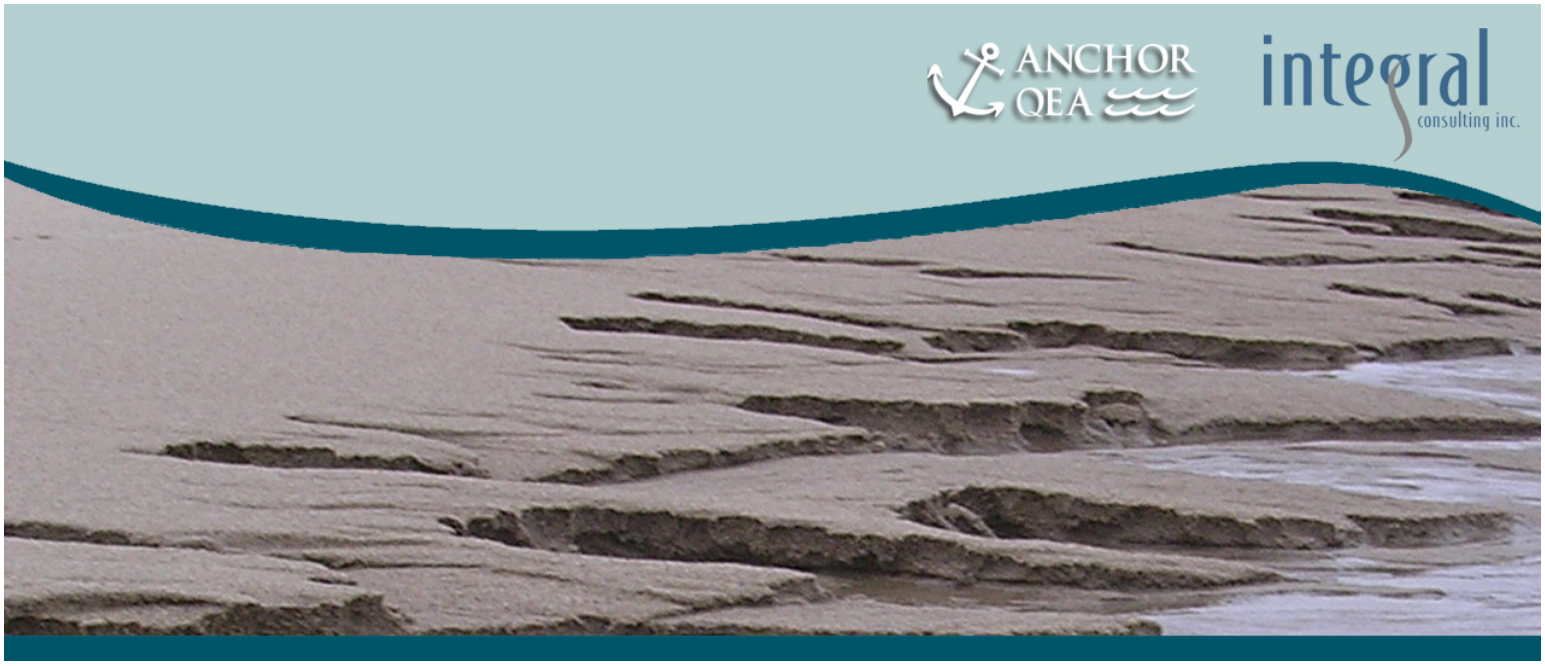


# DRAFT REMEDIAL INVESTIGATION REPORT
# SAN JACINTO RIVER WASTE PITS SUPERFUND SITE

## VOLUME II OF II

**Prepared for**

McGinnes Industrial Maintenance Corporation
International Paper Company
U.S. Environmental Protection Agency, Region 6

**Prepared by**

Integral Consulting Inc.
411 1st Avenue S, Suite 550
Seattle, Washington 98104

Anchor QEA, LLC
614 Magnolia Avenue
Ocean Springs, Mississippi 39564

**December 2012**

9495032

## List of Appendices

Appendix A Data Validation Reports

Appendix B Biota–Sediment Accumulation Factors

Appendix C Summary Statistics Tables

Appendix D Draft Baseline Ecological Risk Assessment for the Peninsula South of I-10

Appendix E Residential Soils

Appendix F Sediment and Soil Fingerprints

# APPENDIX A
# DATA VALIDATION REPORTS
# SAN JACINTO RIVER WASTE PITS
# SUPERFUND SITE

# 1 INTRODUCTION

Chemical and some physical data collected according to sampling and analysis plans (SAPs) for the San Jacinto River Waste Pits Superfund Site remedial investigation and feasibility study require validation according to the specifications within their respective SAPs. In addition, data not specifically generated for the remedial investigation may have been selected for an independent validation effort. This appendix contains the data validation reports for the following sample collection efforts:

- Time critical removal action sediment sampling
- Texas Department of Transportation right-of-way sampling
- Big Star Boat & Barge Company property sampling
- Guard rail soil sampling
- An addendum to the data validation for the 2011 soil sampling covering the reporting of 1,2,3-trichlorobenzene; this analyte was initially omitted by the laboratory from the volatile organic compound analyte list and was reported in an addendum to the laboratory report
- Radioisotope coring study
- Bed property study
- Residential soil sampling
- Sediment and tissue background sampling conducted in October 2011
- May 2012 area groundwater, sediment, and soil (i.e., Soil Investigation Area 4 and adjacent areas) sampling
- TCRA cap porewater assessment sampling
- Sediment sampling at Kirby Marine Terminal (conducted by ATC Associates, Inc., of Houston, Texas, for Orion Construction, LP, of Houston, Texas).

Data validation reports for the following studies are not included in this appendix but can be found in Appendix A to the Preliminary Site Characterization Report (Integral and Anchor QEA 2012):

- 2011 soil sampling in Soil Investigation Areas 1, 2 and 3
- Soil sampling in Soil Investigation Area 4 in 2011
- Geotechnical borings
- 2010 sediment sampling
- Cedar Bayou sediment sampling

- Groundwater sampling
- 2010 tissue sampling.

Finally, data collected for studies other than the RI that have been independently validated, and the location of the independent validation records, are as follows:

- Sediments collected from the area within USEPA's Preliminary Site Perimeter by the Texas Department of Environmental Quality in 2005, with validation reporting provided in Appendix A of Integral 2011
- Tissue and sediment collected by the Texas Department of Environmental Quality in 2008 and 2009, and analyzed for polychlorinated biphenyl congeners, with validation reporting provided in Appendix A of Integral 2012.

Together, these collections of validation reports make up the complete data validation record for the San Jacinto River Waste Pits remedial investigation.

## 2 REFERENCE

Integral, 2011. COPC Technical Memorandum, San Jacinto River Waste Pits Superfund Site. Prepared for McGinnes Industrial Maintenance Corporation, International Paper Company, and U.S. Environmental Protection Agency, Region 6. Integral Consulting Inc., Seattle, WA. May 2011.

Integral, 2012. Exposure Assessment Memorandum, San Jacinto River Waste Pits Superfund Site. Prepared for McGinnes Industrial Maintenance Corporation, International Paper Company, and U.S. Environmental Protection Agency, Region 6. Integral Consulting Inc., Seattle, WA. May.

Integral and Anchor QEA, 2012. Preliminary Site Characterization Report, San Jacinto River Waste Pits Superfund Site. Prepared for McGinnes Industrial Maintenance Corporation, International Paper Company, and U.S. Environmental Protection Agency, Region 6. Anchor QEA, LLC, Ocean Springs, MS, and Integral Consulting Inc., Seattle, WA. February.

EcoChem, INC.
Environmental Data Quality

# DATA VALIDATION REPORT

## SAN JACINTO RIVER WASTE PITS
## Time Critical Removal Action Sediment Sampling

**Prepared for:**

Integral Consulting, Inc.
1205 West Bay Dr. NW
Olympia, Washington 98502

**Prepared by:**

EcoChem, Inc.
710 Second Avenue, Suite 660
Seattle, Washington 98104

EcoChem Project: C22130-1

May 13, 2010

**Approved for Release**

Melissa Swanson
Project Chemist
**EcoChem, Inc.**

# PROJECT NARRATIVE

## Basis for Data Validation

This report summarizes the results of both summary and full validation (Stage 2B and Stage 3/4) performed on sediment and quality control (QC) sample data for the San Jacinto River Waste Pits, Harris County, Texas. A complete list of samples is provided in the **Sample Index**. Laboratory batch ID numbers and associated level of validation is provided at the beginning of each technical section

Samples were analyzed by Columbia Analytical Services, Kelso, Washington and Columbia Analytical Services, Houston, Texas. The analytical methods and EcoChem project chemists are listed below:

| Analysis | Method of Analysis | Primary Review | Secondary Review |
|---|---|---|---|
| Dioxin & Furan Compounds | EPA 1613B | Melissa Swanson | Eric Strout |
| Total Organic Carbon (TOC) | SW9060 | | |

The data were reviewed using guidance and quality control criteria documented in the analytical methods; *USEPA National Functional Guidelines for Chlorinated Dioxin/Furan Data Review* (USEPA, September 2005); and *USEPA National Functional Guidelines for Inorganic Data Review* (USEPA, October 2004).

