified in the SOW for organics analyses (U.S. EPA 1987) and the analytical precision limits specified for this project (± 25%). No data qualifiers were assigned to sample results for volatile organics based on surrogate recoveries.

D. METHOD BLANKS

Method blank analyses were performed at the required frequency. A total of five method blanks were analyzed. Raw data for all method blanks were examined, and no indication of volatile organic contamination at concentrations exceeding practical quantitation limits was found. No data qualifiers were assigned to sample results for volatile organics based on method blank results.

E. MATRIX SPIKE/MATRIX SPIKE DUPLICATE ANALYSIS

MS/MSD analyses were performed on Samples W47 and W52. These samples represent only two of the five batches of samples received by the laboratory which included water samples. As specified for the project, all MS/MSD samples were spiked with 50 µg of each of the CLP target compounds. Table 2 gives the results of the MS/MSD analyses for these two samples and also includes the QC criteria established for the EPA Contract Lab Program (CLP). All percent recoveries and relative percent differences were within the QC criteria established for this project. No data qualifiers were assigned to sample results for volatile organics based on matrix spike/matrix spike duplicate results.

F. FIELD DUPLICATES

Samples W26 and W52 were duplicate samples collected at Station W26. None of the volatile organic compounds tested for was detected in either sample. Given the lack of positive values for these samples, conclusions about lab and field variability are not possible.

G. OTHER QC DATA

Samples W47 and W51 were carbuoy blanks, which consisted of distilled water dispensed from the carbuoy used to composite all water samples. These samples were designed to control for contamination from the carbuoy. Sample W51 was analyzed in the batch that contained Sample W45. It was collected at the time the first water sample was collected (Sample W41). All compounds except Chloroform were undetected. Chloroform was detected at 1.2 μg/L (MDL = 1 μg/L). Chloroform was not detected in the blank associated with this sample. Sample W47 was analyzed in the batch that included Field Sample W37, and was collected at the same time as Sample W37, five days into the cruise. All compounds except 2-Butanone and Toluene were undetected. 2-Butanone was detected at 20 μg/L (MDL = 10 μg/L) while Toluene was detected at 7.3 μg/L (MDL = 1 μg/L). Both compounds are commonly found as laboratory contaminants, although neither compound was detected in the blank associated with this sample. Although three compounds were detected in these carbuoy blank samples, none of the field sample data were qualified due to carbuoy blanks because of the absence of positive values.

SUMMARY

All sample data were reported as µg/L and are presented in Table 3. The data package submitted by the laboratory contained all the required deliverables. Detection limits reported by the laboratory (usually 1 µg/L) met the criteria established in the QA Plan (Tetra Tech 1991). Because standardized reference material for volatile organic compounds in water is not available, no check standard analysis was performed.

Matrix spike/matrix spike duplicate analyses were not performed on three of the five sample batches received by the laboratory that contained water samples. Without this information, the precision of the analytical results is more difficult to evaluate. Spikes of the appropriate surrogate compounds were made to every sample. Given the acceptable percent recoveries of these compounds for all samples and the lack of positive results for all field samples, the lack of the MS/MSD analyses does not make qualifying any of the sample data necessary.

The precision, accuracy, and completeness of the volatile organics analyses were within project guidelines and the data are considered acceptable for their intended use.

REFERENCES

Tetra Tech. 1991. Reconnaissance survey of the lower Columbia River: Quality assurance/quality control (QA/QC) plan. Final Report. Tetra Tech, Inc., Bellevue, WA. 121 pp. + App.

U.S. Environmental Protection Agency. 1987. U.S. EPA Contract Laboratory Program, statement of work for organics analysis, multi-media, multi-concentration. Revision July 1987. IFB WA 87 K238. U.S. Environmental Protection Agency, Washington, DC.

U.S. Environmental Protection Agency. 1988. Laboratory data validation functional guidelines for evaluating organics analyses. U.S. Environmental Protection Agency/Hazardous Site Evaluation Division, Washington, DC.

TABLE 1. VOLATILE ORGANICS ANALYSIS SUMMARY
LOWER COLUMBIA RIVER RECONNAISSANCE SURVEY

Tetra Tech Sample Number	Alden Sample Number	Date Collected	Date Received	Date Analyzed	Holding Time (d)
W6	8789G	10/10/91	10/15/91	10/17/91	7
W14	8716G,I	10/6/91	10/8/91	10/11/91	5
W26	8669G	10/2/91	10/7/91	10/9/91	7
W37	8615H	9/28/91	10/2/91	10/3/91	5
W45	8570G	9/26/91	9/30/91	10/3/91	7
W47	8626C	9/28/91	10/2/91	10/3/91	5
W51	8573C	9/23/91	9/30/91	9/30/91	7
W52	8670G	10/2/91	10/7/91	10/9/91	7

TABLE 2. VOLATILE ORGANICS MS/MSD RESULTS -
LOWER COLUMBIA RIVER RECONNAISSANCE SURVEY

Sample W47 (Sample W37 also included in batch) Analyzed 10/3/91						
	Percent Recovery				QC LIMITS CLP	
	MS	MSD	RSD	RPD	% Rec.	RPD
1,1-Dichloroethene	98	100	1.01	2.02	61-145	14
Trichloroethene	102	104	0.97	1.94	71-120	14
Benzene	102	104	0.97	1.94	76-127	11
Toluene	90	94	1.54	4.35	76-125	13
Chlorobenzene	100	104	1.39	3.92	75-130	13

Sample W52 (Sample W26 also included in batch) Analyzed 10/9/91						
	Percent Recovery				QC LIMITS CLP	
	MS	MSD	RSD	RPD	% Rec.	RPD
1,1-Dichloroethene	95	96	0.74	1.05	61-145	14
Trichloroethene	102	104	0.97	1.94	71-120	14
Benzene	102	104	0.97	1.94	76-127	11
Toluene	96	110	2.57	*13.59*	76-125	13
Chlorobenzene	101	102	0.70	0.99	75-130	13

TABLE 3. VOLATILE ORGANICS ANALYSIS RESULTS
LOWER COLUMBIA RIVER RECONNAISSANCE SURVEY

COMPOUND	SAMPLE RESULTS (ug/L) W6		W14		W26		W37		W45		W47		W51		W52	
Acetone	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Acrolein	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Acrylonitrile	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Benzene	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Bromodichloromethane	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Bromoform	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Bromomethane	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
2-Butanone	10	U	10	U	10	U	10	U	10	U	20		10	U	10	U
Carbon disulfide	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Carbon tetrachloride	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Chlorobenzene	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Chloroethane	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Chloroethyl vinyl ether	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Chloroform	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Chloromethane	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Dibromochloromethane	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
1,2-Dichlorobenzene	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
1,3-Dichlorobenzene	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
1,4-Dichlorobenzene	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
1,1-Dichloroethane	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
1,2-Dichloroethane	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
1,1-Dichloroethene	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
cis-1,2-Dichloroethene	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
trans-1,2-Dichloroethene	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
1,2-Dichloropropane	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
cis-1,3-Dichloropropene	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
trans-1,3-Dichloropropene	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Ethylbenzene	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
2-Hexanone	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Methylene chloride	10	U	16		10	U	10	U	10	U	10	U	10	U	10	U
4-Methyl-2-Pentanone	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Styrene	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
1,1,2,2-Tetrachloroethane	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Tetrachloroethene	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Toluene	1	U	1	U	1	U	1	U	1	U	7.3		1	U	1	U
1,1,1-Trichloroethane	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
1,1,2-Trichloroethane	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Trichloroethene	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Trichlorofluoromethane	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Vinyl acetate	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Vinyl chloride	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
o-Xylene	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
m,p-Xylene	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U

Data Qualifiers: U = Compound was not detected. Value given is the lower quantification limit.

Appendix A-6

Data Validation Report
Pesticides/PCBs Analyses

Site: Lower Columbia River

Sample Numbers: Samples W6, W14, W26, W37, W45, W52 (water)

Samples D1-D46, E1-E14 (sediment)

Samples ST-1-2-D, ST-1-3, ST-1-4, ST-1-5, ST-1-5-dup, ST-1-6, ST-2-1-D, ST-2-2-D, ST-2-3, ST-2-4, ST-3-1-D, ST-3-3-D, ST-3-4, ST-3-6, ST-4-1-D, ST-4-2, ST-4-3-D, ST-4-4 (sturgeon)

Samples D6, D8, D10, D12, D15, D16, D19, D20, D22, D23, D24, D26, D28, D29, D31, D35, D38, D40 (crayfish)

Samples D6S, D8S, D10S, D12S, D15S, D16S, D19S, D20S, D22S, D23S, D24S, D26S, D28S, D29S, D31S, D35S, D38S, D40S (sucker)

Samples D23C, D24C, D26C, D28C, D29C, D31C, D35C, D38C, D40C (carp)

Samples D3P, D10P, D12P, D15P, D16P, D19P, D21P, D23P, D24P, D28P (peamouth)

Samples collected and reported by Tetra Tech, Inc.

Samples analyzed by: Alden Analytical Laboratories, Inc.

Data Reviewed by: Tad Deshler

INTRODUCTION

This report presents the results for the data validation review of 6 water samples, 60 sediment samples, and 73 tissue samples collected for the Lower Columbia River Reconnaissance Survey, and analyzed for pesticides and PCBs by Alden Analytical Laboratories, Inc. Five of the water samples were field samples (Samples W6, W14, W26, W37, and W45), and one sample was a field replicate (Sample W52 for Sample W26). Fifty-four of the sediment samples were field samples (Samples D1-D40 and E1-E14), while six of the samples were field replicates (Sample D41 for Sample D35, Sample D42 for Sample D28, Sample D43 for Sample D23, Sample D44 for Sample D17, Sample D45 for D11, and Sample D46 for Sample D3). All of the tissue samples were unique field samples, with the exception of Sample ST-1-5-dup, which was a field duplicate of Sample ST-1-5. Water samples were analyzed using U.S. Environmental Protection Agency (EPA) Method 608, while sediment and tissue samples were analyzed using U.S. EPA Method 8080. The data validation review was conducted according to guidelines presented in the U.S. EPA Contract Laboratory Program Statement of Work (SOW) for organics analyses (U.S. EPA 1986, 1987), the Laboratory Data Validation Functional Guidelines for Evaluating Organics Analyses (U.S. EPA 1988), and the project QA Plan (Tetra Tech 1991).

A. HOLDING TIMES

Sediment/Water

Water and sediment samples were collected, placed on ice in a cooler, and transported to the laboratory within 4 days of collection. The maximum holding times (time of collection to time of extraction and analysis) for pesticides and PCBs in water matrices have been established as 7 days to extraction and 40 days to analysis (from the time of collection). The maximum holding times for pesticides and PCBs in sediment/soil matrices has been established as 14 days to extraction and 40 days to analysis. Table 1 presents a summary of sample numbers, dates collected, dates extracted, dates of analyses, and holding times. Because all analyses were conducted within the required holding time, no data qualifiers were assigned to sample results for pesticides and PCBs based on holding times.

Tissue

Tissue samples were wrapped in aluminum foil and stored on dry ice in the field, with the exception of sturgeon, which were stored on ice. All samples were transported to Keystone/NEA Laboratories in Portland, Oregon and stored in freezers within three days of collection. Keystone/NEA was responsible for homogenizing the tissue samples before sending them to Alden Analytical Laboratories. Although no holding time has been established by U.S. EPA for frozen tissue samples, a holding time of 60 days was established for this project. Forty-seven of the seventy-two tissue samples were analyzed within 60 days of collection (See Table 1). The holding time established for this project is unnecessarily strict when compared to the protocol of the Puget

Sound Estuary Program, which recommends that all frozen tissue samples be analyzed within 1 year of collection and no more than 40 days after extraction. All samples were analyzed within 107 days of collection and no samples were analyzed more than 40 days after extraction. No data qualifiers were assigned to tissue sample results for pesticides and PCBs based on holding times.

B. CALIBRATION AND INSTRUMENT PERFORMANCE

Dual columns of dissimilar phase (RTX-5 and RTX-1701) were used for quantitation and confirmation of sample pesticide and PCB concentrations. Initial 7-point calibrations for pesticides were conducted on 26 September, 21 and 24 October, 12 November, 13 December, and 9, 14, and 23 January. Calibration standard concentrations were 5, 10, 25, 50, 100, 250, and 500 ppb. Sample analysis continued on each initial calibration until continuing calibration criteria could not be met. Standard curves were also calculated for chlordane (5, 10, 25, 50, 100, and 250 ppb), toxaphene (250, 1000, 2500, and 5000 ppb), and PCBs (50, 100, 250, 500, and 1000 ppb). The percent relative standard deviations (%RSD) of the response factors (RF) for each of the standard curves calculated from the initial calibrations were all less than 20 percent as required by SW-846 (U.S. EPA 1986), indicating that all of the initial calibrations were valid.

Continuing calibration using the 100 ppb pesticide standard was conducted at the required frequency for SW-846 (U.S. EPA 1986) analyses (i.e., before and within 12 h of sample analyses or 12 samples analyzed). The percent difference (%D) between the RF in the continuing calibration and the initial calibration was less than 15 percent for all pesticides except those listed in Table 2. All of the compounds which did not meet QC criteria for continuing calibration will be qualified as estimates in the associated samples.

Instrument performance was checked using U.S. EPA guidelines for DDT retention time, DDT and Endrin breakdown, and the retention time shift for the surrogate dibutylchlorendate (DBC). DDT retention time was greater than 12 minutes, and DDT and Endrin breakdown was less than 20 percent in all applicable standards per U.S. EPA guidelines (U.S. EPA 1988). The retention time shift for DBC in all standards and samples showed less than 2 percent difference from the initial retention times for the respective initial calibration.

C. SURROGATE RECOVERIES

All field, blank, and spike samples were spiked with the surrogate Dibutylchlorendate (DBC) before analysis.

Sediment

Percent recoveries for all analyses were within the advisory recovery limits of 25-150% for sediment specified in SW-846 (U.S. EPA 1986). No data qualifiers were assigned to sediment sample results for pesticides and PCBs based on surrogate recoveries.

Water
Percent recoveries for all analyses were within the advisory recovery limits of 24-150% for water specified in SW-846 (U.S. EPA 1986), with the exception of the analyses for Sample W6 and the matrix spike of Sample W6. The percent recovery of DBC was 181% for Sample W6 and 154% for the matrix spike of Sample W6. The laboratory could not perform a reextraction of Sample W6 because there was insufficient sample remaining. Because of the high surrogate recovery, the positive results from Sample W6 (Dieldrin and Endrin aldehyde) were qualified as estimates (qualifier code 'E'). No other data qualifiers were assigned to water sample results for pesticides and PCBs based on surrogate recoveries.

Tissue
Percent recoveries for all analyses were within the advisory recovery limits of 25-150%, with the exception of the analyses for Sample D8S. This recovery limit is based on soil analyses and may not always be achievable given the complexity of tissue matrices. The percent recovery of DBC in Sample D8S was 16%. No attempt was made to reextract and/or reanalyze this sample. The low surrogate recovery indicates a significant bias in the sample analysis. All of the results for Sample D8S were qualified as unusable.

D. METHOD BLANKS

Method blank analyses were performed for each batch of samples received by the laboratory. Five, six, and eight method blanks were analyzed for water, sediment, and tissue samples, respectively. Raw data for all method blanks were examined, and no indication of pesticide/PCB contamination at concentrations exceeding practical quantitation limits was found. No data qualifiers were assigned to sample results for pesticides and PCBs based on method blank results.

E. MATRIX SPIKE/MATRIX SPIKE DUPLICATE ANALYSIS

Sediment
Table 3 gives the results of MS/MSD analyses for sediment samples. MS/MSD analyses with the normally spiked pesticides (gamma-BHC, Heptachlor, Aldrin, Endrin, Dieldrin, and p,p-DDT) were performed on each of the six batches of sediment samples received. None of these compounds were recovered outside their respective established ranges.

Nine additional pesticides were incorporated into Method 8080 for this project (Dacthal, Dicofal, Malathion, Methyl parathion, Mirex, o,p-DDE, o,p-DDD, o,p-DDT, and Parathion). Standards for these pesticides could not be obtained by the laboratory in time to spike the first two sample batches. Subsequent batches were to have 220 μg of each additional pesticides spiked in addition to the pesticides normally spiked. However, only two of the remaining four sample batches were spiked with the additional pesticides and only one of these two was analyzed in duplicate. There are no established percent recovery limits for the additional pesticides. However, the percent

recoveries of the additional pesticides in the two spiked samples (Samples E1 and E4) were within the ranges established for similar compounds, with the exception of Parathion in Sample E1, which was recovered at 159 and 164%. Parathion was not detected in Sample E1 or in any of the other samples in the same batch, so parathion data will not be qualified based on these results.

No data qualifiers were assigned to sediment sample results for pesticides and PCBs based on MS/MSD results.

Water

Table 4 gives the results of MS/MSD analyses for water samples. MS/MSD analyses with the normally spiked pesticides were performed on three of the five batches which included water samples. For Sample W14, three pesticides were recovered outside the acceptable range (gamma-BHC, Heptachlor, and Aldrin) in the matrix spike duplicate. Since the percent recoveries for these compounds were less than 30% above the acceptable range, and no pesticides were detected in the associated sample, no data qualifiers will be assigned to the negative values in Sample W14.

For Sample W6, all but one of the spiked pesticides was recovered well above the acceptable range in the matrix spike. Based on these results and the high percent recovery of the associated surrogate spike (see Section C above), all results for Sample W6 will be qualified as unusable. The two positive detects in this sample (Dieldrin and Endrin aldehyde) were detected at just above the MDL.

For Sample W14, gamma-BHC, Heptachlor, and Aldrin were all recovered above QC limits in the MSD. The results for these three compounds will be qualified as estimates.

The nine additional pesticides incorporated into Method 608 for this project were spiked in only one of the five batches which included water samples (Sample W14). There are no established percent recovery limits for the additional pesticides in a water matrix. However, the percent recoveries of the additional pesticides in Sample W14 were within the ranges established for similar compounds. No data qualifiers were assigned to the results of Sample W14 based on the results of the MS/MSD of the additional pesticides.

Tissue

Table 5 gives the results of MS/MSD analyses for tissue samples. For each batch of tissue samples received, MS/MSD analyses were performed using the normally spiked pesticides/PCBs and MS analyses were performed using the nine additional pesticides incorporated into Method 8080 for this project.

For Sample D24S, both MS and MSD percent recoveries for 4,4'-DDT were below the advisory QC limits. The positive values for 4,4'-DDT and its metabolites (4,4'-DDD and o,p-DDE) were qualified as estimates for this sample. Also for this sample, the %R for the MSD of gamma-BHC was outside the advisory QC limit. The positive value for gamma-BHC in this sample was qualified as an estimate.

The MS of the additional pesticides for Sample D3P was hampered by serious

matrix interferences. Dicofal, o,p-DDE, and Parathion could not be recovered at all from this sample. The positive values for o,p-DDE and parathion were qualified as estimates for this samples.

The MS/MSD results for Sample D10P were highly affected by matrix interferences and the presence of Aroclor 1260. Although there were no pesticides detected in this sample, all of the sample results will be qualified as estimates because of the very high percent recoveries.

MS/MSD QC limits have not been established for Aroclor-1254 or any of the nine additional pesticides incorporated for this project. A number of the %R for these compounds are outside the ranges established for similar compounds. However, given the lack of positive values for most samples, the complexity of the matrices for these samples, the advisory nature of the "established" QC limits for pesticides/PCBs, and the acceptability of the surrogate recovery and analytical blank data, no data qualifiers were assigned to any other tissue sample results based on MS/MSD analyses.

F. LABORATORY DUPLICATES

Tissue
Two crayfish samples (D15 and D26) were analyzed in duplicate by the laboratory. The pesticide derivative 4,4'-DDE was detected in all analyses at a similar concentration (6.8-8.7 µg/kg). Only three other compounds (4,4'-DDD, o,p-DDE, and Methoxychlor) were detected in any of the analyses of the duplicate pairs, although none were detected in both members of the duplicate pair. Given the small number of positive values for these samples, conclusions about lab variability are not possible.

G. FIELD DUPLICATES

Sediment
Five field duplicate samples were collected and analyzed for pesticides and PCBs. No more than three compounds were detected in any one of these samples. In only one case was the same compound detected in the field sample and field duplicate. Methyl parathion was detected at 6.1 µg/kg in Sample D23 and 10 µg/kg in Sample D43. Given the paucity of positive results for these samples, valid conclusions about field variability are not possible.

Water
Samples W26 and W52 were duplicate samples collected at Station W26. No pesticides or PCBs were detected in either sample. Given the lack of positive values for these samples, conclusions about field variability are not possible.

Tissue
Two of the sturgeon samples (Sample ST-1-5 and ST-1-5-dup) were collected as field duplicates. The only compound detected in either sample was 4,4'-DDE, which was detected at 5.8 µg/kg in Sample ST-1-5-dup and at 5.4 µg/kg in Sample ST-1-5. Although the agreement between samples was good for this

one compound, the lack of additional positive values makes statistically valid conclusions about field variability difficult.

SUMMARY

Sample data were reported in µg/L for water and in µg/kg for sediment and tissue. Sample results with the appropriate qualifiers are presented in Tables 6, 7, and 8 for sediment, water, and tissue, respectively. The data package submitted by the laboratory contained all the required deliverables. Detection limits for sediment and water reported by the laboratory (2-100 µg/kg for sediment and 0.05-0.5 µg/L for water) met or exceeded the criteria established in the QA Plan (Tetra Tech 1991).

Very few data qualifiers other than 'U' (undetected) were added to the pesticide and PCBs data. The pesticides listed in Table 2 were qualified as estimates based on exceedances of QC criteria for continuing calibration. Results from two samples (W6 and D8S) were qualified as unusable due to matrix spike results and surrogate recovery results, respectively. Some of the tissue data was qualified as estimated (qualifier code 'E') due to matrix interferences noted by the laboratory. A number of the detection limits for tissue were adjusted by the laboratory because of coeluting interfering peaks. These compounds were identified with an asterisk in Table 8. Matrix spike/matrix spike duplicate results were generally within QC limits for tissue samples. Minor deviations from QC limits did not warrant the qualifying of any sample results.

The precision, accuracy, and completeness of the pesticide/PCB analyses were within project guidelines and the data are considered acceptable for their intended use.

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TABLE 1. PESTICIDE/PCB ANALYSIS SUMMARY
LOWER COLUMBIA RIVER RECONNAISSANCE SURVEY

Tetra Tech Sample Number	Alden Sample Number	Date Collected	Date Extracted	Date Analyzed	Holding Time (d) Extract	Holding Time (d) Analysis
SEDIMENT						
D1	8766B	10/8/91	10/21/91	11/12/91	13	35
D2	8767B	10/8/91	10/21/91	11/12/91	13	35
D3	8778B	10/9/91	10/21/91	11/8/91	12	30
D4	8768B	10/8/91	10/21/91	11/12/91	13	35
D5	8792B	10/11/91	10/24/91	11/13/91	13	33
D6	8793B	10/10/91	10/24/91	11/13/91	14	34
D7	8794B	10/11/91	10/24/91	11/13/91	13	33
D8	8795B	10/12/91	10/24/91	11/13/91	12	32
D9	8796B	10/12/91	10/24/91	11/13/91	12	32
D10	8769B	10/7/91	10/21/91	11/7/91	14	31
D11	8770B	10/7/91	10/21/91	11/7/91	14	31
D12	8771B	10/7/91	10/21/91	11/7/91	14	31
D13	8723B	10/6/91	10/18/91	11/5/91	12	30
D14	8719B	10/6/91	10/18/91	11/5/91	12	30
D15	8720B	10/5/91	10/18/91	11/5/91	13	31
D16	8721B	10/4/91	10/18/91	11/5/91	14	32
D17	8722B	10/4/91	10/18/91	11/5/91	14	32
D18	8681B	10/3/91	10/15/91	11/5/91	12	33
D19	8680B	10/3/91	10/15/91	11/5/91	12	33
D20	8675B	10/2/91	10/15/91	11/5/91	13	34
D21	8674B	10/2/91	10/15/91	11/5/91	13	34
D22	8673B	10/2/91	10/15/91	11/5/91	13	34
D23	8676B	10/1/91	10/15/91	11/5/91	14	35
D24	8621B	9/30/91	10/5/91	10/30/91	5	30
D25	8624B	9/29/91	10/5/91	10/30/91	6	31
D26	8623B	9/29/91	10/5/91	10/30/91	6	31
D27	8622B	9/29/91	10/5/91	10/30/91	6	31
D28	8627B	9/29/91	10/5/91	10/30/91	6	31
D29	8614B	9/29/91	10/5/91	10/30/91	6	31
D30	8613B	9/28/91	10/5/91	10/30/91	7	32
D31	8612B	9/27/91	10/5/91	10/30/91	8	33
D32	8618B	9/27/91	10/5/91	10/30/91	8	33
D33	8611B	9/27/91	10/5/91	10/30/91	8	33
D34	8610B	9/27/91	10/5/91	10/29/91	8	32
D35	8579B	9/26/91	10/5/91	10/22/91	9	26
D36	8568B	9/26/91	10/5/91	10/22/91	9	26
D37	8576B	9/25/91	10/5/91	10/22/91	10	27
D38	8577B	9/25/91	10/5/91	10/22/91	10	27
D39	8571B	9/24/91	10/5/91	10/22/91	11	28
D40	8572B	9/24/91	10/5/91	10/22/91	11	28
D41	8578B	9/26/91	10/5/91	10/22/91	9	26
D42	8628B	9/29/91	10/5/91	10/30/91	6	31

Table 1. (cont.)

Tetra Tech Sample Number	Alden Sample Number	Date Collected	Date Extracted	Date Analyzed	Holding Time (d) Extract	Holding Time (d) Analysis
D43	8677B	10/1/91	10/15/91	11/5/91	14	35
D44	8724B	10/4/91	10/18/91	11/5/91	14	32
D45	8772B	10/7/91	10/21/91	11/7/91	14	31
D46	8775B	10/9/91	10/21/91	11/7/91	12	29
E1	8776B	10/9/91	10/21/91	11/7/91	12	29
E2	8777B	10/9/91	10/21/91	11/7/91	12	29
E3	8797B	10/11/91	10/24/91	11/13/91	13	33
E4	8798B	10/12/91	10/24/91	11/13/91	12	32
E5	8725B	10/5/91	10/18/91	11/5/91	13	31
E6	8726B	10/4/91	10/18/91	11/5/91	14	32
E7	8682B	10/3/91	10/15/91	11/5/91	12	33
E8	8672B	10/1/91	10/15/91	11/6/91	14	36
E9	8620B	9/30/91	10/5/91	10/30/91	5	30
E10	8629B	9/29/91	10/5/91	10/23/91	6	24
E11	8616B	9/28/91	10/5/91	10/31/91	7	33
E12	8567B	9/26/91	10/5/91	10/22/91	9	26
E13	8569B	9/25/91	10/5/91	10/22/91	10	27
E14	8575B	9/24/91	10/5/91	10/22/91	11	28
WATER						
W6	8789C	10/10/91	10/15/91	10/22/91	5	12
W14	8716C	10/6/91	10/11/91	10/22/91	5	16
W26	8669C	10/2/91	10/7/91	11/5/91	5	34
W37	8615C	9/28/91	10/3/91	10/5/91	5	7
W45	8570C	9/26/91	10/3/91	10/5/91	7	9
W52	8670C	10/2/91	10/7/91	11/5/91	5	34
STURGEON						
ST-1-2-D	8817	10/10/91	10/28/91	11/13/91	18	34
ST-1-3	8738	10/1/91	10/21/91	11/6/91	20	36
ST-1-4	9102	10/15/91	11/18/91	11/21/91	34	37
ST-1-5	9001	10/16/91	11/15/91	11/21/91	30	36
ST-1-6	9042	10/20/91	11/15/91	11/22/91	26	33
ST-2-1-D	8818	10/10/91	10/28/91	11/14/91	18	35
ST-2-2-D	9002	10/20/91	11/15/91	11/21/91	26	32
ST-2-3	9003	10/21/91	11/15/91	11/21/91	25	31
ST-2-4	9004	10/21/91	11/15/91	11/21/91	25	31
ST-3-1-D	9040	10/23/91	11/15/91	11/22/91	23	30
ST-3-3-D	9039	10/23/91	11/15/91	11/22/91	23	30
ST-3-4	9103	10/25/91	11/18/91	11/21/91	24	27
ST-3-6	9038	10/29/91	11/15/91	11/22/91	17	24
ST-4-1-D	8820	10/2/91	10/28/91	11/14/91	26	43
ST-4-2	8819	10/10/91	10/28/91	11/14/91	18	35
ST-4-3-D	8739	9/29/91	10/21/91	11/6/91	22	38
ST-4-4	8740	9/29/91	10/21/91	11/6/91	22	38
ST-1-5-dup	9041	10/16/91	11/15/91	11/22/91	30	37

Table 1. (cont.)

Tetra Tech Sample Number	Alden Sample Number	Date Collected	Date Extracted	Date Analyzed	Holding Time (d) Extract	Holding Time (d) Analysis
CRAYFISH						
D6	8737	10/1/91	10/21/91	11/6/91	20	36
D8	8732	9/30/91	10/21/91	11/5/91	21	36
D10	8735	9/30/91	10/21/91	11/6/91	21	37
D12	8728	9/30/91	10/21/91	11/5/91	21	36
D15	8734	9/28/91	10/21/91	11/6/91	23	39
D16	8733	9/28/91	10/21/91	11/6/91	23	39
D19	8730	9/29/91	10/21/91	11/5/91	22	37
D20	8727	10/1/91	10/21/91	11/5/91	20	35
D22	8741	9/29/91	10/28/91	11/6/91	29	38
D23	8742	9/28/91	10/28/91	11/6/91	30	39
D24	8743	9/30/91	10/28/91	11/6/91	28	37
D26	8744	9/27/91	10/28/91	11/6/91	31	40
D28	8663	9/26/91	10/21/91	11/1/91	25	36
D29	8731	9/26/91	10/21/91	11/5/91	25	40
D31	8665	9/25/91	10/21/91	11/1/91	26	37
D35	8664	9/25/91	10/21/91	11/1/91	26	37
D38	8729	9/25/91	10/21/91	11/5/91	26	41
D40	8736	9/25/91	10/21/91	11/6/91	26	42
SUCKER						
D6S	9342	10/26/91	1/7/92	1/10/92	73	76
D8S	9346	10/27/91	1/7/92	1/10/92	72	75
D10S	9345	10/25/91	1/7/92	1/10/92	74	77
D12S	9340	10/24/91	1/7/92	1/10/92	75	78
D15S	9270	10/23/91	1/2/92	1/9/92	71	78
D16S	9344	10/23/91	1/7/92	1/10/92	76	79
D19S	9272	10/21/91	1/2/92	1/10/92	73	81
D20S	9343	11/19/91	1/7/92	1/10/92	49	52
D22S	9277	11/19/91	1/2/92	1/10/92	44	52
D23S	9275	10/20/91	1/2/92	1/10/92	74	82
D24S	9339	10/19/91	1/7/92	1/10/92	80	83
D26S	9271	11/19/91	1/2/92	1/10/92	44	52
D28S	9278	10/17/91	1/2/92	1/10/92	77	85
D29S	9276	10/16/91	1/2/92	1/10/92	78	86
D31S	9274	10/17/91	1/2/92	1/10/92	77	85
D35S	9273	10/15/91	1/2/92	1/10/92	79	87
D38S	9341	10/15/91	1/7/92	1/10/92	84	87
D40S	9225	10/14/91	12/12/91	12/14/91	59	61

Table 1. (cont.)

Tetra Tech Sample Number	Alden Sample Number	Date Collected	Date Extracted	Date Analyzed	Holding Time (d) Extract	Holding Time (d) Analysis
CARP						
D23C	9223	10/20/91	12/12/91	12/14/91	53	55
D24C	9222	10/19/91	12/12/91	12/14/91	54	56
D26C	9221	10/19/91	12/12/91	12/14/91	54	56
D28C	9005	10/17/91	11/15/91	11/21/91	29	35
D29C	9045	10/16/91	11/15/91	11/22/91	30	37
D31C	9006	10/17/91	11/15/91	11/21/91	29	35
D35C	9044	10/15/91	11/15/91	11/22/91	31	38
D38C	9043	10/15/91	11/15/91	11/22/91	31	38
D40C	9224	10/14/91	12/12/91	12/14/91	59	61
PEAMOUTH						
D3P	9350	10/26/91	1/15/92	1/27/92	81	93
D10P	9351	10/25/91	1/15/92	1/27/92	82	94
D12P	9352	10/25/91	1/15/92	1/27/92	82	94
D15P	9427	10/23/91	1/31/92	2/7/92	100	107
D16P	9353	10/27/91	1/15/92	1/27/92	80	92
D19P	9354	10/27/91	1/15/92	1/27/92	80	92
D21P	9355	10/21/91	1/15/92	1/27/92	86	98
D23P	9356	10/20/91	1/15/92	1/27/92	87	99
D24P	9357	10/19/91	1/15/92	1/27/92	88	100
D28P	9358	10/17/91	1/15/92	1/27/92	90	102

TABLE 2. PESTICIDES OUTSIDE QC CRITERIA FOR CONTINUING CALIBRATION
LOWER COLUMBIA RIVER RECONNAISSANCE SURVEY

Continuing Calibration Date	Initial Calibration Date	Associated Samples	Compound	% D RTX-5	% D RTX-1701
10/23/91	10/21/91	E10	Endosulfan sulfate	28	16
			Heptachlor epoxide	16	17
			Dieldrin	24	17
11/1/91	10/24/91	D28,D35,D31	Endosulfan sulfate	20	21
11/4/91	10/24/91	E8,D22,D21,D20,D23,D43,D19,D18,E7,D14,D15,D16	Endosulfan sulfate	22	24
11/5/91	10/24/91	D6,D8,D10,D12,D15,D16,D19,D20,D29,D38,D40(crayfish) and ST-1-3,ST-4-3-D,ST-4-4	Endosulfan sulfate	17	21
			Methoxychlor	21	23
11/5/91	10/24/91	D17,D13,D44,E5,E6,W26,W52	Endosulfan sulfate	20	21
			Methoxychlor	18	18
11/6/91	10/24/91	D22,D23,D24,D26 (crayfish)	Aldrin	17	17
			Delta-BHC	17	23
			Heptachlor epoxide	19	18
			Endosulfan I	17	20
			Dieldrin	33	20
			Endrin aldehyde	26	29
11/7/91	10/24/91	D1,D2,D4,D10,D11,D12,D45,D46	Delta-BHC	19	21
			Heptachlor epoxide	17	18
			Endosulfan I	18	20
1/27/92	1/23/92	D3P,D10P,D12P,D19P,D21P,D23P,D24P,D28P	Endrin	23	57

TABLE 3. PESTICIDE AND PCB MS/MSD RESULTS - SEDIMENT
LOWER COLUMBIA RIVER RECONNAISSANCE SURVEY

Sample D39 Analyzed 10/22/91	(Samples E12, D36, E13, D40, E14, D37, D38 D35, and D41 also in batch)					
	Percent Recovery				QC LIMITS CLP	
	MS	MSD	RSD	RPD	% Rec.	RPD
gamma-BHC	91	96	1.69	5.35	46-127	50
Heptachlor	91	96	1.69	5.35	35-130	31
Aldrin	96	104	2.00	8.00	34-132	43
Dieldrin	70	69	1.02	1.44	31-134	38
Endrin	117	117	0.00	0.00	42-139	45
4,4'-DDT	96	104	2.00	8.00	23-134	90
Aroclor-1254	89	74	3.36	18.40	not avail.	not avail.

Sample E10 Analyzed 10/23/91	(Samples D34, D33, D31, D29, E11, D32, E9 D24, D27, D26, D25, D28, and D42 also in batch)					
	Percent Recovery				QC LIMITS CLP	
	MS	MSD	RSD	RPD	% Rec.	RPD
gamma-BHC	78	78	0.00	0.00	46-127	50
Heptachlor	78	74	1.86	5.26	35-130	31
Aldrin	87	83	1.66	4.71	34-132	43
Dieldrin	95	68	4.51	33.13	31-134	38
Endrin	87	119	3.88	31.07	42-139	45
4,4'-DDT	66	91	4.50	31.85	23-134	90
Aroclor-1254	82	77	1.99	6.29	not avail.	not avail.

Sample E8 Analyzed 11/5/91	(Samples D22, D21, D20, D23, D43, D19 D18, and E7 also in batch)					
	Percent Recovery				QC LIMITS CLP	
	MS	MSD	RSD	RPD	% Rec.	RPD
gamma-BHC	106	100	1.68	5.83	46-127	50
Heptachlor	110	105	1.47	4.65	35-130	31
Aldrin	90	95	1.71	5.41	34-132	43
Dieldrin	75	74	0.95	1.34	31-134	38
Endrin	118	114	1.22	3.45	42-139	45
4,4'-DDT	95	91	1.52	4.30	23-134	90
Aroclor-1254	146	146	0.00	0.00	not avail.	not avail.

Table 3 (cont.)

Sample E5 Analyzed 11/5/91	(Samples D14, D15, D16, D17, D44 D13, and E6 also in batch)					
	Percent Recovery				QC LIMITS CLP	
	MS	MSD	RSD	RPD	% Rec.	RPD
gamma-BHC	120	105	2.43	13.33	46-127	50
Heptachlor	125	110	2.33	12.77	35-130	31
Aldrin	115	95	3.01	19.05	34-132	43
Dieldrin	58	49	3.97	16.82	31-134	38
Endrin	99	84	2.99	16.39	42-139	45
4,4'-DDT	80	70	2.98	13.33	23-134	90
Aroclor-1254	88	88	0.00	0.00	not avail.	not avail.

Sample E1 Analyzed 11/7/91	(Samples D1, D2, D4, D10, D11, D45, D12 D46, and E2 also in batch)					
	Percent Recovery				QC LIMITS CLP	
	MS	MSD	RSD	RPD	% Rec.	RPD
gamma-BHC	82	95	2.88	14.69	46-127	50
Heptachlor	59	68	3.34	14.17	35-130	31
Aldrin	68	77	2.93	12.41	34-132	43
Dieldrin	52	71	5.01	30.89	31-134	38
Endrin	109	115	1.55	5.36	42-139	45
4,4'-DDT	36	61	7.29	51.55	23-134	90
Aroclor-1254	109	114	1.42	4.48	not avail.	not avail.
Dacthal	64	64	0.00	0.00		
Dicofal	36	37	1.94	2.74		
Malathion	109	109	0.00	0.00		
Methyl parathion	109	114	1.42	4.48		
Mirex	45	50	3.33	10.53		
o,p-DDE	77	77	0.00	0.00		
o,p-DDD	109	114	1.42	4.48		
o,p-DDT	64	73	3.10	13.14		
Parathion	159	164	0.98	3.10		

Table 3 (cont.)

Sample E4 Analyzed 11/13/91	(Samples D5, D6, D7, D8, D9, and E3 also in batch)					
	Percent Recovery				QC LIMITS CLP	
	MS	MSD	RSD	RPD	% Rec.	RPD
gamma-BHC	82	100	3.30	19.78	46-127	50
Heptachlor	86	105	3.23	19.90	35-130	31
Aldrin	73	91	3.66	21.95	34-132	43
Dieldrin	75	80	2.04	6.45	31-134	38
Endrin	84	103	3.30	20.32	42-139	45
4,4'-DDT	81	108	3.89	28.57	23-134	90
Aroclor-1254	91	111	3.13	19.80	not avail.	not avail.
Dacthal	52	--	--	--		
Dicofal	132	--	--	--		
Malathion	73	--	--	--		
Methyl parathion	38	--	--	--		
Mirex	89	--	--	--		
o,p-DDE	86	--	--	--		
o,p-DDD	84	--	--	--		
o,p-DDT	80	--	--	--		
Parathion	64	--	--	--		

TABLE 4. PESTICIDE AND PCB MS/MSD RESULTS - WATER
LOWER COLUMBIA RIVER RECONNAISSANCE SURVEY

Sample W45 Analyzed 10/5/91	Percent Recovery				QC LIMITS CLP	
	MS	MSD	RSD	RPD	% Rec.	RPD
gamma-BHC	87	95	2.20	8.79	56-123	15
Heptachlor	83	90	2.16	8.09	40-131	20
Aldrin	99	110	2.24	10.53	40-120	22
Dieldrin	55	63	3.39	13.56	52-126	18
Endrin	88	98	2.40	10.75	56-121	21
4,4'-DDT	90	95	1.71	5.41	38-127	27
Aroclor-1254	90	90	0.00	0.00	not avail.	not avail.

Sample W14 Analyzed 10/22/91	Percent Recovery				QC LIMITS CLP	
	MS	MSD	RSD	RPD	% Rec.	RPD
gamma-BHC	110	***140***	3.10	***24.00***	56-123	15
Heptachlor	110	***140***	3.10	***24.00***	40-131	20
Aldrin	120	***150***	2.87	***22.22***	40-120	22
Dieldrin	53	60	3.31	12.39	52-126	18
Endrin	90	108	3.03	18.18	56-121	21
4,4'-DDT	103	108	1.50	4.74	38-127	27
Aroclor-1254	95	150	4.28	44.90	not avail.	not avail.
Dacthal	48	48	0.00	0.00		
Dicofal	70	77	2.55	9.52		
Malathion	75	76	0.94	1.32		
Methyl parathion	68	70	1.45	2.90		
Mirex	33	34	2.11	2.99		
o,p-DDE	52	54	1.89	3.77		
o,p-DDD	62	63	1.13	1.60		
o,p-DDT	48	50	2.04	4.08		
Parathion	69	69	0.00	0.00		

Table 4 (cont.)

Sample W6 Analyzed 10/22/91						
	Percent Recovery				QC LIMITS CLP	
	MS	MSD	RSD	RPD	% Rec.	RPD
gamma-BHC	***180***	120	3.65	***40.00***	56-123	15
Heptachlor	***170***	120	3.45	***34.48***	40-131	20
Aldrin	***180***	***130***	3.23	***32.26***	40-120	22
Dieldrin	68	55	4.15	***21.14***	52-126	18
Endrin	***350***	95	5.07	***114.61***	56-121	21
4,4'-DDT	***138***	105	3.34	***27.16***	38-127	27
Aroclor-1254	275	95	5.13	97.30	not avail.	not avail.

TABLE 5. PESTICIDE AND PCB MS/MSD RESULTS - TISSUE
LOWER COLUMBIA RIVER RECONNAISSANCE SURVEY

Sample ST-1-3 sturgeon Analyzed 10/22/91	(Samples D20, D12, D38, D19, D29, D8, D16, D15, D10, D40, D6, ST-4-3-D, ST-4-4, D28, D35, and D31 also in batch)					
	Percent Recovery				QC LIMITS CLP	
	MS	MSD	RSD	RPD	% Rec.	RPD
gamma-BHC	92	88	1.57	4.44	56-123	15
Heptachlor	96	96	0.00	0.00	40-131	20
Aldrin	88	76	2.99	14.63	40-120	22
Dieldrin	83	83	0.00	0.00	52-126	18
Endrin	***130***	***130***	0.00	0.00	56-121	21
4,4'-DDT	85	96	2.59	12.15	38-127	27
Aroclor-1254	96	142	4.03	38.66	not avail.	not avail.
Dacthal	70	62	3.03	12.12	not avail.	not avail.
Dicofal	20	23	5.70	13.95	not avail.	not avail.
Malathion	109	90	3.10	19.10	not avail.	not avail.
Methyl parathion	123	97	3.28	23.64	not avail.	not avail.
Mirex	59	45	5.09	26.92	not avail.	not avail.
o,p-DDE	74	61	3.78	19.26	not avail.	not avail.
o,p-DDD	105	94	2.36	11.06	not avail.	not avail.
o,p-DDT	98	76	3.81	25.29	not avail.	not avail.
Parathion	163	134	2.56	19.53	not avail.	not avail.

Sample ST-1-2-D sturgeon Analyzed 11/13/91	(Samples D22, D23, D24, D26 ST-2-1-D, ST-4-2; and ST-4-1-D also in batch)					
	Percent Recovery				QC LIMITS CLP	
	MS	MSD	RSD	RPD	% Rec.	RPD
gamma-BHC	72	72	0.00	0.00	56-123	15
Heptachlor	56	64	3.33	13.33	40-131	20
Aldrin	72	84	3.14	15.38	40-120	22
Dieldrin	68	75	2.62	9.79	52-126	18
Endrin	80	85	1.92	6.06	56-121	21
4,4'-DDT	79	80	0.89	1.26	38-127	27
Aroclor-1254	190	180	1.21	5.41	not avail.	not avail.

Table 5 (cont.)

Sample ST-2-1-D sturgeon Analyzed 11/14/91	(Samples D22, D23, D24, D26 ST-1-2-D, ST-4-2, and ST-4-1-D also in batch)					
	Percent Recovery				QC LIMITS CLP	
	MS	MSD	RSD	RPD	% Rec.	RPD
Dacthal	30	--	--	--	not avail.	not avail.
Dicofal	19	--	--	--	not avail.	not avail.
Malathion	72	--	--	--	not avail.	not avail.
Methyl parathion	52	--	--	--	not avail.	not avail.
Mirex	34	--	--	--	not avail.	not avail.
o,p-DDE	40	--	--	--	not avail.	not avail.
o,p-DDD	48	--	--	--	not avail.	not avail.
o,p-DDT	44	--	--	--	not avail.	not avail.
Parathion	44	--	--	--	not avail.	not avail.

Sample ST-1-5 sturgeon Analyzed 11/21/91	(Samples ST-2-2-D, ST-2-3, ST-2-4, D28C, D31C, ST-3-6, ST-3-3-D, ST-3-1-D, ST-1-5-dup, ST-1-6, D38C, D35C, and D29C also in batch)					
	Percent Recovery				QC LIMITS CLP	
	MS	MSD	RSD	RPD	% Rec.	RPD
gamma-BHC	116	124	1.67	6.67	56-123	15
Heptachlor	***136***	***132***	1.06	2.99	40-131	20
Aldrin	100	112	2.31	11.32	40-120	22
Dieldrin	86	81	1.89	5.99	52-126	18
Endrin	110	110	0.00	0.00	56-121	21
4,4'-DDT	100	110	2.13	9.52	38-127	27
Aroclor-1254	196	260	2.48	28.07	not avail.	not avail.
Dacthal	48	--	--	--	not avail.	not avail.
Dicofal	70	--	--	--	not avail.	not avail.
Malathion	128	--	--	--	not avail.	not avail.
Methyl parathion	104	--	--	--	not avail.	not avail.
Mirex	56	--	--	--	not avail.	not avail.
o,p-DDE	78	--	--	--	not avail.	not avail.
o,p-DDD	72	--	--	--	not avail.	not avail.
o,p-DDT	74	--	--	--	not avail.	not avail.
Parathion	82	--	--	--	not avail.	not avail.

Table 5 (cont.)

Sample ST-1-4 sturgeon Analyzed 11/21/91	(Sample ST-3-4 also in batch)					
	Percent Recovery				QC LIMITS CLP	
	MS	MSD	RSD	RPD	% Rec.	RPD
gamma-BHC	68	64	2.14	6.06	56-123	15
Heptachlor	76	72	1.91	5.41	40-131	20
Aldrin	80	76	1.81	5.13	40-120	22
Dieldrin	69	66	1.81	4.44	52-126	18
Endrin	86	83	1.45	3.55	56-121	21
4,4'-DDT	88	96	2.17	8.70	38-127	27
Aroclor-1254	116	134	2.40	14.40	not avail.	not avail.
Dacthal	46	--	--	--	not avail.	not avail.
Dicofal	54	--	--	--	not avail.	not avail.
Malathion	106	--	--	--	not avail.	not avail.
Methyl parathion	108	--	--	--	not avail.	not avail.
Mirex	46	--	--	--	not avail.	not avail.
o,p-DDE	62	--	--	--	not avail.	not avail.
o,p-DDD	58	--	--	--	not avail.	not avail.
o,p-DDT	58	--	--	--	not avail.	not avail.
Parathion	84	--	--	--	not avail.	not avail.

Sample D26C carp Analyzed 12/14/91	(Samples D24C, D23C, D40C, and D40S also included in batch)					
	Percent Recovery				QC LIMITS CLP	
	MS	MSD	RSD	RPD	% Rec.	RPD
gamma-BHC	66	86	4.16	26.32	56-123	15
Heptachlor	96	96	0.00	0.00	40-131	20
Aldrin	48	***128***	7.19	90.91	40-120	22
Dieldrin	69	75	2.41	8.33	52-126	18
Endrin	93	116	3.25	22.01	56-121	21
4,4'-DDT	53	62	3.69	15.65	38-127	27
Aroclor-1254	156	156	0.00	0.00	not avail.	not avail.

Table 5 (cont.)

Sample D26C (cont.)						
carp	(Samples D24C, D23C,					
Analyzed 12/14/91	D40C, and D40S also included in batch)					
	Percent Recovery				QC LIMITS CLP	
	MS	MSD	RSD	RPD	% Rec.	RPD
Dacthal	43	--	--	--	not avail.	not avail.
Dicofal	148	--	--	--	not avail.	not avail.
Malathion	36	--	--	--	not avail.	not avail.
Methyl parathion	28	--	--	--	not avail.	not avail.
Mirex	16	--	--	--	not avail.	not avail.
o,p-DDE	58	--	--	--	not avail.	not avail.
o,p-DDD	90	--	--	--	not avail.	not avail.
o,p-DDT	42	--	--	--	not avail.	not avail.
Parathion	72	--	--	--	not avail.	not avail.

Sample D15S						
sucker	(Samples D26S, D19S, D35S, D31S, D23S,					
Analyzed 1/10/92	D29S, D22S, and D28S also included in batch)					
	Percent Recovery				QC LIMITS CLP	
	MS	MSD	RSD	RPD	% Rec.	RPD
gamma-BHC	96	96	0.00	0.00	56-123	15
Heptachlor	108	104	1.33	3.77	40-131	20
Aldrin	76	76	0.00	0.00	40-120	22
Dieldrin	52	52	0.00	0.00	52-126	18
Endrin	***125***	***125***	0.00	0.00	56-121	21
4,4'-DDT	51	51	0.00	0.00	38-127	27
Aroclor-1254	86	96	2.46	10.99	not avail.	not avail.
Dacthal	64	--	--	--	not avail.	not avail.
Dicofal	68	--	--	--	not avail.	not avail.
Malathion	0	--	--	--	not avail.	not avail.
Methyl parathion	2	--	--	--	not avail.	not avail.
Mirex	102	--	--	--	not avail.	not avail.
o,p-DDE	98	--	--	--	not avail.	not avail.
o,p-DDD	72	--	--	--	not avail.	not avail.
o,p-DDT	174	--	--	--	not avail.	not avail.
Parathion	70	--	--	--	not avail.	not avail.

Table 5 (cont.)

Sample D24S sucker Analyzed 1/10/92	(Samples D12S, D38S, D6S, D20S, D16S, D10S, and D8S also included in batch)					
	Percent Recovery				QC LIMITS CLP	
	MS	MSD	RSD	RPD	% Rec.	RPD
gamma-BHC	80	***132***	4.81	***49.06***	56-123	15
Heptachlor	92	124	3.70	***29.63***	40-131	20
Aldrin	76	***132***	5.09	***53.85***	40-120	22
Dieldrin	48	53	3.13	9.90	52-126	18
Endrin	96	115	2.92	18.01	56-121	21
4,4'-DDT	***16***	***24***	10.00	***40.00***	38-127	27
Aroclor-1254	118	112	1.51	5.22	not avail.	not avail.
Dacthal	148	--	--	--	not avail.	not avail.
Dicofal	142	--	--	--	not avail.	not avail.
Malathion	98	--	--	--	not avail.	not avail.
Methyl parathion	21	--	--	--	not avail.	not avail.
Mirex	50	--	--	--	not avail.	not avail.
o,p-DDE	13	--	--	--	not avail.	not avail.
o,p-DDD	4.6	--	--	--	not avail.	not avail.
o,p-DDT	34	--	--	--	not avail.	not avail.
Parathion	84	--	--	--	not avail.	not avail.

Sample D3P peamouth Analyzed 1/27/92	(Samples D10P, D12P, D16P, D19P, D21P, D23P, D24P, and D28P also included in batch)					
	Percent Recovery				QC LIMITS CLP	
	MS	MSD	RSD	RPD	% Rec.	RPD
Dacthal	18	--	--	--	not avail.	not avail.
Dicofal	*	--	--	--	not avail.	not avail.
Malathion	60	--	--	--	not avail.	not avail.
Methyl parathion	180	--	--	--	not avail.	not avail.
Mirex	54	--	--	--	not avail.	not avail.
o,p-DDE	70	--	--	--	not avail.	not avail.
o,p-DDD	*	--	--	--	not avail.	not avail.
o,p-DDT	104	--	--	--	not avail.	not avail.
Parathion	*	--	--	--	not avail.	not avail.

* Analyte not recovered due to matrix interferences

Table 5 (cont.)

Sample D10P peamouth Analyzed 1/27/92	(Samples D3P, D12P, D16P, D19P, D21P, D23P, D24P, and D28P also included in batch)					
	Percent Recovery				QC LIMITS CLP	
	MS	MSD	RSD	RPD	% Rec.	RPD
gamma-BHC	***148***	***920***	3.68	***144.57***	56-123	15
Heptachlor	92	***168***	4.74	***58.46***	40-131	20
Aldrin	108	***176***	4.11	***47.89***	40-120	22
Dieldrin	97	***168***	4.50	***53.58***	52-126	18
Endrin	***150***	***159***	1.37	5.83	56-121	21
4,4'-DDT	79	***139***	5.02	***55.05***	38-127	27
Aroclor-1254	138	162	2.31	16.00	not avail.	not avail.

TABLE 6. PESTICIDE AND PCB ANALYSIS RESULTS FOR SEDIMENT LOWER COLUMBIA RIVER RECONNAISSANCE SURVEY

COMPOUND	SAMPLE RESULTS (ug/kg) D1	D2	D3	D4	D5	D6	D7	D8
Pesticides								
Aldrin	20 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
alpha-BHC	20 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
beta-BHC	20 U	6* U	12* U	4* U	2 U	2 U	2 U	2 U
delta-BHC	20 UE	2 UE	3* U	2 UE	2 U	2 U	2 U	2 U
gamma-BHC	20 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Chlordane	20 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
4,4'-DDD	20 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
4,4'-DDE	20 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
4,4'-DDT	20 U	3* U	2 U	2 U	2 U	2 U	2 U	2 U
Dieldrin	20 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Endosulfan I	20 UE	2 UE	2 U	2 UE	2 U	2 U	2 U	2 U
Endosulfan II	20 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Endosulfan sulfate	20 U	3* U	2 U	2 U	2 U	2 U	2 U	2 U
Endrin	20 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Endrin aldehyde	20 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Heptachlor	20 UE	2 UE	2 U	2 UE	2 U	2 U	2 U	2 U
Heptachlor epoxide	20 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Methoxychlor	200 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U
Toxaphene	1000 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Dacthal	20 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Dicofal	200 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U
Malathion	20 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Methyl parathion	68	2 U	6* U	2 U	3.1	4.1	2 U	3
Mirex	20 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
o,p-DDE	20 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
o,p-DDD	20 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
o,p-DDT	20	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Parathion	20 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
PCBs								
Aroclor-1016	250 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U
Aroclor-1221	250 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U
Aroclor-1232	250 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U
Aroclor-1242	250 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U
Aroclor-1248	250 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U
Aroclor-1254	250 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U
Aroclor-1260	250 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U

* Reporting limits adjusted due to coeluting interfering peaks.

Data Qualifiers: U = Compound not detected. Value given is the lower quantification limit
E = Estimated value

Table 6 (cont.)

COMPOUND	SAMPLE RESULTS (ug/kg) D9		D10		D11		D12		D13		D14		D15		D16	
Pesticides																
Aldrin	2	U	2	U	2	U	2	U	2	U	2	U	2	U	2	U
alpha-BHC	2	U	2	U	2	U	2	U	2	U	2	U	2	U	2	U
beta-BHC	2	U	2	U	24*	U	2	U	2	U	2	U	2	U	2	U
delta-BHC	2	U	2	UE	3*	UE	7.9	E	2	U	2	U	2	U	4.2	
gamma-BHC	3*	U	2	U	2	U	2	U	2	U	2	U	2	U	2	U
Chlordane	2	U	2	U	2	U	2	U	2	U	2	U	2	U	2	U
4,4'-DDD	2	U	2	U	2	U	2	U	2	U	2	U	2	U	2	U
4,4'-DDE	2	U	2	U	2	U	2	U	2	U	2	U	2	U	2.1	
4,4'-DDT	2	U	2	U	2	U	2	U	2	U	2	U	2	U	2	U
Dieldrin	2	U	2	U	2	U	2	U	2	U	2	U	2	U	2	U
Endosulfan I	2	U	2	UE	2	UE	2	UE	2	U	2	U	2	U	2	U
Endosulfan II	2	U	2	U	2	U	2	U	2	U	2	U	2	U	2	U
Endosulfan sulfate	2	U	2	U	2	U	2	U	2	UE	2	UE	2	UE	2	UE
Endrin	2	U	2	U	2	U	2	U	2	U	2	U	2	U	2	U
Endrin aldehyde	2	U	2	U	2	U	3*	U	2	U	2	U	2	U	2	U
Heptachlor	2	U	2	UE	2	UE	3*	UE	2	U	2	U	2	U	2	U
Heptachlor epoxide	2	U	2	U	2	U	2	U	2	U	2	U	2	U	2	U
Methoxychlor	20	U	20	U	20	U	20	U	20	UE	20	U	20	U	20	U
Toxaphene	100	U	100	U	100	U	100	U	100	U	100	U	100	U	100	U
Dacthal	2	U	2	U	2	U	2	U	2	U	2	U	2	U	2	U
Dicofal	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U
Malathion	2	U	2	U	2	U	2	U	2	U	2	U	2	U	2	U
Methyl parathion	2	U	3*	U	7*	U	10		9*	U	6*	U	3*	U	20*	U
Mirex	2	U	2	U	2	U	2	U	2	U	2	U	2	U	2	U
o,p-DDE	2	U	2	U	2	U	2	U	2	U	2	U	2	U	2	U
o,p-DDD	2	U	2	U	2	U	2	U	2	U	2	U	2	U	2	U
o,p-DDT	2	U	2	U	2	U	2	U	2	U	2	U	2	U	2	U
Parathion	2	U	2	U	2	U	2	U	2	U	2	U	2	U	2	U
PCBs																
Aroclor-1016	25	U	25	U	25	U	25	U	25	U	25	U	25	U	25	U
Aroclor-1221	25	U	25	U	25	U	25	U	25	U	25	U	25	U	25	U
Aroclor-1232	25	U	25	U	25	U	25	U	25	U	25	U	25	U	25	U
Aroclor-1242	25	U	25	U	25	U	25	U	25	U	25	U	25	U	25	U
Aroclor-1248	25	U	25	U	25	U	25	U	25	U	25	U	25	U	25	U
Aroclor-1254	25	U	25	U	25	U	25	U	25	U	25	U	25	U	25	U
Aroclor-1260	25	U	25	U	25	U	25	U	25	U	25	U	25	U	25	U

* Reporting limits adjusted due to coeluting interfering peaks.

Data Qualifiers: U = Compound not detected. Value given is the lower quantification limit

E = Estimated value

Table 6 (cont.)

COMPOUND	SAMPLE RESULTS (ug/kg) D17		D18		D19		D20		D21		D22		D23		D24	
Pesticides																
Aldrin	2	U	2	U	2	U	2	U	2	U	2	U	2	U	2	U
alpha-BHC	2	U	2	U	2	U	2	U	2	U	2.6		2	U	2.9	
beta-BHC	2	U	2	U	2	U	2	U	2	U	2	U	2	U	2	U
delta-BHC	5.5		2	U	2	U	2	U	2	U	2	U	2	U	4*	U
gamma-BHC	3*	U	2	U	2	U	4*	U	2	U	2	U	2.2		2	U
Chlordane	2	U	2	U	2	U	2	U	2	U	2	U	2	U	2	U
4,4'-DDD	2	U	2	U	2	U	2	U	2	U	2	U	2	U	2	U
4,4'-DDE	2	U	2	U	4*	U	2	U	2	U	2	U	2	U	3.2	
4,4'-DDT	2	U	2	U	2	U	2	U	2	U	2	U	2	U	9*	U
Dieldrin	2	U	2	U	2	U	2	U	2	U	2	U	2	U	2	U
Endosulfan I	2	U	2	U	2	U	2	U	2	U	2	U	2	U	2	U
Endosulfan II	2	U	2	U	2	U	2	U	2	U	2	U	2	U	2	U
Endosulfan sulfate	2	UE	2	UE	2	UE	2	UE	2	UE	2	UE	2	UE	2	U
Endrin	2	U	2	U	2	U	2	U	2	U	2	U	2	U	5*	U
Endrin aldehyde	2	U	2	U	2	U	2	U	2	U	2	U	2	U	2	U
Heptachlor	2	U	2	U	2	U	2	U	2	U	2.5		2	U	2	U
Heptachlor epoxide	2	U	2	U	2	U	2	U	2	U	2	U	2	U	2	U
Methoxychlor	20	UE	20	U	20	U	20	U	20	U	20	U	20	U	20	U
Toxaphene	100	U	100	U	100	U	100	U	100	U	100	U	100	U	100	U
Dacthal	2	U	2	U	2	U	2	U	2	U	2	U	2	U	2	U
Dicofal	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U
Malathion	2	U	2	U	2	U	2	U	2	U	2	U	2	U	2	U
Methyl parathion	20*	U	5.9		2	U	2	U	6*	U	14		6.1		3.4	
Mirex	2	U	2	U	2	U	2	U	2	U	2	U	2	U	2	U
o,p-DDE	2	U	2	U	2	U	2	U	2	U	2	U	2	U	3.2	
o,p-DDD	2	U	2	U	2	U	2	U	2	U	2	U	2	U	3*	U
o,p-DDT	2	U	2	U	2	U	2	U	2	U	2	U	2	U	9.4	
Parathion	2	U	2	U	2	U	2	U	2	U	2	U	2	U	3*	U
PCBs																
Aroclor-1016	25	U	25	U	25	U	25	U	25	U	25	U	25	U	25	U
Aroclor-1221	25	U	25	U	25	U	25	U	25	U	25	U	25	U	25	U
Aroclor-1232	25	U	25	U	25	U	25	U	25	U	25	U	25	U	25	U
Aroclor-1242	25	U	25	U	25	U	25	U	25	U	25	U	25	U	25	U
Aroclor-1248	25	U	25	U	25	U	25	U	25	U	25	U	25	U	25	U
Aroclor-1254	25	U	25	U	85		25	U	25	U	25	U	25	U	25	U
Aroclor-1260	25	U	25	U	25	U	25	U	25	U	25	U	25	U	25	U

* Reporting limits adjusted due to coeluting interfering peaks.

Data Qualifiers: U = Compound not detected. Value given is the lower quantification limit
E = Estimated value

Table 6 (cont.)

COMPOUND	SAMPLE RESULTS (ug/kg) D25	D26	D27	D28	D29	D30	D31	D32
Pesticides								
Aldrin	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
alpha-BHC	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
beta-BHC	2 U	2 U	2 U	6* U	2 U	3* U	2 U	2 U
delta-BHC	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
gamma-BHC	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Chlordane	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
4,4'-DDD	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
4,4'-DDE	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
4,4'-DDT	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Dieldrin	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Endosulfan I	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Endosulfan II	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Endosulfan sulfate	2 U	2 U	2 U	2 UE	2 U	2 U	2 UE	2 U
Endrin	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Endrin aldehyde	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Heptachlor	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Heptachlor epoxide	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Methoxychlor	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U
Toxaphene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Dacthal	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Dicofal	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U
Malathion	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Methyl parathion	2 U	2 U	2 U	9* U	2 U	6.3	4	2 U
Mirex	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
o,p-DDE	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
o,p-DDD	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
o,p-DDT	2 U	2 U	2 U	2.7	2 U	2 U	2 U	8.3
Parathion	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
PCBs								
Aroclor-1016	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U
Aroclor-1221	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U
Aroclor-1232	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U
Aroclor-1242	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U
Aroclor-1248	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U
Aroclor-1254	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U
Aroclor-1260	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U

* Reporting limits adjusted due to coeluting interfering peaks.

Data Qualifiers: U = Compound not detected. Value given is the lower quantification limit
E = Estimated value

Table 6 (cont.)

COMPOUND	SAMPLE RESULTS (ug/kg) D33	D34	D35	D36	D37	D38	D39	D40
Pesticides								
Aldrin	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
alpha-BHC	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
beta-BHC	2 U	2 U	6* U	2 U	2 U	2 U	2 U	2 U
delta-BHC	2 U	2 U	5* U	2 U	2 U	2 U	2 U	2 U
gamma-BHC	2 U	2 U	3* U	2 U	2 U	2 U	2 U	2 U
Chlordane	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
4,4'-DDD	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
4,4'-DDE	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2.5
4,4'-DDT	2 U	2 U	6* U	2 U	2 U	2 U	2 U	2 U
Dieldrin	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Endosulfan I	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Endosulfan II	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Endosulfan sulfate	2 U	2 U	2 UE	2 U	2 U	2 U	2 U	2 U
Endrin	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Endrin aldehyde	2 U	2 U	3* U	2 U	2 U	2 U	2 U	2 U
Heptachlor	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Heptachlor epoxide	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Methoxychlor	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U
Toxaphene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Dacthal	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Dicofal	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U
Malathion	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Methyl parathion	2 U	2 U	2 U	5* U	2 U	2 U	2 U	2 U
Mirex	2 U	2 U	5.2	2 U	2 U	2 U	2 U	2 U
o,p-DDE	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
o,p-DDD	2 U	2 U	2 U	2 U	2 U	2 U	2 U	3* U
o,p-DDT	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Parathion	2 U	2 U	2 U	2 U	2 U	2 U	2 U	4.4
PCBs								
Aroclor-1016	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U
Aroclor-1221	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U
Aroclor-1232	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U
Aroclor-1242	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U
Aroclor-1248	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U
Aroclor-1254	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U
Aroclor-1260	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U

* Reporting limits adjusted due to coeluting interfering peaks.

Data Qualifiers: U = Compound not detected. Value given is the lower quantification limit

Table 6 (cont.)

COMPOUND	SAMPLE RESULTS (ug/kg) D41		D42		D43		D44		D45		D46		E1		E2	
Pesticides																
Aldrin	2	U	2	U	2	U	2	U	2	U	2	U	2	U	2	U
alpha-BHC	4		2	U	2	U	2	U	2	U	2	U	3*	U	2	U
beta-BHC	7*	U	4*	U	2	U	2	U	11*	U	10*	U	5*	U	2	U
delta-BHC	7*	U	2	U	2	U	2	U	3*	UE	2	UE	2	U	2	U
gamma-BHC	7*	U	2	U	2	U	2	U	2	U	2	U	2	U	2	U
Chlordane	2	U	2	U	2	U	2	U	2	U	2	U	2	U	2	U
4,4'-DDD	2	U	2	U	2	U	2	U	2	U	2	U	2	U	2	U
4,4'-DDE	5.6		2	U	2	U	2	U	2	U	2	U	2	U	2	U
4,4'-DDT	2	U	2	U	2	U	2	U	2	U	2	U	2	U	2	U
Dieldrin	4*	U	2	U	2	U	2	U	2	U	2	U	2	U	2	U
Endosulfan I	2	U	2	U	2	U	2	U	2	UE	2	UE	2	U	2	U
Endosulfan II	2	U	2	U	2	U	2	U	2	U	2	U	2	U	2	U
Endosulfan sulfate	2	U	2	U	2	UE	2	UE	2	U	2	U	2	U	2	U
Endrin	2	U	2	U	2	U	2	U	2	U	2	U	2	U	2	U
Endrin aldehyde	2	U	2	U	2	U	2	U	2	U	2	U	2	U	2	U
Heptachlor	6.1		2	U	2	U	2	U	2	UE	2	UE	2	U	2	U
Heptachlor epoxide	2	U	2	U	2	U	2	U	2	U	2	U	2	U	2	U
Methoxychlor	20	U	20	U	20	U	20	UE	20	U	20	U	20	U	20	U
Toxaphene	100	U	100	U	100	U	100	U	100	U	100	U	100	U	100	U
Dacthal	2	U	2	U	2	U	2	U	2	U	2	U	2	U	2	U
Dicofal	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U
Malathion	2	U	2	U	2	U	2	U	2	U	2	U	2	U	2	U
Methyl parathion	2	U	2	U	10		7*	U	9*	U	5*	U	2	U	2	U
Mirex	2	U	2	U	2	U	2	U	2	U	2	U	2	U	2	U
o,p-DDE	2	U	2	U	2	U	2	U	2	U	2	U	2	U	2	U
o,p-DDD	2	U	2	U	2	U	2	U	2	U	2	U	2	U	2	U
o,p-DDT	7*	U	2	U	2	U	2	U	2	U	2	U	2	U	2	U
Parathion	2	U	2	U	2	U	2	U	2	U	2	U	2	U	2	U
PCBs																
Aroclor-1016	25	U	25	U	25	U	25	U	25	U	25	U	25	U	25	U
Aroclor-1221	25	U	25	U	25	U	25	U	25	U	25	U	25	U	25	U
Aroclor-1232	25	U	25	U	25	U	25	U	25	U	25	U	25	U	25	U
Aroclor-1242	25	U	25	U	25	U	25	U	25	U	25	U	25	U	25	U
Aroclor-1248	25	U	25	U	25	U	25	U	25	U	25	U	25	U	25	U
Aroclor-1254	25	U	25	U	25	U	25	U	25	U	25	U	25	U	25	U
Aroclor-1260	25	U	25	U	25	U	25	U	25	U	25	U	25	U	25	U

* Reporting limits adjusted due to coeluting interfering peaks.