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

Data qualifier definitions, reason codes, and validation criteria are included as **Appendix A**. Data Validation Worksheets and the associated communication records will be kept on file at EcoChem, Inc. A qualified laboratory electronic data deliverable (EDD) was also submitted with this report.

# SAMPLE INDEX
## Integral Consulting
## San Jacinto Waste Pits
## Time Critical Removal Action

| Sample ID | Matrix | Dioxin Lab ID | TOC Lab ID |
|---|---|---|---|
| SJA3-SG-N | Sediment | E1000376-001 | K1003620-001 |
| SJA4-SG-N | Sediment | E1000376-002 | K1003620-002 |
| SJA5-SG-N | Sediment | E1000376-003 | K1003620-003 |
| SJB3-SG-N | Sediment | E1000376-004 | K1003620-004 |
| SJB4-SG-N | Sediment | E1000376-005 | K1003620-005 |
| SJB5-SG-N | Sediment | E1000376-006 | K1003620-006 |
| SJC3-SG-N | Sediment | E1000380-001 | K1003667-001 |
| SJC4-SG-N | Sediment | E1000380-002 | K1003667-002 |
| SJC5-SG-N | Sediment | E1000380-003 | K1003667-003 |
| SJD1-SG-N | Sediment | E1000380-004 | K1003667-004 |
| SJD2-SG-N | Sediment | E1000380-005 | K1003667-005 |
| SJD3-SG-N | Sediment | E1000380-006 | K1003667-006 |
| SJD4-SG-N | Sediment | E1000380-007 | K1003667-007 |
| SJD5-SG-N | Sediment | E1000380-008 | K1003667-008 |
| SJD5-SG-D | Sediment | E1000380-009 | K1003667-009 |
| SJE1-SG-N | Sediment | E1000380-010 | K1003667-010 |
| SJE2-SG-N | Sediment | E1000380-011 | K1003667-018 |
| SJE3-SG-N | Sediment | E1000380-012 | K1003667-019 |
| SJE4-SG-N | Sediment | E1000380-013 | K1003667-020 |
| SJE5-SG-N | Sediment | E1000380-014 | K1003667-021 |
| SDFW-901G | Filter Wipe | E1000391-001 | N/A |
| SDFW-905G | Filter Wipe | E1000391-002 | N/A |
| FB-903 | Filter Wipe | E1000391-003 | N/A |
| SLFW-902A | Filter Wipe | E1000391-004 | N/A |
| SJB2-SG-N | Sediment | E1000391-005 | K1003667-011 |
| SJC2-SG-N | Sediment | E1000391-006 | K1003667-012 |
| SJC1-SG-N | Sediment | E1000391-007 | K1003667-013 |
| SJA2-SL-N | Sediment | E1000391-008 | K1003667-014 |
| SJB1-SG-N | Sediment | E1000391-009 | K1003667-015 |
| SJA1-SL-N | Sediment | E1000391-010 | K1003667-016 |
| SJA1-SL-D | Sediment | E1000391-011 | K1003667-017 |

# DATA VALIDATION REPORT
# San Jacinto River Waste Pits
# Time Critical Removal Action Sediment Sampling
# Dioxin/Furan Compounds by EPA 1613B

This report documents the review of analytical data from the analyses of sediment samples and the associated laboratory quality control (QC) samples. Columbia Analytical Services, Houston, Texas, analyzed the samples. Refer to the **Sample Index** for a complete list of samples.

| SDG | Number of Samples | Validation Level |
|---|---|---|
| E1000376 | 6 Sediment | EPA Stage 4 |
| E1000380 | 14 Sediment | EPA Stage 2B |
| E1000391 | 7 Sediment & 4 Filter Wipe | EPA Stage 2B |

## I. DATA PACKAGE COMPLETENESS

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

## II. EDD TO HARDCOPY VERIFICATION

Ten percent (10%) of the results in the laboratory EDD were verified by comparison to the hardcopy laboratory data package. No errors were noted.

## III. TECHNICAL DATA VALIDATION

The QC requirements that were reviewed are listed in the following table.

| | | | |
|---|---|---|---|
| 1 | Sample Receipt, Preservation, and Holding Times | 1 | Matrix Spike/Matrix Spike Duplicate (MS/MSD) |
| | GC/MS Instrument Performance Check | 1 | Laboratory Control Samples (LCS/LCSD) |
| | Initial Calibration (ICAL) | 1 | Reference Material (RM) |
| | Calibration Verification (CVER) | 1 | Field Replicates |
| | Isomer Specificity | | Target Analyte List |
| 2 | Laboratory Blanks | 2 | Reported Results |
| 1 | Field (Equipment Rinsate) Blanks | 2 | Compound Identification |
| | Labeled Compound Recovery | 1 | Calculation Verification (EPA Stage 4 only) |

[1] ***Quality control results are discussed below, but no data were qualified.***
[2] ***Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed below.***

## Sample Receipt, Preservation, and Holding Times

As stated in validation guidance documents, sample shipping coolers should arrive at the laboratory within the advisory temperature range of 2° to 6°C. The laboratory received sample coolers with temperatures less than the lower limit, at 1°C. It was determined that these outliers did not impact data quality therefore, no qualifiers were assigned.

## Laboratory Blanks

To assess the impact of any blank contaminant on the reported sample results, an action level is established at five times (5x) the concentration reported in the blank. If a contaminant is reported in an associated field sample and the concentration is less than the action level, the result is qualified as not detected (U-7). If the result is also less than the reporting limit, then the result is elevated to the reporting limit. No action is taken if the sample result is greater than the action level, or for non-detected results.

Method blanks were analyzed at the appropriate frequency. For the analytical batches noted below, one or more target analytes were reported in the method blank. A summary of contaminant levels, associated samples, and action levels is documented in the data validation worksheets.

***SDG E1000376:*** OCDD and OCDF were detected at low levels in the method blank. All OCDD and OCDF concentrations in the associated samples were greater than the action level. No data were qualified based on method blank contamination.

***SDG E1000380:*** OCDD was detected at low levels in the method blank. All OCDD concentrations in the associated samples were greater than the action level. No data were qualified based on method blank contamination.

***SDG E1000391:*** The analytes 1,2,3,4,6,7,8-HpCDD, OCDD, and OCDF were detected at low levels in the sediment method blank. All concentrations for these analytes in the associated samples were greater than the action level. No sediment data were qualified based on method blank contamination.

The analytes 1,2,3,4,6,7,8-HpCDD and OCDD were detected at low levels in the filter wipe method blank. Two 1,2,3,4,6,7,8-HpCDD results and three OCDD results in the filter wipe samples were qualified as not detected (U-7) at the reported concentrations.

## Field Blanks

***SDG E1000391:*** Four filter wipe blanks, SDFW-901G, SDFW-905G, FB-903, and SLFW-902A, were submitted. After qualifiers based on method blank contamination were issued, positive results remained in Sample SDFW-901G for 1,2,3,4,6,7,8-HpCDD, OCDD, 1,2,3,4,7,8-HxCDF, 1,2,3,6,7,8-HxCDF, 1,2,3,4,6,7,8-HpCDF, and OCDF. All associated field sample results were either not detected or detected at concentrations greater than the action level. No qualifiers were issued based on filter wipe blank contamination.

## Matrix Spike/Matrix Spike Duplicate

Matrix spike/matrix spike duplicate (MS/MSD) samples were not analyzed. Accuracy and precision were evaluated using the laboratory control sample/laboratory control sample duplicate (LCS/LCSD).

## Laboratory Control Samples

***SDG E1000376:*** The LCS percent recovery (%R) value for 1,2,3,6,7,8-HxCDD was greater than the upper control limit. The LCSD %R value was within control limits. No qualifiers were applied for this single outlier.

## Standard Reference Material

***SDG E1000376:*** The laboratory extracted and analyzed NIST standard reference material (SRM-1944) with SDG E1000376. For all analytes with concentrations greater than the reporting limit, EcoChem evaluated the results using the 95% confidence interval of the true value (reference value ± the uncertainty value as stated by NIST).

Nine of the 25 results were outside the reference concentration ranges. For these results, the %R values (of the reported result verses the reference value) ranged from 67.3% (1,2,3,4,7,8-HxCDD) to 134% (Total TCDF).

EcoChem then evaluated the SRM results using ±20% of the reference value as criteria; the majority of SRM results were within these criteria, indicating that the reference concentration ranges, derived using the 95% confidence interval, might be too narrow. Finally, the SRM results were evaluated against method specified recovery ranges for LCS analyses (no criteria stated for Total TCDF).

Based on these evaluations, the SRM result for only one analyte, 1,2,3,4,7,8-HxCDD, may be moderately biased low. No data were qualified.

## Field Replicates

The following acceptance criteria were used to evaluate precision: the relative percent difference (RPD) control limit is 50% for results greater than 5x the reporting limit (RL). For results less than 5x the RL, the absolute difference between the sample and replicate must be less than 2x the RL. No data were qualified based on field replicate precision outliers. Users of the data should consider the impact of field precision outliers on the reported results.

***SDG E1000380:*** One set of field replicates, SJD5-SG-N & SJD5-SG-D, were submitted. All field precision criteria were met.

***SDG E1000391:*** One set of field replicates, SJA1-SL-N & SJA1-SL-D, were submitted. The RPD values for all analytes were greater than 50%, with the lowest RPD value at 77%.

## Reported Results

Reported concentrations for several compounds (usually 2,3,7,8-TCDF and 2,3,7,8-TCDD) were greater than the calibrated linear range of the instrument; the laboratory flagged these results with an "E". Affected sample extracts were diluted and re-analyzed; both sets of data were reported and reviewed. The results for these compounds from the original analyses were flagged as do-not-report (DNR-20) and should be reported from the diluted analyses. All other results in the diluted analyses were flagged DNR-11 and the original results should be reported. Affected samples are listed below.

***SDG E1000380:*** The 2,3,7,8-TCDF results from the DB-225 column exceeded the calibrated range in Samples SJD1-SG-N, SJE1-SG-N, and SJE2-SG-N. These samples were diluted (5x) and re-analyzed.

***SDG E1000391:*** The 2,3,7,8-TCDD results exceeded the calibrated range in Samples SJC1-SG-N, SJA2-SL-N, SJB1-SG-N, SJA1-SL-N, and SJA1-SL-D. The results for 1,2,3,7,8-PeCDF and 1,2,3,4,7,8-HxCDF from the DB-5 column also exceeded the calibrated range in Sample SJA2-SL-N. These samples were diluted (10x or 50x) and re-analyzed.

The 2,3,7,8-TCDF results from the DB-225 column exceeded the calibrated range in Samples SJC1-SG-N, SJA2-SL-N, SJB1-SG-N, SJA1-SL-N and SJA1-SL-D. These samples were diluted (10x or 50x) and re-analyzed.

## Compound Identification

The laboratory assigned K-flags to results when a peak was detected but did not meet ion ratio quantitation criteria. The reported values cannot be considered as positive identification for these analytes. These results were considered potential false positives or estimated maximum possible concentrations (EMPC) and were qualified as not detected (U-22) at the reported values. Laboratory blank values with K flags were considered as non-detects.

All results for 2,3,7,8-TCDF were confirmed on a DB-225 column as required by the method. The 2,3,7,8-TCDF results from the DB-5 column were qualified do-not-report (DNR-11) in favor of the results from the DB-225 column.

## Calculation Verification

***SDG E1000376:*** Several results were verified by recalculation from the raw data. No calculation or transcription errors were noted.

## IV. OVERALL ASSESSMENT

As determined by this evaluation, the laboratory followed the specified analytical method. With the exceptions noted in this report, accuracy was acceptable, as demonstrated by labeled compound and LCS/LCSD %R values and precision was acceptable as indicated by the LCS/LCSD and field duplicate RPD values.

Data were qualified as not detected due to laboratory blank contamination and ion ratio criteria outliers.

Data were flagged as do-not-report (DNR) due to linear calibration range outliers and to indicate which result (from multiple reported analyses) should not be used. Data that has been flagged DNR should not be used for any purpose.

All other data, as qualified, are acceptable for use.

# DATA VALIDATION REPORT
# San Jacinto River Waste Pits
# Time Critical Removal Action Sediment Sampling
# Total Organic Carbon by 9060M

This report documents the review of analytical data from the analyses of sediment samples and the associated laboratory quality control (QC) samples. Columbia Analytical Services, Kelso, Washington, analyzed the samples. Please see the **Sample Index** for a complete list of samples for which data were reviewed.

| SDG | Number of Samples | Validation Level |
|---|---|---|
| K1003620 | 6 Sediment | EPA Stage 2B |
| K1003667 | 21 Sediment | EPA Stage 3 |

## I. DATA PACKAGE COMPLETENESS

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

## II. EDD TO HARDCOPY VERIFICATION

Ten percent (10%) of the results in the laboratory EDD were verified by comparison to the hardcopy laboratory data package. No errors were noted.

## III. TECHNICAL DATA VALIDATION

The QC requirements that were reviewed are listed in the following table.

| | | | |
|---|---|---|---|
| 1 | Sample Receipt, Preservation, and Holding Times | | Matrix Spikes (MS) |
| | Initial Calibration | | Laboratory Duplicates |
| | Calibration Verification | 1 | Field Replicates |
| | Laboratory Blanks | | Reporting Limits |
| | Laboratory Control Samples (LCS) | 1 | Calculation Verification (full validation only) |

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

### Sample Receipt, Preservation, and Holding Times

As stated in validation guidance documents, sample shipping coolers should arrive at the laboratory within the advisory temperature range of 2° to 6°C. The laboratory received a sample cooler with a temperature less than the lower limit, at 1.1°C. It was determined that this outlier did not impact data quality; therefore, no qualifiers were assigned.

## Field Replicates

***SDG K1003667:*** Two sets of field replicates, SJD5-SG-N & SJD5-SG-D and SJA1-SL-N & SJA1-SL-D, were submitted. All field precision criteria were met.

## Calculation Verification

***SDG K1003667:*** When attempting to verify the reported results by recalculation from the raw data, the validator was unable to recalculate the percent standard deviation values. The laboratory was contacted; and it was determined that an error existed in the calculation. The laboratory submitted corrected summary forms for both data packages.

# IV OVERALL ASSESSMENT

As determined by this evaluation, the laboratory followed the specified analytical methods. Accuracy was acceptable, as demonstrated by the matrix spike and laboratory control sample percent recovery values. The laboratory and field replicate relative percent difference and percent relative standard deviation values indicated acceptable precision.

All data, as reported, are acceptable for use.

EcoChem, INC.
Environmental Data Quality

# APPENDIX A

# DATA QUALIFIER DEFINITIONS REASON CODES AND CRITERIA TABLES

# DATA VALIDATION QUALIFIER CODES
# Based on National Functional Guidelines

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

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

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

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

# DATA QUALIFIER REASON CODES

| | |
|---|---|
| 1 | Holding Time/Sample Preservation |
| 2 | Chromatographic pattern in sample does not match pattern of calibration standard. |
| 3 | Compound Confirmation |
| 4 | Tentatively Identified Compound (TIC) (associated with NJ only) |
| 5A | Calibration (initial) |
| 5B | Calibration (continuing) |
| 6 | Field Blank Contamination |
| 7 | Lab Blank Contamination (e.g., method blank, instrument, etc.) |
| 8 | Matrix Spike(MS & MSD) Recoveries |
| 9 | Precision (all replicates) |
| 10 | Laboratory Control Sample Recoveries |
| 11 | A more appropriate result is reported (associated with “R” and “DNR” only) |
| 12 | Reference Material |
| 13 | Surrogate Spike Recoveries (a.k.a., labeled compounds & recovery standards) |
| 14 | Other (define in validation report) |
| 15 | GFAA Post Digestion Spike Recoveries |
| 16 | ICP Serial Dilution % Difference |
| 17 | ICP Interference Check Standard Recovery |
| 18 | Trip Blank Contamination |
| 19 | Internal Standard Performance (e.g., area, retention time, recovery) |
| 20 | Linear Range Exceeded |
| 21 | Potential False Positives |
| 22 | Elevated Detection Limit Due to Interference (i.e., laboratory, chemical and/or matrix) |

# EcoChem Validation Guidelines for Dioxin/Furan Analysis by HRMS
## (Based on EPA Reg. 10 SOP, Rev. 2, 1996 & EPA SW-846, Methods 1613b and 8290)

| VALIDATION QC ELEMENT | ACCEPTANCE CRITERIA | ACTION | REASON CODE |
|---|---|---|---|
| Cooler/Storage Temperature | Waters/Solids < 4°C<br>Tissues <-10°C | EcoChem PJ, see TM-05 | 1 |
| Holding Time | Extraction - Water: 30 days from collection<br>*Note:* Under CWA, SDWA, and RCRA the HT for H2O is 7 days*<br>Extraction - Soil: 30 days from collection<br>Analysis: 40 days from extraction | J(+)/UJ(-) if ext > 30 days<br>J(+)/UJ(-) if analysis > 40 Days<br>EcoChem PJ, see TM-05 | 1 |
| Mass Resolution | >=10,000 resolving power at m/z 304.9824<br>Exact mass of m/z 380.9760 w/in 5 ppm of theoretical value (380.97410 to 380.97790) .<br>Analyzed prior to ICAL and at the start and end of each 12 hr. shift | R(+/-) if not met | 14 |
| Window Defining Mix and Column Performance Mix | Window defining mixture/Isomer specificity std run before ICAL and CCAL<br>Valley < 25% (valley = (x/y)*100%)<br>x = ht. of TCDD<br>y = baseline to bottom of valley<br>For all isomers eluting near 2378-TCDD/TCDF isomers (TCDD only for 8290) | J(+) if valley > 25% | 5A (ICAL)<br>5B (CCAL |
| Initial Calibration | Minimum of five standards<br>%RSD < 20% for native compounds<br>%RSD <30% for labeled compounds<br>(%RSD <35% for labeled compounds under 1613b) | J(+) natives if %RSD > 20% | 5A |
| | Abs. RT of $^{13}C_{12}$-1234-TCDD<br>>25 min on DB5<br>>15 min on DB-225 | EcoChem PJ, see TM-05 | |
| | Ion Abundance ratios within QC limits<br>(Table 8 of method 8290)<br>(Table 9 of method 1613B) | EcoChem PJ, see TM-05 | |
| | S/N ratio > 10 for all native and labeled compounds in CS1 std. | If <10, elevate Det. Limit or R(-) | |



Copyright 2007 EcoChem, Inc.