Data Qualifiers: U = Compound not detected. Value given is the lower quantification limit
E = Estimated value

Table 6 (cont.)

COMPOUND	SAMPLE RESULTS (ug/kg) E3	E4	E5	E6	E7	E8	E9	E10
Pesticides								
Aldrin	2 U	2 U	2 U	2 U	2 U	2 U	3.1	2 U
alpha-BHC	2 U	2 U	2 U	2 U	2 U	2 U	3	2 U
beta-BHC	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
delta-BHC	2 U	2 U	2 U	2 U	2 U	2 U	7* U	2 U
gamma-BHC	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Chlordane	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
4,4'-DDD	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
4,4'-DDE	2 U	2 U	2 U	2 U	2 U	2 U	3* U	2 U
4,4'-DDT	2 U	2 U	2 U	2 U	2 U	3.3	100	2 U
Dieldrin	2 U	2 U	2 U	2 U	2 U	3.3	2 U	2 UE
Endosulfan I	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Endosulfan II	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Endosulfan sulfate	2 U	2 U	2 UE	2 U	2 UE	2 UE	2 U	2 UE
Endrin	2 U	2 U	2 U	2 U	2 U	4.5	2 U	2 U
Endrin aldehyde	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Heptachlor	2 U	2 U	2 U	2 U	2 U	2 U	2.1	2 U
Heptachlor epoxide	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 UE
Methoxychlor	20 U	20 U	20 UE	20 U	20 U	20 U	20 U	20 U
Toxaphene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Dacthal	2 U	2 U	2 U	2 U	2 U	9	2 U	2 U
Dicofal	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U
Malathion	2 U	2 U	2 U	2 U	2 U	2.3	2 U	2 U
Methyl parathion	2 U	2 U	2 U	2.3	2 U	4.9	2 U	2 U
Mirex	2 U	2 U	2 U	2 U	2 U	4.8	2 U	2 U
o,p-DDE	2 U	2 U	2 U	2 U	2 U	3.6	2 U	2 U
o,p-DDD	2 U	2 U	2 U	2 U	2 U	6.6	2 U	2 U
o,p-DDT	2 U	2 U	2 U	2 U	2 U	5.6	2 U	2 U
Parathion	2 U	2 U	2 U	2 U	2 U	5.1	2 U	2 U
PCBs								
Aroclor-1016	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U
Aroclor-1221	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U
Aroclor-1232	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U
Aroclor-1242	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U
Aroclor-1248	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U
Aroclor-1254	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U
Aroclor-1260	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U

* Reporting limits adjusted due to coeluting interfering peaks.

Data Qualifiers: U = Compound not detected. Value given is the lower quantification limit
E = Estimated value

Table 6 (cont.)

COMPOUND	SAMPLE RESULTS (ug/kg) E11		E12		E13		E14					
Pesticides												
Aldrin	2	U	2	U	2	U	2	U				
alpha-BHC	3*	U	2	U	2	U	2	U				
beta-BHC	2	U	2	U	2	U	2	U				
delta-BHC	3*	U	2	U	2	U	2	U				
gamma-BHC	2	U	2	U	2	U	2	U				
Chlordane	2	U	2	U	2	U	2	U				
4,4'-DDD	2	U	2	U	2	U	2	U				
4,4'-DDE	2	U	2	U	2	U	2	U				
4,4'-DDT	2	U	2	U	2	U	2	U				
Dieldrin	2	U	2	U	2	U	2	U				
Endosulfan I	2	U	2	U	2	U	2	U				
Endosulfan II	2	U	2	U	2	U	2	U				
Endosulfan sulfate	2	U	2	U	2	U	2	U				
Endrin	2	U	2	U	2	U	2	U				
Endrin aldehyde	2	U	2	U	2	U	2	U				
Heptachlor	2	U	2	U	2	U	2	U				
Heptachlor epoxide	2	U	2	U	2	U	2	U				
Methoxychlor	20	U	20	U	20	U	20	U				
Toxaphene	100	U	100	U	100	U	100	U				
Dacthal	2	U	2	U	2	U	2	U				
Dicofal	20	U	20	U	20	U	20	U				
Malathion	2	U	2	U	2	U	2	U				
Methyl parathion	3*	U	2	U	2	U	2	U				
Mirex	2	U	2	U	2	U	2	U				
o,p-DDE	2	U	2	U	2	U	2	U				
o,p-DDD	2	U	2	U	2	U	2	U				
o,p-DDT	2	U	2	U	2	U	2	U				
Parathion	2	U	2	U	2	U	2	U				
PCBs												
Aroclor-1016	25	U	25	U	25	U	25	U				
Aroclor-1221	25	U	25	U	25	U	25	U				
Aroclor-1232	25	U	25	U	25	U	25	U				
Aroclor-1242	25	U	25	U	25	U	25	U				
Aroclor-1248	25	U	25	U	25	U	25	U				
Aroclor-1254	25	U	25	U	25	U	25	U				
Aroclor-1260	25	U	25	U	25	U	25	U				

* Reporting limits adjusted due to coeluting interfering peaks.

Data Qualifiers: U = Compound not detected. Value given is the lower quantification limit

TABLE 7. PESTICIDE AND PCB ANALYSIS RESULTS FOR WATER LOWER COLUMBIA RIVER RECONNAISSANCE SURVEY

COMPOUND	SAMPLE RESULTS (ug/l) W6	W14	W26	W37	W45	W52
Pesticides						
Aldrin	0.05 UR	0.05 UE	0.05 U	0.05 U	0.05 U	0.05 U
alpha-BHC	0.05 UR	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
beta-BHC	0.05 UR	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
delta-BHC	0.05 UR	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
gamma-BHC	0.05 UR	0.05 UE	0.05 U	0.05 U	0.05 U	0.05 U
Chlordane	0.05 UR	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
4,4'-DDD	0.05 UR	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
4,4'-DDE	0.05 UR	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
4,4'-DDT	0.05 UR	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Dieldrin	0.06 UR	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Endosulfan I	0.05 UR	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Endosulfan II	0.05 UR	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Endosulfan sulfate	0.05 UR	0.05 U	0.05 UE	0.05 U	0.05 U	0.05 UE
Endrin	0.05 UR	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Endrin aldehyde	0.07 UR	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Heptachlor	0.05 UR	0.05 UE	0.05 U	0.05 U	0.05 U	0.05 U
Heptachlor epoxide	0.05 UR	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Methoxychlor	0.05 UR	0.05 U	0.05 UE	0.05 U	0.05 U	0.05 UE
Toxaphene	5 UR	5 U	5 U	5 U	5 U	5 U
Dacthal	0.05 UR	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Dicofal	0.5 UR	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Malathion	0.05 UR	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Methyl parathion	0.05 UR	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Mirex	0.05 UR	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
o,p-DDE	0.05 UR	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
o,p-DDD	0.05 UR	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
o,p-DDT	0.05 UR	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Parathion	0.05 UR	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
PCBs						
Aroclor-1016	0.5 UR	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Aroclor-1221	0.5 UR	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Aroclor-1232	0.5 UR	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Aroclor-1242	0.5 UR	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Aroclor-1248	0.5 UR	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Aroclor-1254	0.5 UR	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Aroclor-1260	0.5 UR	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U

Data Qualifiers:

U = Compound was not detected.
E = Estimated value
R = Data are unusable

TABLE 8. PESTICIDE AND PCB ANALYSIS RESULTS FOR TISSUE
LOWER COLUMBIA RIVER RECONNAISSANCE SURVEY

COMPOUND	SAMPLE RESULTS (STURGEON) (ug/kg) ST-1-2-D		ST-1-3		ST-1-4		ST-1-5		ST-1-6		ST-2-1-D		ST-2-2-D		ST-2-3	
Pesticides																
Aldrin	3	U	3	U	3	U	3	U	3	U	3	U	3	U	3	U
alpha-BHC	3	U	3	U	3	U	3	U	3	U	3	U	3	U	3	U
beta-BHC	3	U	3	U	3	U	3	U	3	U	3	U	3	U	3	U
delta-BHC	3	U	3	U	3	U	3	U	3	U	3	U	3	U	3	U
gamma-BHC	3	U	3	U	3	U	3	U	3	U	3	U	3	U	3	U
Chlordane	3	U	3	U	3	U	3	U	3	U	3	U	3	U	3	U
4,4'-DDD	3	U	11		3	U	3	U	3	U	3	U	3	U	3	U
4,4'-DDE	9.9		51		5.5		5.4		11		6.6		3	U	3.9	
4,4'-DDT	3	U	3.5		3	U	3	U	3	U	14		3	U	3	U
Dieldrin	3	U	3		3	U	3	U	3	U	3	U	3	U	3	U
Endosulfan I	3	U	4.9		3	U	3	U	3	U	3	U	3	U	3	U
Endosulfan II	3	U	4*	UE	3	U	3	U	3	U	3	U	3	U	3	U
Endosulfan sulfate	3	U	3	U	3	U	3	U	3	U	3	U	3	U	3	U
Endrin	3	U	3	U	3	U	3	U	3	U	3	U	3	U	3	U
Endrin aldehyde	3	U	3	U	3	U	3	U	3	U	3	U	3	U	3	U
Heptachlor	3	U	3	U	3	U	3	U	3	U	3	U	3	U	3	U
Heptachlor epoxide	3	U	3	U	3	U	3	U	3	U	3	U	3	U	3	U
Methoxychlor	30	U	50	E	30	U	30	U	30	U	30	U	30	U	30	U
Toxaphene	150	U	150	U	150	U	150	U	150	U	150	U	150	U	150	U
Dacthal	3	U	3	U	3	U	3	U	3	U	3	U	3	U	3	U
Dicofal	30	U	30	U	30	U	30	U	30	U	30	U	30	U	30	U
Malathion	3	U	3	U	3	U	3	U	3	U	3	U	3	U	3	U
Methyl parathion	3	U	16		3	U	3	U	5*	U	20*	U	3	U	3	U
Mirex	3	U	3	U	3	U	3	U	3	U	3	U	3	U	3	U
o,p-DDE	3	U	3	U	3	U	3	U	3	U	3	U	3	U	3	U
o,p-DDD	3	U	3	U	3	U	3	U	3	U	3	U	3	U	3	U
o,p-DDT	3	U	3	U	3	U	3	U	3	U	3	U	3	U	3	U
Parathion	3	U	3	U	3	U	3	U	3	U	3	U	3	U	3	U
PCBs																
Aroclor-1016	50	U	50	U	50	U	50	U	50	U	50	U	50	U	50	U
Aroclor-1221	50	U	50	U	50	U	50	U	50	U	50	U	50	U	50	U
Aroclor-1232	50	U	50	U	50	U	50	U	50	U	50	U	50	U	50	U
Aroclor-1242	50	U	50	U	50	U	50	U	50	U	50	U	50	U	50	U
Aroclor-1248	50	U	50	U	50	U	50	U	50	U	50	U	50	U	50	U
Aroclor-1254	50	U	50	U	50	U	50	U	50	U	50	U	50	U	50	U
Aroclor-1260	50	U	50	U	50	U	50	U	50	U	50	U	50	U	50	U

* Reporting limits adjusted due to coeluting interfering peaks.

Data Qualifiers: U = Compound not detected. Value given is the lower quantification limit
E = Estimated value

Table 8 (cont.)

COMPOUND	SAMPLE RESULTS (STURGEON) (µg/kg) ST-2-4		ST-3-1-D		ST-3-3-D		ST-3-4		ST-3-6		ST-4-1-D		ST-4-2		ST-4-3-D	
Pesticides																
Aldrin	3	U	3	U	3	U	3	U	3	U	3	U	3	U	3	U
alpha-BHC	3	U	3	U	3	U	3	U	3	U	3	U	3	U	3	U
beta-BHC	3	U	3	U	3	U	3	U	3	U	3	U	3	U	3	U
delta-BHC	3	U	3	U	3	U	3	U	3	U	3	U	3	U	3	U
gamma-BHC	3	U	3	U	3	U	3	U	3	U	4*	U	3	U	3	U
Chlordane	3	U	3	U	3	U	3	U	3	U	3	U	3	U	3	U
4,4'-DDD	3	U	16*	U	6*	U	7*	U	3	U	3	U	3	U	6.5	
4,4'-DDE	3	U	24*	U	50		50	E	16		5.8		21		34	
4,4'-DDT	3	U	9*	U	8.6	E	8	E	3	U	3.1		16		5.3	
Dieldrin	3	U	12	E	5.4	E	4.1	E	3	U	3	U	4*	U	3	U
Endosulfan I	3	U	4*	U	3	U	3	U	3	U	3	U	3	U	3	U
Endosulfan II	3	U	3	U	3	U	3	U	3	U	3	U	3	U	3	U
Endosulfan sulfate	3	U	3	U	4*	U	5.5		3	U	3	U	3	U	3	UE
Endrin	3	U	30*	U	5.1	E	3.2	E	3	U	3	U	3	U	3	U
Endrin aldehyde	3	U	6*	U	7	E	8.4	E	3.7	U	3	U	3	U	3	U
Heptachlor	3	U	3	U	3	U	3	U	3	U	3	U	3	U	3	U
Heptachlor epoxide	3	U	3	U	3	U	3	U	3	U	3	U	3	U	3	U
Methoxychlor	30	U	180	E	30	U	30	U	30	U	30	U	50		30	UE
Toxaphene	150	U	150	U	150	U	150	U	150	U	150	U	150	U	150	U
Dacthal	3	U	3	U	3	U	3	U	3	U	3	U	3	U	3	U
Dicofal	30	U	30	U	30	U	30	U	30	U	30	U	30	U	30	U
Malathion	3	U	3	U	3	U	3	U	3	U	3	U	3	U	3	U
Methyl parathion	3	U	10*	U	3	U	5*	U	3	U	3	U	3	U	10	
Mirex	3	U	3	U	3	U	3	U	3	U	3	U	3	U	3	U
o,p-DDE	3	U	14	E	3	U	3	U	3	U	3	U	3	U	3	U
o,p-DDD	3	U	3	U	3	U	9.1	E	3	U	3	U	5.4		3	U
o,p-DDT	3	U	30	E	3	U	3	U	3	U	3	U	3	U	3	U
Parathion	3	U	3	U	3	U	3	U	3	U	3	U	3	U	3	U
PCBs																
Aroclor-1016	50	U	50	U	50	U	50	U	50	U	50	U	50	U	50	U
Aroclor-1221	50	U	50	U	50	U	50	U	50	U	50	U	50	U	50	U
Aroclor-1232	50	U	50	U	50	U	50	U	50	U	50	U	50	U	50	U
Aroclor-1242	50	U	50	U	50	U	50	U	50	U	50	U	50	U	50	U
Aroclor-1248	50	U	50	U	50	U	50	U	50	U	50	U	50	U	50	U
Aroclor-1254	50	U	500		96		150		57		50	U	50	U	50	U
Aroclor-1260	50	U	50	U	50	U	50	U	50	U	50	U	50	U	50	U

* Reporting limits adjusted due to coeluting interfering peaks.

Data Qualifiers: U = Compound not detected. Value given is the lower quantification limit

E = Estimated value due to coeluting peak present in Aroclor 1254

Table 8 (cont.)

COMPOUND	SAMPLE RESULTS (ug/kg) STURGEON ST-4-4		STURGEON ST-1-5-dup		CRAYFISH D6		CRAYFISH D8		CRAYFISH D10		CRAYFISH D12		CRAYFISH D15		CRAYFISH D16	
Pesticides																
Aldrin	3	U	3	U	3	U	3	U	3	U	3	U	3	U	3	U
alpha-BHC	3	U	3	U	3	U	3	U	3	U	3	U	3	U	3	U
beta-BHC	3	U	3	U	3	U	3	U	3	U	3	U	3	U	5.6	
delta-BHC	3	U	3	U	3	U	3	U	3	U	3	U	3	U	3	U
gamma-BHC	3	U	3	U	3	U	3	U	3	U	3	U	3	U	3	U
Chlordane	3	U	3	U	3	U	3	U	3	U	3	U	3	U	3	U
4,4'-DDD	11		3	U	3	U	5*	U	9.9		3	U	9.6		3	U
4,4'-DDE	48		5.8		4.7		5.4		8.5		3.3		6.8		3.4	
4,4'-DDT	5.8		3	U	3	U	3	U	3	U	3	U	3	U	3	U
Dieldrin	3.1		3	U	3	U	3	U	3	U	3	U	3	U	3	U
Endosulfan I	3	U	3	U	3	U	3	U	3	U	3	U	3	U	3	U
Endosulfan II	5*	U	3	U	3	U	3	U	3	U	3	U	3	U	3	U
Endosulfan sulfate	3	UE	3	U	3	UE	3	UE	3	UE	3	UE	3	UE	3	E
Endrin	3	U	3	U	3	U	3	U	3	U	3	U	3	U	3	U
Endrin aldehyde	3	U	3	U	3	U	3	U	3	U	3	U	3	U	3	U
Heptachlor	3	U	3	U	3	U	3	U	3	U	3	U	3	U	3	U
Heptachlor epoxide	3	U	3	U	3	U	3	U	3	U	3	U	3	U	3	U
Methoxychlor	30	UE	30	U	30	UE	30	UE	30	UE	30	UE	32	E	30	UE
Toxaphene	150	U	150	U	150	U	150	U	150	U	150	U	150	U	150	U
Dacthal	3	U	3	U	3	U	3	U	3	U	3	U	3	U	3	U
Dicofal	30	U	30	U	30	U	30	U	30	U	30	U	30	U	30	U
Malathion	3	U	3	U	3	U	3	U	3	U	3	U	3	U	3	U
Methyl parathion	22		3	U	38		3	U	3	U	3	U	3	U	10	
Mirex	3	U	3	U	3	U	3	U	3	U	3	U	3	U	3	U
o,p-DDE	3	U	3	U	3	U	3	U	3	U	3	U	3	U	3	U
o,p-DDD	3	U	4*	U	3	U	3	U	3	U	3	U	3	U	3	U
o,p-DDT	3	U	3	U	3	U	3	U	3	U	3	U	3	U	3	U
Parathion	3	U	3	U	3	U	3	U	3	U	3	U	3	U	3	U
PCBs																
Aroclor-1016	50	U	50	U	50	U	50	U	50	U	50	U	50	U	50	U
Aroclor-1221	50	U	50	U	50	U	50	U	50	U	50	U	50	U	50	U
Aroclor-1232	50	U	50	U	50	U	50	U	50	U	50	U	50	U	50	U
Aroclor-1242	50	U	50	U	50	U	50	U	50	U	50	U	50	U	50	U
Aroclor-1248	50	U	50	U	50	U	50	U	50	U	50	U	50	U	50	U
Aroclor-1254	50	U	50	U	50	U	50	U	50	U	50	U	50	U	50	U
Aroclor-1260	50	U	50	U	50	U	50	U	50	U	50	U	50	U	50	U

* Reporting limits adjusted due to coeluting interfering peaks.

Data Qualifiers: U = Compound not detected. Value given is the lower quantification limit
E = Estimated value

Table 8 (cont.)

COMPOUND	SAMPLE RESULTS (CRAYFISH) (ug/kg) D19		D20		D22		D23		D24		D26		D28		D29	
Pesticides																
Aldrin	3	U	3	U	3	UE	3	UE	3	UE	3	UE	3	U	3	U
alpha-BHC	3	U	3	U	3	U	3	U	3	U	3	U	3	U	3	U
beta-BHC	3	U	3	U	3	U	3	U	3	U	3	U	3	U	3	U
delta-BHC	3	U	3	U	3	UE	3	UE	3	UE	3	UE	3	U	3	U
gamma-BHC	3	U	3	U	3	U	3	U	3	U	3	U	3	U	3	U
Chlordane	3	U	3	U	3	U	3	U	3	U	3	U	3	U	3	U
4,4'-DDD	3	U	3	U	3	U	3	U	3	U	3	U	3	U	8*	U
4,4'-DDE	9.8		11		7.2		14		8.7		7.8		3	U	11	
4,4'-DDT	3	U	3		3	U	3	U	3	U	3	U	3	U	3	U
Dieldrin	3	U	3	U	3	UE	3	UE	3	UE	3	UE	3	U	3	U
Endosulfan I	3	U	3	U	3	UE	3	UE	3	UE	3	UE	3	U	3	U
Endosulfan II	3	U	3	U	3	U	3	U	3	U	3	U	3	U	7.6	
Endosulfan sulfate	3	UE	3	UE	3	U	3	U	3	U	3	U	3	U	3	UE
Endrin	3	U	3	U	3	U	3	U	3	U	3	U	3	U	4*	U
Endrin aldehyde	3	U	3	U	3	UE	3	UE	3	UE	3	UE	3	U	3	U
Heptachlor	3	U	3	U	3	U	3	U	3	U	3	U	3	U	3	U
Heptachlor epoxide	3	U	3	U	3	UE	3	UE	3	UE	3	UE	3	U	3	U
Methoxychlor	30	UE	30	UE	30	U	40*	U	34		30	U	30	U	30	UE
Toxaphene	150	U	150	U	150	U	150	U	150	U	150	U	150	U	150	U
Dacthal	3	U	3	U	3	U	3	U	3	U	3	U	3	U	3	U
Dicofal	30	U	30	U	30	U	30	U	30	U	30	U	30	U	30	U
Malathion	3	U	3	U	3	U	3	U	3	U	3	U	3	U	3	U
Methyl parathion	3	U	3	U	3	U	7*	U	17		3	U	3	U	8*	U
Mirex	3	U	3	U	3	U	3	U	3	U	3	U	3	U	3	U
o,p-DDE	3	U	3	U	3	U	3	U	3	U	3	U	3	U	3	U
o,p-DDD	3	U	3	U	3	U	3	U	3	U	3	U	3	U	3	U
o,p-DDT	3	U	3	U	3	U	3		3	U	3	U	3	U	3	U
Parathion	3	U	3	U	3	U	3	U	3	U	3	U	3	U	3	U
PCBs																
Aroclor-1016	50	U	50	U	50	U	50	U	50	U	50	U	50	U	50	U
Aroclor-1221	50	U	50	U	50	U	50	U	50	U	50	U	50	U	50	U
Aroclor-1232	50	U	50	U	50	U	50	U	50	U	50	U	50	U	50	U
Aroclor-1242	50	U	50	U	50	U	50	U	50	U	50	U	50	U	50	U
Aroclor-1248	50	U	50	U	50	U	50	U	50	U	50	U	50	U	50	U
Aroclor-1254	50	U	50	U	50	U	50	U	50	U	50	U	50	U	50	U
Aroclor-1260	50	U	50	U	50	U	50	U	50	U	50	U	50	U	50	U

* Reporting limits adjusted due to coeluting interfering peaks.

Data Qualifiers: U = Compound not detected. Value given is the lower quantification limit
E = Estimated value

Table 8 (cont.)

COMPOUND	SAMPLE RESULTS (ug/kg) CRAYFISH D31		D35		D38		D40		SUCKER D6S		D8S		D10S		D12S	
Pesticides																
Aldrin	3	U	3	U	3	U	3	U	3	U	3	UR	3.9		5.6	
alpha-BHC	3	U	3	U	3	U	3	U	3	U	3	UR	5*	U	10*	U
beta-BHC	3	U	3	U	4.1		3	U	3	U	3	UR	3	U	3	U
delta-BHC	3	U	3	U	3	U	3	U	3	U	3	UR	3	U	3	U
gamma-BHC	3	U	3	U	3	U	3	U	3	U	3	UR	3	U	3	U
Chlordane	3	U	3	U	3	U	3	U	3	U	3	UR	3	U	3	U
4,4'-DDD	3	U	7*	U	3	U	3	U	5*	U	5.6	R	23	E	7*	U
4,4'-DDE	17		3	U	17		6.1		3	U	26	R	59*	U	45*	U
4,4'-DDT	3	U	4*	U	3	U	3	U	4.5	E	3	UR	11	E	3	U
Dieldrin	6.6		3	U	3	U	3	U	3	U	3	UR	3	U	3	U
Endosulfan I	3	U	3	U	3	U	3	U	3	U	3	UR	3.3		3	U
Endosulfan II	3	U	4*	U	3	U	3	U	3	U	3	UR	3	U	3	U
Endosulfan sulfate	3	U	3	U	3	UE	3	UE	3	U	3	UR	3	U	6*	U
Endrin	3	U	3	U	3	U	3	U	3	U	3	UR	4*	U	3	U
Endrin aldehyde	3	U	3	U	3	U	3	U	3	U	3	UR	4*	U	4.2	
Heptachlor	3	U	3	U	4.5		3	U	3	U	3	UR	3	U	3	U
Heptachlor epoxide	3	U	3	U	3	U	3	U	3	U	3	UR	3	U	3	U
Methoxychlor	30	U	30	U	30	UE	30	UE	30	U	30	UR	30	U	30	U
Toxaphene	150	U	150	U	150	U	150	U	150	U	150	UR	150	U	150	U
Dacthal	3	U	3	U	3	U	3	U	3	U	3	UR	3	U	3	U
Dicofal	30	U	30	U	30	U	30	U	30	U	30	UR	30	U	30	U
Malathion	3	U	3	U	3	U	3	U	3	U	3	UR	3	U	3	U
Methyl parathion	3	U	4*	U	3	U	3	U	6*	U	5*	UR	16*	U	12*	U
Mirex	3	U	3	U	3	U	3	U	3	U	3	UR	3	U	3	U
o,p-DDE	3	U	3	U	3	U	3	U	4*	U	3	UR	4*	U	3	U
o,p-DDD	3	U	3	U	3	U	3	U	3	U	3	UR	3	U	3	U
o,p-DDT	3	U	3	U	3	U	3	U	3	U	3	UR	3	U	3	U
Parathion	3	U	3	U	3	U	3	U	6*	U	7.8	R	3	U	3	U
PCBs																
Aroclor-1016	50	U	50	U	50	U	50	U	50	U	50	UR	50	U	50	U
Aroclor-1221	50	U	50	U	50	U	50	U	50	U	50	UR	50	U	50	U
Aroclor-1232	50	U	50	U	50	U	50	U	50	U	50	UR	50	U	50	U
Aroclor-1242	50	U	50	U	50	U	50	U	50	U	50	UR	50	U	50	U
Aroclor-1248	50	U	50	U	50	U	50	U	50	U	50	UR	50	U	50	U
Aroclor-1254	50	U	50	U	50	U	50	U	110		70	R	210		110	
Aroclor-1260	50	U	50	U	50	U	50	U	50	U	50	UR	50	U	50	U

* Reporting limits adjusted due to coeluting interfering peaks.

Data Qualifiers: U = Compound not detected. Value given is the lower quantification limit
E = Estimated value

Table 8 (cont.)

COMPOUND	SAMPLE RESULTS (SUCKER) (ug/kg) D15S		D16S		D19S		D20S		D22S		D23S		D24S		D26S	
Pesticides																
Aldrin	3	U	3	U	3	U	3	U	3	U	3	U	3	U	3	U
alpha-BHC	7*	U	3	U	8*	U	3	U	3	U	3		9*	U	3.7	
beta-BHC	8*	U	3	U	8*	U	3	U	3	U	3	U	3	U	3	U
delta-BHC	3	U	3	U	3	U	3	U	3	U	3	U	3	U	3	U
gamma-BHC	3	U	5.6		7.7		3	U	3	U	3	U	3.1	E	3	U
Chlordane	3	U	3	U	3	U	3	U	3	U	3	U	3	U	3	U
4,4'-DDD	24	E	13	E	16	E	13	E	8.7	E	23	E	21	E	30	E
4,4'-DDE	45*	U	70*	U	38*	U	60*	U	45*	U	63*	U	53*	U	62*	U
4,4'-DDT	16		4.2	E	4*	U	5.8	E	6.1	E	11	E	9.6*	E	13	E
Dieldrin	3	U	3	U	3	U	3	U	3	U	4*	U	3	U	4.5	
Endosulfan I	3	U	3	U	3	U	3	U	3	U	3	U	3	U	3	U
Endosulfan II	3	U	3	U	3	U	3	U	3	U	3	U	3	U	3	U
Endosulfan sulfate	3	U	3	U	3	U	3	U	3	U	3	U	3	U	3	U
Endrin	6*	U	3	U	3	U	6*	U	3	U	12		6*	U	8*	U
Endrin aldehyde	4*	U	3	U	3	U	3	U	3	U	4*	U	3	U	3	U
Heptachlor	3	U	3	U	3	U	3	U	3	U	3	U	3	U	3	U
Heptachlor epoxide	3	U	3	U	3	U	3	U	3	U	3	U	3	U	3	U
Methoxychlor	65		30	U	30	U	30	U	30	U	30	U	30	U	30	U
Toxaphene	150	U	150	U	150	U	150	U	150	U	150	U	150	U	150	U
Dacthal	3	U	3	U	3	U	3	U	3	U	3	U	3	U	3	U
Dicofal	30	U	30	U	30	U	30	U	30	U	30	U	30	U	30	U
Malathion	3	U	3	U	3	U	3	U	3	U	3	U	3	U	3	U
Methyl parathion	9*	U	7*	U	3	U	16*	U	5*	U	3	U	3	U	3	U
Mirex	3	U	3	U	3	U	3	U	3	U	3	U	3	U	3	U
o,p-DDE	24		10		23		3	U	14		21		5.5	E	8*	U
o,p-DDD	24		3	U	3	U	3	U	24		24		3	U	3	U
o,p-DDT	3	U	3	U	15*	U	3	U	3	U	5*	U	3	U	3	U
Parathion	3	U	7.5		3	U	15		3	U	3	U	3	U	3	U
PCBs																
Aroclor-1016	50	U	50	U	50	U	50	U	50	U	50	U	50	U	50	U
Aroclor-1221	50	U	50	U	50	U	50	U	50	U	50	U	50	U	50	U
Aroclor-1232	50	U	50	U	50	U	50	U	50	U	50	U	50	U	50	U
Aroclor-1242	50	U	50	U	50	U	50	U	50	U	50	U	50	U	50	U
Aroclor-1248	50	U	50	U	50	U	50	U	50	U	50	U	50	U	50	U
Aroclor-1254	66		76		63		130		61		160		120		150	
Aroclor-1260	50	U	50	U	50	U	50	U	50	U	50	U	50	U	50	U

* Reporting limits adjusted due to coeluting interfering peaks.

Data Qualifiers: U = Compound not detected. Value given is the lower quantification limit
E = Estimated value

Table 8 (cont.)

COMPOUND	SAMPLE RESULTS (ug/kg) SUCKER D28S		D29S		D31S		D35S		D38S		D40S		CARP D23C		D24C	
Pesticides																
Aldrin	3	U	3	U	3	U	3	U	3	U	3		3	U	3	U
alpha-BHC	3	U	3	U	3	U	3	U	3	U	3	U	3	U	3	U
beta-BHC	3	U	4.1		3	U	3	U	3	U	3	U	3	U	3	U
delta-BHC	3	U	3	U	3	U	3	U	3	U	3	U	3	U	3	U
gamma-BHC	3	U	3	U	3	U	3	U	3	U	3	U	3	U	3	U
Chlordane	3	U	3	U	3	U	3	U	3	U	3	U	3	U	3	U
4,4'-DDD	18	E	6.1	E	26	E	8.5	E	24	E	18	E	7.6	E	4.4	E
4,4'-DDE	57*	U	45*	U	61*	U	50*	U	5*	U	50*	U	18	E	21	E
4,4'-DDT	5.1	E	4	E	12*	U	3.9	E	5.2	E	7.5	E	3	U	3	U
Dieldrin	3	U	3	U	3	U	3	U	4*	U	3	U	3	U	3	U
Endosulfan I	3	U	3	U	3	U	3	U	3	U	3	U	3	U	3	U
Endosulfan II	3	U	3	U	3	U	3	U	3	U	3	U	3	U	3	U
Endosulfan sulfate	3	U	3	U	6*	U	3.5		3	U	3	U	3	U	3	U
Endrin	3	U	6.7		3	U	3	U	3	U	3	U	3	U	3	U
Endrin aldehyde	3	U	3	U	3	U	3	U	3	U	3	U	3	U	3	U
Heptachlor	3	U	3	U	3	U	3	U	3	U	3	U	3	U	3	U
Heptachlor epoxide	3	U	3	U	3	U	3	U	3	U	3	U	3	U	3	U
Methoxychlor	30	U	30	U	30	U	30	U	30	U	30	U	30	U	30	U
Toxaphene	150	U	150	U	150	U	150	U	150	U	150	U	150	U	150	U
Dacthal	3	U	3	U	3	U	3	U	3	U	3	U	3	U	3	U
Dicofal	30	U	30	U	30	U	30	U	30	U	30	U	30	U	30	U
Malathion	3	U	3	U	3	U	3	U	3	U	3	U	3	U	3	U
Methyl parathion	3	U	3	U	3	U	6*	U	5*	U	10*	U	3	U	3	U
Mirex	3	U	3	U	3	U	3	U	3	U	3	U	3	U	3	U
o,p-DDE	16		14		42		3	U	3	U	3	U	3	U	3	U
o,p-DDD	8*	U	24		29		18		3	U	3	U	3	U	3	U
o,p-DDT	5*	U	6*	U	10*	U	3	U	3	U	3	U	4*	U	8*	U
Parathion	3	U	3	U	3	U	3	U	3	U	3	U	3	U	3	U
PCBs																
Aroclor-1016	50	U	50	U	50	U	50	U	50	U	50	U	50	U	50	U
Aroclor-1221	50	U	50	U	50	U	50	U	50	U	50	U	50	U	50	U
Aroclor-1232	50	U	50	U	50	U	50	U	50	U	50	U	50	U	50	U
Aroclor-1242	50	U	50	U	50	U	50	U	50	U	50	U	50	U	50	U
Aroclor-1248	50	U	50	U	50	U	50	U	50	U	50	U	50	U	50	U
Aroclor-1254	380		160		210		55		130		50	U	50	U	50	U
Aroclor-1260	50	U	50	U	50	U	50	U	50	U	130		69		62	

* Reporting limits adjusted due to coeluting interfering peaks.