# EcoChem Validation Guidelines for Dioxin/Furan Analysis by HRMS
## (Based on EPA Reg. 10 SOP, Rev. 2, 1996 & EPA SW-846, Methods 1613b and 8290)

| VALIDATION QC ELEMENT | ACCEPTANCE CRITERIA | ACTION | REASON CODE |
|---|---|---|---|
| Continuing Calibration | Analyzed at the start and end of each 12 hour shift.<br>%D+/-20% for native compounds<br>%D +/-30% for labeled compounds<br>(Must meet limits in Table 6, Method 1613B)<br>(If %Ds in the closing CCAL are w/in 25%/35% the avg RF from the two CCAL may be used to calculate samples per Method 8290, Section 8.3.2.4) | Do not qualify labeled compounds. Narrate in report for labeled compound %D outliers.<br>For native compound %D outliers:<br>8290: J(+)/UJ(-) if %D = 20% - 75%<br>J(+)/R(-) if %D > 75%<br>1613: J(+)/UJ(-) if %D is outside Table 6 limits<br>J(+)/R(-) if %D is +/- 75% of Table 6 limit | 5B |
| | Abs. RT of $^{13}C_{12}$-1234-TCDD and $^{13}C12$-123789-HxCDD +/- 15 sec of ICAL. | EcoChem PJ, see ICAL section of TM-05 | |
| | RRT of all other compounds must meet Table 2 of 1613B. | EcoChem PJ, see TM-05 | |
| | Ion Abundance ratios within QC limits<br>(Table 8 of method 8290)<br>(Table 9 of method 1613B) | EcoChem PJ, see TM-05 | |
| | S/N ratio > 10 | If <10, elevate Det. Limit or R(-) | |
| Method Blank | One per matrix per batch<br>No positive results | If sample result <5X action level, qualify U at reported value. | 7 |
| Field Blanks (Not Required) | No positive results | If sample result <5X action level, qualify U at reported value. | 6 |
| LCS / OPR | Concentrations must meet limits in Table 6, Method 1613B or lab limits. | J(+) if %R > UCL<br>J(+)/UJ(-) if %R < LCL<br>J(+)/R(-) using PJ if %R <<LCL (< 10%) | 10 |
| MS/MSD (recovery) | May not analyze MS/MSD<br>%R should meet lab limits. | Qualify parent only unless other QC indicates systematic problems:<br>J(+) if both %R > UCL<br>J(+)/UJ(-) if both %R < LCL<br>J(+)/R(-) if both %R < 10%<br>PJ if only one %R outlier | 8 |
| MS/MSD (RPD) | May not analyze MS/MSD<br>RPD < 20% | J(+) in parent sample if RPD > CL | 9 |



Copyright 2007 EcoChem, Inc.

# EcoChem Validation Guidelines for Dioxin/Furan Analysis by HRMS
## (Based on EPA Reg. 10 SOP, Rev. 2, 1996 & EPA SW-846, Methods 1613b and 8290)

| VALIDATION QC ELEMENT | ACCEPTANCE CRITERIA | ACTION | REASON CODE |
|---|---|---|---|
| Lab Duplicate | RPD <25% if present. | J(+)/UJ(-) if outside limts | 9 |
| Labeled Compounds / Internal Standards | *Method 8290:* %R = 40% - 135% in all samples<br>*Method 1613B:* %R must meet limits specified in Table 7, Method 1613 | J(+)/UJ(-) if %R = 10% to LCL<br>J(+) if %R > UCL<br>J(+)/R(-) if %R < 10% | 13 |
| Quantitation/ Identification | Ions for analyte, IS, and rec. std. must max w/in 2 sec.<br>S/N >2.5<br>IA ratios meet limits in Table 9 of 1613B or Table 8 of 8290<br>RRTs w/in limits in Table 2 of 1613B | If RT criteria not met, use PJ (see TM-05)<br>If S/N criteria not met, J(+).<br>if unlabelled ion abundance not met, change to EMPC<br>If labelled ion abundance not met, J(+). | 21 |
| EMPC (estimated maximum possible concentration) | If quantitation idenfication criteria are not met, laboratory should report an EMPC value. | If laboratory correctly reported an EMPC value, qualify with U to indicate that the value is a detection limit. | 14 |
| Interferences | PCDF interferences from PCDPE | If both detected, change PCDF result to EMPC | 14 |
| Second Column Confirmation | All 2378-TCDF hits must be confirmed on a DB-225 (or equiv) column. All QC specs in this table must be met for the confirmation analysis. | Report lower of the two values.<br>If not performed use PJ (see TM-05). | 3 |
| Field Duplicates | Use QAPP limits. If no QAPP:<br>Solids: RPD <50%<br>OR absolute diff. < 2X RL (for results < 5X RL)<br>Aqueous: RPD <35%<br>OR absolute diff. < 1X RL (for results < 5X RL) | Narrate and qualify if required by project (EcoChem PJ) | 9 |
| Two analyses for one sample | Report only one result per analyte | "DNR" results that should not be used | 11 |



Copyright 2007 EcoChem, Inc.

# EcoChem Validation Guidelines for Conventional Chemistry Analysis (Based on EPA Standard Methods)

| VALIDATION QC ELEMENT | ACCEPTANCE CRITERIA | ACTION | REASON CODE |
|---|---|---|---|
| Cooler Temperature and Preservation | Cooler Temperature 4°C ±2°C<br>Preservation: Method Specific | Use Professional Judgment to qualify based to qualify for coole temp outliers<br>J(+)/UJ(-) if preservation requirements not met | 1 |
| Holding Time | Method Specific | Professional Judgment<br>J(+)/UJ(-) if holding time exceeded<br>J(+)/R(-) if HT exceeded by > 3X | 1 |
| Initial Calibration | Method specific<br>r>0.995 | Use professional judgment<br>J(+)/UJ(-) for r < 0.995 | 5A |
| Initial Calibration Verification (ICV) | Where applicable to method<br>Independent source analyzed immediately after calibration<br>%R method specific, usually 90% - 110% | R(+/-) if %R significantly < LCL<br>J(+)/UJ(-) if %R < LCL<br>J(+) if %R > UCL<br>R(+) if %R significantly > UCL | 5A |
| Continuing Cal Verification (CCV) | Where applicable to method<br>Every ten samples, immed. following ICV/ICB and end of run<br>%R method specific, usually 90% - 110% | R(+/-) if %R significantly < LCL<br>J(+)/UJ(-) if %R < LCL<br>J(+) if %R > UCL<br>R(+) if %R significantly > UCL | 5B |
| Initial and Continuing Cal Blanks (ICB/CCB) | Where applicable to method<br>After each ICV and CCV every ten samples and end of run<br>\| blank\| < MDL | Action level is 5x absolute value of blank conc.<br>For (+) blanks, U(+) results < action level<br>For (-) blanks, J(+)/UJ(-) results < action level<br>refer to TM-02 for additional details | 7 |
| Method Blank | One per matrix per batch<br>(not to exceed 20 samples)<br>blank < MDL | Action level is 5x absolute value of blank conc.<br>For (+) blk value, U(+) results < action level<br>For (-) blk value, J(+)/UJ(-) results < action level | 7 |
| Laboratory Control Sample | Waters:<br>One per matrix per batch<br>%R (80-120%) | R(+/-) if %R < 50%<br>J(+)/UJ(-) if %R = 50-79%<br>J(+) if %R >120% | 10 |
| | Soils:<br>One per matrix per batch<br>Result within manufacturer's certified acceptance range | J(+)/UJ(-) if < LCL,<br>J(+) if > UCL | 10 |
| Matrix Spike | One per matrix per batch; 5% frequency<br>75-125% for samples less than 4 x spike level | J(+) if %R > 125% or < 75%<br>UJ(-) if %R = 30-74%<br>R(+/-) results < IDL if %R < 30% | 8 |
| Laboratory Duplicate | One per matrix per batch<br>RPD <20% for samples > 5x RL<br>Diff <RL for samples >RL and <5 x RL<br>(may use RPD < 35%, Diff < 2X RL for solids) | J(+)/UJ(-) if RPD > 20% or diff > RL<br>all samples in batch | 9 |



Copyright 2006 EcoChem, Inc.

# EcoChem Validation Guidelines for Conventional Chemistry Analysis (Based on EPA Standard Methods)

| VALIDATION QC ELEMENT | ACCEPTANCE CRITERIA | ACTION | REASON CODE |
|---|---|---|---|
| Field Blank | blank < MDL | Action level is 5x blank conc.<br>U(+) sample values < action level<br>in associated field samples only | 6 |
| Field Duplicate | For results > 5X RL:<br>Water: RPD < 35% Solid: RPD < 50%<br>For results < 5 x RL:<br>Water: Diff<RL Solid: Diff < 2X RL | J(+)/UJ(-) in parent samples only | 9 |



Copyright 2006 EcoChem, Inc.