Data Qualifiers: U = Compound not detected. Value given is the lower quantification limit
E = Estimated value

Table 8 (cont.)

COMPOUND	SAMPLE RESULTS (ug/kg) CARP D26C		D28C		D29C		D31C		D35C		D38C		D40C		PEA-MOUTH D3P	
Pesticides																
Aldrin	4*	U	3	U	9.6		4*	U	3	U	3	U	3	U	25	U
alpha-BHC	3	U	3	U	3	U	3	U	3	U	3	U	3	U	25	U
beta-BHC	3	U	3	U	3	U	3	U	3	U	3	U	3	U	100*	U
delta-BHC	3	U	3	U	3	U	3	U	3	U	3	U	3	U	40*	U
gamma-BHC	3.5		3	U	3	U	3	U	3	U	3	U	3	U	40*	U
Chlordane	3	U	3	U	3	U	3	U	3	U	3	U	3	U	25	U
4,4'-DDD	23	E	3.5	E	3	U	7*	U	3	U	4.9	E	14	E	50*	U
4,4'-DDE	3	U	37	E	22		91	E	38		88		40*	U	270	E
4,4'-DDT	11	E	3	U	3.5	E	7	E	3	U	5.3	E	3.5	E	25	U
Dieldrin	10*	U	3	U	3	U	5.6	E	3	U	3.6	E	3	U	40*	U
Endosulfan I	3	U	3	U	3	U	3	U	3	U	3	U	3	U	45	
Endosulfan II	3	U	3	U	3	U	3	U	3	U	3	U	3	U	25	U
Endosulfan sulfate	3	U	3	U	3	U	3	U	3	U	3	U	3	U	25	U
Endrin	12*	U	3	U	3	U	3	U	3	U	3.9	E	3	U	25	UE
Endrin aldehyde	5*	U	3	U	3	U	3	U	3	U	3	U	3	U	40*	U
Heptachlor	3	U	3	U	3	U	3	U	3	U	3	U	3	U	25	U
Heptachlor epoxide	4*	U	3	U	3	U	3	U	3	U	3	U	3	U	25	U
Methoxychlor	30	U	30	U	30	U	30	U	30	U	30	U	30	U	250	U
Toxaphene	150	U	150	U	150	U	150	U	150	U	150	U	150	U	1500	U
Dacthal	4*	U	3	U	3	U	3	U	3	U	3	U	3	U	25	U
Dicofal	30	U	30	U	30	U	30	U	30	U	30	U	30	U	250	U
Malathion	4*	U	3	U	3	U	3	U	3	U	3	U	6*	U	25	U
Methyl parathion	3	U	3	U	3	U	3	U	4*	U	3	U	10*	U	25	U
Mirex	8.8		3	U	3	U	3	U	3	U	3	U	3	U	25	U
o,p-DDE	17		11	E	4*	U	11	E	3	U	4*	U	3	U	47	E
o,p-DDD	20*	U	3	U	3.3	E	3	U	3	U	3	U	6	U	49	
o,p-DDT	3	U	6.9	E	3	U	3	U	3	U	4*	U	3	U	25	U
Parathion	3	U	3	U	3	U	3	U	3	U	3	U	3	U	26	E
PCBs																
Aroclor-1016	50	U	50	U	50	U	50	U	50	U	50	U	50	U	50	U
Aroclor-1221	50	U	50	U	50	U	50	U	50	U	50	U	50	U	50	U
Aroclor-1232	50	U	50	U	50	U	50	U	50	U	50	U	50	U	50	U
Aroclor-1242	50	U	50	U	50	U	50	U	50	U	50	U	50	U	99	
Aroclor-1248	50	U	50	U	50	U	50	U	50	U	50	U	50	U	50	U
Aroclor-1254	50	U	270		190		260		60		110		50	U	50	U
Aroclor-1260	80*		50	U	50	U	50	U	50	U	50	U	110		280	

* Reporting limits adjusted due to coeluting interfering peaks.

** Acid cleanup performed for Aroclor 1260 quantitation to eliminate matrix interferences

Data Qualifiers: U = Compound not detected. Value given is the lower quantification limit

E = Estimated value

Table 8 (cont.)

COMPOUND	SAMPLE RESULTS (PEAMOUTH) (ug/kg) D10P	D12P	D15P	D16P	D19P	D21P	D23P	D24P
Pesticides								
Aldrin	25 UE	3 U	11	3.7	67 U	42	25 U	25 U
alpha-BHC	25 UE	3 U	3 U	3 U	25 U	25 U	25 U	25 U
beta-BHC	40* UE	13	3 U	25* U	25 U	150	160* U	50* U
delta-BHC	25 UE	3 U	3 U	9* U	25 U	25 U	25 U	25 U
gamma-BHC	25 UE	3 U	14	3 U	40* U	40* U	25 U	25 U
Chlordane	25 UE	3 U	3 U	3 U	25 U	25 U	25 U	25 U
4,4'-DDD	30* UE	3 U	38	3 U	38	30* U	72	30* U
4,4'-DDE	55* UE	3 U	83	3 U	140 E	170 E	200 E	480 E
4,4'-DDT	25 UE	3 U	3 U	3 U	25 U	25 U	25 U	25 U
Dieldrin	25 UE	3 U	3 U	3 U	25 U	35	32	25 U
Endosulfan I	25 UE	3 U	5* U	3 U	60* U	69	85	25 U
Endosulfan II	25 UE	3 U	3 U	3 U	25 U	25 U	25 U	25 U
Endosulfan sulfate	25 UE	3 U	3 U	3 U	25 U	25 U	25 U	25 U
Endrin	25 UE	3 UE	3 U	3 U	25 UE	25 UE	25 UE	25 UE
Endrin aldehyde	25 UE	3 U	3 U	3 U	30* U	40	25 U	25 U
Heptachlor	25 UE	3 U	3 U	8* U	25 U	25 U	25 U	25 U
Heptachlor epoxide	25 UE	3 U	3 U	3 U	25 U	25 U	25 U	25 U
Methoxychlor	250 UE	30 U	30 U	30 U	250 U	250 U	250 U	250 U
Toxaphene	1500 UE	150 U	150 U	150 U	1500 U	1500 U	1500 U	1500 U
Dacthal	25 UE	3 U	3 U	13	25 U	25 U	25 U	25 U
Dicofal	250 UE	30 U	30 U	30 U	250 U	250 U	250 U	250 U
Malathion	110 E	3 U	3 U	3 U	25 U	25 U	25 U	66
Methyl parathion	25 UE	3 U	15* U	3 U	25 U	25 U	25 U	25 U
Mirex	25 UE	3 U	3 U	3 U	25 U	25 U	25 U	25 U
o,p-DDE	25 UE	3 U	3 U	3 U	25 U	25 U	25 U	25 U
o,p-DDD	25 UE	3 U	10* U	3 U	25 U	25 U	25 U	25 U
o,p-DDT	25 UE	3 U	3 U	3 U	25 U	25 U	25 U	25 U
Parathion	25 UE	3 U	3 U	3 U	35* U	25 U	25 U	25 U
PCBs								
Aroclor-1016	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U
Aroclor-1221	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U
Aroclor-1232	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U
Aroclor-1242	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U
Aroclor-1248	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U
Aroclor-1254	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U
Aroclor-1260	80	130	170	120	180	160	170	520

* Reporting limits adjusted due to coeluting interfering peaks.

Data Qualifiers: U = Compound not detected. Value given is the lower quantification limit

E = Estimated value

Table 8 (cont.)

COMPOUND	SAMPLE RESULTS (PEAMOUTH) (ug/kg) D28P								
Pesticides									
Aldrin	25	U							
alpha-BHC	25	U							
beta-BHC	25	U							
delta-BHC	25	U							
gamma-BHC	25	U							
Chlordane	25	U							
4,4'-DDD	25	U							
4,4'-DDE	82	E							
4,4'-DDT	25	U							
Dieldrin	25	U							
Endosulfan I	25	U							
Endosulfan II	25	U							
Endosulfan sulfate	25	U							
Endrin	25	UE							
Endrin aldehyde	25	U							
Heptachlor	25	U							
Heptachlor epoxide	25	U							
Methoxychlor	250	U							
Toxaphene	1500	U							
Dacthal	25	U							
Dicofal	250	U							
Malathion	25	U							
Methyl parathion	25	U							
Mirex	25	U							
o,p-DDE	25	U							
o,p-DDD	25	U							
o,p-DDT	25	U							
Parathion	25	U							
PCBs									
Aroclor-1016	50	U							
Aroclor-1221	50	U							
Aroclor-1232	50	U							
Aroclor-1242	78								
Aroclor-1248	50	U							
Aroclor-1254	50	U							
Aroclor-1260	86								

* Reporting limits adjusted due to coeluting interfering peaks.

Data Qualifiers: U = Compound not detected. Value given is the lower quantification limit
E = Estimated value

Appendix A-7

Data Validation Report
Dioxins/Furans Analyses

Site: Lower Columbia River

Sample Number: Samples D4, D5, D6, D6dup, D8, D10, D11, D14, D15, D16, D18, D19, D20, D23, D24, D26, D28, D30, D35, D38, D40, D40dup, D45 (sediment)

Samples ST-1-2-D, ST-1-3-D, ST-2-1-D, ST-2-2-D, ST-3-1-D, ST-3-3-D, ST-4-1-D, ST-4-3-D (sturgeon tissue)

Samples D24C, D28C, D35C, D38C, D40C (Carp tissue)

Samples D6S, D8S, D10S, D15S, D19S, D20S, D23S, D24S, D28S, D35S, D38S, D40S (Sucker tissue)

Samples D6, D8, D10, D15, D19, D20, D23, D24, D28, D35, D38, D40 (Crayfish tissue)

Samples D10P, D15P, D19P, D21P, D23P, D24P, D28P (Peamouth Chub tissue)

Samples collected and reported by: Tetra Tech, Inc

Samples analyzed by: Keystone/NEA Environmental Resources,Inc.

Data Reviewed by: M.R. Mulholland

INTRODUCTION

This report presents the results for the data validation review of 23 sediment samples and 44 tissue samples collected for the Lower Columbia River Reconnaissance Survey, and analyzed for dioxins and furans by Keystone/NEA Environmental Resources, Inc. Twenty of the sediment samples were field samples (Samples D4, D5, D6, D8, D10, D11, D14, D15, D16, D18, D19, D20, D23, D24, D26, D28, D30, D35, D38, and D40), one sample was a field replicate (Sample D45 for Sample D11), and two samples were laboratory duplicates (Sample D6dup and Sample D40dup). All forty-four of the tissue samples were field samples. Sediment and tissue samples were analyzed using U.S. EPA Method 1613 with some modifications made to improve the efficiency and accuracy during the data validation steps, and to reduce the occurrence of sample contamination with native 2378-TCDD. Tissue samples were analyzed using U.S. EPA Method 1613; however, extraction and sample clean-up was performed according to guidelines outlined in Method 8290 since there are no protocols in Method 1613 for the extraction of tissue samples. The modifications made by the laboratory were consistent with procedures outlined in other EPA methods (Method 8280, Method 8290, Method 23, SAS CLP work, etc.), or have been suggested by NCASI (Method 90.01). The following modifications were made:

- A reduction in the spike level of ^{37}Cl-2378-TCDD from 800 pg to 200pg, as suggested by NCASI Method 90.01. This change was made to reduce the occurrence of native contamination in the 322 channel.

- Standards used for the analyses were prepared in tetradecane in order to prevent changes in standard concentrations due to solvent losses resulting from solution with acetone.

- The acceptance criteria were simplified by adopting EPA Method 8290 acceptance criteria of $\pm$ 20% for the continuing calibration. EPA Method 1613 lists separate and different acceptance criteria for each of the seventeen native analytes, for the fifteen internal standards, and for the Clean-Up Recovery Standard. This change makes the acceptance criteria for the continuing calibration the same as the acceptance criteria for the initial calibration. This is a more conservative acceptance criteria for the seventeen native analytes and the fifteen internal standards.

- Sample specific Estimated Detection Limits (EDLs), analyte concentrations below the Lower Method Calibration Limit (LMCL), and Estimated Maximum Possible Concentrations (EMPCs) have been calculated and reported according to standard EPA methods. Method

1613 does not specify how these values should be calculated and/or reported, but instead reports only the LMCL. Additionally, analyte recoveries in the Precision and Recovery (PAR) samples are reported as the total amount of analyte recovered from the original sample, rather than as a concentration in the final extract.

Calculations and reporting of results conformed with EPA Methods. Where a peak was positively identified as one of the 2378-substituted PCDD/PCDF isomers by passing all the QA criteria (retention times, analyte isotope ratios, and signal-to-noise ratios), a concentration was calculated in the usual manner and reported. In cases where the reported concentration fell below the LMCL, the calculated values were reported. The laboratory stated, however, that these values should be considered as estimates. These data were qualified with an "S" by Tetra Tech reviewers. Where a peak passed all of the QA criteria except for the analyte isotope ratios, there may have been co-eluting contaminants or other chemical interferences. In these cases, concentrations were calculated in the usual manner, but qualified as an Estimated Maximum Possible Concentration (EMPC) by the laboratory. Tetra Tech reviewers shortened this code to an "M" qualifier. Where the chromatogram was characterized by the absence of peaks in both native channels at the appropriate retention times, or where a peak was present in one or both channels but does not pass the signal-to-noise criteria of 2.5:1, the analyte could not be positively identified and was reported by the laboratory as Not Detected (ND) at or above the sample specific Estimated Detection Limit (EDL). A data-review specialist inspected each of these chromatograms and calculated an EDL based on the reporting requirements specified in EPA Method 8290. These data were qualified by Tetra Tech reviewers with the a "U" and an "E" (appearing as "U/E") to indicate that the reported value is the EDL.

Lower and Upper Method Calibration Limits (LMCLs and UMCLs) were calculated based on a sample size of 10 g. Instrument Calibration Points vary with each homologue group. Sediment results reported for this study are based on the initial weight of the sample (20-30 g). For a 20 g sample, the LMCL for 2378-TCDD and TCDF (tetra homologue group) was 0.5 pg/g, for the penta, hexa, and hepta homologue group the LMCL for a 20 g sample was 2.5 pg/g, and for the octa homologue group the LMCL was 5.0 pg/g for a 20 g sample.

The twenty-three sediment samples were analyzed in six analytical batches. A method blank was associated with each sample batch and one or two Precision and Recovery (PAR) sample results were reported with every two sample batches. One matrix spike (MS) and matrix spike duplicate (MSD) were analyzed for sediments (Sample D16).

Of the forty-four tissue samples, eight were sturgeon, twelve were crayfish, seven were peamouth chub, five were carp, and twelve were suckers. Sturgeon samples were analyzed in two batches. A method blank was analyzed with each batch and an MS/MSD were analyzed with the second batch. Crayfish were analyzed in three batches. Three method blanks were analyzed in conjunction with these samples as well as one MS/MSD sample. Peamouth chub were analyzed in two batches. A method blank was analyzed with each batch and one MS/MSD sample was analyzed for this species. Carp were also analyzed in two sample batches. A

method blank was analyzed in association with each batch and one MS/MSD sample was analyzed for the species. Suckers were analyzed in three analytical batches. Three method blanks were associated with the twelve sucker samples and one MS/MSD spike was analyzed for the sucker matrix.

The data validation review was conducted according to guidelines presented in the U.S. EPA Functional Guidelines for Evaluating Data from IFB WA84-A002 Chemical Analytical Services for 2,3,7,8-tetrachlorodibenzo-p-dioxin (U.S. EPA 1985), procedures outlined in EPA Methods 1613 and 8290, and in consideration of laboratory evaluations of the data and analytical methods and the approved QA Plan for this project (Tetra Tech 1991).

A. HOLDING TIMES

Sediment and tissue samples were collected, placed on ice in a cooler, and transported to the laboratory within 4 days of collection. The maximum recommended holding times (time of collection to time of extraction) for dioxins and furans in sediment/soil matrices have been established as one year in Method 1613. The recommended holding time between extraction and analysis is 40 days. The maximum recommended holding times for dioxin/furan analyses in tissue matrices for Method 8290 is 30 days from collection until extraction and 45 days from collection until analysis. Table 1 presents a summary of sample numbers, dates collected, dates extracted, dates of analyses, and holding times. Recommended holding times between extraction and analysis and between collection and extraction were exceeded for some samples. However, no strict holding times have been established for these analyses. There is evidence that tissue samples held at -20°C for periods in excess of 30 days suffer no loss of analyte (EPA Method 8290). The laboratory verified that holding times for these analyses were not excessive and that loss of analyte probably would not occur at the holding times achieved for these analyses. No data qualifiers were assigned to sample results for dioxins and furans based on holding time exceedances.

B. CALIBRATION AND INSTRUMENT PERFORMANCE

All instrument calibration solutions (CS1 through CS5) were prepared and certified by an independent laboratory (Cambridge Isotope Labs), and conform to EPA Method 1613 levels.

Conventional instrument quality control measures were applied for the analysis of these samples. The High Resolution Gas Chromatographic (HRGC) and High Resolution Mass Spectrophotometrigraphic (HRMS) systems' initial calibrations were verified immediately prior to and following analysis by injection of appropriate standards. One instrument blank was run prior to the laboratory Method Blank. All relevant instrument performance criteria were met. The appropriate documentation of initial and continuing calibrations, and GC and MS resolution checks was reported by the analytical laboratory.

C. SURROGATE RECOVERIES

The spiking levels for Internal Standard, Recovery Standard, and native analytes were identical to those specified in EPA Method 1613. All field, blank, and spike samples were spiked with the isotopic compounds before analysis. Recoveries of labelled isotope are reported in Table 2.

Sediment

Percent recoveries for all isotopically labelled congeners for all analyses were within the advisory recovery limits of 25-150% for sediment specified in EPA Methods 1613, with the exception of a recovery of 152% for ^{13}C-1,2,3,4,6,7,8-HpCDD from Sample D19. This single violation was considered minor and no data qualifiers were assigned to sample results based on isotope recoveries.

Tissue

The percent recoveries of internal standards from tissue and associated QA/QC samples were within the advisory range recommended in Method 1613 with some exceptions. For sturgeon samples analyzed in the batch associated with Method Blank 1 (MB-1), the recovery of ^{13}C-2,3,4,6,7,8-HxCDF was less than 25% for the Method Blank and the five sturgeon samples analyzed with this Method Blank (Samples ST-1-2-D, ST-2-1-D, ST-2-2-D, ST-3-3-D, and ST-3-1-D). For the Matrix Spike Duplicate (MSD) for sample ST-4-1-D, four of the isotopically labelled congeners were recovered at less than 25% (^{13}C-1,2,3,4,6,7,8-HpCDD, ^{13}C-1,2,3,7,8,9-HxCDF, ^{13}C-1,2,3,4,6,7,8-HpCDF, and ^{13}C-1,2,3,4,7,8,9-HpCDF). Since the samples were non-detect for that analyte, the only effect of the low recoveries was to raise the sample specific EDLs for the corresponding native furan. For crayfish samples analyzed for dioxins and furans, only one isotopically labelled congener in one sample was outside the recommended range for this method. For the crayfish sample from station D28, the recovery of ^{13}C-1,2,3,6,7,8-HxCDF was 23%.

For peamouth samples the internal standard recoveries were within the method guidelines for all of the samples with only one exception. One analyte, ^{13}C-2,3,4,6,7,8-HxCDF had recoveries below the method guidelines in both of the method blanks. Since the corresponding analyte was non-detect in both of the method blanks, the only effect is to raise the sample specific EDL for that analyte. For carp, all of the internal standard recoveries for samples and QA samples were within the guidelines specified in Method 1613.

For suckers, the percent recovery of Internal Standard was outside the method guidelines of 25-150% for a number of individual labeled analytes within a number of samples. In all of these cases, however, the signal-to-noise ratio for the labeled internal standard exceeded the recommended ratio of 10:1 by a significant margin. Since most of the corresponding unlabeled analytes are either non-detects or are present only at levels below the Lower Method Calibration Limit (LMCL), the effect of this deviation was probably minimal.

No qualifiers were assigned to this data based on the recoveries of internal standards.

D. METHOD BLANKS

Method blank analyses were performed for each batch of samples analyzed by the laboratory to test for laboratory contamination.

Sediment

A total of six method blanks were analyzed for the six sediment sample batches analyzed. Most of the method blanks were non-detect for all of the PCDD and PCDF isomers at the LMCL for a 20 gram sample of 0.5 pg/g (tetras), 2.5 pg/g (pentas, hexas, heptas), and 5.0 pg/g (octas). Four of the method blanks (MB-1, MB-3, MB-4, and MB-6) had levels of OCDD exceeding the LMCL for a 20 gram sample. Data were not blank corrected since the source and distribution of the contamination was unknown.

Many of the analytes had sample specific EDLs significantly lower than the LMCL. Some of the analytes were present at levels significantly below the LMCL for their particular homologue group and would not normally be reported under Method 1613 but are included in this review. The total amount of a particular homologue group measured in these samples is reported with these data but these data will not undergo QA/QC review since congener-specific data is more appropriate for this type of review.

Tissue

A total of twelve method blanks were analyzed for the five species of tissue samples. Raw data for all method blanks were examined, and no indication of dioxin/furan contamination at concentrations exceeding the Lower Method Calibration Limits (LMCL) was found. Concentrations of analyte lower than the LMCL are reported where a peak was positively identified as one of the 2378-substituted PCDD/PCDF isomers by passing all of the appropriate QA criteria. These reported values should be considered estimates only. Some of the analytes were present at levels significantly below the LMCL for their particular homologue group and would not normally be reported under Method 1613 but are included in this review. Many of the analytes had sample specific EDLs significantly below their respective LMCLs. For both of the sturgeon method blanks the EDL exceeded the LMCL for 2378-TCDD and for one of the method blanks the EDL exceeded the LMCL for 234678-HxCDF. This was due to very low recovery of the internal standard for the latter analyte. No explanation was provided by the laboratory for the high EDL for 2378-TCDD. This may indicate matrix interferences and prevent the detection of analyte at or above the LMCL. The EDLs for 2378-TCDD for all of the sturgeon samples were higher than normal, thus no analyte could be detected at the LMCL.

No data qualifiers were assigned to sample results for dioxin/furan analyses based on method blank results. None of the data are blank corrected since the source and pervasiveness of contamination was not identified. Method blank data is reported in Tables 7 and 8 along with sample and QA sample results.

E. PAR SAMPLES

Sediment

A total of 5 Precision and Recovery Samples were analyzed with the sediment samples. Results are listed in Table 3. Four of the PAR samples were reported in pairs and RPDs were calculated while one of the PAR samples was reported individually. Detected levels are compared to the spiked levels, and a percent recovery of analyte is reported. Recovery for the various analytes is a measure of laboratory accuracy. Analyte recovery for the two pairs of PAR samples ranged from 84-134% and from 78-139%. Analyte recovery ranged from 93-136% for the PAR sample analyzed singly. These recoveries were within the $\pm$ 50% range recommended for spiked analyte. The relative percent difference (RPD) between the two PAR samples is a measure of laboratory precision. For one pair of PAR samples, all of the values are within 18% except for 123789-HxCDD which had an RPD of 25%. For the other pair of PAR samples, the RPDs were all less than 6% except for 123789-HxCDD which had an RPD of 39%. These RPDs were not considered excessive. These results indicated good accuracy and precision by the analytical laboratory. No data qualifiers were assigned to the data based on results from PAR samples.

F. MATRIX SPIKE/MATRIX SPIKE DUPLICATE ANALYSIS

Sediment

One MS/MSD analysis was performed on a sediment sample from Station D16. Results are presented in Table 4. The percent recovery of spiked analyte from the matrix ranged from 72-132% with one exception. The percent recovery of 123789-HxCDD was 168% and 176% for the MS and MSD, respectively. The relative percent difference between the MS and MSD recovery for spiked analytes ranged from 1.68-17.28%. Results indicate good laboratory accuracy and precision these analyses. No data qualifiers were assigned based on MS/MSD results.

Tissue

Table 4 gives the results of MS/MSD analyses for tissue samples. MS/MSD analyses with the normally spiked dioxins/furans were performed on one sample of each species for a total of five MS/MSD analyses for tissue. Sample ST-4-1-D was used for the MS/MSD analysis for sturgeon. Recoveries of analyte ranged from 21-246%. The method specifies that spike recoveries should be $\pm$ 50% for MS/MSD analyses. In the MSD, recovery of 169% was noted for 1234678-HpCDD, a recovery of 227% was obtained for OCDD, 246% recovery was measured for 1234678-HpCDF, and 21% recovery was measured for OCDF. The RPD between MS and MSD ranged from 0-140.43%. High RPD values were noted for analytes with percent recoveries higher than 150% and lower than 50%. The laboratory noted that laboratory interferences also caused many Internal Standard Recoveries to be outside the recommended

ranges for the MSD. They concluded that the results reported for the MS should be considered to be more reliable. With this qualification, none of the data were flagged based on these results.

For crayfish, MS/MSD analysis was performed on Sample D35. The percent recovery of spiked analytes in this matrix ranged from 98-179%. RPDs for this analysis ranged from 0.64-13.24% indicating good laboratory precision. Recovery of analyte was greater than 150% for 4 analytes in the MS and 2 analytes in the MSD. High recoveries (179% and 159%) for 123789-HxCDD in both the MS and MSD may indicate problems with laboratory accuracy. Other exceedances of method QA criteria were considered minor. No data qualifiers were assigned to the data based on MS/MSD analyses.

Sample D38C was used for MS/MSD analysis for the carp matrix. Percent recovery of spiked analyte ranged from 113-158%. Exceedances of the method criteria of $\pm$ 50% were considered minor. RPDs for MS and MSD analyses ranged from 0.66-6.02% indicating good laboratory precision and accuracy for this matrix. None of the carp results were qualified based on MS/MSD results.

For peamouth, sample D24P was used for the MS/MSD analysis. The percent recovery of analyte in these two samples ranged from 77-162%. For three analytes the percent recovery exceeded 150% in both the MS and MSD while for one analyte the percent recovery exceeded 150% in the MSD. These exceedances were considered minor, however, and all of the calculated RPDs were less than 10% indicating good laboratory accuracy and precision for this matrix. No data qualifiers were assigned based on these results.

For sucker, sample D38S was spiked for MS/MSD analysis. The percent recovery of spiked analyte ranged from 96-265%. Three analytes in the MS were recovered outside the method criteria of $\pm$ 50% and twelve of the analytes from the MSD were recovered at greater than 150%. The RPD between MS and MSD samples ranged from 1.85-72.49%. These results may indicate poor laboratory accuracy and precision for this matrix. The laboratory commented that the MSD sample was subject to unusual chemical contamination in all five homologue groups during the first analysis. The extract of that sample was run through an additional carbon column to remove the interferences, and analyzed a second time. The analyte concentrations and percent recoveries for the MSD sample were calculated but should be considered as estimates only due to the interference.

G. FIELD AND LABORATORY DUPLICATES

Sediment

Samples D11 and D45 were field duplicates collected at Station D11. RPDs for field duplicates ranged from 0 to 164.88% (Table 5). The high variability associated with these results may have been due to the fact that for a large number of analytes, the analyte was detected below the LMCL and the reported values should be considered as estimates. Where analytes in both

duplicates were detected at levels above the LMCL, the RPDs were less than 20%. Generally, duplicate results indicated acceptable field homogenization, storage, and handling techniques. Results of field duplicate analyses should be considered when utilizing data; however, no qualification of data is recommended based on these results (EPA 1985).

Two sediment samples were analyzed as laboratory duplicates (Sample D6 and D40). Results of duplicate analyses are presented in Table 6. The RPDs between measured concentrations of various PCDD/PCDF isomers in duplicate analyses ranged from 10.14-129.78% for Sample D40 (and D40 duplicate) and from 3.87-146.67% for Sample D6 (and D6 duplicate). High RPDs for these isomers may be due to the fact that levels of most analytes in both duplicates were detected below the LMCL. Consequently, values reported for these analytes should be considered as estimates. High RPDs for these analytes may not be indicative of poor laboratory precision for the recovery of analyte in sample matrices.

Tissue

No duplicate tissue analyses were performed.

H. OTHER

For most analytes in numerous samples, analytes were detected at levels lower than the LMCL. The level of analyte was calculated and reported for consideration; however, these values should be considered to be estimates since they are outside of the instrument calibration range. All data with reported concentrations below the LMCL for the homologue group were qualified with an "S" and should be considered to be estimated values only.

SUMMARY

All sediment and tissue sample data were reported as pg/g or parts per trillion (ppt) and are presented in Tables 7 and 8, respectively. Tissue samples are reported on a wet weight basis. The data package submitted by the laboratory contained all the required deliverables. Most of the estimated detection limits reported by the laboratory met criteria established in the QA Plan (Tetra Tech 1991) or were appropriately qualified in the case narrative supplied by the laboratory with each data submittal.

All of the data were reviewed and verified by the scientist that performed the analysis, by the Director of the Center for Analytical Mass Spectrometry, and by the Quality Assurance Officer for the laboratory. All of the quality control and sample-specific information supplied in the data package was complete and met or exceeded the minimum requirements for acceptability.

Data were qualified with an "S" qualifier if the reported level of analyte was below the LMCL for a 20g sample. These values should be considered to be estimates since they are outside of the calibration range of the instrument.

The precision, accuracy, and completeness of the volatile dioxin/furan analyses were within project guidelines and the data are considered acceptable for their intended use.

Toxicity equivalency factors specified in EPA Method 8290 were used to calculate the total Toxicity Equivalence (TEQ) for each tissue sample analyzed and for method blanks. The results of these calculations are presented in Table 9. TEQs have been used to assess risk associated with the total 2378-substituted PCDD/PCDF load borne by fish or other aquatic organisms.

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TABLE 1. DIOXIN ANALYSIS SUMMARY
LOWER COLUMBIA RIVER RECONNAISSANCE SURVEY

Tetra Tech Sample Number	Keystone/NEA Sample Number	MS File Number DB-5 Data	MS File Number DB-225 Data	Date Collected	Date Extracted	Date Analyzed DB-5 Column	Holding Time (d) Extract	Holding Time (d) Analysis
SEDIMENT								
D4	91TT09OC01-04	04DEC91LCB2081	11DEC91LCB4041	10/8/91	10/14/91	12/4/91	6	57
D5	91TT15OC01-01	13DEC91LCB2091	12DEC91LCB3011	10/11/91	10/17/91	12/13/91	6	63
D6	91TT15OC01-03	13DEC91LCB2111	12DEC91LCB3031	10/10/91	10/17/91	12/13/91	7	64
D6Dup	91TT15OC01-03d	13DEC91LCB2121	12DEC91LCB3041	10/10/91	10/17/91	12/13/91	7	64
D8	91TT15OC01-02	13DEC91LCB2101	12DEC91LCB3021	10/12/91	10/17/91	12/13/91	5	62
D10	91TT09OC01-02	04DEC91LCB2091	11DEC91LCB4051	10/7/91	10/14/91	12/4/91	7	58
D11	91TT09OC01-03	04DEC91LCB2101	11DEC91LCB4061	10/7/91	10/14/91	12/4/91	7	58
D14	91TT08OC01-01	16DEC91LCB3081	12DEC91LCB4011	10/6/91	10/17/91	12/16/91	11	71
D15	91TT08OC01-02	16DEC91LCB3091	12DEC91LCB4021	10/5/91	10/17/91	12/16/91	12	72
D16	91TT08OC01-03	16DEC91LCB3101	12DEC91LCB4031	10/4/91	10/17/91	12/16/91	13	73
D16MS	91TT08OC01-03MS	16DEC91LCB3111	12DEC91LCB4041	10/4/91	10/17/91	12/16/91	13	73
D16MSDup	91TT08OC01-03MSd	16DEC91LCB3121	12DEC91LCB4051	10/4/91	10/17/91	12/16/91	13	73
D18	91TT08OC01-04	16DEC91LCB3021	12DEC91LCB4061	10/3/91	10/15/91	12/16/91	12	74
D19	91TT08OC01-05	16DEC91LCB3031	12DEC91LCB4071	10/3/91	10/15/91	12/16/91	12	74
D20	91TT08OC01-06	16DEC91LCB3041	12DEC91LCB4081	10/2/91	10/15/91	12/16/91	13	75
D23	91TT08OC01-07	16DEC91LCB3051	12DEC91LCB4091	10/1/91	10/15/91	12/16/91	14	76
D24	91TT01OC01-02	04DEC91LCB2031	11DEC91LCB4021	9/30/91	10/14/91	12/4/91	14	65
D26	91TT01OC01-03	04DEC91LCB2041	None necessary	9/29/91	10/14/91	12/4/91	15	66
D28	91TT01OC01-01	04DEC91LCB2021	11DEC91LCB4011	9/29/91	10/14/91	12/4/91	15	66
D30	91TT01OC01-04	04DEC91LCB2051	11DEC91LCB4031	9/28/91	10/14/91	12/4/91	16	67
D35	91TT27SP01-01	13DEC91LCB2041	12DEC91LCB3051	9/26/91	10/14/91	12/13/91	18	78
D38	91TT27SP01-02	13DEC91LCB2051	12DEC91LCB3061	9/25/91	10/14/91	12/13/91	19	79
D40	91TT27SP01-03	13DEC91LCB2061	12DEC91LCB3071	9/24/91	10/14/91	12/13/91	20	80
D40Dup	91TT27SP01-03d	13DEC91LCB2071	12DEC91LCB3081	9/24/91	10/14/91	12/13/91	20	80
D45	91TT09OC01-04	04DEC91LCB2111	11DEC91LCB4071	10/7/91	10/14/91	12/4/91	7	58

TABLE 1 (cont.)
TISSUE

Tetra Tech Sample Number	Keystone/NEA Sample Number	MS File Number DB-5 Data	MS File Number DB-225 Data	Date Collected	Date Extracted	Date Analyzed DB-5 Column	Holding Time (d) Extract	Holding Time (d) Analysis
CRAYFISH								
	91TT05OC01-MB	03MAR92LCB4031			1/22/92	3/3/92		
D6	91TT05OC01-01	03MAR92LCB4081	15FEB92LCB5061	10/1/91	1/20/92	3/3/92	111	154
D8	91TT05OC01-02	03MAR92LCB4091	15FEB92LCB5071	9/30/91	1/20/92	3/3/92	112	155
D10	91TT05OC01-03	03MAR92LCB4111	15FEB92LCB5081	9/30/91	1/22/92	3/3/92	114	155
D15	91TT05OC01-05	03MAR92LCB4121	15FEB92LCB5091	9/28-29/91	1/22/92	3/3/92	116	157
D19	91TT05OC01-07	03MAR92LCB4131	15FEB92LCB5101	9/29/91	1/22/92	3/3/92	115	156
D20	91TT05OC01-08	03MAR92LCB4141	15FEB92LCB5111	10/1/91	1/22/92	3/3/92	113	154
D23	91TT05OC01-10	03MAR92LCB4151	15FEB92LCB5121	9/28/91	1/22/92	3/3/92	116	157
D24	91TT05OC01-11	05MAR92LCB3201	15FEB92LCB5161	9/28-30/91	1/31/92	3/5/92	125	159
	91TT27SP02-MB	03MAR92LCB4021			1/20/92	3/3/92		
D28	91TT27SP02-01	03MAR92LCB4051	15FEB92LCB5031	9/26/91	1/20/92	3/3/92	116	159
	91TT26SP01-MB	03MAR92LCB4041			1/31/92	3/3/92		
D35	91TT26SP01-02	05MAR92LCB3171	15FEB92LCB5131	9/25/91	1/31/92	3/5/92	128	162
	91TT26SP01-02MS	05MAR92LCB3181			1/31/92	3/5/92		
	91TT26SP01-02MSD	05MAR92LCB3191			1/31/92	3/5/92		
D38	91TT27SP02-03	03MAR92LCB4061	15FEB92LCB5041	9/25-26/91	1/20/92	3/3/92	117	160
D40	92TT27SP02-04	03MAR92LCB4071	15FEB92LCB5051	9/25-27/91	1/20/92	3/3/92	117	160

TABLE 1 (cont.)