EcoChem, INC.
Environmental Data Quality

# DATA VALIDATION REPORT

## SAN JACINTO RIVER
## Texas Department of Transportation Right of Way Soil Sampling

**Prepared for:**

Integral Consulting, Inc.
1205 West Bay Dr. NW
Olympia, Washington 98502

**Prepared by:**

EcoChem, Inc.
710 Second Avenue, Suite 660
Seattle, Washington 98104

EcoChem Project: C22130-3

September 24, 2010

**Approved for Release**

Melissa Swanson
Project Chemist
**EcoChem, Inc.**

# PROJECT NARRATIVE

## Basis for Data Validation

This report summarizes the results of the validation (Stage 2A, Stage 2B, and Stage 3/4) performed on sediment and quality control (QC) sample data for the San Jacinto River – Texas Department of Transportation Right of Way Soil Sampling. A complete list of samples is provided in the **Sample Index**. Laboratory batch ID numbers and associated level of validation is provided at the beginning of each technical section

Samples were analyzed by Columbia Analytical Services, Kelso, Washington and Columbia Analytical Services, Houston, Texas. The analytical methods and EcoChem project chemists are listed below:

| Analysis | Method of Analysis | Primary Review | Secondary Review |
|---|---|---|---|
| Volatile Organic Compounds | EPA8260B | M. Brindle | M. Swanson |
| Semivolatile Organic Compounds | SW8270C | | |
| Polychlorinated Biphenyls (Aroclors) | SW8082 | | |
| Dioxin & Furan Compounds | EPA 1613B | | |
| Polychlorinated Biphenyls (Congeners) | EPA 1668A | | |
| Metals | ICPAES3050B, ICPMS3050B, SW7470A/7471A | J.Maute | |
| Total Solids | EPA160.3 | | |

The data were reviewed using guidance and quality control criteria documented in the analytical methods; the *Sampling and Analysis Plan: Sediment Study San Jacinto River Waste Pits Superfund Site* (Integral/AnchorQEA, April 2010); *USEPA National Functional Guidelines for Chlorinated Dioxin/Furan Data Review* (USEPA, September 2005); *National Functional Guidelines for Organic Data Review* (USEPA 1999);.and *USEPA National Functional Guidelines for Inorganic Data Review* (USEPA, October 2004).

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

Data qualifier definitions, reason codes, and validation criteria are included as **Appendix A**. The qualified data summary table is included as **Appendix B.** Communication records are included as **Appendix C**. Data Validation Worksheets and the associated communication records will be kept on file at EcoChem, Inc. A qualified laboratory electronic data deliverable (EDD) was also submitted with this report.

Sample Index
San Jacinto Texas DOT Right of Way Soil Sampling

| Sample ID | Kelso Lab ID | Houston Lab ID | SVOC | VOC | PCB Aroclors | Dioxins | PCB Congeners | Metals | Total Solids |
|---|---|---|---|---|---|---|---|---|---|
| TxDOT001-SO-0-12-N | K1008732-001 | E1000886-001 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| TxDOT002-SO-0-12-N | K1008732-002 | E1000886-002 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| TxDOT003-SO-0-12-N | K1008732-003 | E1000886-003 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| TxDOT004-SO-0-12-N | K1008732-004 | E1000886-004 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| TxDOT004-SO-48-60-N | K1008732-005 | E1000886-005 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| TxDOT005-SO-0-12-N | K1008732-006 | E1000886-006 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| TxDOT006-SO-0-6-N | K1008732-007 | E1000886-007 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| TxDOT007-SO-0-12-N | K1008732-008 | E1000886-008 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| TxDOT008-SO-0-12-N | K1008732-009 | E1000886-009 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| TxDOT009-SO-0-12-N | K1008732-010 | E1000886-010 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| TxDOT010-SO-0-12-N | K1008732-011 | E1000886-011 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| TxDOT011-SO-0-8-N | K1008732-012 | E1000886-012 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| TxDOT012-SO-0-12-N | K1008732-013 | E1000886-013 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| TxDOT012-SO-48-60-N | K1008732-014 | E1000886-014 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| TxDOT006-SO-0-6-D | K1008732-015 | E1000886-015 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| SoFW-901A | K1008732-016 | E1000886-016 | ✓ | | | ✓ | | ✓ | |
| FB-902 | K1008732-017 | | | | | | | ✓ | |

# DATA VALIDATION REPORT
# San Jacinto Texas DOT Right of Way Soil Sampling
# Volatile Organic Compounds by Method SW8260B

This report documents the review of analytical data from the analyses of soil samples and the associated laboratory and field quality control (QC) samples. Samples were analyzed by Columbia Analytical Services, Inc., Kelso, Washington. Refer to the **Sample Index** for a complete list of samples

| SDG | Number of Samples | Validation Level |
|---|---|---|
| K1008732 | 15 Soil | Stage 4 |

## I. DATA PACKAGE COMPLETENESS

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

## II. EDD TO HARDCOPY VERIFICATION

Ten percent (10%) of the results in the laboratory electronic data deliverable (EDD) were verified by comparison to the hardcopy laboratory data package. No errors were noted.

## III. TECHNICAL DATA VALIDATION

The quality control (QC) requirements that were reviewed are listed in the following table.

| | | | |
|---|---|---|---|
| 1 | Sample Receipt, Preservation, and Holding Times | | Laboratory Control Samples (LCS/LCSD) |
| | GC/MS Instrument Performance Check | 1 | Field Replicates |
| | Initial Calibration (ICAL) | | Internal Standards |
| | Continuing Calibration (CCAL) | | Reporting Limits |
| | Laboratory Blanks | | Reported Results |
| 1 | Field (Trip) Blanks | | Compound Identification (Full validation only) |
| | Surrogate Compounds | 1 | Calculation Verification (Full validation only) |
| | Matrix Spikes/Matrix Spike Duplicates (MS/MSD) | | |

[1] ***Quality control results are discussed below, but no data were qualified.***
[2] ***Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed below.***

### Sample Receipt, Preservation, and Holding Times

The validation guidance documents state that sample shipping coolers should arrive at the laboratory within the advisory temperature range of 2° to 6°C. The laboratory received sample coolers with temperatures less than the lower limit, at -0.3°C and -0.4°C. These outliers did not impact data quality; therefore no qualifiers were assigned.

## Field Blanks

No field blanks were submitted with this analytical fraction.

## Field Replicates

One set of field replicates, TxDOT006-SO-0-6-N & TxDOT006-SO-0-6-D, was submitted. No target analytes were detected, field precision was acceptable.

## Calculation Verification

Calculation verifications were performed for this SDG. No calculation or transcription errors were found.

## OVERALL ASSESSMENT

As determined by this evaluation, the laboratory followed the specified analytical method. Accuracy was acceptable, as demonstrated by the surrogate, laboratory control sample/laboratory control sample duplicate (LCS/LCSD) and matrix spike/matrix spike duplicate (MS/MSD) percent recovery (%R) values. Precision was also acceptable as demonstrated by the LCS/LCSD, MS/MSD and field replicate relative percent difference values.

No data were qualified for any reason.

All data, as reported, are acceptable for use.

# DATA VALIDATION REPORT
# San Jacinto Texas DOT Right of Way Soil Sampling
# Semivolatile Organic Compounds by Method SW8270C

This report documents the review of analytical data from the analyses of soil samples and the associated laboratory and field quality control (QC) samples. Samples were analyzed by Columbia Analytical Services, Inc., Kelso, Washington. Refer to the **Sample Index** for a complete list of samples.

| SDG | Number of Samples | Validation Level |
|---|---|---|
| K1008732 | 15 Soil | Stage 4 |
| | 1 Filter Wipe | Stage 2A |

## I. DATA PACKAGE COMPLETENESS

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

## II. EDD TO HARDCOPY VERIFICATION

Ten percent (10%) of the results in the laboratory EDD were verified by comparison to the hardcopy laboratory data package. No errors were noted.

## III. TECHNICAL DATA VALIDATION

The QC requirements that were reviewed are listed below.

| | | | |
|---|---|---|---|
| 1 | Sample Receipt, Preservation, and Holding Times | | Laboratory Control Samples (LCS/LCSD) |
| | GC/MS Instrument Performance Check | 1 | Field Replicates |
| | Initial Calibration (ICAL) | | Internal Standards |
| | Continuing Calibration (CCAL) | | Target Analyte List |
| 2 | Laboratory Blanks | | Reporting Limits (MDL and MRL) |
| 1 | Field Blanks | | Compound Identification |
| | Surrogate Compounds | | Reported Results |
| 2 | Matrix Spikes/Matrix Spike Duplicates (MS/MSD) | 1 | Calculation Verification (Full validation only) |

[1] ***Quality control results are discussed below, but no data were qualified.***
[2] ***Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed below.***

### Sample Receipt, Preservation, and Holding Times

The validation guidance documents state that sample shipping coolers should arrive at the laboratory within the advisory temperature range of 2° to 6°C. The laboratory received sample coolers with temperatures less than the lower limit, at -0.3°C and -0.4°C. These outliers did not impact data quality; therefore no qualifiers were assigned.

## Laboratory Blanks

To assess the impact of any blank contaminant on the reported sample results, an action level is established at five times (5x) the concentration reported in the blank. If a contaminant is reported in an associated field sample and the concentration is less than the action level, the result is qualified as not detected (U-7). If the result is also less than the reporting limit, then the result is elevated to the reporting limit. No action is taken if the sample result is greater than the action level, or for non-detected results.

Method blanks were analyzed at the appropriate frequency. Contaminant levels, associated samples, and action levels are documented in the data validation worksheets. Bis (2-ethylhexyl) phthalate was detected in the wipe method blank. This analyte was qualified as not detected (U-7) in Sample SOFW-901A.

## Field Blanks

Laboratory blanks are used to evaluate all associated field blanks. The field blank for this project is a filter wipe, Sample SOFW-901A. To evaluate the effect on the sample data, action levels of five times (5x) the blank concentrations were established. Positive results remained for carbazole, naphthalene, and phenanthrene in Sample SOFW-901A after qualifiers based on method blank contamination were issued. No field sample results were qualified based on filter wipe blank contamination; these associated results were either not detected or detected at levels greater than the action level.

## Matrix Spike/Matrix Spike Duplicates

The matrix spike/matrix spike duplicate (MS/MSD) analysis was performed using Sample TxDOT011-SO-0-8-N. The relative percent difference (RPD) value for bis(2-ethylhexyl)phthalate was greater than the control limit and the MS percent recovery (%R) value was greater than the control limit. The result for this analyte was estimated (J-8,9) in the parent sample.

## Field Replicates

One set of field replicates, TxDOT006-SO-0-6-N & TxDOT006-SO-0-6-D, was submitted. All field precision criteria were met. The RPD values were less than 50% for results greater than 5x the reporting limit (RL). Or the absolute difference between the sample and replicate was less than 2x the RL for results less than 5x the RL.

## Calculation Verification

Calculation verifications were performed for this SDG. No calculation or transcription errors were found.

## OVERALL ASSESSMENT

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

On data point was qualified as not detected based on method blank contamination. One data point was estimated due to MS/MSD %R and RPD outliers.

All data, as qualified, are acceptable for use.

# DATA VALIDATION REPORT
# San Jacinto Texas DOT Right of Way Soil Sampling
# PCB Aroclors by Method SW8082

This report documents the review of analytical data from the analyses of soil samples and the associated laboratory quality control (QC) samples. Samples were analyzed by Columbia Analytical Services, Kelso, Washington. Refer to the **Sample Index** for a complete list of samples.

| SDG | Number of Samples | Validation Level |
|---|---|---|
| K1008732 | 15 Soil | Stage 4 |

## I. DATA PACKAGE COMPLETENESS

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

## II. EDD TO HARDCOPY VERIFICATION

Ten percent (10%) of the results in the laboratory EDD were verified by comparison to the hardcopy laboratory data package. No errors were noted.

## III. TECHNICAL DATA VALIDATION

The QC requirements that were reviewed are listed in the following table

| | | | |
|---|---|---|---|
| 1 | Sample Receipt, Preservation, and Holding Times | | Matrix Spikes/Matrix Spike Duplicate (MS/MSD) |
| | Initial Calibration (ICAL) | 1 | Field Replicates |
| | Continuing Calibration (CCAL) | | Reporting Limits |
| | Laboratory Blanks | 1 | Compound Identification |
| 1 | Field Blanks | | Reported Results |
| | Surrogate Compounds | 1 | Calculation Verification (Full Validation only) |
| | Laboratory Control Samples (LCS/LCSD) | | |

[1] ***Quality control results are discussed below, but no data were qualified.***
[2] ***Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed below.***

### Sample Receipt, Preservation, and Holding Times

As stated in validation guidance documents, sample shipping coolers should arrive at the laboratory within the advisory temperature range of 2° to 6°C. The laboratory received sample coolers with temperatures less than the lower limit, at -0.3°C and -0.4°C. These outliers did not impact data quality; therefore no qualifiers were assigned.

## Field Blanks

No field blanks were submitted with this analytical fraction.

## Field Replicates

One set of field replicates, TxDOT006-SO-0-6-N & TxDOT006-SO-0-6-D, was submitted. No target analytes were detected, field precision was acceptable.

## Compound identification

The reported compound identifications were verified by using the quantitation reports (comparing the reported concentrations for each congener used for Aroclor identification), and also by comparing the patterns in the sample chromatogram to the patterns in the standard chromatogram. All compound identifications were acceptable.

## Calculation Verification

Calculation verifications were performed for this SDG. No calculation or transcription errors were found.

# IV. OVERALL ASSESSMENT

As determined by this evaluation, the laboratory followed the specified analytical method. Accuracy was acceptable, as demonstrated by the surrogate, matrix spike/matrix spike duplicate (MS/MSD), and laboratory control sample (LCS) percent recovery (%R) values. Precision was also acceptable as demonstrated by the MS/MSD and field replicate relative percent difference (RPD) values.

No data were qualified for any reason.

All data, as reported, are acceptable for use.

# DATA VALIDATION REPORT
# San Jacinto Texas DOT Right of Way Soil Sampling
# Dioxin/Furan Compounds by EPA 1613B

This report documents the review of analytical data from the analyses of soil samples and the associated laboratory quality control (QC) samples. Columbia Analytical Services, Houston, Texas, analyzed the samples. Refer to the **Sample Index** for a complete list of samples.

| SDG | Number of Samples | Validation Level |
|---|---|---|
| E1000886 | 15 Soil | EPA Stage 4 |
| | 1 Filter Wipe | EPA Stage 2A |

## I. DATA PACKAGE COMPLETENESS

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

## II. EDD TO HARDCOPY VERIFICATION

Ten percent (10%) of the results in the laboratory EDD were verified by comparison to the hardcopy laboratory data package. No errors were noted.

## III. TECHNICAL DATA VALIDATION

The QC requirements that were reviewed are listed in the following table.

| | | | |
|---|---|---|---|
| | Sample Receipt, Preservation, and Holding Times | 1 | Matrix Spike/Matrix Spike Duplicate (MS/MSD) |
| | GC/MS Instrument Performance Check | 1 | Laboratory Control Samples (LCS/LCSD) |
| | Initial Calibration (ICAL) | | Reference Material (RM) |
| | Calibration Verification (CVER) | 1 | Field Replicates |
| | Isomer Specificity | | Target Analyte List |
| 2 | Laboratory Blanks | 2 | Reported Results |
| 1 | Field Blanks | 2 | Compound Identification |
| 1 | Labeled Compound Recovery | 1 | Calculation Verification (EPA Stage 4 only) |

[1] ***Quality control results are discussed below, but no data were qualified.***
[2] ***Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed below.***

### Laboratory Blanks

To assess the impact of any blank contaminant on the reported sample results, an action level is established at five times (5x) the concentration reported in the blank. If a contaminant is

reported in an associated field sample and the concentration is less than the action level, the result is qualified as not detected (U-7). If the result is also less than the reporting limit, then the result is elevated to the reporting limit. No action is taken if the sample result is greater than the action level, or for non-detected results.

Method blanks were analyzed at the appropriate frequency. Contaminant levels, associated samples, and action levels are documented in the data validation worksheets. Various target analytes were detected in the method blanks, however only the result for 1,2,3,4,6,7,8-HpCDF in Sample TxDOT004-SO-48-60-N and the result for OCDD in Sample SoFW-901A were qualified as not detected (U-7).

## Field Blanks

One filter wipe blank, SOFW-901A, was submitted with this SDG. No target analytes were detected in this blank after qualifiers based on method blank contamination were issued.

## Labeled Compound Recovery

The percent recovery (%R) value for 13C-1,2,3,4,6,7,8-HpCDF (at 26%) was less than the lower control limit in Sample TxDOT010-SO-0-12-N (5x dilution). Only OCDD was reported from this dilution; no qualifiers were required.

## Matrix Spike/Matrix Spike Duplicate

Matrix spike/matrix spike duplicate (MS/MSD) samples were not analyzed. Accuracy and precision were evaluated using the laboratory control sample/laboratory control sample duplicate (LCS/LCSD).

## Laboratory Control Samples

The LCS %R value for 1,2,3,7,8,9-HxCDF was less than the lower control limit in extraction batch 117375. The LCSD %R value was within control limits; no qualifiers were applied for this single outlier.

## Field Replicates

One set of field replicates, TxDOT006-SO-0-6-N & TxDOT006-SO-0-6-D, was submitted. All field precision criteria were met. The relative percent difference (RPD) values were less than 50% for results greater than 5x the reporting limit (RL). Or the absolute difference between the sample and replicate was less than 2x the RL for results less than 5x the RL.

## Reported Results

The result for OCDD exceeded the calibrated range in Sample TxDOT010-SO-0-12-N and was "E" flagged by the laboratory. This sample was diluted (5x) and re-analyzed. The OCDD result from the original analyses was qualified as do-not-report (DNR-20) and was reported from the diluted analysis. All other results in the diluted analysis were qualified (DNR-11) and the original results were reported.