Tetra Tech Sample Number	Keystone/NEA Sample Number	MS File Number DB-5 Data	MS File Number DB-225 Data	Date Collected	Date Extracted	Date Analyzed DB-5 Column	Holding Time (d) Extract	Holding Time (d) Analysis
STURGEON								
ST-1-2-D	91TT11OC01-MB				1/18/92	2/6/92		
ST-1-2-D	91TT11OC01-01	06FEB92LCB2021	13FEB92LCB3011	10/10/91	1/18/92	2/6/92	100	119
ST-2-1-D	91TT11OC01-02	06FEB92LCB2031	13FEB92LCB3021	10/10/91	1/18/92	2/6/92	100	119
ST-2-2-D	91TT22OC01-04	06FEB92LCB2041	13FEB92LCB3031	10/20/91	1/18/92	2/6/92	90	109
ST-3-3-D	91TT24OC01-02	06FEB92LCB2051	13FEB92LCB3041	10/23/91	1/18/92	2/6/92	87	106
ST-3-1-D	91TT24OC01-03	06FEB92LCB4011	13FEB92LCB3051	10/23/91	1/18/92	2/6/92	87	106
ST-4-3-D	91TT30SP01-MB				1/18/92	2/6/92		
ST-4-3-D	91TT30SP01-02	06FEB92LCB4071	13FEB92LCB3061	9/29/91	1/18/92	2/6/92	111	130
ST-1-3-D	91TT03OC01-01	06FEB92LCB4081	13FEB92LCB3071	10/1/91	1/18/92	2/6/92	109	128
ST-4-1-D	91TT04OC01-01	06FEB92LCB4091	13FEB92LCB3081	10/2/91	1/18/92	2/6/92	108	127
ST-4-1-D	91TT04OC01-01MS	06FEB92LCB4101	13FEB92LCB3091	10/2/91	1/18/92	2/6/92	108	127
ST-4-1-D	91TT04OC01-01MSd	06FEB92LCB4111	13FEB92LCB3101	10/2/91	1/18/92	2/6/92	108	127

TABLE 1 (cont.)

Tetra Tech Sample Number	Keystone/NEA Sample Number	MS File Number DB-5 Data	MS File Number DB-225 Data	Date Collected	Date Extracted	Date Analyzed DB-5 Column	Holding Time (d) Extract	Holding Time (d) Analysis
SUCKER								
D6S	91TT28OC02-03RX	11MAR92LCB3161	15FEB92LCB2031	10/26/91	2/9/92	3/11/92	106	137
	91TT28OC02-MB1RX	11MAR92LCB3041			2/9/92			
D8S	91TT28OC02-04RX	11MAR92LCB3171	15FEB92LCB2041	10/27/91	2/9/92	3/11/92	105	136
D10S	91TT28OC02-13RX	20MAR92LCB2201	15FEB92LCB2051	10/25/91	2/9/92	3/20/92	107	147
D15S	91TT28OC02-02RX	11MAR92LCB3151	15FEB92LCB2021	10/27/91	2/9/92	3/11/92	105	136
D19S	91TT28OC02-01RX	11MAR92LCB3141	15FEB92LCB2011	10/27/91	2/9/92	3/11/92	105	136
D20S	91TT20NV01-01	11MAR92LCB3081	14FEB92LCB2181	11/19/91	1/14/92	3/11/92	55	113
D23S	91TT22OC02-10	11MAR92LCB3071	14FEB92LCB2171	10/20/91	1/14/92	3/11/92	86	143
D24S	91TT22OC02-08	11MAR92LCB3061	14FEB92LCB2161	10/19/91	1/14/92	3/11/92	87	144
	91TT18OC01-MB2	11MAR92LCB3021			1/14/92			
D28S	91TT18OC01-05	11MAR92LCB3051	14FEB92LCB2151	10/17/91	1/14/92	3/11/92	89	146
	91TT16OC01-MB2	11MAR92LCB3031			2/3/92			
D35S	91TT16OC01-01	11MAR92LCB3091	14FEB92LCB2101	10/15/91	2/3/92	3/11/92	111	148
	91TT16OC01-02MS	11MAR92LCB3121			2/3/92			
	91TT16OC01-02MSD	11MAR92LCB3131			2/3/92			
	91TT16OC01-02MSD	28MAR92LCB3011			2/3/92			
	91TT16OC01-02MSD	31MAR92LCB2071			2/3/92			
D38S	91TT16OC01-02	11MAR92LCB3101	14FEB92LCB2111	10/15/91	2/3/92	3/11/92	111	148
D40S	91TT16OC01-05	11MAR92LCB3111	14FEB92LCB2121	10/14/91	2/3/92	3/11/92	112	149

TABLE 1 (cont.)

Tetra Tech Sample Number	Keystone/NEA Sample Number	MS File Number DB-5 Data	MS File Number DB-225 Data	Date Collected	Date Extracted	Date Analyzed DB-5 Column	Holding Time (d) Extract	Holding Time (d) Analysis
CARP								
	91TT18OC01-MBRX	27FEB92LCB9061			2/5/92			
D24C	91TT22OC01-07RX	29FEB92LCB3071	16FEB92LCB2071	10/19/91	2/5/92	2/29/92	109	133
D28C	91TT18OC01-06RX	29FEB92LCB3061	16FEB92LCB2061	10/17/91	2/5/92	2/29/92	111	135
	91TT16OC01-MB1	27FEB92LCB9051			1/10/92			
D35C	91TT16OC01-03	29FEB92LCB3011	16FEB92LCB2011	10/15/91	1/10/92	2/29/92	87	137
	91TT16OC01-07MS	29FEB92LCB3041			1/10/92			
	91TT16OC01-07 MDS	29FEB92LCB3051			1/10/92			
D38C	91TT16OC01-07	29FEB92LCB3031	16FEB92LCB2031	10/15/91	1/10/92	2/29/92	87	137
D40C	91TT16OC01-04	29FEB92LCB3021	16FEB92LCB2021	10/14/91	1/10/92	2/29/92	88	136
PEAMOUTH CHUB								
D10P	91TT28OC02-08	19FEB92LCB3041	15FEB92LCB5181	10/25/91	1/16/92	2/19/92	83	117
D15P	91TT28OC02-11	19FEB92LCB3061	15FEB92LCB5201	10/27/91	1/16/92	2/19/92	81	115
D19P	91TT28OC02-10	19FEB92LCB3051	15FEB92LCB5191	10/27/91	1/16/92	2/19/92	81	115
	91TT22OC02-MB	19FEB92LCB3021			1/16/92			
D21P	91TT22OC02-01	19FEB92LCB3071	15FEB92LCB5211	10/21/91	1/16/92	2/19/92	87	121
D23P	91TT22OC02-06	26FEB92LCB3021	15FEB92LCB5231	10/20/91	1/16/92	2/26/92	88	129
	91TT22OC02-04MS	26FEB92LCB3031			1/16/92			
	91TT22OC02-04MSD	26FEB92LCB3041			1/16/92			
D24P	91TT22OC02-04	26FEB92LCB3011	15FEB92LCB5221	10/19/91	1/16/92	2/26/92	89	130
	91TT18OC01-MB3	19FEB92LCB3011			1/16/92			
D28P	91TT18OC01-04	19FEB92LCB3031	15 FEB92LCB5171	10/17/91	1/16/92	2/19/92	91	125

TABLE 2. INTERNAL STANDARD RECOVERIES IN SEDIMENT AND TISSUE SAMPLES
LOWER COLUMBIA RIVER RECONNAISSANCE SURVEY

Internal Standard	QC Limits	Percent Recovery						
SEDIMENT:	Compound Recovery Limits (1613)	Method Blank MB-1	Method Blank MB-2	Method Blank MB-3	Method Blank MB-4	Method Blank MB-5	Method Blank MB-6	PAR1 Sample
13C-2,3,7,8-TCDD	25-150	84	83	87	94	82	73	95
13C-1,2,3,7,8-PeCDD	25-150	102	100	112	113	103	116	118
13C-1,2,3,4,7,8-HxCDD	25-150	82	76	79	80	74	73	80
13C-1,2,3,6,7,8-HxCDD	25-150	75	81	80	92	76	87	87
13C-1,2,3,4,6,7,8-HpCDD	25-150	92	97	101	99	106	83	98
13C-OCDD	25-150	80	74	76	81	80	76	82
13C-2,3,7,8-TCDF	25-150	84	83	100	106	96	101	103
13C-1,2,3,7,8-PeCDF	25-150	74	75	89	92	87	95	92
13C-2,3,4,7,8-PeCDF	25-150	84	81	98	102	95	101	102
13C-1,2,3,4,7,8-HxCDF	25-150	71	72	76	84	76	78	80
13C-1,2,3,6,7,8-HxCDF	25-150	64	66	70	82	70	75	75
13C-2,3,4,6,7,8-HxCDF	25-150	45	65	64	68	52	50	60
13C-1,2,3,7,8,9-HxCDF	25-150	85	84	88	97	88	95	93
13C-1,2,3,4,6,7,8-HpCDF	25-150	78	79	86	92	88	77	87
13C-1,2,3,4,7,8,9-HpCDF	25-150	91	90	95	100	101	84	98
37Cl4-2378-TCDD		88	85	91	104	87	67	102
Method Blank or Sample Reference:		D4,D10, D11,D45	D24,D26 D28,D30	D14,D15 D16,D16MS D16MSd	D18,D19 D20,D23 PAR1	D35,D38 D40,D40dup PAR2	D5,D8 D6,D6dup PAR3	MB-4

Recoveries marked with an asterisk (*) are from a DB-225 column.

Table 2 (cont.)

Internal Standard	QC Limits	Percent Recovery							
SEDIMENT:	Compound Recovery Limits (1613)	PAR2 Sample	PAR3 Sample	D4	D5	D6	D6dup	D8	D10
13C-2,3,7,8-TCDD	25-150	74	89	74	98	88	94	86	88
13C-1,2,3,7,8-PeCDD	25-150	97	111	88	119	114	120	115	112
13C-1,2,3,4,7,8-HxCDD	25-150	64	82	77	80	72	74	77	99
13C-1,2,3,6,7,8-HxCDD	25-150	77	78	47	88	85	67	80	52
13C-1,2,3,4,6,7,8-HpCDD	25-150	80	78	73	87	80	82	78	95
13C-OCDD	25-150	60	71	70	83	80	77	76	94
13C-2,3,7,8-TCDF	25-150	87	102	65*	86*	79*	85*	78*	76*
13C-1,2,3,7,8-PeCDF	25-150	79	94	63	98	92	96	92	78
13C-2,3,4,7,8-PeCDF	25-150	84	99	69	103	100	106	99	89
13C-1,2,3,4,7,8-HxCDF	25-150	70	82	55	87	78	81	81	67
13C-1,2,3,6,7,8-HxCDF	25-150	65	75	47	80	73	75	72	58
13C-2,3,4,6,7,8-HxCDF	25-150	40	52	29	58	54	62	44	40
13C-1,2,3,7,8,9-HxCDF	25-150	81	91	67	97	92	96	93	84
13C-1,2,3,4,6,7,8-HpCDF	25-150	71	77	57	87	78	79	75	74
13C-1,2,3,4,7,8,9-HpCDF	25-150	76	81	72	89	81	83	82	93
37Cl4-2378-TCDD		90	101	80	103	93	101	92	99
Method Blank or Sample Reference:		MB-5	MB-6	MB-1	MB-6	MB-6	MB-6	MB-6	MB-1

Recoveries marked with an asterisk (*) are from a DB-225 column.

Table 2 (cont.)

Internal Standard	Percent Recovery				
SEDIMENT:	**D11**	**D14**	**D15**	**D16**	**D16MS**
13C-2,3,7,8-TCDD	86	94	94	64	94
13C-1,2,3,7,8-PeCDD	107	121	125	82	121
13C-1,2,3,4,7,8-HxCDD	97	89	95	75	102
13C-1,2,3,6,7,8-HxCDD	51	73	72	41	59
13C-1,2,3,4,6,7,8-HpCDD	94	105	105	74	104
13C-OCDD	93	84	91	70	97
13C-2,3,7,8-TCDF	78*	80*	83*	55*	80*
13C-1,2,3,7,8-PeCDF	75	93	94	63	92
13C-2,3,4,7,8-PeCDF	82	101	101	67	98
13C-1,2,3,4,7,8-HxCDF	67	77	73	61	96
13C-1,2,3,6,7,8-HxCDF	56	67	69	35	42
13C-2,3,4,6,7,8-HxCDF	47	72	74	45	64
13C-1,2,3,7,8,9-HxCDF	81	92	95	61	90
13C-1,2,3,4,6,7,8-HpCDF	73	84	89	54	78
13C-1,2,3,4,7,8,9-HpCDF	90	98	103	53	95
37Cl4-2378-TCDD	92	96	97	71	97
Method Blank or Sample Reference:	MB-1	MB-3	MB-3	MB-3	MB-3

Recoveries marked with an asterisk (*) are from a DB-225 column.

TABLE 2 (cont.)

Internal Standard	QC Limits	Percent Recovery							
SEDIMENT:	Compound Recovery Limits (1613)	D16MSd	D18	D19	D20	D23	D24	D26	D28
13C-2,3,7,8-TCDD	25-150	90	92	88	90	89	94	91	91
13C-1,2,3,7,8-PeCDD	25-150	113	114	79	115	113	116	117	112
13C-1,2,3,4,7,8-HxCDD	25-150	101	78	84	81	84	82	84	91
13C-1,2,3,6,7,8-HxCDD	25-150	55	78	129	74	67	84	79	67
13C-1,2,3,4,6,7,8-HpCDD	25-150	100	93	152	96	91	110	106	96
13C-OCDD	25-150	100	79	141	84	76	116	97	86
13C-2,3,7,8-TCDF	25-150	76*	80*	78*	75*	76*	88*	91	83*
13C-1,2,3,7,8-PeCDF	25-150	87	88	91	89	87	80	83	82
13C-2,3,4,7,8-PeCDF	25-150	93	98	63	98	95	86	94	88
13C-1,2,3,4,7,8-HxCDF	25-150	81	75	108	75	74	74	74	72
13C-1,2,3,6,7,8-HxCDF	25-150	51	69	82	68	66	65	65	63
13C-2,3,4,6,7,8-HxCDF	25-150	46	61	82	65	49	54	70	62
13C-1,2,3,7,8,9-HxCDF	25-150	87	88	117	89	89	95	89	85
13C-1,2,3,4,6,7,8-HpCDF	25-150	78	82	121	80	78	83	82	75
13C-1,2,3,4,7,8,9-HpCDF	25-150	93	93	148	94	92	104	103	94
37Cl4-2378-TCDD		100	92	95	95	97	78	94	99
Method Blank or Sample Reference:		MB-3	MB-4	MB-4	MB-4	MB-4	MB-2	MB-2	MB-2

Recoveries marked with an asterisk (*) are from a DB-225 column.

TABLE 2 (cont.)

Internal Standard	Percent Recovery					
SEDIMENT:	D30	D35	D38	D40	D40dup	D45
13C-2,3,7,8-TCDD	89	88	76	82	84	84
13C-1,2,3,7,8-PeCDD	112	115	105	113	114	102
13C-1,2,3,4,7,8-HxCDD	87	78	65	77	78	82
13C-1,2,3,6,7,8-HxCDD	68	80	71	72	73	62
13C-1,2,3,4,6,7,8-HpCDD	97	102	82	92	88	90
13C-OCDD	86	88	54	65	63	87
13C-2,3,7,8-TCDF	81*	82*	67*	75*	73*	76*
13C-1,2,3,7,8-PeCDF	78	97	85	90	90	72
13C-2,3,4,7,8-PeCDF	91	60	90	97	96	79
13C-1,2,3,4,7,8-HxCDF	73	75	68	78	77	63
13C-1,2,3,6,7,8-HxCDF	62	70	62	68	68	56
13C-2,3,4,6,7,8-HxCDF	48	54	49	59	49	39
13C-1,2,3,7,8,9-HxCDF	85	92	81	90	89	78
13C-1,2,3,4,6,7,8-HpCDF	78	84	71	80	76	69
13C-1,2,3,4,7,8,9-HpCDF	93	100	82	91	85	87
37Cl4-2378-TCDD	96	95	82	93	94	88
Method Blank or Sample Reference:	MB-2	MB-5	MB-5	MB-5	MB-5	MB-1

Recoveries marked with an asterisk (*) are from a DB-225 column.

Table 2 (cont.)
TISSUE:

Internal Standard	QC Limits	Percent Recovery						
STURGEON:		Method Blank MB-1	Method Blank MB-2	ST-1-2-D	ST-2-1-D	ST-2-2-D	ST-3-3-D	ST-3-1-D
13C-2,3,7,8-TCDD	25-150	50	48	52	56	51	60	58
13C-1,2,3,7,8-PeCDD	25-150	57	66	64	73	66	76	64
13C-1,2,3,4,7,8-HxCDD	25-150	40	49	96	48	44	45	52
13C-1,2,3,6,7,8-HxCDD	25-150	64	67	76	73	72	81	68
13C-1,2,3,4,6,7,8-HpCDD	25-150	45	47	56	55	54	65	53
13C-OCDD	25-150	41	45	55	61	49	61	52
13C-2,3,7,8-TCDF	25-150	47	44	57*	57*	57*	64*	61*
13C-1,2,3,7,8-PeCDF	25-150	50	47	51	55	52	60	49
13C-2,3,4,7,8-PeCDF	25-150	52	61	62	57	58	64	50
13C-1,2,3,4,7,8-HxCDF	25-150	44	51	50	50	50	51	49
13C-1,2,3,6,7,8-HxCDF	25-150	59	61	66	66	64	70	62
13C-2,3,4,6,7,8-HxCDF	25-150	12	47	15	21	24	15	22
13C-1,2,3,7,8,9-HxCDF	25-150	43	44	54	50	53	53	50
13C-1,2,3,4,6,7,8-HpCDF	25-150	46	54	57	57	52	60	54
13C-1,2,3,4,7,8,9-HpCDF	25-150	44	45	58	51	55	63	57
37Cl4-2378-TCDD		71	68	63	72	67	79	71
Method Blank or Sample Reference:		ST-1-2-D ST-2-1-D ST-2-2-D ST-3-3-D ST-3-1-D	ST-4-3-D ST-1-3-D ST-4-1-D ST-4-1-DMS ST-4-1-DMSd	MB-1	MB-1	MB-1	MB-1	MB-1

Recoveries marked with an asterisk (*) are from a DB-225 column.

Table 2 (cont.)

Internal Standard	QC Limits	Percent Recovery				
STURGEON:		ST-4-3-D	ST-1-3-D	ST-4-1-D	ST-4-1-DMS	ST-4-1-DMSd
13C-2,3,7,8-TCDD	25-150	53	56	52	59	48
13C-1,2,3,7,8-PeCDD	25-150	74	78	81	86	80
13C-1,2,3,4,7,8-HxCDD	25-150	47	83	57	69	35
13C-1,2,3,6,7,8-HxCDD	25-150	78	78	65	74	39
13C-1,2,3,4,6,7,8-HpCDD	25-150	63	85	65	68	41
13C-OCDD	25-150	68	76	65	70	18
13C-2,3,7,8-TCDF	25-150	59*	73*	56*	60*	48*
13C-1,2,3,7,8-PeCDF	25-150	57	37	55	60	64
13C-2,3,4,7,8-PeCDF	25-150	62	33	67	77	53
13C-1,2,3,4,7,8-HxCDF	25-150	59	63	54	55	31
13C-1,2,3,6,7,8-HxCDF	25-150	63	58	57	60	29
13C-2,3,4,6,7,8-HxCDF	25-150	41	61	49	55	25
13C-1,2,3,7,8,9-HxCDF	25-150	55	66	49	58	12
13C-1,2,3,4,6,7,8-HpCDF	25-150	67	74	64	62	13
13C-1,2,3,4,7,8,9-HpCDF	25-150	66	78	60	67	6
37Cl4-2378-TCDD		69	75	66	69	72
Method Blank or Sample Reference:		MB-2	MB-2	MB-2	MB-2	MB-2

Recoveries marked with an asterisk (*) are from a DB-225 column.

Table 2 (cont.)

Internal Standard	QC Limits	Percent Recovery							
CRAYFISH:		MB-1	MB-2	MB-3	D35	D28	D38	D40	D6
13C-2,3,7,8-TCDD	25-150	57	60	63	65	57	50	53	64
13C-1,2,3,7,8-PeCDD	25-150	70	68	71	87	71	62	67	81
13C-1,2,3,4,7,8-HxCDD	25-150	56	59	67	80	55	49	61	83
13C-1,2,3,6,7,8-HxCDD	25-150	67	87	98	80	98	71	69	98
13C-1,2,3,4,6,7,8-HpCDD	25-150	51	57	48	80	66	58	62	78
13C-OCDD	25-150	42	40	37	68	71	58	70	83
13C-2,3,7,8-TCDF	25-150	64	70	69	84*	76*	61*	67*	79*
13C-1,2,3,7,8-PeCDF	25-150	54	59	58	62	56	51	56	64
13C-2,3,4,7,8-PeCDF	25-150	55	58	57	63	56	50	54	65
13C-1,2,3,4,7,8-HxCDF	25-150	59	66	69	82	62	55	67	71
13C-1,2,3,6,7,8-HxCDF	25-150	67	82	68	63	23	60	59	68
13C-2,3,4,6,7,8-HxCDF	25-150	60	66	66	65	55	56	49	68
13C-1,2,3,7,8,9-HxCDF	25-150	55	64	56	74	54	53	57	68
13C-1,2,3,4,6,7,8-HpCDF	25-150	44	57	49	69	62	55	57	66
13C-1,2,3,4,7,8,9-HpCDF	25-150	42	52	48	82	69	55	60	71
37Cl4-2378-TCDD		70	66	76	82	73	68	66	80
Method Blank or Sample Reference:		26-Sep	27-Sep	5-Oct	MB-1	MB-2	MB-2	MB-2	MB-3

Recoveries marked with an asterisk (*) are from a DB-225 column.

Table 2 (cont.)

Internal Standard	QC Limits	Percent Recovery							
CRAYFISH:		D8	D10	D15	D19	D20	D23	D24	D35MS
13C-2,3,7,8-TCDD	25-150	62	58	50	67	59	51	64	61
13C-1,2,3,7,8-PeCDD	25-150	78	72	57	57	78	66	83	83
13C-1,2,3,4,7,8-HxCDD	25-150	60	72	58	68	58	58	83	92
13C-1,2,3,6,7,8-HxCDD	25-150	81	60	68	79	71	59	77	64
13C-1,2,3,4,6,7,8-HpCDD	25-150	74	56	51	69	54	48	80	73
13C-OCDD	25-150	67	53	43	62	46	47	67	63
13C-2,3,7,8-TCDF	25-150	76*	66*	62*	84*	75*	66*	88*	73*
13C-1,2,3,7,8-PeCDF	25-150	65	57	50	76	61	53	59	58
13C-2,3,4,7,8-PeCDF	25-150	64	58	47	35	59	50	59	58
13C-1,2,3,4,7,8-HxCDF	25-150	66	59	59	72	62	56	84	78
13C-1,2,3,6,7,8-HxCDF	25-150	65	60	56	64	57	53	58	54
13C-2,3,4,6,7,8-HxCDF	25-150	63	58	50	67	51	50	62	59
13C-1,2,3,7,8,9-HxCDF	25-150	62	59	49	69	57	50	71	67
13C-1,2,3,4,6,7,8-HpCDF	25-150	63	49	45	57	46	40	65	60
13C-1,2,3,4,7,8,9-HpCDF	25-150	62	49	42	57	48	42	80	73
37Cl4-2378-TCDD		80	68	62	74	76	67	83	79
Method Blank or Sample Reference:									

Recoveries marked with an asterisk (*) are from a DB-225 column.

Table 2 (cont.)

Internal Standard	
CRAYFISH:	D35MSD
13C-2,3,7,8-TCDD	64
13C-1,2,3,7,8-PeCDD	86
13C-1,2,3,4,7,8-HxCDD	93
13C-1,2,3,6,7,8-HxCDD	72
13C-1,2,3,4,6,7,8-HpCDD	82
13C-OCDD	71
13C-2,3,7,8-TCDF	74*
13C-1,2,3,7,8-PeCDF	59
13C-2,3,4,7,8-PeCDF	58
13C-1,2,3,4,7,8-HxCDF	81
13C-1,2,3,6,7,8-HxCDF	61
13C-2,3,4,6,7,8-HxCDF	60
13C-1,2,3,7,8,9-HxCDF	73
13C-1,2,3,4,6,7,8-HpCDF	66
13C-1,2,3,4,7,8,9-HpCDF	82
37Cl4-2378-TCDD	85
Method Blank or Sample Reference:	

Recoveries marked with an asterisk (*) are from a DB-225 column.

Table 2 (cont.)

Internal Standard	QC Limits	Percent Recovery							
PEAMOUTH CHUB:		MB3	D28P	D10P	D19P	D15P	MB	D21P	D24P
13C-2,3,7,8-TCDD	25-150	44	54	61	69	62	44	57	57
13C-1,2,3,7,8-PeCDD	25-150	53	67	76	93	93	53	73	61
13C-1,2,3,4,7,8-HxCDD	25-150	46	59	62	72	68	43	63	55
13C-1,2,3,6,7,8-HxCDD	25-150	72	81	83	90	77	65	75	87
13C-1,2,3,4,6,7,8-HpCDD	25-150	32	60	62	73	67	38	58	59
13C-OCDD	25-150	12	36	40	47	42	20	36	39
13C-2,3,7,8-TCDF	25-150	59	75*	90*	99*	89*	55	81*	85*
13C-1,2,3,7,8-PeCDF	25-150	46	59	67	76	70	45	60	63
13C-2,3,4,7,8-PeCDF	25-150	52	63	70	84	33	51	70	67
13C-1,2,3,4,7,8-HxCDF	25-150	60	67	67	78	70	54	64	70
13C-1,2,3,6,7,8-HxCDF	25-150	70	72	72	77	69	59	64	83
13C-2,3,4,6,7,8-HxCDF	25-150	33	39	36	51	39	16	32	42
13C-1,2,3,7,8,9-HxCDF	25-150	36	52	63	72	66	46	59	58
13C-1,2,3,4,6,7,8-HpCDF	25-150	39	60	59	60	59	38	39	61
13C-1,2,3,4,7,8,9-HpCDF	25-150	35	71	49	75	50	42	59	64
37Cl4-2378-TCDD		59	74	77	97	88	58	79	78
Method Blank or Sample Reference:									

Recoveries marked with an asterisk (*) are from a DB-225 column.

Table 2 (cont.)

Internal Standard	QC Limits	Percent Recovery		
PEAMOUTH CHUB:		D23P	D24MS	D24MSD
13C-2,3,7,8-TCDD	25-150	58	59	54
13C-1,2,3,7,8-PeCDD	25-150	66	66	63
13C-1,2,3,4,7,8-HxCDD	25-150	61	65	64
13C-1,2,3,6,7,8-HxCDD	25-150	83	87	80
13C-1,2,3,4,6,7,8-HpCDD	25-150	56	62	57
13C-OCDD	25-150	33	36	32
13C-2,3,7,8-TCDF	25-150	82*	85*	74*
13C-1,2,3,7,8-PeCDF	25-150	68	67	63
13C-2,3,4,7,8-PeCDF	25-150	70	69	64
13C-1,2,3,4,7,8-HxCDF	25-150	76	77	76
13C-1,2,3,6,7,8-HxCDF	25-150	81	82	76
13C-2,3,4,6,7,8-HxCDF	25-150	39	47	47
13C-1,2,3,7,8,9-HxCDF	25-150	62	79	63
13C-1,2,3,4,6,7,8-HpCDF	25-150	58	62	59
13C-1,2,3,4,7,8,9-HpCDF	25-150	70	76	68
37Cl4-2378-TCDD		83	81	77
Method Blank or Sample Reference:				

Recoveries marked with an asterisk (*) are from a DB-225 column.

Table 2 (cont.)

Internal Standard	QC Limits	Percent Recovery							
CARP:		MB1	D35C	D40C	D38C	D38C-MS	D38C-MSD	MBRX	D28C
13C-2,3,7,8-TCDD	25-150	54	61	61	59	56	59	59	74
13C-1,2,3,7,8-PeCDD	25-150	75	84	82	93	89	86	65	104
13C-1,2,3,4,7,8-HxCDD	25-150	59	66	68	70	73	74	58	71
13C-1,2,3,6,7,8-HxCDD	25-150	66	82	84	85	76	73	63	86
13C-1,2,3,4,6,7,8-HpCDD	25-150	51	67	61	69	68	68	65	77
13C-OCDD	25-150	31	42	32	47	45	45	44	60
13C-2,3,7,8-TCDF	25-150	68	91*	87*	85*	79*	81*	74	89*
13C-1,2,3,7,8-PeCDF	25-150	74	70	70	78	76	76	79	100
13C-2,3,4,7,8-PeCDF	25-150	69	71	69	77	73	75	75	97
13C-1,2,3,4,7,8-HxCDF	25-150	69	69	69	68	69	68	67	78
13C-1,2,3,6,7,8-HxCDF	25-150	73	72	74	66	67	65	66	75
13C-2,3,4,6,7,8-HxCDF	25-150	45	35	41	47	44	42	42	50
13C-1,2,3,7,8,9-HxCDF	25-150	70	67	65	63	65	64	64	71
13C-1,2,3,4,6,7,8-HpCDF	25-150	61	62	56	63	59	61	66	70
13C-1,2,3,4,7,8,9-HpCDF	25-150	70	68	57	71	67	71	73	72
37Cl4-2378-TCDD		72	82	83	81	79	77	83	99
Method Blank or Sample Reference:									

Recoveries marked with an asterisk (*) are from a DB-225 column.

Table 2 (cont.)

Internal Standard	QC Limits	
CARP:		D24C
13C-2,3,7,8-TCDD	25-150	63
13C-1,2,3,7,8-PeCDD	25-150	89
13C-1,2,3,4,7,8-HxCDD	25-150	72
13C-1,2,3,6,7,8-HxCDD	25-150	83
13C-1,2,3,4,6,7,8-HpCDD	25-150	75
13C-OCDD	25-150	58
13C-2,3,7,8-TCDF	25-150	92*
13C-1,2,3,7,8-PeCDF	25-150	85
13C-2,3,4,7,8-PeCDF	25-150	81
13C-1,2,3,4,7,8-HxCDF	25-150	77
13C-1,2,3,6,7,8-HxCDF	25-150	74
13C-2,3,4,6,7,8-HxCDF	25-150	41
13C-1,2,3,7,8,9-HxCDF	25-150	73
13C-1,2,3,4,6,7,8-HpCDF	25-150	69
13C-1,2,3,4,7,8,9-HpCDF	25-150	69
37Cl4-2378-TCDD		83
Method Blank or Sample Reference:		

Recoveries marked with an asterisk (*) are from a DB-225 column.

Table 2 (cont.)

Internal Standard	QC Limits	Percent Recovery							
SUCKER:		MB2	MB2/2	MB1RX	D35S	D38S	D40S	D28S	D24S
13C-2,3,7,8-TCDD	25-150	29	29	59	35	39	23	26	28
13C-1,2,3,7,8-PeCDD	25-150	35	38	71	23	52	31	36	37
13C-1,2,3,4,7,8-HxCDD	25-150	31	31	65	42	47	30	30	31
13C-1,2,3,6,7,8-HxCDD	25-150	36	39	72	97	47	32	34	35
13C-1,2,3,4,6,7,8-HpCDD	25-150	34	34	68	46	50	29	31	33
13C-OCDD	25-150	29	22	53	39	43	21	13	20
13C-2,3,7,8-TCDF	25-150	30	31	62	38*	44*	27*	32*	31*
13C-1,2,3,7,8-PeCDF	25-150	27	28	54	34	37	22	26	27
13C-2,3,4,7,8-PeCDF	25-150	27	28	56	35	38	23	27	28
13C-1,2,3,4,7,8-HxCDF	25-150	32	32	62	39	44	31	29	29
13C-1,2,3,6,7,8-HxCDF	25-150	29	31	61	36	41	27	28	29
13C-2,3,4,6,7,8-HxCDF	25-150	24	23	53	31	37	21	5	13
13C-1,2,3,7,8,9-HxCDF	25-150	32	30	63	40	44	24	28	31
13C-1,2,3,4,6,7,8-HpCDF	25-150	25	25	49	37	39	22	25	26
13C-1,2,3,4,7,8,9-HpCDF	25-150	33	32	66	45	50	28	31	34
37Cl4-2378-TCDD		41	37	84	47	52	31	34	43
Method Blank or Sample Reference:					MB2	MB2	MB2	MB2/2	

Recoveries marked with an asterisk (*) are from a DB-225 column.

TABLE 2 (cont.)

Internal Standard	QC Limits	Percent Recovery							
SUCKER:		D23S	D19S	D15S	D6S	D8S	D10S	D20S	D38S-MS
13C-2,3,7,8-TCDD	25-150	27	64	69	66	61	83	28	43
13C-1,2,3,7,8-PeCDD	25-150	35	78	87	84	79	85	34	57
13C-1,2,3,4,7,8-HxCDD	25-150	30	67	73	75	70	64	32	55
13C-1,2,3,6,7,8-HxCDD	25-150	34	73	75	78	70	63	33	50
13C-1,2,3,4,6,7,8-HpCDD	25-150	33	65	74	79	73	73	33	55
13C-OCDD	25-150	19	48	59	65	64	47	21	45
13C-2,3,7,8-TCDF	25-150	31*	72*	76*	75*	71*	60*	34*	48*
13C-1,2,3,7,8-PeCDF	25-150	26	59	64	64	56	89	27	42
13C-2,3,4,7,8-PeCDF	25-150	27	61	65	65	57	94	27	43
13C-1,2,3,4,7,8-HxCDF	25-150	30	66	70	70	60	68	28	50
13C-1,2,3,6,7,8-HxCDF	25-150	27	61	60	61	59	55	28	46
13C-2,3,4,6,7,8-HxCDF	25-150	12	50	51	53	47	54	15	38
13C-1,2,3,7,8,9-HxCDF	25-150	30	64	68	68	62	68	29	49
13C-1,2,3,4,6,7,8-HpCDF	25-150	26	57	64	67	61	62	25	40
13C-1,2,3,4,7,8,9-HpCDF	25-150	34	67	77	80	71	86	34	55
37Cl4-2378-TCDD		41	84	86	90	88	79	41	65
Method Blank or Sample Reference:			MB1RX	MB1RX	MB1RX	MB1RX	MB1RX		MB2

Recoveries marked with an asterisk (*) are from a DB-225 column.

Table 2 (cont.)

Internal Standard	QC Limits	
SUCKER:		**D38S-MSD**
13C-2,3,7,8-TCDD	25-150	51
13C-1,2,3,7,8-PeCDD	25-150	63
13C-1,2,3,4,7,8-HxCDD	25-150	40
13C-1,2,3,6,7,8-HxCDD	25-150	54
13C-1,2,3,4,6,7,8-HpCDD	25-150	15
13C-OCDD	25-150	6
13C-2,3,7,8-TCDF	25-150	63*
13C-1,2,3,7,8-PeCDF	25-150	39
13C-2,3,4,7,8-PeCDF	25-150	33
13C-1,2,3,4,7,8-HxCDF	25-150	25
13C-1,2,3,6,7,8-HxCDF	25-150	31
13C-2,3,4,6,7,8-HxCDF	25-150	23
13C-1,2,3,7,8,9-HxCDF	25-150	6
13C-1,2,3,4,6,7,8-HpCDF	25-150	12
13C-1,2,3,4,7,8,9-HpCDF	25-150	8
37Cl4-2378-TCDD		93
Method Blank or Sample Reference:		MB2

Recoveries marked with an asterisk (*) are from a DB-225 column.

TABLE 3. DIOXINS/FURANS PAR RESULTS
SEDIMENT
LOWER COLUMBIA RIVER RECONNAISSANCE SURVEY

Sample PAR Analyzed 12/13/92	(Samples D5, D8, D6, D6d also in batch)				
	Percent Recovery			QC LIMITS	
COMPOUND	91TT27SP01-PAR	91TT15OC01-PAR	RPD	%REC	RPD
2,3,7,8-TCDD	119	111	6.96	50-150	20
1,2,3,7,8-PeCDD	92	84	9.09	50-150	20
1,2,3,4,7,8-HxCDD	134	112	17.89	50-150	20
1,2,3,6,7,8-HxCDD	124	122	1.63	50-150	20
1,2,3,7,8,9-HxCDD	103	132	**24.68**	50-150	20
1,2,3,4,6,7,8-HpCDD	107	98	8.78	50-150	20
OCDD	118	108	8.85	50-150	20
2,3,7,8-TCDF	107	101	5.77	50-150	20
1,2,3,7,8-PeCDF	132	119	10.36	50-150	20
2,3,4,7,8-PeCDF	132	117	12.05	50-150	20
1,2,3,4,7,8-HxCDF	119	105	12.50	50-150	20
1,2,3,6,7,8-HxCDF	122	114	6.78	50-150	20
2,3,4,6,7,8-HxCDF	120	110	8.70	50-150	20
1,2,3,7,8,9-HxCDF	107	97	9.80	50-150	20
1,2,3,4,6,7,8-HpCDF	131	123	6.30	50-150	20
1,2,3,4,7,8,9-HpCDF	124	113	9.28	50-150	20
OCDF	128	118	8.13	50-150	20

TABLE 3 (cont.)

Sample PAR Analyzed 12/4/92		(Samples D28, D24, D26, D30, D4, D10, D11, D45 also in batch)			
	Percent Recovery			QC LIMITS	
COMPOUND	91TT01OC01-PAR	91TT09OC01-PAR	RPD	%REC	RPD
2,3,7,8-TCDD	103	106	2.87	50-150	20
1,2,3,7,8-PeCDD	78	78	0.00	50-150	20
1,2,3,4,7,8-HxCDD	117	111	5.26	50-150	20
1,2,3,6,7,8-HxCDD	111	115	3.54	50-150	20
1,2,3,7,8,9-HxCDD	94	139	**38.63**	50-150	20
1,2,3,4,6,7,8-HpCDD	96	99	3.08	50-150	20
OCDD	108	111	2.74	50-150	20
2,3,7,8-TCDF	101	98	3.02	50-150	20
1,2,3,7,8-PeCDF	123	115	6.72	50-150	20
2,3,4,7,8-PeCDF	119	121	1.67	50-150	20
1,2,3,4,7,8-HxCDF	114	111	2.67	50-150	20
1,2,3,6,7,8-HxCDF	112	115	2.64	50-150	20
2,3,4,6,7,8-HxCDF	117	114	2.60	50-150	20
1,2,3,7,8,9-HxCDF	101	101	0.00	50-150	20
1,2,3,4,6,7,8-HpCDF	122	117	4.18	50-150	20
1,2,3,4,7,8,9-HpCDF	108	110	1.83	50-150	20
OCDF	112	106	5.50	50-150	20

TABLE 3 (cont.)

Sample PAR Analyzed 12/13/92	(Samples D18, D19, D20, and D23 also in batch)				
COMPOUND	Percent Recovery 91TT08OC01-PAR			QC LIMITS % Rec.	 RPD
2,3,7,8-TCDD	119			50-150	20
1,2,3,7,8-PeCDD	93			50-150	20
1,2,3,4,7,8-HxCDD	132			50-150	20
1,2,3,6,7,8-HxCDD	128			50-150	20
1,2,3,7,8,9-HxCDD	131			50-150	20
1,2,3,4,6,7,8-HpCDD	109			50-150	20
OCDD	136			50-150	20
2,3,7,8-TCDF	108			50-150	20
1,2,3,7,8-PeCDF	130			50-150	20
2,3,4,7,8-PeCDF	130			50-150	20
1,2,3,4,7,8-HxCDF	121			50-150	20
1,2,3,6,7,8-HxCDF	123			50-150	20
2,3,4,6,7,8-HxCDF	122			50-150	20
1,2,3,7,8,9-HxCDF	112			50-150	20
1,2,3,4,6,7,8-HpCDF	130			50-150	20
1,2,3,4,7,8,9-HpCDF	122			50-150	20
OCDF	127			50-150	20

TABLE 4. DIOXINS/FURANS MS/MSD RESULTS
TISSUE AND SEDIMENT
LOWER COLUMBIA RIVER RECONNAISSANCE SURVEY

Sample D16 (Samples D14, D15, and D16 also in batch)
Analyzed 12/13/91

COMPOUND	Percent Recovery MS	MSD	RPD	QC LIMITS % Rec.	QC LIMITS RPD
2,3,7,8-TCDD	109	116	6.22	50-150	20
1,2,3,7,8-PeCDD	82	91	10.40	50-150	20
1,2,3,4,7,8-HxCDD	117	125	6.61	50-150	20
1,2,3,6,7,8-HxCDD	118	120	1.68	50-150	20
1,2,3,7,8,9-HxCDD	168	176	4.65	50-150	20
1,2,3,4,6,7,8-HpCDD	88	87	1.14	50-150	20
OCDD	81	72	11.76	50-150	20
2,3,7,8-TCDF	88	94	6.59	50-150	20
1,2,3,7,8-PeCDF	116	124	6.67	50-150	20
2,3,4,7,8-PeCDF	118	123	4.15	50-150	20
1,2,3,4,7,8-HxCDF	113	109	3.60	50-150	20
1,2,3,6,7,8-HxCDF	111	132	17.28	50-150	20
2,3,4,6,7,8-HxCDF	110	116	5.31	50-150	20
1,2,3,7,8,9-HxCDF	98	105	6.90	50-150	20
1,2,3,4,6,7,8-HpCDF	114	109	4.48	50-150	20
1,2,3,4,7,8,9-HpCDF	106	114	7.27	50-150	20
OCDF	115	105	9.09	50-150	20

TABLE 4 (cont.)

Sample D16 MS/MSD Analyzed 12/13/92	(Samples D14, D15, and D16 also in batch)				
	Concentration			QC LIMITS	
COMPOUND	D16MS	D16MSD	RPD	%REC	RPD
2,3,7,8-TCDD	7.32	6.79	7.51	50-150	20
1,2,3,7,8-PeCDD	28.3	27.3	3.60	50-150	20
1,2,3,4,7,8-HxCDD	34.4	31.9	7.54	50-150	20
1,2,3,6,7,8-HxCDD	35.3	31.3	12.01	50-150	20
1,2,3,7,8,9-HxCDD	44.3	40.8	8.23	50-150	20
1,2,3,4,6,7,8-HpCDD	53.8	49.5	8.33	50-150	20
OCDD	294	255	14.21	50-150	20
2,3,7,8-TCDF	9.31	8.25	12.07	50-150	20
1,2,3,7,8-PeCDF	34.8	32.4	7.14	50-150	20
2,3,4,7,8-PeCDF	33.4	30.4	9.40	50-150	20
1,2,3,4,7,8-HxCDF	35.4	29.6	17.85	50-150	20
1,2,3,6,7,8-HxCDF	33.4	34.5	3.24	50-150	20
2,3,4,6,7,8-HxCDF	32.3	29.6	8.72	50-150	20
1,2,3,7,8,9-HxCDF	30.1	27.9	7.59	50-150	20
1,2,3,4,6,7,8-HpCDF	38.4	32.5	16.64	50-150	20
1,2,3,4,7,8,9-HpCDF	32.7	30.5	6.96	50-150	20
OCDF	77.0	62.0	21.58	50-150	20

TABLE 4 (cont.)

Sample D24P (Samples D23P and D24P also in batch) Analyzed 2/26/92					
	Percent Recovery			QC LIMITS	
COMPOUND	MS	MSD	RPD	% Rec.	RPD
2,3,7,8-TCDD	129	133	3.05	50-150	20
1,2,3,7,8-PeCDD	111	110	0.90	50-150	20
1,2,3,4,7,8-HxCDD	146	152	4.03	50-150	20
1,2,3,6,7,8-HxCDD	132	133	0.75	50-150	20
1,2,3,7,8,9-HxCDD	113	114	0.88	50-150	20
1,2,3,4,6,7,8-HpCDD	122	127	4.02	50-150	20
OCDD	118	124	4.96	50-150	20
2,3,7,8-TCDF	77	79	2.56	50-150	20
1,2,3,7,8-PeCDF	152	156	2.60	50-150	20
2,3,4,7,8-PeCDF	152	156	2.60	50-150	20
1,2,3,4,7,8-HxCDF	131	130	0.77	50-150	20
1,2,3,6,7,8-HxCDF	141	140	0.71	50-150	20
2,3,4,6,7,8-HxCDF	133	135	1.49	50-150	20
1,2,3,7,8,9-HxCDF	128	134	4.58	50-150	20
1,2,3,4,6,7,8-HpCDF	125	137	9.16	50-150	20
1,2,3,4,7,8,9-HpCDF	122	125	2.43	50-150	20
OCDF	160	162	1.24	50-150	20

TABLE 4 (cont.)

Sample ST-4-1-D (Samples ST-4-3-D, ST-1-3-D also in batch) Analyzed 2/13/92					
	Percent Recovery			QC LIMITS	
COMPOUND	MS	MSD	RPD	% Rec.	RPD
2,3,7,8-TCDD	111	121	8.62	50-150	20
1,2,3,7,8-PeCDD	95	95	0.00	50-150	20
1,2,3,4,7,8-HxCDD	124	128	3.17	50-150	20
1,2,3,6,7,8-HxCDD	124	89	**32.86**	50-150	20
1,2,3,7,8,9-HxCDD	126	133	5.41	50-150	20
1,2,3,4,6,7,8-HpCDD	118	**169**	**35.54**	50-150	20
OCDD	128	**227**	**55.77**	50-150	20
2,3,7,8-TCDF	120	131	8.76	50-150	20
1,2,3,7,8-PeCDF	137	141	2.88	50-150	20
2,3,4,7,8-PeCDF	135	146	7.83	50-150	20
1,2,3,4,7,8-HxCDF	125	142	12.73	50-150	20
1,2,3,6,7,8-HxCDF	126	128	1.57	50-150	20
2,3,4,6,7,8-HxCDF	122	140	13.74	50-150	20
1,2,3,7,8,9-HxCDF	116	120	3.39	50-150	20
1,2,3,4,6,7,8-HpCDF	131	**246**	**61.01**	50-150	20
1,2,3,4,7,8,9-HpCDF	119	114	4.29	50-150	20
OCDF	120	**21**	**140.43**	50-150	20

TABLE 4 (cont.)

Sample D38C
Analyzed 2/29/92

COMPOUND	Percent Recovery MS	MSD	RPD	QC LIMITS % Rec.	QC LIMITS RPD
2,3,7,8-TCDD	154	145	6.02	50-150	20
1,2,3,7,8-PeCDD	116	120	3.39	50-150	20
1,2,3,4,7,8-HxCDD	122	127	4.02	50-150	20
1,2,3,6,7,8-HxCDD	158	156	1.27	50-150	20
1,2,3,7,8,9-HxCDD	134	137	2.21	50-150	20
1,2,3,4,6,7,8-HpCDD	115	120	4.26	50-150	20
OCDD	126	127	0.79	50-150	20
2,3,7,8-TCDF	113	115	1.75	50-150	20
1,2,3,7,8-PeCDF	150	151	0.66	50-150	20
2,3,4,7,8-PeCDF	156	150	3.92	50-150	20
1,2,3,4,7,8-HxCDF	126	119	5.71	50-150	20
1,2,3,6,7,8-HxCDF	141	138	2.15	50-150	20
2,3,4,6,7,8-HxCDF	132	134	1.50	50-150	20
1,2,3,7,8,9-HxCDF	125	122	2.43	50-150	20
1,2,3,4,6,7,8-HpCDF	128	124	3.17	50-150	20
1,2,3,4,7,8,9-HpCDF	129	122	5.58	50-150	20
OCDF	131	134	2.26	50-150	20

TABLE 4 (cont.)

Sample D38S
Analyzed 3/11/91

COMPOUND	Percent Recovery MS	MSD*	RPD	QC LIMITS % Rec.	QC LIMITS RPD
2,3,7,8-TCDD	114	**176**	**42.76**	50-150	20
1,2,3,7,8-PeCDD	96	124	**25.45**	50-150	20
1,2,3,4,7,8-HxCDD	114	124	8.40	50-150	20
1,2,3,6,7,8-HxCDD	147	**170**	14.51	50-150	20
1,2,3,7,8,9-HxCDD	102	**174**	**52.17**	50-150	20
1,2,3,4,6,7,8-HpCDD	116	**161**	**32.49**	50-150	20
OCDD	124	**265**	**72.49**	50-150	20
2,3,7,8-TCDF	124	116	6.67	50-150	20
1,2,3,7,8-PeCDF	140	145	3.51	50-150	20
2,3,4,7,8-PeCDF	140	**185**	**27.69**	50-150	20
1,2,3,4,7,8-HxCDF	**160**	**163**	1.86	50-150	20
1,2,3,6,7,8-HxCDF	**161**	**164**	1.85	50-150	20
2,3,4,6,7,8-HxCDF	**162**	**189**	15.38	50-150	20
1,2,3,7,8,9-HxCDF	149	**171**	13.75	50-150	20
1,2,3,4,6,7,8-HpCDF	132	**226**	**52.51**	50-150	20
1,2,3,4,7,8,9-HpCDF	122	147	18.59	50-150	20
OCDF	121	**155**	24.64	50-150	20

*Recoveries of analyte for the MSD should be considered to be estimates based on chemical interference.

TABLE 4 (cont.)

Sample D35 Crayfish
Analyzed 3/5/91

COMPOUND	Percent Recovery MS	MSD	RPD	QC LIMITS % Rec.	QC LIMITS RPD
2,3,7,8-TCDD	122	115	5.91	50-150	20
1,2,3,7,8-PeCDD	99	98	1.02	50-150	20
1,2,3,4,7,8-HxCDD	115	131	13.01	50-150	20
1,2,3,6,7,8-HxCDD	153	134	13.24	50-150	20
1,2,3,7,8,9-HxCDD	179	159	11.83	50-150	20
1,2,3,4,6,7,8-HpCDD	127	120	5.67	50-150	20
OCDD	131	125	4.69	50-150	20
2,3,7,8-TCDF	126	123	2.41	50-150	20
1,2,3,7,8-PeCDF	146	143	2.08	50-150	20
2,3,4,7,8-PeCDF	155	156	0.64	50-150	20
1,2,3,4,7,8-HxCDF	118	132	11.20	50-150	20
1,2,3,6,7,8-HxCDF	154	139	10.24	50-150	20
2,3,4,6,7,8-HxCDF	138	139	0.72	50-150	20
1,2,3,7,8,9-HxCDF	132	134	1.50	50-150	20
1,2,3,4,6,7,8-HpCDF	138	134	2.94	50-150	20
1,2,3,4,7,8,9-HpCDF	132	126	4.65	50-150	20
OCDF	111	106	4.61	50-150	20

TABLE 5. DIOXINS/FURANS FIELD DUPLICATE RESULTS FOR SEDIMENTS LOWER COLUMBIA RIVER RECONNAISSANCE SURVEY

COMPOUND	SAMPLE RESULTS (pg/g) D11		D45		RPD
2,3,7,8-TCDD	0.22	S	0.25	S	12.77
1,2,3,7,8-PeCDD	0.12	S	0.16	S	**28.57**
1,2,3,4,7,8-HxCDD	0.38	S	0.40	S/M	5.13
1,2,3,6,7,8-HxCDD	1.43	S	1.43	S	0.00
1,2,3,7,8,9-HxCDD	1.19	S	0.94	S	**23.47**
1,2,3,4,6,7,8-HpCDD	**23.8**		**27.1**		12.97
OCDD	**217**		**244**		11.71
2,3,7,8-TCDF	**1.93**	*	**1.96**	*	1.54
1,2,3,7,8-PeCDF	0.36	S/M	0.25	S/M	**36.07**
2,3,4,7,8-PeCDF	0.24	S	0.27	S/M	11.76
1,2,3,4,7,8-HxCDF	0.51	S/M	0.54	S	5.71
1,2,3,6,7,8-HxCDF	0.21	S/M	0.28	S/M	**28.57**
2,3,4,6,7,8-HxCDF	0.16	S	0.30	S/M	**60.87**
1,2,3,7,8,9-HxCDF	1.87	S/M	0.18	U/E	**164.88**
1,2,3,4,6,7,8-HpCDF	**2.83**		**2.91**		2.79
1,2,3,4,7,8,9-HpCDF	0.31	S/M	0.25	S	**21.43**
OCDF	**6.76**		**8.22**		19.49

U/E = Analyte not detected at or above the sample specific estimated detection limit (EDL) EDL is reported.
M = Estimated Maximum Possible Concentration
S = Analyte detected below the Lower Method Calibration Limit. Value reported should be considered an estimate.
Concentrations marked with an asterisk (*) are from a DB-225 column.

TABLE 6. DIOXINS/FURANS LABORATORY DUPLICATE RESULTS FOR SEDIMENT LOWER COLUMBIA RIVER RECONNAISSANCE SURVEY

Sample D40 Analyzed 12/13/91					
	Concentration (pg/g)				
COMPOUND	D40		D40dup		RPD
2,3,7,8-TCDD	0.21	S/M	0.17	S	21.05
1,2,3,7,8-PeCDD	0.18	S	0.13	S/M	32.26
1,2,3,4,7,8-HxCDD	0.27	S/M	0.20	S/M	29.79
1,2,3,6,7,8-HxCDD	0.59	S	0.42	S	33.66
1,2,3,7,8,9-HxCDD	0.84	S	0.59	S/M	34.97
1,2,3,4,6,7,8-HpCDD	9.25		6.41		36.27
OCDD	71.5		64.6		10.14
2,3,7,8-TCDF	0.98	*	0.65	*	40.49
1,2,3,7,8-PeCDF	0.94	S	0.32	S	98.41
2,3,4,7,8-PeCDF	0.69	S	0.28	S/M	84.54
1,2,3,4,7,8-HxCDF	2.78		0.76	S	114.12
1,2,3,6,7,8-HxCDF	1.06	S	0.3	S	111.76
2,3,4,6,7,8-HxCDF	1.25	S	0.53	S	80.90
1,2,3,7,8,9-HxCDF	0.15	S/M	0.22	S	37.84
1,2,3,4,6,7,8-HpCDF	6.38		2.08	S	101.65
1,2,3,4,7,8,9-HpCDF	1.61	S	0.50	S	105.21
OCDF	12.5		5.14		83.45

U/E = Analyte not detected at or above the sample specific estimated detection limit (EDL) EDL is reported.

M = Estimated Maximum Possible Concentration

S = Analyte detected below the Lower Method Calibration Limit. Value reported should be considered an estimate.

Concentrations marked with an asterisk (*) are from a DB-225 column.

TABLE 6 (cont.)

Sample D6 Analyzed 12/13/91					
	Concentration (pg/g)				
COMPOUND	D6		D6 dup		RPD
2,3,7,8-TCDD	0.15	S	0.17	S	12.50
1,2,3,7,8-PeCDD	0.16	S	0.19	S/M	17.14
1,2,3,4,7,8-HxCDD	0.17	S/M	0.19	S	11.11
1,2,3,6,7,8-HxCDD	1.14	S	1.98	S	**53.85**
1,2,3,7,8,9-HxCDD	0.74	S	1.04	S/M	**33.71**
1,2,3,4,6,7,8-HpCDD	**8.75**		**10.1**		14.32
OCDD	**64.6**		**57.9**		10.94
2,3,7,8-TCDF	**1.25**	*	**1.33**	*	6.20
1,2,3,7,8-PeCDF	0.24	S/M	0.50	S	**70.27**
2,3,4,7,8-PeCDF	0.20	S	0.25	S/M	**22.22**
1,2,3,4,7,8-HxCDF	0.37	S	2.09	S	**139.84**
1,2,3,6,7,8-HxCDF	0.17	S	0.50	S	**98.51**
2,3,4,6,7,8-HxCDF	0.30	S	0.54	S/M	**57.14**
1,2,3,7,8,9-HxCDF	0.21	U/E	0.20	U/E	4.88
1,2,3,4,6,7,8-HpCDF	2.24	S	**4.31**		**63.21**
1,2,3,4,7,8,9-HpCDF	0.42	U/E	0.66	S	**44.44**
OCDF	4.64	S	**6.27**		**29.88**

U/E = Analyte not detected at or above the sample specific estimated detection limit (EDL)
EDL is reported.

M = Estimated Maximum Possible Concentration

S = Analyte detected below the Lower Method Calibration Limit.
Value reported should be considered an estimate.

Concentrations marked with an asterisk (*) are from a DB-225 column.

TABLE 7. DIOXINS/FURANS ANALYSIS RESULTS FOR SEDIMENT
LOWER COLUMBIA RIVER RECONNAISSANCE SURVEY

COMPOUND	Lower Method Calibration Limit (20g sample)	SAMPLE RESULTS (pg/g) D4		D5		D6		D6d		D8		D10		D11	
2,3,7,8-TCDD	0.5	0.23	S	0.12	S	0.15	S	0.17	S	0.16	S	0.26	S/M	0.22	S
Total TCDD		0.71		0.33	S	0.79		0.76		0.76		1.24		0.92	
1,2,3,7,8-PeCDD	2.5	0.22	S/M	0.17	S/M	0.16	S	0.19	S/M	0.14	S/M	0.52	S	0.12	S
Total PeCDD		0.12	S	0.68	S	0.10	S	0.65	S	0.20	S	2.60		0.37	S
1,2,3,4,7,8-HxCDD	2.5	0.51	S	0.15	S	0.17	S/M	0.19	S	0.19	S	1.92	S	0.38	S
1,2,3,6,7,8-HxCDD	2.5	1.91	S	0.78	S/M	1.14	S	1.98	S	0.59	S	5.95		1.43	S
1,2,3,7,8,9-HxCDD	2.5	1.58	S	0.58	S	0.74	S	1.04	S/M	0.37	S	5.04		1.19	S
Total HxCDD		16.8		3.93		7.62		12.0		2.36	S	47.3		14.40	
1,2,3,4,6,7,8-HpCDD	2.5	26.2		12.6		8.75		10.1		5.93		132		23.8	
Total HpCDD		55.2		23.1		18.2		20.7		12.2		211		46.1	
OCDD	5.0	272		159		64.6		57.9		45.9		768		217	
2,3,7,8-TCDF	0.5	2.06	*	1.23	*	1.25	*	1.33	*	0.96	*	2.09	*	1.93	*
Total TCDF		6.79		2.89		4.5		5.24		2.55		7.72		5.96	
1,2,3,7,8-PeCDF	2.5	0.30	S/M	0.79	S	0.24	S/M	0.50	S	0.24	S	0.69	S/M	0.36	S/M
2,3,4,7,8-PeCDF	2.5	0.30	S/M	0.54	S	0.20	S/M	0.25	S/M	0.16	S/M	0.43	S/M	0.24	S
Total PeCDF		1.20	S	3.61		1.21	S	1.54	S	1.40	S	10.1		2.91	
1,2,3,4,7,8-HxCDF	2.5	0.67	S/M	1.69	S	0.37	S	2.09	S	0.42	S	1.75	S	0.51	S/M
1,2,3,6,7,8-HxCDF	2.5	0.27	S	0.63	S	0.17	S	0.50	S	0.14	S	1.41	S/M	0.21	S/M
2,3,4,6,7,8-HxCDF	2.5	0.66	S/M	0.86	S/M	0.30	S	0.54	S/M	0.43	S	1.40	S	0.16	S
1,2,3,7,8,9-HxCDF	2.5	0.07	S/M	0.10	S/M	0.21	U/E	0.20	U/E	0.19	U/E	0.08	S/M	1.87	S/M
Total HxCDF		5.29		6.81		3.08		6.51		2.28	S	28.6		2.48	S
1,2,3,4,6,7,8-HpCDF	2.5	4.65		4.50		2.24	S	4.31		1.52	S	14.8		2.83	
1,2,3,4,7,8,9-HpCDF	2.5	0.31	S	1.14	S	0.42	U/E	0.66	S	0.25	S	1.19	S	0.31	S/M
Total HpCDF		14.1		9.99		6.91		11.3		4.55		52.5		8.14	
OCDF	5.0	15.1		14.9		4.64	S	6.27		4.48	S/M	34.6		6.76	
Sample or Method Blank Reference:		MB-1		MB-6		MB-6		MB-6		MB-6		MB-1		MB-1	

U/E = Analyte not detected at or above the sample specific estimated detection limit (EDL). EDL is reported.
M = Estimated Maximum Possible Concentration
S = Detected level of analyte is below the Lower Method Calibration Limit. Value should be considered an estimate
Concentrations marked with an asterisk (*) are from a DB-225 column.

TABLE 7 (cont.)

COMPOUND	Lower Method Calibration Limit (20g sample)	SAMPLE RESULTS (pg/g) D14		D15		D16		D18		D19		D20		D23	
2,3,7,8-TCDD	0.5	0.19	S	0.17	S	0.35	S	0.13	S	0.07	S/M	0.24	S	0.19	S
Total TCDD		1.60		1.48		2.49		0.96		2.1		1.54		1.40	
1,2,3,7,8-PeCDD	2.5	0.23	S	0.16	S	0.23	S	0.20	S	0.08	U/E	0.12	S	0.13	S
Total PeCDD		1.01	S	1.01	S	1.64	S	1.61	S	0.08	U/E	0.67	S	0.66	S
1,2,3,4,7,8-HxCDD	2.5	0.40	S/M	0.26	S/M	0.74	S	0.49	S	0.15	S	0.31	S	0.15	S/M
1,2,3,6,7,8-HxCDD	2.5	1.21	S	0.99	S	1.67	S	1.93	S	0.44	S	1.48	S	1.02	S
1,2,3,7,8,9-HxCDD	2.5	1.00	S	0.83	S	1.59	S	2.39	S	0.20	S	0.89	S/M	0.58	S
Total HxCDD		8.95		10.8		18.9		16.0		4.84		10.4		6.19	
1,2,3,4,6,7,8-HpCDD	2.5	12.7		12.1		28.8		27.3		16.5		54.3		15.4	
Total HpCDD		24.3		24.3		60.5		55.5		48.5		105		31.1	
OCDD	5.0	103		105		303		219		129		566		139	
2,3,7,8-TCDF	0.5	1.17	*	1.34	*	2.87	*	1.30	*	0.82	*	2.07	*	1.92	*
Total TCDF		8.53		7.66		13.9		7.78		11.9		10.8		10.8	
1,2,3,7,8-PeCDF	2.5	0.27	S	0.29	S	0.57	S	1.37	S	0.31	S/M	0.17	S/M	0.19	S
2,3,4,7,8-PeCDF	2.5	0.24	S	0.23	S	0.49	S	1.46	S	0.28	S	0.28	S	0.21	S
Total PeCDF		3.71		7.84		7.07		11.80		9.37		5.60		5.42	
1,2,3,4,7,8-HxCDF	2.5	0.61	S	0.73	S	1.14	S	7.47		0.60	S	0.61	S	0.43	S
1,2,3,6,7,8-HxCDF	2.5	0.23	S/M	0.31	S	0.37	S/M	2.22	S	0.27	S/M	0.25	S	0.18	S
2,3,4,6,7,8-HxCDF	2.5	0.36	S	0.43	S	0.61	S	6.21		0.30	S	0.55	S/M	0.47	S
1,2,3,7,8,9-HxCDF	2.5	0.14	S/M	0.18	S	0.27	S/M	7.21	M	0.07	S/M	0.16	S/M	0.15	S/M
Total HxCDF		5.20		5.02		8.16		38.7		3.71		6.08		4.01	
1,2,3,4,6,7,8-HpCDF	2.5	2.75		3.12		5.14		27.8		2.06	S	3.42		2.45	S
1,2,3,4,7,8,9-HpCDF	2.5	0.25	S/M	0.45	S/M	0.75	S	15.5		0.31	S	0.37	S/M	0.28	S
Total HpCDF		7.95		8.25		17.0		76.5		5.27		11.2		6.34	
OCDF	5.0	7.86		9.45		8.61		128		6.15		12.5		6.30	
Sample or Method Blank Reference:		MB-3		MB-3		MB-3		MB-4		MB-4		MB-4		MB-4	

U/E = Analyte not detected at or above the sample specific estimated detection limit (EDL). EDL is reported.
M = Estimated Maximum Possible Concentration
S = Detected level of analyte is below the Lower Method Calibration Limit. Value should be considered an estimate
Concentrations marked with an asterisk (*) are from a DB-225 column.

TABLE 7 (cont.)

COMPOUND	Lower Method Calibration Limit (20g sample)	SAMPLE RESULTS (pg/g) D24		D26		D28		D30		D35		D38		D40	
2,3,7,8-TCDD	0.5	0.26	S/M	0.10	U/E	0.18	S/M	0.12	S	0.28	S	0.09	U/E	0.21	S/M
Total TCDD		2.94		0.55		0.97		0.48	S	2.50		0.87		0.43	S
1,2,3,7,8-PeCDD	2.5	3.38	S/M	0.12	U/E	0.21	M	0.09	S	0.13	U/E	0.10	U/E	0.18	S
Total PeCDD		2.24	S	0.24	S	0.48	S	0.40	S	0.13	U/E	0.10	U/E	1.33	S
1,2,3,4,7,8-HxCDD	2.5	1.37	S	0.10	S/M	0.65	S	0.17	S/M	0.40	S	0.17	U/E	0.27	M
1,2,3,6,7,8-HxCDD	2.5	5.29		0.61	S	1.61	S	0.82	S	1.39	S	0.14	S/M	0.59	S
1,2,3,7,8,9-HxCDD	2.5	2.52		0.44	S	1.13	S	0.57	S/M	1.00	S	0.10	S	0.84	S
Total HxCDD		54.67		4.71		13.31		7.42		18.7		1.46	S	12.4	
1,2,3,4,6,7,8-HpCDD	2.5	188		6.38		41.4		23.03		20.0		0.90	S	9.25	
Total HpCDD		378		11.2		80.36		45.38		67.2		1.68	S	27.3	
OCDD	5.0	1480		53.76		369		221		193		6.76		71.5	
2,3,7,8-TCDF	0.5	3.23	*	0.67		1.44	*	1.72	*	2.94	*	0.06	*S	0.98	*
Total TCDF		11.21		1.76		5.73		4.59		9.62		0.18	S	7.38	
1,2,3,7,8-PeCDF	2.5	1.14	S	0.24	S/M	0.26	S/M	0.19	S/M	1.14	S	0.07	U/E	0.94	S
2,3,4,7,8-PeCDF	2.5	0.83	S	0.20	S	0.32	S	0.16	S	0.18	S	0.07	U/E	0.69	S
Total PeCDF		7.66		8.97		2.17	S	1.11	S	2.34	S	0.07	U/E	5.73	
1,2,3,4,7,8-HxCDF	2.5	2.18	S	0.70	S	0.74	S/M	0.37	S	2.99		0.31	S	2.78	
1,2,3,6,7,8-HxCDF	2.5	0.91	S	0.23	S	0.43	S	0.16	S	0.94	S	0.11	S/M	1.06	S
2,3,4,6,7,8-HxCDF	2.5	0.65	S	0.38	S/M	0.44	S/M	0.37	S	1.02	S	0.24	S/M	1.25	S
1,2,3,7,8,9-HxCDF	2.5	0.09	S	0.08	S/M	0.24	U/E	0.10	S/M	0.22	S	0.10	U/E	0.15	S/M
Total HxCDF		23.55		2.06	S	11.79		4.17		19.2		0.65	S/M	13.4	
1,2,3,4,6,7,8-HpCDF	2.5	13.05		1.67	S	4.30		2.37	S	6.46		0.51	S	6.38	
1,2,3,4,7,8,9-HpCDF	2.5	1.14	S	0.35	S	0.37	S	0.12	S/M	1.76	S	0.15	S	1.61	S
Total HpCDF		43.35		3.47		17.67		7.54		27.3		1.05	S	17.4	
OCDF	5.0	36.56		3.58	S	9.84		6.89		16.9		1.19	S	12.5	
Sample or Method Blank Reference:		MB-2		MB-2		MB-2		MB-2		MB-5		MB-5		MB-5	

U/E = Analyte not detected at or above the sample specific estimated detection limit (EDL). EDL is reported.