## Compound Identification

The laboratory assigned K-flags to results when a peak was detected but did not meet ion ratio quantitation criteria. The reported values cannot be considered as positive identification for these analytes. These results were considered potential false positives or estimated maximum possible concentrations (EMPC) and were qualified as not detected (U-22) at the reported values. Laboratory blank values flagged "K" were considered as non-detects.

All positive results for 2,3,7,8-TCDF were confirmed on a DB-225 column as required by the method. The 2,3,7,8-TCDF results from the DB-5 column were qualified do-not-report (DNR-11) in favor of the results from the DB-225 column.

For Sample TxDOT011-SO-0-8-N, the laboratory assigned a P-flag to the 1,2,3,7,8-PeCDF result to indicate the presence of chlorodiphenyl ether interference. The result for this analyte was estimated (J-14).

## Calculation Verification

Several results were verified by recalculation from the raw data. No calculation or transcription errors were noted.

# IV. OVERALL ASSESSMENT

As determined by this evaluation, the laboratory followed the specified analytical method. Accuracy was acceptable, as demonstrated by labeled compound and LCS/LCSD %R values, with the exceptions noted above. Precision was also acceptable as demonstrated by the LCS/LCSD and field replicate RPD values.

Data were qualified as not detected due to laboratory blank contamination and ion ratio criteria outliers. One data point was estimated due to chlorodiphenyl ether interference.

Data were flagged as do-not-report (DNR) due to linear calibration range outliers and to indicate which result (from multiple reported analyses) should not be used. Data that has been flagged DNR should not be used for any purpose.

All other data, as qualified, are acceptable for use.

# DATA VALIDATION REPORT
# San Jacinto Texas DOT Right of Way Soil Sampling
# PCB Congeners by EPA 1668A

This report documents the review of analytical data from the analyses of soil samples and the associated laboratory quality control (QC) samples. Columbia Analytical Services, Houston, Texas, analyzed the samples. Refer to the **Sample Index** for a complete list of samples.

| SDG | Number of Samples | Validation Level |
|---|---|---|
| E1000886 | 15 Soil | EPA Stage 4 |

## I. DATA PACKAGE COMPLETENESS

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

## II. EDD TO HARDCOPY VERIFICATION

Ten percent (10%) of the results in the laboratory EDD were verified by comparison to the hardcopy laboratory data package. No errors were noted.

## III. TECHNICAL DATA VALIDATION

The QC requirements that were reviewed are listed in the following table.

| | | | |
|---|---|---|---|
| | Sample Receipt, Preservation, and Holding Times | 1 | Matrix Spike/Matrix Spike Duplicate (MS/MSD) |
| | GC/MS Instrument Performance Check | | Laboratory Control Samples (LCS/LCSD) |
| | Initial Calibration (ICAL) | | Reference Material (RM) |
| | Calibration Verification (CVER) | 1 | Field Replicates |
| | Isomer Specificity | | Target Analyte List |
| 2 | Laboratory Blanks | | Reported Results |
| 1 | Field Blanks | 2 | Compound Identification |
| | Labeled Compound Recovery | 1 | Calculation Verification (EPA Stage 4 only) |

***[1] Quality control results are discussed below, but no data were qualified.***
***[2] Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed below.***

### Laboratory Blanks

To assess the impact of any blank contaminant on the reported sample results, an action level is established at five times (5x) the concentration reported in the blank. If a contaminant is reported in an associated field sample and the concentration is less than the action level, the result is qualified as not detected (U-7). If the result is also less than the reporting limit, then the result is elevated to the reporting limit. No action is taken if the sample result is greater than the

action level, or for non-detected results.

Method blanks were analyzed at the appropriate frequency. Contaminant levels, associated samples, and action levels are documented in the data validation worksheets. Various target analytes were detected in the method blanks, however only results for PCB105 and PCB118 in Samples TxDOT012-SO-0-12-N and TxDOT012-SO-48-60-N were qualified as not detected (U-7).

## Field Blanks

No field blanks were submitted with this analytical fraction.

## Matrix Spike/Matrix Spike Duplicate

Matrix spike/matrix spike duplicate (MS/MSD) samples were not analyzed. Accuracy and precision were evaluated using the laboratory control sample/laboratory control sample duplicate (LCS/LCSD).

## Field Replicates

One set of field replicates, TxDOT006-SO-0-6-N & TxDOT006-SO-0-6-D, was submitted. All field precision criteria were met. The relative percent difference (RPD) values were less than 50% for results greater than 5x the reporting limit (RL). Or the absolute difference between the sample and replicate was less than 2x the RL for results less than 5x the RL.

## Compound Identification

The laboratory assigned K-flags to results when a peak was detected but did not meet ion ratio quantitation criteria. The reported values cannot be considered as positive identification for these analytes. These results were considered potential false positives or estimated maximum possible concentrations (EMPC) and were qualified as not detected (U-22) at the reported values. Laboratory blank values flagged “K” were considered as non-detects.

## Calculation Verification

Several results were verified by recalculation from the raw data. No calculation or transcription errors were noted.

## IV. OVERALL ASSESSMENT

As was determined by this evaluation, the laboratory followed the specified analytical method. Accuracy was acceptable, as demonstrated by labeled compound and LCS/LCSD %R values. Precision was also acceptable as demonstrated by the LCS/LCSD and field replicate RPD values.

Data were qualified as not detected due to method blank contamination and ion ratio criteria outliers.

All data, as qualified, are acceptable for use.

# DATA VALIDATION REPORT
# San Jacinto Texas DOT Right of Way Soil Sampling
# Metals by Methods SW6010B, 6020A, and 7471A
# Total Solids by EPA 160.3M

This report documents the review of analytical data from the analyses of soil samples and the associated laboratory quality control (QC) samples. Columbia Analytical Services, Houston, Texas, analyzed the samples. Refer to the **Sample Index** for a complete list of samples.

| SDG | Number of Samples | Validation Level |
|---|---|---|
| K1008732 | 15 Soil | Stage 3 |
| | 2 Filter Wipes | Stage 2B |

## I. DATA PACKAGE COMPLETENESS

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

## I. EDD TO HARDCOPY VERIFICATION

Ten percent (10%) of the results in the laboratory EDD were verified by comparison to the hardcopy laboratory data package. No errors were noted.

## III. TECHNICAL DATA VALIDATION

The QC requirements that were reviewed are listed below.

| | | | |
|---|---|---|---|
| 1 | Sample Receipt, Preservation, and Holding Times | 2 | Matrix Spike Samples |
| | Initial Calibration | 1 | Laboratory Duplicates |
| | Continuing Calibration Verification | 1 | Field Replicates |
| | CRDL Standards | | Interference Check Samples |
| 2 | Laboratory Blanks | | Serial Dilutions |
| 1 | Field Blanks | | ICP-MS Internal Standards |
| | Laboratory Control Samples (LCS/LCSD) | | Reporting Limits (MDL and MRL) |
| 1 | Reference Materials | 1 | Calculation Verification (Stage 3 only) |

[1] ***Quality control results are discussed below, but no data were qualified***
[2] ***Quality control control outliers that impact the reported data were noted. Data qualifiers were issued as discussed below.***

## Sample Preservation and Holding Times

As stated in validation guidance documents, sample shipping coolers should arrive at the laboratory within the advisory temperature range of 2° to 6°C. The laboratory received sample coolers with temperatures less the lower control limit, at -0.3°C and -0.4°C. These outliers did not impact data quality; therefore no qualifiers were assigned.

## Laboratory Blanks

To assess the impact of each blank contaminant on the reported sample results, an action level is established at five times the concentration detected in the blank. If a contaminant is detected in an associated field sample and the concentration is less than the action level, the result is qualified U-7 at the reported concentration to indicate an elevation of the reporting limit. No action is taken if the sample result is greater than the action level, or for non-detected results.

Some analytes were found at levels less than the negative MDL in some instrument blanks. Action levels of five times the absolute value of the blank concentrations were established for negative blanks. Results less than the action levels in the associated samples were estimated (J/UJ-7) to indicate a potential low bias.

Various target analytes were detected in the instrument blanks. Aluminum and manganese results were qualified as not detected (U-7) in Sample FB-902. Chromium and barium results were qualified as not detected in Samples SOFW-901A and FB-902 (U-7). Copper was estimated (J/UJ-7) in Samples SOFW-901A and FB-902.

## Field Blanks

Laboratory blanks are used to evaluate all associated field blanks. The field blanks for this project were filter wipe samples. To evaluate the effect on the sample data, action levels of five times the blank concentrations were established. Sample FB-902 was a master filter wipe blank; it was used to evaluate the filter wipe blank Sample SOFW-901A. Magnesium, nickel, and zinc were qualified as not detected (U-6) in Sample SOFW-901A. Positive results for aluminum and manganese remained after qualifiers based on FB-902 were issued. Field sample results for aluminum and manganese were greater than the action levels; no additional qualifiers were applied.

## Reference Materials

The certified reference material (CRM) ERA lot number D065540 was analyzed with all soil samples. All recoveries were within the certified acceptance ranges.