M = Estimated Maximum Possible Concentration

S = Detected level of analyte is below the Lower Method Calibration Limit. Value should be considered an estimate

Concentrations marked with an asterisk (*) are from a DB-225 column.

TABLE 7 (cont.)

COMPOUND	Lower Method Calibration Limit (20g sample)	SAMPLE RESULTS (pg/g) D40d		D45		MB-1		MB-2		MB-3		MB-4		MB-5	
2,3,7,8-TCDD	0.5	0.17	S	0.25	S	0.08	U/E	0.17	U/E	0.72	U/E	0.05	U/E	0.13	U/E
Total TCDD		1.10		1.06		0.08	U/E	0.17	U/E	0.12	S	0.12	S	0.37	S
1,2,3,7,8-PeCDD	2.5	0.13	S/M	0.16	S	0.13	U/E	0.28	U/E	0.38	U/E	0.10	U/E	0.13	U/E
Total PeCDD		0.45	S	0.67	S	0.13	U/E	0.28	U/E	0.38	U/E	0.10	U/E	0.13	U/E
1,2,3,4,7,8-HxCDD	2.5	0.20	S/M	0.40	S/M	0.22	U/E	0.30	U/E	0.10	S/M	0.11	U/E	0.17	U/E
1,2,3,6,7,8-HxCDD	2.5	0.42	S	1.43	S	0.19	U/E	0.25	U/E	0.27	S	0.17	S/M	0.14	U/E
1,2,3,7,8,9-HxCDD	2.5	0.59	S/M	0.94	S	0.21	U/E	0.27	U/E	0.25	S	0.15	S	0.19	U/E
Total HxCDD		5.74		12.8		0.19	U/E	0.25	U/E	1.08	S	0.37	S	0.14	U/E
1,2,3,4,6,7,8-HpCDD	2.5	6.41		27.1		1.84	S	0.66	M	2.66		0.07	S	0.71	S
Total HpCDD		19.4		53.7		2.62		0.41	S	4.59		0.60	S	1.11	S
OCDD	5.0	64.6		244		11.7		3.76	S	29.1		5.75		4.54	S
2,3,7,8-TCDF	0.5	0.65	*	1.96	*	0.15	S/M	0.32	S/M	0.05	S	0.13	S	0.08	U/E
Total TCDF		4.43		6.79		0.15	U/E	0.32	S	0.12	S	0.13	S	0.31	S
1,2,3,7,8-PeCDF	2.5	0.32	S	0.25	S/M	0.17	U/E	0.22	U/E	0.94	U/E	0.14	S	0.13	U/E
2,3,4,7,8-PeCDF	2.5	0.28	S/M	0.27	S/M	0.15	U/E	0.20	U/E	0.89	U/E	0.13	S/M	0.12	U/E
Total PeCDF		1.22	S	2.65		0.15	U/E	0.20	U/E	0.89	U/E	0.15	S	0.12	U/E
1,2,3,4,7,8-HxCDF	2.5	0.76	S	0.54	S	0.35	S	0.62	U/E	0.18	S	0.40	S	0.40	S/M
1,2,3,6,7,8-HxCDF	2.5	0.30	S	0.28	S/M	0.17	S/M	0.63	U/E	0.10	S	0.16	S/M	0.14	S
2,3,4,6,7,8-HxCDF	2.5	0.53	S	0.30	S/M	0.33	S	0.75	U/E	0.28	S/M	0.36	S/M	0.38	S/M
1,2,3,7,8,9-HxCDF	2.5	0.22	S	0.18	U/E	0.04	S/M	0.74	U/E	0.12	U/E	0.15	S/M	0.10	S/M
Total HxCDF		3.64		4.64		1.03	S	0.62	U/E	7.33		0.84	S	0.17	S
1,2,3,4,6,7,8-HpCDF	2.5	2.08	S	2.91		0.97	S	0.82	S	0.84	S	0.92	S	0.71	S
1,2,3,4,7,8,9-HpCDF	2.5	0.50	S	0.25	S	0.32	S/M	0.33	S/M	0.23	S	0.28	S	0.25	S/M
Total HpCDF		4.66		8.54		1.89	S	0.94	S	2.44	S	1.82	S	1.21	S
OCDF	5.0	5.14		8.22		2.55	S	1.52	S/M	3.07	S	2.43	S	1.13	S
Sample or Method Blank Reference:		MB-5		MB-1		D4, D10 D11, D45		D24, D26 D28, D30		D14, D15 D16, D16MS D16MSd		D18, D19 D20, D23 PAR1		D35, D38 D40, D40d PAR2	

U/E = Analyte not detected at or above the sample specific estimated detection limit (EDL). EDL is reported.

M = Estimated Maximum Possible Concentration

S = Detected level of analyte is below the Lower Method Calibration Limit. Value should be considered an estimate

Concentrations marked with an asterisk (*) are from a DB-225 column.

TABLE 7 (cont.)

COMPOUND	Lower Method Calibration Limit (20g sample)	LE RESULTS (pg/g) MB-6		
2,3,7,8-TCDD	0.5	0.07	U/E	
Total TCDD		0.44	S	
1,2,3,7,8-PeCDD	2.5	0.08	U/E	
Total PeCDD		0.08	U/E	
1,2,3,4,7,8-HxCDD	2.5	0.15	U/E	
1,2,3,6,7,8-HxCDD	2.5	0.13	U/E	
1,2,3,7,8,9-HxCDD	2.5	0.14	U/E	
Total HxCDD		0.13	U/E	
1,2,3,4,6,7,8-HpCDD	2.5	1.22	S	
Total HpCDD		2.02	S	
OCDD	5.0	9.69		
2,3,7,8-TCDF	0.5	0.23	S	
Total TCDF		0.23	S	
1,2,3,7,8-PeCDF	2.5	0.08	U/E	
2,3,4,7,8-PeCDF	2.5	0.08	U/E	
Total PeCDF		0.08	U/E	
1,2,3,4,7,8-HxCDF	2.5	0.14	U/E	
1,2,3,6,7,8-HxCDF	2.5	0.13	U/E	
2,3,4,6,7,8-HxCDF	2.5	0.28	S/M	
1,2,3,7,8,9-HxCDF	2.5	0.16	U/E	
Total HxCDF		0.13	U/E	
1,2,3,4,6,7,8-HpCDF	2.5	0.42	S	
1,2,3,4,7,8,9-HpCDF	2.5	0.22	U/E	
Total HpCDF		0.52	S	
OCDF	5.0	1.03	S/M	
Sample or Method Blank Reference:		D5, D8 D6, D6d PAR3		

U/E = Analyte not detected at or above the sample specific estimated detection limit (EDL). EDL is reported.
M = Estimated Maximum Possible Concentration
S = Detected level of analyte is below the Lower Method Calibration Limit. Value should be considered an estimate
Concentrations marked with an asterisk (*) are from a DB-225 column.

TABLE 8. DIOXINS/FURANS ANALYSIS RESULTS FOR TISSUE SAMPLES
LOWER COLUMBIA RIVER RECONNAISSANCE SURVEY

COMPOUND	Method Blank		STURGEON SAMPLE RESULTS (pg/g wet weight) ST-1-2-D		ST-2-1-D		ST-2-2-D		ST-3-3-D		ST-3-1-D	
DIOXINS/FURANS:												
2,3,7,8-TCDD	1.10	U/E	1.00	U/E	0.92	U/E	0.79	U/E	0.72	U/E	1.66	
Total TCDD	1.10	U/E	0.73		0.92	U/E	0.79	U/E	0.72	U/E	2.74	
1,2,3,7,8-PeCDD	1.48	U/E	1.02	U/E	1.14	U/E	0.92	U/E	0.87	U/E	0.90	U/E
Total PeCDD	1.48	U/E	1.02	U/E	1.14	U/E	0.92	U/E	0.87	U/E	0.90	U/E
1,2,3,4,7,8-HxCDD	0.52	U/E	0.50	U/E	0.53	U/E	0.40	U/E	0.43	U/E	0.42	U/E
1,2,3,6,7,8-HxCDD	0.41	U/E	0.36	U/E	0.38	U/E	0.30	U/E	0.33	U/E	0.31	U/E
1,2,3,7,8,9-HxCDD	0.44	U/E	0.40	U/E	0.42	U/E	0.33	U/E	0.36	U/E	0.34	U/E
Total HxCDD	0.41	U/E	0.36	U/E	0.38	U/E	0.30	U/E	0.33	U/E	0.31	U/E
1,2,3,4,6,7,8-HpCDD	1.77	U/E	1.25	U/E	1.09	U/E	1.00	U/E	0.87	U/E	1.03	U/E
Total HpCDD	1.77	U/E	1.25	U/E	1.09	U/E	1.00	U/E	0.87	U/E	1.03	U/E
OCDD	0.81	U/E	0.61	U/E	0.98	S/M	2.22	S/M	2.90	S	1.48	S/M
2,3,7,8-TCDF	0.44	U/E	1.54	*	6.41	*	1.66	*	22.6	*	22.8	*
Total TCDF	0.44	U/E	1.63		6.22		1.68		20.0		18.8	
1,2,3,7,8-PeCDF	0.30	U/E	0.32	U/E	0.25	U/E	0.27	U/E	0.29	U/E	0.73	S/M
2,3,4,7,8-PeCDF	0.29	U/E	0.28	U/E	0.24	U/E	0.24	U/E	0.28	U/E	0.49	S/M
Total PeCDF	0.29	U/E	0.28	U/E	0.24	U/E	0.24	U/E	0.28	U/E	2.50	U/L
1,2,3,4,7,8-HxCDF	1.28	U/E	1.02	U/E	1.15	U/E	0.72	U/E	1.08	U/E	1.30	U/E
1,2,3,6,7,8-HxCDF	1.16	U/E	0.83	U/E	0.88	U/E	0.62	U/E	0.90	U/E	1.10	U/E
2,3,4,6,7,8-HxCDF	5.65	U/E	3.83	U/E	3.09	U/E	1.95	U/E	4.81	U/E	3.66	U/E
1,2,3,7,8,9-HxCDF	1.34	U/E	1.67	U/E	1.74	U/E	1.09	U/E	1.78	U/E	2.04	U/E
Total HxCDF	1.16	U/E	0.83	U/E	0.88	U/E	0.62	U/E	0.90	U/E	1.10	U/E
1,2,3,4,6,7,8-HpCDF	0.77	U/E	0.58	U/E	0.73	U/E	0.59	U/E	0.47	U/E	0.84	U/E
1,2,3,4,7,8,9-HpCDF	1.12	U/E	0.79	U/E	1.00	U/E	0.78	U/E	0.63	U/E	0.57	U/E
Total HpCDF	0.77	U/E	0.58	U/E	0.73	U/E	0.59	U/E	0.47	U/E	0.67	S
OCDF	0.93	U/E	0.65	U/E	0.82	U/E	0.93	U/E	0.82	U/E	0.72	U/E
Percent Lipids:	0.0%		1.3%		4.5%		0.0%		6.6%		3.9%	

U = Compound was not detected.
E = Analyte not detected at or above the sample specific Estimated Detection Limit (EDL). The EDL is reported.
L = Analyte not detected at or above the Lower Method Calibration Limit (LMCL). The LMCL is reported.
M = Estimated Maximum Possible Concentration.
S = Analyte detected below the Lower Method Calibration Limit. Value should be considered an estimate.
Concentrations marked with an asterisk (*) are from a DB-225 column.

TABLE 8 (cont.)

COMPOUND	Method Blank		STURGEON SAMPLE RESULTS (pg/g wet weight) ST-4-3-D		ST-1-3-D		ST-4-1-D	
DIOXINS/FURANS:								
2,3,7,8-TCDD	0.88	U/E	0.59	U/E	1.07	U/E	0.62	U/E
Total TCDD	0.88	U/E	0.87		0.73		0.62	U/E
1,2,3,7,8-PeCDD	0.92	U/E	0.61	U/E	2.50	U/L	0.57	U/E
Total PeCDD	0.92	U/E	0.61	U/E	2.50	U/L	0.57	U/E
1,2,3,4,7,8-HxCDD	0.56	U/E	0.47	U/E	0.18	U/E	0.37	U/E
1,2,3,6,7,8-HxCDD	0.42	U/E	0.35	U/E	0.17	U/E	0.3	U/E
1,2,3,7,8,9-HxCDD	0.46	U/E	0.39	U/E	0.19	U/E	0.33	U/E
Total HxCDD	0.42	U/E	0.35	U/E	0.17	U/E	0.30	U/E
1,2,3,4,6,7,8-HpCDD	1.45	U/E	0.50	S/M	0.35	S	0.63	U/E
Total HpCDD	1.45	U/E	0.72	U/E	0.35	S	0.63	U/E
OCDD	1.21	U/E	3.61	S/M	0.25	S	1.07	S
2,3,7,8-TCDF	0.28	U/E	13.3	*	5.52	*	3.53	
Total TCDF	0.28	U/E	10.9		4.85		3.58	
1,2,3,7,8-PeCDF	0.21	U/E	0.31	U/E	2.50	U/L	0.26	U/E
2,3,4,7,8-PeCDF	0.20	U/E	0.28	U/E	2.50	U/L	0.21	U/E
Total PeCDF	0.20	U/E	0.56	S	2.50	U/L	0.64	S
1,2,3,4,7,8-HxCDF	0.84	U/E	0.80	U/E	0.31	U/E	0.67	U/E
1,2,3,6,7,8-HxCDF	0.77	U/E	0.70	U/E	0.31	U/E	0.58	U/E
2,3,4,6,7,8-HxCDF	1.11	U/E	1.27	U/E	0.35	U/E	0.83	U/E
1,2,3,7,8,9-HxCDF	1.54	U/E	1.33	U/E	0.41	U/E	1.13	U/E
Total HxCDF	0.77	U/E	0.97	S	0.50	S	0.58	U/E
1,2,3,4,6,7,8-HpCDF	0.52	U/E	0.53	U/E	0.20	U/E	0.50	U/E
1,2,3,4,7,8,9-HpCDF	0.82	U/E	0.84	U/E	0.26	U/E	0.69	U/E
Total HpCDF	0.52	U/E	0.53	U/E	0.20	U/E	0.50	U/E
OCDF	0.90	U/E	0.49	U/E	0.29	U/E	0.61	U/E
Percent Lipids:	0.0%		2.3%		6.1%		3.9%	

U = Compound was not detected.
E = Analyte not detected at or above the sample specific Estimated Detection Limit (EDL). The EDL is reported.
L = Analyte not detected at or above the Lower Method Calibration Limit (LMCL). The LMCL is reported.
M = Estimated Maximum Possible Concentration.
S = Analyte detected below the Lower Method Calibration Limit. Value should be considered an estimate.
Concentrations marked with an asterisk (*) are from a DB-225 column.

TABLE 8 (cont.)

CHUB SAMPLE RESULTS (pg/g wet weight)												
COMPOUND	**MB-3**		**D28**		**D10**		**D19**		**D15**		**MB**	
DIOXINS/FURANS:												
2,3,7,8-TCDD	0.22	U/E	2.00		2.32		3.29		1.44		0.19	U/E
Total TCDD	0.77		4.14		3.96		5.12		3.67		5.21	
1,2,3,7,8-PeCDD	0.19	U/E	0.66	S	0.50	S	0.70	S	0.31	S	0.15	U/E
Total PeCDD	0.19	U/E	1.17	S	0.5	S	0.87	S	0.38	S	0.15	U/E
1,2,3,4,7,8-HxCDD	0.27	U/E	0.20	S/M	0.11	S/M	0.14	S	0.11	S	0.12	U/E
1,2,3,6,7,8-HxCDD	0.19	U/E	0.59	S	0.31	S	0.51	S	0.39	S	0.09	U/E
1,2,3,7,8,9-HxCDD	0.20	U/E	0.22	S	0.14	S	0.15	S	0.12	S/M	0.09	U/E
Total HxCDD	0.19	U/E	1.90	S	0.77	S	1.11	S	0.86	S	0.09	U/E
1,2,3,4,6,7,8-HpCDD	0.31	S/M	1.83	S/M	0.65	S	0.73	S	0.74	S	0.02	S/M
Total HpCDD	0.27	U/E	1.51	S	1.35	S	1.37	S	0.74	S	2.50	U/L
OCDD	1.40	S	8.40		3.62	S	4.47	S	5.67		1.43	S
2,3,7,8-TCDF	0.12	S/M	32.5	*	40.0	*	52.1	*	22.2	*	0.1	U/E
Total TCDF	0.45	S	25.10		30.1		39.0		17.8		1.09	
1,2,3,7,8-PeCDF	0.29	U/E	0.38	S	0.31	S	0.58	S/M	0.24	S	0.07	U/E
2,3,4,7,8-PeCDF	0.23	U/E	0.82	S	0.59	S	0.94	S	0.55	S	0.06	U/E
Total PeCDF	0.23	U/E	1.85	S	2.01	S	1.93	S	1.86	S	0.06	U/E
1,2,3,4,7,8-HxCDF	0.24	U/E	0.24	S	0.11	U/E	0.13	S	0.12	S	0.16	U/E
1,2,3,6,7,8-HxCDF	0.22	U/E	0.13	S	0.10	U/E	0.07	S/M	0.05	S	0.15	U/E
2,3,4,6,7,8-HxCDF	0.44	U/E	0.32	S	0.26	S/M	0.23	S/M	0.25	S	0.58	U/E
1,2,3,7,8,9-HxCDF	0.54	U/E	0.26	U/E	0.15	U/E	0.11	U/E	0.08	U/E	0.26	U/E
Total HxCDF	0.22	U/E	2.41	S	0.31	S	1.10	S	0.78	S	0.15	U/E
1,2,3,4,6,7,8-HpCDF	0.13	M	0.43	S	0.21	S	0.20	S	0.16	S/M	0.16	U/E
1,2,3,4,7,8,9-HpCDF	0.33	U/E	0.18	S/M	0.06	S/M	0.08	U/E	0.04	S	0.19	U/E
Total HpCDF	0.33	U/E	0.90	S	0.31	S	0.19	S	0.25	S	0.16	U/E
OCDF	1.49	U/E	1.01	S/M	0.31	S	0.53	S	0.38	S	0.39	S
Percent Lipids:			11.2		17.0		12.9		11.4			

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E = Analyte not detected at or above the sample specific Estimated Detection Limit (EDL). The EDL is reported.
L = Analyte not detected at or above the Lower Method Calibration Limit (LMCL). The LMCL is reported.
M = Estimated Maximum Possible Concentration.
S = Analyte detected below the Lower Method Calibration Limit. Value should be considered an estimate.
Concentrations marked with an asterisk (*) are from a DB-225 column.

TABLE 8 (cont.)

CHUB SAMPLE RESULTS (pg/g wet weight)						
COMPOUND	D21		D24		D23	
DIOXINS/FURANS:						
2,3,7,8-TCDD	2.77		4.41		3.10	
Total TCDD	7.45		10.1		8.29	
1,2,3,7,8-PeCDD	0.76	S	2.04	S/M	0.83	S
Total PeCDD	1.58	S	1.05	U/E	1.47	S
1,2,3,4,7,8-HxCDD	0.21	S/M	0.87	S/M	0.39	S/M
1,2,3,6,7,8-HxCDD	0.63	S	1.16	S	0.62	S/M
1,2,3,7,8,9-HxCDD	0.18	S	0.47	U/E	0.29	S/M
Total HxCDD	1.92	S	2.51		0.16	U/E
1,2,3,4,6,7,8-HpCDD	1.09	S	2.81		0.24	S
Total HpCDD	1.89	S	5.34		2.77	
OCDD	4.21	S	18.1		3.91	S
2,3,7,8-TCDF	41.2		58.8	*	42.5	*
Total TCDF	35.6		42.6		35.8	
1,2,3,7,8-PeCDF	0.56	S	0.86	S	0.65	S/M
2,3,4,7,8-PeCDF	0.90	S	2.46	S	0.95	S/M
Total PeCDF	3.08		5.89		2.21	S
1,2,3,4,7,8-HxCDF	0.16	S	0.56	S/M	0.71	U/E
1,2,3,6,7,8-HxCDF	0.06	S/M	0.44	S/M	0.64	U/E
2,3,4,6,7,8-HxCDF	0.29	S	1.61	U/E	1.38	U/E
1,2,3,7,8,9-HxCDF	0.14	U/E	1.38	U/E	1.09	U/E
Total HxCDF	1.00	S	1.88	S	1.34	S
1,2,3,4,6,7,8-HpCDF	0.18	S	0.74	S	0.17	U/E
1,2,3,4,7,8,9-HpCDF	0.07	S/M	0.50	U/E	0.18	U/E
Total HpCDF	0.14	S	0.86	S	0.17	U/E
OCDF	0.41	S/M	2.03	S	1.18	U/E
Percent Lipids:	14.5		12.0		13.2	

U = Compound was not detected.

E = Analyte not detected at or above the sample specific Estimated Detection Limit (EDL). The EDL is reported.

L = Analyte not detected at or above the Lower Method Calibration Limit (LMCL). The LMCL is reported.

M = Estimated Maximum Possible Concentration.

S = Analyte detected below the Lower Method Calibration Limit. Value should be considered an estimate.

Concentrations marked with an asterisk (*) are from a DB-225 column.

TABLE 8 (cont.)

CARP SAMPLE RESULTS (pg/g wet weight)												
COMPOUND	**MB-1**		**D35C**		**D40C**		**D38C**		**MBRX**		**D28C**	
DIOXINS/FURANS:												
2,3,7,8-TCDD	0.14	U/E	1.32		2.10		1.28		0.12	U/E	1.64	
Total TCDD	1.74		2.28		3.76		2.91		1.63		2.75	
1,2,3,7,8-PeCDD	0.19	S	1.11	S/M	1.68	S/M	0.84	S/M	0.30	U/E	1.77	S/M
Total PeCDD	0.19	S	0.16	U/E	0.24	U/E	0.19	U/E	2.50	S	1.59	S
1,2,3,4,7,8-HxCDD	0.23	U/E	0.62	S/M	0.40	S/M	0.26	S	0.15	S/M	1.18	S
1,2,3,6,7,8-HxCDD	0.19	U/E	1.53	S/M	1.93	S	0.73	S	0.28	S	3.73	
1,2,3,7,8,9-HxCDD	0.19	U/E	0.21	S/M	0.27	S/M	0.12	S/M	0.27	S	0.36	U/E
Total HxCDD	0.19	U/E	0.48	U/E	1.91	S	1.00	S	1.47	S	6.41	
1,2,3,4,6,7,8-HpCDD	0.78	S	3.42		4.39		1.59	S	0.60	S	9.50	
Total HpCDD	1.61	S	4.31		4.39		1.59	S	1.06	S	11.80	
OCDD	10.20		12.30		7.54		2.71		1.29	S	30.6	
2,3,7,8-TCDF	0.14	U/E	9.53	*	12.2	*	7.60	*	0.12	U/E	4.89	*
Total TCDF	0.43	S	9.90		12.90		8.55		0.50	S	4.57	
1,2,3,7,8-PeCDF	0.17	U/E	0.29	S	0.39	S	0.21	S	0.22	U/E	0.57	S/M
2,3,4,7,8-PeCDF	0.18	U/E	0.73	S/M	0.96	S	0.46	S	0.25	U/E	1.37	S
Total PeCDF	0.17	U/E	0.67	S	1.34	S	0.77	S	0.22	U/E	1.69	S
1,2,3,4,7,8-HxCDF	0.14	S/M	0.23	S/M	0.19	S/M	0.12	S	0.18	U/E	0.52	S
1,2,3,6,7,8-HxCDF	0.14	S	0.18	S	0.16	S	0.09	S/M	0.18	U/E	0.42	S/M
2,3,4,6,7,8-HxCDF	0.28	S	0.33	S/M	0.40	S/M	0.26	S	0.36	S/M	3.50	MD
1,2,3,7,8,9-HxCDF	0.28	U/E	0.21	U/E	0.12	U/E	0.05	S/M	0.30	U/E	0.34	U/E
Total HxCDF	0.43	S	0.72	S	0.43	S	0.66	S	0.18	U/E	2.97	
1,2,3,4,6,7,8-HpCDF	0.21	S	0.40	S	0.27	S/M	0.18	S/M	0.17	S/M	1.31	S
1,2,3,4,7,8,9-HpCDF	0.14	S/M	0.12	S	0.16	U/E	0.56	U/E	0.12	U/E	0.18	U/E
Total HpCDF	0.43	S	1.00	S	0.32	S	0.56	U/E	0.12	U/E	3.57	
OCDF	1.13	S	0.84	S	0.52	U/E	0.29	U/E	0.30	U/E	2.45	S
Percent Lipids:			3.9		6.9		1.5				2.9	

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E = Analyte not detected at or above the sample specific Estimated Detection Limit (EDL). The EDL is reported.
L = Analyte not detected at or above the Lower Method Calibration Limit (LMCL). The LMCL is reported.
M = Estimated Maximum Possible Concentration.
MD = Estimated Maximum Possible Concentration with Diphenyl Ether interferences.
S = Analyte detected below the Lower Method Calibration Limit. Value should be considered an estimate.
Concentrations marked with an asterisk (*) are from a DB-225 column.

TABLE 8 (cont.)

CARP SAMPLE RESULTS (pg/g wet weight)		
COMPOUND	**D24C**	
DIOXINS/FURANS:		
2,3,7,8-TCDD	**1.57**	
Total TCDD	**3.36**	
1,2,3,7,8-PeCDD	**1.89**	S/M
Total PeCDD	**1.91**	S
1,2,3,4,7,8-HxCDD	**1.45**	S/M
1,2,3,6,7,8-HxCDD	**4.82**	
1,2,3,7,8,9-HxCDD	**0.50**	S
Total HxCDD	**6.87**	
1,2,3,4,6,7,8-HpCDD	**9.81**	
Total HpCDD	**11.6**	
OCDD	**20.10**	
2,3,7,8-TCDF	**4.37**	*
Total TCDF	**8.49**	
1,2,3,7,8-PeCDF	**0.76**	S
2,3,4,7,8-PeCDF	**1.37**	S
Total PeCDF	**2.59**	
1,2,3,4,7,8-HxCDF	**0.66**	S
1,2,3,6,7,8-HxCDF	**0.57**	S
2,3,4,6,7,8-HxCDF	**5.70**	MD
1,2,3,7,8,9-HxCDF	**0.30**	U/E
Total HxCDF	**1.60**	S
1,2,3,4,6,7,8-HpCDF	**0.75**	S
1,2,3,4,7,8,9-HpCDF	**0.11**	U/E
Total HpCDF	**0.95**	S
OCDF	**0.86**	S/M
Percent Lipids:	6.2	

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M = Estimated Maximum Possible Concentration.

MD = Estimated Maximum Possible Concentration with Diphenyl Ether interferences.

S = Analyte detected below the Lower Method Calibration Limit. Value should be considered an estimate.

Concentrations marked with an asterisk (*) are from a DB-225 column.

TABLE 8 (cont.)

CRAYFISH SAMPLE RESULTS (pg/g wet weight)												
COMPOUND	**MB-1**		**MB-2**		**MB-3**		**D35**		**D28**		**D38**	
DIOXINS/FURANS:												
2,3,7,8-TCDD	0.16	U/E	0.12	U/E	0.17	U/E	0.40	S/M	**0.86**		0.40	S/M
Total TCDD	**3.56**		**0.70**		**3.01**		**5.96**		**1.79**		0.37	S
1,2,3,7,8-PeCDD	0.28	U/E	0.29	U/E	0.29	U/E	0.48	S	0.32	U/E	0.27	U/E
Total PeCDD	**3.28**		0.29	U/E	0.29	U/E	**5.16**		0.32	U/E	0.27	U/E
1,2,3,4,7,8-HxCDD	0.34	U/E	0.15	U/E	0.08	U/E	0.15	S/M	0.16	S/M	0.24	U/E
1,2,3,6,7,8-HxCDD	0.40	S	0.14	U/E	0.07	U/E	0.53	S	0.32	S/M	0.25	U/E
1,2,3,7,8,9-HxCDD	0.30	U/E	0.13	U/E	0.30	U/E	0.59	S	0.19	U/E	0.25	U/E
Total HxCDD	**3.90**		0.13	U/E	0.07	U/E	**6.14**		1.13	S	0.24	U/E
1,2,3,4,6,7,8-HpCDD	1.24	S	0.30	S	0.30	U/E	2.07	S	**5.21**		0.32	U/E
Total HpCDD	1.24	S	0.30	S	0.30	U/E	**3.80**		**18.6**		0.32	U/E
OCDD	1.65	S/M	0.42	U/E	0.29	U/E	**5.72**		**79.10**		1.62	S/M
2,3,7,8-TCDF	0.22	U/E	0.16	U/E	0.16	U/E	**4.10**	*	**12.40**	*	**4.83**	*
Total TCDF	0.38	S	0.16	U/E	**0.85**		**10.2**		**18.5**		**6.33**	
1,2,3,7,8-PeCDF	0.27	U/E	0.20	U/E	0.07	U/E	0.30	S	0.39	S/M	0.42	U/E
2,3,4,7,8-PeCDF	0.24	U/E	0.20	U/E	0.08	U/E	0.48	S/M	0.85	S/M	0.29	S/M
Total PeCDF	0.24	U/E	0.20	U/E	0.08		1.79	S	**2.99**		0.59	S
1,2,3,4,7,8-HxCDF	0.33	U/E	0.36	U/E	0.34	U/E	0.21	S	0.28	S	0.42	U/E
1,2,3,6,7,8-HxCDF	0.34	U/E	0.34	U/E	0.32	U/E	0.18	S/M	0.32	S/M	0.40	U/E
2,3,4,6,7,8-HxCDF	0.33	S	0.47	U/E	0.19	S	0.48	S	**7.26**		0.34	S/M
1,2,3,7,8,9-HxCDF	0.50	U/E	0.56	U/E	0.55	U/E	0.13	S/M	0.71	U/E	0.59	U/E
Total HxCDF	0.43	S	0.34	U/E	0.26	S	1.72	S	**49.10**		0.40	U/E
1,2,3,4,6,7,8-HpCDF	0.26	S/M	0.10	U/E	0.18	U/E	0.29	S	0.31	S/M	0.45	S/M
1,2,3,4,7,8,9-HpCDF	0.30	U/E	0.13	U/E	0.20	U/E	0.07	U/E	0.35	U/E	0.24	U/E
Total HpCDF	0.30	U/E	0.10	U/E	0.18	U/E	0.07	U/E	0.72	S	0.24	U/E
OCDF	0.45	U/E	0.35	U/E	0.44	U/E	0.42	S/M	1.24	S/M	0.60	S/M
Percent Lipids:							3.36		3.78		3.89	

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M = Estimated Maximum Possible Concentration.
MD = Estimated Maximum Possible Concentration with Diphenyl Ether interferences.
S = Analyte detected below the Lower Method Calibration Limit. Value should be considered an estimate.
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TABLE 8 (cont.)

CRAYFISH SAMPLE RESULTS
(pg/g wet weight)

COMPOUND	D40		D6		D8		D10		D15		D19	
DIOXINS/FURANS:												
2,3,7,8-TCDD	0.27	S	0.44	S	0.45	S	0.45	S	0.39	S/M	0.62	
Total TCDD	1.06		1.58		0.45	S	3.05		2.38		3.25	
1,2,3,7,8-PeCDD	0.22	U/E	0.19	U/E	0.18	U/E	0.17	U/E	0.14	U/E	0.66	U/E
Total PeCDD	0.22	U/E	0.19	U/E	0.18	U/E	0.17	U/E	0.14	U/E	0.66	U/E
1,2,3,4,7,8-HxCDD	0.20	U/E	0.16	U/E	0.08	U/E	0.13	U/E	0.08	U/E	0.21	U/E
1,2,3,6,7,8-HxCDD	0.19	U/E	0.16	U/E	0.07	U/E	0.38	S/M	0.07	U/E	0.30	U/E
1,2,3,7,8,9-HxCDD	0.18	U/E	0.16	U/E	0.07	U/E	0.12	U/E	0.07	U/E	0.18	U/E
Total HxCDD	0.18	U/E	0.16	U/E	0.07	U/E	0.12	U/E	0.07	U/E	0.33	S
1,2,3,4,6,7,8-HpCDD	0.62	S	0.42	S/M	0.67	S/M	1.57	S	0.53	S/M	1.18	S
Total HpCDD	0.62	S	0.58	S	0.58	S	2.85		0.06	U/E	2.87	
OCDD	3.12	S	2.22	S	4.12	S	7.81		3.38	S	6.52	
2,3,7,8-TCDF	4.81	*	4.66	*	4.72	*	4.41	*	4.12	*	9.52	*
Total TCDF	6.84		6.74		5.35		7.62		5.80		16.2	
1,2,3,7,8-PeCDF	0.26	U/E	0.14	S	0.11	S/M	0.16	U/E	0.19	U/E	1.02	S
2,3,4,7,8-PeCDF	0.22	S/M	0.23	S	0.22	S/M	0.24	S/M	0.29	S/M	3.05	
Total PeCDF	0.26	S	0.23	S	0.26	S	0.30	S	0.44	S	12.10	
1,2,3,4,7,8-HxCDF	0.32	U/E	0.27	U/E	0.24	U/E	0.26	U/E	0.09	U/E	0.35	S
1,2,3,6,7,8-HxCDF	0.31	U/E	0.27	U/E	0.22	U/E	0.25	U/E	0.09	U/E	0.24	S
2,3,4,6,7,8-HxCDF	0.27	S/M	0.32	U/E	0.21	S/M	0.26	S	0.28	S	0.46	S
1,2,3,7,8,9-HxCDF	0.50	U/E	0.41	U/E	0.31	U/E	0.35	U/E	0.16	U/E	0.05	U/E
Total HxCDF	0.31	U/E	0.27	U/E	0.22	U/E	1.01	S	0.34	S	2.48	S
1,2,3,4,6,7,8-HpCDF	0.09	U/E	0.13	U/E	0.10	U/E	0.29	S	0.27	S/M	0.31	U/E
1,2,3,4,7,8,9-HpCDF	0.14	U/E	0.15	U/E	0.13	U/E	0.16	U/E	0.16	U/E	0.09	U/E
Total HpCDF	0.09	U/E	0.13	U/E	0.10	U/E	0.37	S	0.16	U/E	0.09	U/E
OCDF	0.24	U/E	0.29	U/E	0.18	U/E	0.35	U/E	0.52	U/E	0.56	S
Percent Lipids:	3.32		4.43		2.96		2.15		2.05		2.54	

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M = Estimated Maximum Possible Concentration.
MD = Estimated Maximum Possible Concentration with Diphenyl Ether interferences.
S = Analyte detected below the Lower Method Calibration Limit. Value should be considered an estimate.
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TABLE 8 (cont.)

COMPOUND	CRAYFISH SAMPLE RESULTS (pg/g wet weight) D20		D23		D24	
DIOXINS/FURANS:						
2,3,7,8-TCDD	0.39	S/M	0.43	S	0.47	S
Total TCDD	**0.89**		**0.93**		**6.98**	
1,2,3,7,8-PeCDD	0.09	U/E	0.32	U/E	0.83	U/E
Total PeCDD	0.09	U/E	0.20	U/E	**6.26**	
1,2,3,4,7,8-HxCDD	0.30	U/E	0.10	U/E	0.39	S
1,2,3,6,7,8-HxCDD	0.30	U/E	**0.31**		0.89	S
1,2,3,7,8,9-HxCDD	0.29	U/E	0.15	M	0.76	S/M
Total HxCDD	0.23	S	0.30	S	**8.14**	
1,2,3,4,6,7,8-HpCDD	0.47	S	0.71	S	**4.01**	
Total HpCDD	0.47	S	0.71	S	**7.62**	
OCDD	3.33	S	4.67	S	**16.70**	
2,3,7,8-TCDF	**5.64**	*	**6.08**	*	**6.39**	*
Total TCDF	**6.62**		**5.66**		**14.2**	
1,2,3,7,8-PeCDF	0.17	S	0.25	S/M	0.67	S
2,3,4,7,8-PeCDF	0.20	S	0.42	S/M	0.98	S
Total PeCDF	1.07	S	1.12	S	**7.45**	
1,2,3,4,7,8-HxCDF	0.09	U/E	0.07	U/E	0.36	S
1,2,3,6,7,8-HxCDF	0.10	U/E	0.06	U/E	0.32	S
2,3,4,6,7,8-HxCDF	0.35	S	0.33	S	0.84	S
1,2,3,7,8,9-HxCDF	0.12	U/E	0.09	U/E	0.23	S
Total HxCDF	0.37	S	0.78	S	**5.11**	
1,2,3,4,6,7,8-HpCDF	0.13	U/E	0.37	S/M	0.70	S
1,2,3,4,7,8,9-HpCDF	0.17	U/E	0.27	U/E	0.19	S
Total HpCDF	0.13	U/E	0.27	U/E	1.17	S
OCDF	0.44	U/E	0.49	S/M	0.63	S
Percent Lipids:	2.84		2.57		2.92	

U = Compound was not detected.
E = Analyte not detected at or above the sample specific Estimated Detection Limit (EDL). The EDL is reported.
L = Analyte not detected at or above the Lower Method Calibration Limit (LMCL). The LMCL is reported.
M = Estimated Maximum Possible Concentration.
MD = Estimated Maximum Possible Concentration with Diphenyl Ether interferences.
S = Analyte detected below the Lower Method Calibration Limit. Value should be considered an estimate.
Concentrations marked with an asterisk (*) are from a DB-225 column.

TABLE 8 (cont.)

SUCKER SAMPLE RESULTS (pg/g wet weight)												
COMPOUND	**MB-2**		**MB-2/2**		**MB1RX**		**D35S**		**D38S**		**D40S**	
DIOXINS/FURANS:												
2,3,7,8-TCDD	0.08	U/E	0.07	U/E	0.06	S	0.62		1.38		0.72	
Total TCDD	1.80		0.89		1.84		2.15		0.30	S	2.35	
1,2,3,7,8-PeCDD	0.29	S/M	0.25	S	0.24	S/M	0.40	S/M	0.72	S/M	0.48	S/M
Total PeCDD	1.72	S	0.60	S	3.38		3.15		1.65	S	1.98	S
1,2,3,4,7,8-HxCDD	0.16	S/M	0.17	S	0.12	S	0.20	S	0.33	S	0.17	S/M
1,2,3,6,7,8-HxCDD	0.45	S	0.33	S	0.47	S/M	0.18	S	0.81	S	0.41	S
1,2,3,7,8,9-HxCDD	0.28	S/M	0.30	S/M	0.33	S	0.11	S	0.38	S	0.32	S/M
Total HxCDD	2.19	S	1.05	S	3.80		1.12	S	3.61		2.78	
1,2,3,4,6,7,8-HpCDD	0.85	S/M	0.66	S	1.16	S	1.04	S	2.41	S	1.82	S
Total HpCDD	0.61	S	0.66	S	2.08	S	1.83	S	3.28		4.38	
OCDD	1.73	S/M	2.12	S	1.65	S	3.79	S	4.12	S	0.79	S
2,3,7,8-TCDF	0.08	U/E	0.10	U/E	0.29	S	7.09	*	11.4	*	11.0	*
Total TCDF	0.76		0.15	S	2.07		6.41		16.8		12.9	
1,2,3,7,8-PeCDF	0.28	S/M	0.31	S	0.15	S	0.18	S	0.23	S/M	0.16	S/M
2,3,4,7,8-PeCDF	0.32	S/M	0.25	S/M	0.27	S	0.31	S	0.72	S	0.45	S/M
Total PeCDF	0.14	U/E	0.30	S	1.16	S	1.13	S	2.51		1.18	S
1,2,3,4,7,8-HxCDF	0.30	S	0.30	S	0.21	S	0.08	S	0.27	S/M	0.09	S
1,2,3,6,7,8-HxCDF	0.39	S/M	0.30	S	0.22	S	0.16	S	0.36	S	0.15	S/M
2,3,4,6,7,8-HxCDF	0.61	S	0.59	S/M	0.49	S/M	1.61	S/MD	2.69	MD	2.77	MD
1,2,3,7,8,9-HxCDF	0.39	S	0.40	S/M	0.18	S/M	0.11	S	0.18	S	0.17	S/M
Total HxCDF	1.29	S	0.77	S	0.52	S	1.17	S	1.89	S	0.95	S
1,2,3,4,6,7,8-HpCDF	0.34	S	0.32	S/M	0.29	S/M	0.90	S	1.79	S/MD	0.30	S/M
1,2,3,4,7,8,9-HpCDF	0.34	S	0.25	S	0.11	S/M	0.10	S	0.15	S	0.11	S/M
Total HpCDF	0.68	S	0.25	S	0.03	U/E	1.53	S	1.94	S	2.52	
OCDF	0.62	S/M	0.77	S	0.27	S/M	0.35	S/M	0.69	S	10.60	
Percent Lipids:							3.4		9.2		15	

U = Compound was not detected.

E = Analyte not detected at or above the sample specific Estimated Detection Limit (EDL). The EDL is reported.

L = Analyte not detected at or above the Lower Method Calibration Limit (LMCL). The LMCL is reported.

M = Estimated Maximum Possible Concentration.

MD = Estimated Maximum Possible Concentration with Diphenyl Ether interferences.

S = Analyte detected below the Lower Method Calibration Limit. Value should be considered an estimate.

Concentrations marked with an asterisk (*) are from a DB-225 column.

TABLE 8 (cont.)

COMPOUND	SUCKER SAMPLE RESULTS (pg/g wet weight) D28S		D24S		D23S		D19S		D15S		D6S	
DIOXINS/FURANS:												
2,3,7,8-TCDD	1.41		1.01		0.92		1.32		0.88		0.49	S
Total TCDD	3.5		3.36		2.69		3.79		2.65		2.71	
1,2,3,7,8-PeCDD	0.90	S/M	0.58	S/M	0.43	S/M	0.64	S/M	0.51	S/M	0.46	S/M
Total PeCDD	0.11	U/E	0.85	S	0.26	S	5.06		4.50		4.86	
1,2,3,4,7,8-HxCDD	0.35	S	0.22	S	0.13	S/M	0.23	S	0.19	S/M	0.18	S
1,2,3,6,7,8-HxCDD	1.42	S	0.65	S	0.44	S	0.87	S	0.74	S	0.68	S/M
1,2,3,7,8,9-HxCDD	0.36	S	0.28	S	0.19	S	0.48	S	0.42	S	0.43	S
Total HxCDD	3.63		2.23	S	1.54	S	7.65		7.42		7.01	
1,2,3,4,6,7,8-HpCDD	4.36		3.11		1.10	S	2.98		2.45	S	2.07	S
Total HpCDD	7.30		5.74		1.90	S	5.48		4.53		3.85	
OCDD	20.1		21.3		5.25		9.28		6.43		4.04	S
2,3,7,8-TCDF	6.98	*	7.24	*	6.36	*	8.79	*	4.69	*	5.24	*
Total TCDF	7.95		7.34		6.07		8.69		6.00		6.03	
1,2,3,7,8-PeCDF	0.42	S	0.28	S/M	0.16	S	0.34	S/M	0.20	S	0.18	S
2,3,4,7,8-PeCDF	0.92	S	0.50	S	0.38	S	0.69	S	0.48	S	0.43	S
Total PeCDF	2.15	S	1.14	S	0.76	S	2.44	S	2.56		2.47	S
1,2,3,4,7,8-HxCDF	0.45	S	0.22	S/M	0.13	S/M	0.27	S	0.20	S	0.18	S
1,2,3,6,7,8-HxCDF	0.25	S	0.18	S	0.11	S/M	0.22	S	0.22	S	0.23	S
2,3,4,6,7,8-HxCDF	1.50	S/M	0.54	S/M	0.49	S/M	1.41	S/M	1.65	S/MD	1.35	S/MD
1,2,3,7,8,9-HxCDF	0.33	S	0.17	S	0.09	S	0.18	S	0.12	S/M	0.13	S
Total HxCDF	2.71		1.21	S	0.38	S	1.21	S	0.93	S	0.90	S
1,2,3,4,6,7,8-HpCDF	0.70	S	0.55	S	0.23	S/M	1.05	S/MD	1.03	S/MD	0.29	S/MD
1,2,3,4,7,8,9-HpCDF	0.30	S	0.15	S/M	0.09	S	0.13	S	0.10	S/M	0.06	S
Total HpCDF	2.23	S	1.53	S	0.22	S	0.89	S	0.26	S	0.45	S
OCDF	3.07	S	1.76	S	0.56	S	1.03	S	0.47	S	0.30	S
Percent Lipids:	8.2		8.1		6.7		7.6		5.4		5.3	

U = Compound was not detected.
E = Analyte not detected at or above the sample specific Estimated Detection Limit (EDL). The EDL is reported.
L = Analyte not detected at or above the Lower Method Calibration Limit (LMCL). The LMCL is reported.
M = Estimated Maximum Possible Concentration.
MD = Estimated Maximum Possible Concentration with Diphenyl Ether interferences.
S = Analyte detected below the Lower Method Calibration Limit. Value should be considered an estimate.
Concentrations marked with an asterisk (*) are from a DB-225 column.

TABLE 8 (cont.)

COMPOUND	SUCKER SAMPLE RESULTS (pg/g wet weight) D8S		D10S		D20S	
DIOXINS/FURANS:						
2,3,7,8-TCDD	0.82		1.56		0.76	
Total TCDD	3.24		52.6		3.11	
1,2,3,7,8-PeCDD	0.65	S/M	1.10	S/M	0.40	S/M
Total PeCDD	4.90		7.22		0.18	S
1,2,3,4,7,8-HxCDD	0.23	S	0.53	S	0.13	S/M
1,2,3,6,7,8-HxCDD	0.97	S	1.01	S	0.33	S/M
1,2,3,7,8,9-HxCDD	0.45	S	0.92	S	0.16	S
Total HxCDD	8.03		10.2		1.36	S
1,2,3,4,6,7,8-HpCDD	2.44	S	3.35		1.66	S
Total HpCDD	4.33		5.76		2.66	
OCDD	4.41	S	6.67		13.7	
2,3,7,8-TCDF	7.97	*	5.45	*	2.46	*M
Total TCDF	7.97		7.82		3.51	
1,2,3,7,8-PeCDF	0.23	S	0.49	S	0.14	S
2,3,4,7,8-PeCDF	0.52	S	1.21	S	0.33	S
Total PeCDF	2.69		4.22		0.47	S
1,2,3,4,7,8-HxCDF	0.21	S	0.39	S	0.14	S
1,2,3,6,7,8-HxCDF	0.21	S/M	0.33	S/M	0.09	S
2,3,4,6,7,8-HxCDF	2.17	S/M	0.78	S	0.40	S
1,2,3,7,8,9-HxCDF	0.14	S	0.60	S	0.09	S/M
Total HxCDF	0.36	S	2.25	S	0.61	S
1,2,3,4,6,7,8-HpCDF	0.36	S	0.85	S	0.33	S/M
1,2,3,4,7,8,9-HpCDF	0.08	S/M	0.43	S	0.12	S/M
Total HpCDF	0.92	S	1.23	S	0.41	S
OCDF	0.35	S	1.20	S	1.44	S
Percent Lipids:	7.1		9.7		3.4	

U = Compound was not detected.
E = Analyte not detected at or above the sample specific Estimated Detection Limit (EDL). The EDL is reported.
L = Analyte not detected at or above the Lower Method Calibration Limit (LMCL). The LMCL is reported.
M = Estimated Maximum Possible Concentration.
MD = Estimated Maximum Possible Concentration with Diphenyl Ether interferences.
S = Analyte detected below the Lower Method Calibration Limit. Value should be considered an estimate.
Concentrations marked with an asterisk (*) are from a DB-225 column.

TABLE 9. DIOXINS/FURANS TOXICITY EQUIVALENCE FOR TISSUE SAMPLES
LOWER COLUMBIA RIVER RECONNAISSANCE SURVEY

			STURGEON SAMPLE RESULTS						
COMPOUND	TEQ	Method Blank	ST-1-2-D	ST-2-1-D	ST-2-2-D	ST-3-3-D	ST-3-1-D	Method Blank	ST-4-3-D
DIOXINS/FURANS:									
2,3,7,8-TCDD	1	1.1	1	0.92	0.79	0.72	1.66	0.88	0.59
1,2,3,7,8-PeCDD	0.5	0.74	0.51	0.57	0.46	0.435	0.45	0.46	0.305
1,2,3,4,7,8-HxCDD	0.1	0.052	0.05	0.053	0.04	0.043	0.042	0.056	0.047
1,2,3,6,7,8-HxCDD	0.1	0.041	0.036	0.038	0.03	0.033	0.031	0.042	0.035
1,2,3,7,8,9-HxCDD	0.1	0.044	0.04	0.042	0.033	0.036	0.034	0.046	0.039
1,2,3,4,6,7,8-HpCDD	0.01	0.0177	0.0125	0.0109	0.01	0.0087	0.0103	0.0145	0.005
OCDD	0.001	0.00081	0.00061	0.00098	0.00222	0.0029	0.00148	0.00121	0.00361
2,3,7,8-TCDF	0.1	0.044	0.154	0.641	0.166	2.26	2.28	0.028	1.33
1,2,3,7,8-PeCDF	0.05	0.015	0.016	0.0125	0.0135	0.0145	0.0365	0.0105	0.0155
2,3,4,7,8-PeCDF	0.5	0.145	0.14	0.12	0.12	0.14	0.245	0.1	0.14
1,2,3,4,7,8-HxCDF	0.1	0.128	0.102	0.115	0.072	0.108	0.13	0.084	0.08
1,2,3,6,7,8-HxCDF	0.1	0.116	0.083	0.088	0.062	0.09	0.11	0.077	0.07
2,3,4,6,7,8-HxCDF	0.1	0.565	0.383	0.309	0.195	0.481	0.366	0.111	0.127
1,2,3,7,8,9-HxCDF	0.1	0.134	0.167	0.174	0.109	0.178	0.204	0.154	0.133
1,2,3,4,6,7,8-HpCDF	0.01	0.0077	0.0058	0.0073	0.0059	0.0047	0.0084	0.0052	0.0053
1,2,3,4,7,8,9-HpCDF	0.01	0.0112	0.0079	0.01	0.0078	0.0063	0.0057	0.0082	0.0084
OCDF	0.001	0.00093	0.00065	0.00082	0.00093	0.00082	0.00072	0.0009	0.00049
Total Toxicity Equivalence:		3.16234	2.70846	3.1125	2.11735	4.56192	5.6151	2.07851	2.9343

TABLE 9 (cont.)

STURGEON SAMPLE RESULTS				
COMPOUND	**TEQ**	**ST-1-3-D**	**ST-4-1-D**	
DIOXINS/FURANS:				
2,3,7,8-TCDD	1	1.07	0.62	
1,2,3,7,8-PeCDD	0.5	1.25	0.285	
1,2,3,4,7,8-HxCDD	0.1	0.018	0.037	
1,2,3,6,7,8-HxCDD	0.1	0.017	0.03	
1,2,3,7,8,9-HxCDD	0.1	0.019	0.033	
1,2,3,4,6,7,8-HpCDD	0.01	0.0035	0.0063	
OCDD	0.001	0.00025	0.00107	
2,3,7,8-TCDF	0.1	0.552	0.353	
1,2,3,7,8-PeCDF	0.05	0.125	0.013	
2,3,4,7,8-PeCDF	0.5	1.25	0.105	
1,2,3,4,7,8-HxCDF	0.1	0.031	0.067	
1,2,3,6,7,8-HxCDF	0.1	0.031	0.058	
2,3,4,6,7,8-HxCDF	0.1	0.035	0.083	
1,2,3,7,8,9-HxCDF	0.1	0.041	0.113	
1,2,3,4,6,7,8-HpCDF	0.01	0.002	0.005	
1,2,3,4,7,8,9-HpCDF	0.01	0.0026	0.0069	
OCDF	0.001	0.00029	0.00061	
Total Toxicity Equivalence:		4.44764	1.81688	

TABLE 9 (cont.)

CHUB SAMPLE RESULTS

COMPOUND	TEQ	MB-3	D28P	D10P	D19P	D15P	MB	D21P	D24P	D23P
DIOXINS/FURANS:										
2,3,7,8-TCDD	1	0.22	2	2.32	3.29	1.44	0.19	2.77	4.41	3.1
1,2,3,7,8-PeCDD	0.5	0.095	0.33	0.25	0.35	0.155	0.075	0.38	1.02	0.415
1,2,3,4,7,8-HxCDD	0.1	0.027	0.02	0.011	0.014	0.011	0.012	0.021	0.087	0.039
1,2,3,6,7,8-HxCDD	0.1	0.019	0.059	0.031	0.051	0.039	0.009	0.063	0.116	0.062
1,2,3,7,8,9-HxCDD	0.1	0.02	0.022	0.014	0.015	0.012	0.009	0.018	0.047	0.029
1,2,3,4,6,7,8-HpCDD	0.01	0.0031	0.0183	0.0065	0.0073	0.0074	0.0002	0.0109	0.0281	0.0024
OCDD	0.001	0.0014	0.0084	0.00362	0.00447	0.00567	0.00143	0.00421	0.0181	0.00391
2,3,7,8-TCDF	0.1	0.012	3.25	4	5.21	2.22	0.01	4.12	5.88	4.25
1,2,3,7,8-PeCDF	0.05	0.0145	0.019	0.0155	0.029	0.012	0.0035	0.028	0.043	0.0325
2,3,4,7,8-PeCDF	0.5	0.115	0.41	0.295	0.47	0.275	0.03	0.45	1.23	0.475
1,2,3,4,7,8-HxCDF	0.1	0.024	0.024	0.011	0.013	0.012	0.016	0.016	0.056	0.071
1,2,3,6,7,8-HxCDF	0.1	0.022	0.013	0.01	0.007	0.005	0.015	0.006	0.044	0.064
2,3,4,6,7,8-HxCDF	0.1	0.044	0.032	0.026	0.023	0.025	0.058	0.029	0.161	0.138
1,2,3,7,8,9-HxCDF	0.1	0.054	0.026	0.015	0.011	0.008	0.026	0.014	0.138	0.109
1,2,3,4,6,7,8-HpCDF	0.01	0.0013	0.0043	0.0021	0.002	0.0016	0.0016	0.0018	0.0074	0.0017
1,2,3,4,7,8,9-HpCDF	0.01	0.0033	0.0018	0.0006	0.0008	0.0004	0.0019	0.0007	0.005	0.0018
OCDF	0.001	0.00149	0.00101	0.00031	0.00053	0.00038	0.00039	0.00041	0.00203	0.00118
Total Toxicity Equivalence:		0.67709	6.23881	7.01163	9.4981	4.22945	0.45902	7.93302	13.29263	8.79549

TABLE 9 (cont.)

CARP SAMPLE RESULTS								
COMPOUND	**TEQ**	**MB-1**	**D35C**	**D40C**	**D38C**	**MBRX**	**D28C**	**D24C**
DIOXINS/FURANS:								
2,3,7,8-TCDD	1	0.14	1.32	2.1	1.28	0.12	1.64	1.57
1,2,3,7,8-PeCDD	0.5	0.095	0.555	0.84	0.42	0.15	0.885	0.945
1,2,3,4,7,8-HxCDD	0.1	0.023	0.062	0.04	0.026	0.015	0.118	0.145
1,2,3,6,7,8-HxCDD	0.1	0.019	0.153	0.193	0.073	0.028	0.373	0.482
1,2,3,7,8,9-HxCDD	0.1	0.019	0.021	0.027	0.012	0.027	0.036	0.05
1,2,3,4,6,7,8-HpCDD	0.01	0.0078	0.0342	0.0439	0.0159	0.006	0.095	0.0981
OCDD	0.001	0.0102	0.0123	0.00754	0.00271	0.00129	0.0306	0.0201
2,3,7,8-TCDF	0.1	0.014	0.953	1.22	0.76	0.012	0.489	0.437
1,2,3,7,8-PeCDF	0.05	0.0085	0.0145	0.0195	0.0105	0.011	0.0285	0.038
2,3,4,7,8-PeCDF	0.5	0.09	0.365	0.48	0.23	0.125	0.685	0.685
1,2,3,4,7,8-HxCDF	0.1	0.014	0.023	0.019	0.012	0.018	0.052	0.066
1,2,3,6,7,8-HxCDF	0.1	0.014	0.018	0.016	0.009	0.018	0.042	0.057
2,3,4,6,7,8-HxCDF	0.1	0.028	0.033	0.04	0.026	0.036	0.35	0.57
1,2,3,7,8,9-HxCDF	0.1	0.028	0.021	0.012	0.005	0.03	0.034	0.03
1,2,3,4,6,7,8-HpCDF	0.01	0.0021	0.004	0.0027	0.0018	0.0017	0.0131	0.0075
1,2,3,4,7,8,9-HpCDF	0.01	0.0014	0.0012	0.0016	0.0056	0.0012	0.0018	0.0011
OCDF	0.001	0.00113	0.00084	0.00052	0.00029	0.0003	0.00245	0.00086
Total Toxicity Equivalence:		0.51513	3.59104	5.06276	2.8898	0.60049	4.87545	5.20266

TABLE 9 (cont.)

		CRAYFISH SAMPLE RESULTS								
COMPOUND	**TEQ**	**MB-1**	**MB-2**	**MB-3**	**D35**	**D28**	**D38**	**D40**	**D6**	**D8**
DIOXINS/FURANS:										
2,3,7,8-TCDD	1	0.16	0.12	0.17	0.4	0.86	0.4	0.27	0.44	0.45
1,2,3,7,8-PeCDD	0.5	0.14	0.145	0.145	0.24	0.16	0.135	0.11	0.095	0.09
1,2,3,4,7,8-HxCDD	0.1	0.034	0.015	0.008	0.015	0.016	0.024	0.02	0.016	0.008
1,2,3,6,7,8-HxCDD	0.1	0.04	0.014	0.007	0.053	0.032	0.025	0.019	0.016	0.007
1,2,3,7,8,9-HxCDD	0.1	0.03	0.013	0.03	0.059	0.019	0.025	0.018	0.016	0.007
1,2,3,4,6,7,8-HpCDD	0.01	0.0124	0.003	0.003	0.0207	0.0521	0.0032	0.0062	0.0042	0.0067
OCDD	0.001	0.00165	0.00042	0.00029	0.00572	0.0791	0.00162	0.00312	0.00222	0.00412
2,3,7,8-TCDF	0.1	0.022	0.016	0.016	0.41	1.24	0.483	0.481	0.466	0.472
1,2,3,7,8-PeCDF	0.05	0.0135	0.01	0.0035	0.015	0.0195	0.021	0.013	0.007	0.0055
2,3,4,7,8-PeCDF	0.5	0.12	0.1	0.04	0.24	0.425	0.145	0.11	0.115	0.11
1,2,3,4,7,8-HxCDF	0.1	0.033	0.036	0.034	0.021	0.028	0.042	0.032	0.027	0.024
1,2,3,6,7,8-HxCDF	0.1	0.034	0.034	0.032	0.018	0.032	0.04	0.031	0.027	0.022
2,3,4,6,7,8-HxCDF	0.1	0.033	0.047	0.019	0.048	0.726	0.034	0.027	0.032	0.021
1,2,3,7,8,9-HxCDF	0.1	0.05	0.056	0.055	0.013	0.071	0.059	0.05	0.041	0.031
1,2,3,4,6,7,8-HpCDF	0.01	0.0026	0.001	0.0018	0.0029	0.0031	0.0045	0.0009	0.0013	0.001
1,2,3,4,7,8,9-HpCDF	0.01	0.003	0.0013	0.002	0.0007	0.0035	0.0024	0.0014	0.0015	0.0013
OCDF	0.001	0.00045	0.00035	0.00044	0.00042	0.00124	0.0006	0.00024	0.00029	0.00018
Total Toxicity Equivalence:		0.7296	0.61207	0.56703	1.56244	3.76754	1.44532	1.19286	1.30751	1.2608

TABLE 9 (cont.)

COMPOUND	TEQ	D10	D15	D19	D20	D23	D24
DIOXINS/FURANS:							
2,3,7,8-TCDD	1	0.45	0.39	0.62	0.39	0.43	0.47
1,2,3,7,8-PeCDD	0.5	0.085	0.07	0.33	0.045	0.16	0.415
1,2,3,4,7,8-HxCDD	0.1	0.013	0.008	0.021	0.03	0.01	0.039
1,2,3,6,7,8-HxCDD	0.1	0.038	0.007	0.03	0.03	0.031	0.089
1,2,3,7,8,9-HxCDD	0.1	0.012	0.007	0.018	0.029	0.015	0.076
1,2,3,4,6,7,8-HpCDD	0.01	0.0157	0.0053	0.0118	0.0047	0.0071	0.0401
OCDD	0.001	0.00781	0.00338	0.00652	0.00333	0.00467	0.0167
2,3,7,8-TCDF	0.1	0.441	0.412	0.952	0.564	0.608	0.639
1,2,3,7,8-PeCDF	0.05	0.008	0.0095	0.051	0.0085	0.0125	0.0335
2,3,4,7,8-PeCDF	0.5	0.12	0.145	1.525	0.1	0.21	0.49
1,2,3,4,7,8-HxCDF	0.1	0.026	0.009	0.035	0.009	0.007	0.036
1,2,3,6,7,8-HxCDF	0.1	0.025	0.009	0.024	0.01	0.006	0.032
2,3,4,6,7,8-HxCDF	0.1	0.026	0.028	0.046	0.035	0.033	0.084
1,2,3,7,8,9-HxCDF	0.1	0.035	0.016	0.005	0.012	0.009	0.023
1,2,3,4,6,7,8-HpCDF	0.01	0.0029	0.0027	0.0031	0.0013	0.0037	0.007
1,2,3,4,7,8,9-HpCDF	0.01	0.0016	0.0016	0.0009	0.0017	0.0027	0.0019
OCDF	0.001	0.00035	0.00052	0.00056	0.00044	0.00049	0.00063
Total Toxicity Equivalence:		1.30736	1.124	3.67988	1.27397	1.55016	2.49283

TABLE 9 (cont.)

	SUCKER SAMPLE RESULTS									
COMPOUND	**TEQ**	**MB-2**	**MB-2/2**	**MB1RX**	**D35S**	**D38S**	**D40S**	**D28S**	**D24S**	**D23S**
DIOXINS/FURANS:										
2,3,7,8-TCDD	1	0.08	0.07	0.06	0.62	1.38	0.72	1.41	1.01	0.92
1,2,3,7,8-PeCDD	0.5	0.145	0.125	0.12	0.2	0.36	0.24	0.45	0.29	0.215
1,2,3,4,7,8-HxCDD	0.1	0.016	0.017	0.012	0.02	0.033	0.017	0.035	0.022	0.013
1,2,3,6,7,8-HxCDD	0.1	0.045	0.033	0.047	0.018	0.081	0.041	0.142	0.065	0.044
1,2,3,7,8,9-HxCDD	0.1	0.028	0.03	0.033	0.011	0.038	0.032	0.036	0.028	0.019
1,2,3,4,6,7,8-HpCDD	0.01	0.0085	0.0066	0.0116	0.0104	0.0241	0.0182	0.0436	0.0311	0.011
OCDD	0.001	0.00173	0.00212	0.00165	0.00379	0.00412	0.00079	0.0201	0.0213	0.00525
2,3,7,8-TCDF	0.1	0.008	0.01	0.029	0.709	1.14	1.1	0.698	0.724	0.636
1,2,3,7,8-PeCDF	0.05	0.014	0.0155	0.0075	0.009	0.0115	0.008	0.021	0.014	0.008
2,3,4,7,8-PeCDF	0.5	0.16	0.125	0.135	0.155	0.36	0.225	0.46	0.25	0.19
1,2,3,4,7,8-HxCDF	0.1	0.03	0.03	0.021	0.008	0.027	0.009	0.045	0.022	0.013
1,2,3,6,7,8-HxCDF	0.1	0.039	0.03	0.022	0.016	0.036	0.015	0.025	0.018	0.011
2,3,4,6,7,8-HxCDF	0.1	0.061	0.059	0.049	0.161	0.269	0.277	0.15	0.054	0.049
1,2,3,7,8,9-HxCDF	0.1	0.039	0.04	0.018	0.011	0.018	0.017	0.033	0.017	0.009
1,2,3,4,6,7,8-HpCDF	0.01	0.0034	0.0032	0.0029	0.009	0.0179	0.003	0.007	0.0055	0.0023
1,2,3,4,7,8,9-HpCDF	0.01	0.0034	0.0025	0.0011	0.001	0.0015	0.0011	0.003	0.0015	0.0009
OCDF	0.001	0.00062	0.00077	0.00027	0.00035	0.00069	0.0106	0.00307	0.00176	0.00056
Total Toxicity Equivalence:		0.68265	0.59969	0.57102	1.96254	3.80181	2.73469	3.58177	2.57516	2.14701

TABLE 9 (cont.)

COMPOUND	TEQ	D19S	D15S	D6S	D8S	D10S	D20S
DIOXINS/FURANS:							
2,3,7,8-TCDD	1	1.32	0.88	0.49	0.82	1.56	0.76
1,2,3,7,8-PeCDD	0.5	0.32	0.255	0.23	0.325	0.55	0.2
1,2,3,4,7,8-HxCDD	0.1	0.023	0.019	0.018	0.023	0.053	0.013
1,2,3,6,7,8-HxCDD	0.1	0.087	0.074	0.068	0.097	0.101	0.033
1,2,3,7,8,9-HxCDD	0.1	0.048	0.042	0.043	0.045	0.092	0.016
1,2,3,4,6,7,8-HpCDD	0.01	0.0298	0.0245	0.0207	0.0244	0.0335	0.0166
OCDD	0.001	0.00928	0.00643	0.00404	0.00441	0.00667	0.0137
2,3,7,8-TCDF	0.1	0.879	0.469	0.524	0.797	0.545	0.246
1,2,3,7,8-PeCDF	0.05	0.017	0.01	0.009	0.0115	0.0245	0.007
2,3,4,7,8-PeCDF	0.5	0.345	0.24	0.215	0.26	0.605	0.165
1,2,3,4,7,8-HxCDF	0.1	0.027	0.02	0.018	0.021	0.039	0.014
1,2,3,6,7,8-HxCDF	0.1	0.022	0.022	0.023	0.021	0.033	0.009
2,3,4,6,7,8-HxCDF	0.1	0.141	0.165	0.135	0.217	0.078	0.04
1,2,3,7,8,9-HxCDF	0.1	0.018	0.012	0.013	0.014	0.06	0.009
1,2,3,4,6,7,8-HpCDF	0.01	0.0105	0.0103	0.0029	0.0036	0.0085	0.0033
1,2,3,4,7,8,9-HpCDF	0.01	0.0013	0.001	0.0006	0.0008	0.0043	0.0012
OCDF	0.001	0.00103	0.00047	0.0003	0.00035	0.0012	0.00144
Total Toxicity Equivalence:		3.29891	2.2507	1.81454	2.68506	3.79467	1.54824