## Matrix Spike

Matrix spike/matrix spike duplicate (MS/MSD) samples were not analyzed for wipe samples. Accuracy and precision were evaluated using the laboratory control sample/laboratory control sample duplicate (LCS/LCSD).

The MS/MSD analysis was performed using Sample TxDOT001-SO-0-12-NS. The percent recovery (%R) value for magnesium was greater than the upper control limit, at 153.4%. Associated magnesium results were estimated (J-8) to indicate a high bias.

### Laboratory Duplicates

Laboratory duplicates were not analyzed for wipe samples. Accuracy and precision were evaluated using the LCS/LCSD. For soil samples laboratory duplicate precision was acceptable.

### Field Replicates

One set of field replicates, TxDOT006-SO-0-6-N & TxDOT006-SO-0-6-D, was submitted. The relative percent difference (RPD) values were greater than the 50% control limit for barium and cobalt, at 51.8% and 131%, respectively. No data were qualified based on field replicate precision outliers. Data users should consider the impact of field precision outliers on the reported results.

### Calculation Verification

Several results were verified by recalculation from the raw data. No calculation or transcription errors were noted.

## IV. OVERALL ASSESSMENT

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

Data were estimated and/or detection limits were elevated based on laboratory blank results. Data were also estimated based on MS %R outliers

All data, as qualified, are acceptable for use.

EcoChem, INC.
Environmental Data Quality

# APPENDIX A

# DATA QUALIFIER DEFINITIONS, REASON CODES, AND CRITERIA TABLES

# DATA VALIDATION QUALIFIER CODES
# Based on National Functional Guidelines

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

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

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

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

# DATA QUALIFIER REASON CODES

| | |
|---|---|
| 1 | Holding Time/Sample Preservation |
| 2 | Chromatographic pattern in sample does not match pattern of calibration standard. |
| 3 | Compound Confirmation |
| 4 | Tentatively Identified Compound (TIC) (associated with NJ only) |
| 5A | Calibration (initial) |
| 5B | Calibration (continuing) |
| 6 | Field Blank Contamination |
| 7 | Lab Blank Contamination (e.g., method blank, instrument, etc.) |
| 8 | Matrix Spike(MS & MSD) Recoveries |
| 9 | Precision (all replicates) |
| 10 | Laboratory Control Sample Recoveries |
| 11 | A more appropriate result is reported (associated with “R” and “DNR” only) |
| 12 | Reference Material |
| 13 | Surrogate Spike Recoveries (a.k.a., labeled compounds & recovery standards) |
| 14 | Other (define in validation report) |
| 15 | GFAA Post Digestion Spike Recoveries |
| 16 | ICP Serial Dilution % Difference |
| 17 | ICP Interference Check Standard Recovery |
| 18 | Trip Blank Contamination |
| 19 | Internal Standard Performance (e.g., area, retention time, recovery) |
| 20 | Linear Range Exceeded |
| 21 | Potential False Positives |
| 22 | Elevated Detection Limit Due to Interference (i.e., laboratory, chemical and/or matrix) |

# EcoChem Validation Guidelines for Volatile Analysis by GC/MS (Based on Organic NFG 1999)

| VALIDATION QC ELEMENT | ACCEPTANCE CRITERIA | ACTION | REASON CODE |
|---|---|---|---|
| Cooler Temperature | 4°C±2°C<br>Water: HCl to pH < 2 | J(+)/UJ(-) if greater than 6 deg. C (EcoChem PJ) | 1 |
| Hold Time | Waters: 14 days preserved<br>7 Days: unpreserved (for aromatics)<br><br>Solids: 14 Days | J(+)/UJ(-) if hold times exceeded<br>If exceeded by > 3X HT: J(+)/R(-) (EcoChem PJ) | 1 |
| Tuning | BFB<br>Beginning of each 12 hour period<br>Method acceptance criteria | R(+/-) all analytes in all samples associated with the tune | 5A |
| Initial Calibration (Minimum 5 stds.) | RRF > 0.05 | (EcoChem PJ, see TM-06)<br>If MDL= reporting limit:<br>J(+)/R(-) if RRF < 0.05<br><br>If reporting limit > MDL:<br>note in worksheet if RRF <0.05 | 5A |
| | %RSD < 30% | (EcoChem PJ, see TM-06)<br>J(+) if %RSD > 30% | 5A |
| Continuing Calibration (Prior to each 12 hr. shift) | RRF > 0.05 | (EcoChem PJ, see TM-06)<br>If MDL= reporting limit:<br>J(+)/R(-) if RRF < 0.05<br><br>If reporting limit > MDL:<br>note in worksheet if RRF <0.05 | 5B |
| | %D <25% | (EcoChem PJ, see TM-06)<br>If > +/-90%: J+/R-<br>If -90% to -26%: J+ (high bias)<br>If 26% to 90%: J+/UJ- (low bias) | 5B |
| Method Blank | One per matrix per batch<br>No results > CRQL | U(+) if sample (+) result is less than CRQL and less than appropriate 5X or 10X rule (raise sample value to CRQL) | 7 |
| | | U(+) if sample (+) result is greater than or equal to CRQL and less than appropriate 5X and 10X rule (at reported sample value) | 7 |
| | No TICs present | R(+) TICs using 10X rule | 7 |
| Storage Blank | One per SDG<br><CRQL | U(+) the specific analyte(s) results in all assoc.samples using the 5x or 10x rule | 7 |
| Trip Blank | Frequency as per project QAPP | Same as method blank for positive results remaining in trip blank after method blank qualifiers are assigned | 18 |
| Field Blanks (if required in QAPP) | No results > CRQL | Apply 5X/10X rule; U(+) < action level | 6 |



Copyright 2005 EcoChem, Inc.

# EcoChem Validation Guidelines for Volatile Analysis by GC/MS (Based on Organic NFG 1999)

| VALIDATION QC ELEMENT | ACCEPTANCE CRITERIA | ACTION | REASON CODE |
|---|---|---|---|
| MS/MSD (recovery) | One per matrix per batch<br>Use method acceptance criteria | Qualify parent only unless other QC indicates systematic problems:<br>J(+) if both %R > UCL<br>J(+)/UJ(-) if both %R < LCL<br>J(+)/R(-) if both %R < 10%<br>PJ if only one %R outlier | 8 |
| MS/MSD (RPD) | One per matrix per batch<br>Use method acceptance criteria | J(+) in parent sample if RPD > CL | 9 |
| LCS<br>*low conc. H2O VOA* | One per lab batch<br>Within method control limits | J(+) assoc. cmpd if > UCL<br>J(+)/R(-) assoc. cmpd if < LCL<br>J(+)/R(-) all cmpds if half are < LCL | 10 |
| LCS<br>*regular VOA (H2O & solid)* | One per lab batch<br>Lab or method control limits | J(+) if %R > UCL J(+)/UJ(-) if %R <LCL<br>J(+)/R(-) if %R < 10% (EcoChem PJ) | 10 |
| LCS/LCSD<br>*(if required)* | One set per matrix and batch of 20 samples<br>RPD < 35% | J(+)/UJ(-) assoc. cmpd. in all samples | 9 |
| Surrogates | Added to all samples<br>Within method control limits | J(+) if %R >UCL<br>J(+)/UJ(-) if %R <LCL but >10% (see PJ[1])<br>J(+)/R(-) if <10% | 13 |
| Internal Standard (IS) | Added to all samples<br>Acceptable Range: IS area 50% to 200% of CCAL area<br>RT within 30 seconds of CC RT | J(+) if > 200%<br>J(+)/UJ(-) if < 50%<br>J(+)/R(-) if < 25%<br>RT>30 seconds, narrate and Notify PM | 19 |
| Field Duplicates | Use QAPP limits. If no QAPP:<br>Solids: RPD <50%<br>OR absolute diff. < 2X RL (for results < 5X RL)<br><br>Aqueous: RPD <35%<br>OR absolute diff. < 1X RL (for results < 5X RL) | Narrate and qualify if required by project<br>(EcoChem PJ) | 9 |
| TICs | Major ions (>10%) in reference must be present in sample; intensities agree within 20%; check identification | NJ the TIC unless:<br>R(+) common laboratory contaminants<br>See Technical Director for ID issues | 4 |
| Quantitation/ Identification | RRT within 0.06 of standard RRT<br>Ion relative intensity within 20% of standard<br>All ions in std. at > 10% intensity must be present in sample | See Technical Director if outliers | 14<br>21 (false +) |

**PJ[1]** No action if there are 4+ surrogates and only 1 outlier.



Copyright 2005 EcoChem, Inc.

# EcoChem Validation Guidelines for Semivolatile Analysis by GC/MS (Based on Organic NFG 1999)

| VALIDATION QC ELEMENT | ACCEPTANCE CRITERIA | ACTION | REASON CODE |
|---|---|---|---|
| Cooler Temperature | 4°C ±2° | J(+)/UJ(-) if greater than 6 deg. C (EcoChem PJ) | 1 |
| Holding Time | Water: 7 days from collection<br>Soil: 14 days from collection<br>Analysis: 40 days from extraction | Water:<br>J(+)/UJ(-) if ext. > 7 and < 21 days<br>J(+)/R(-) if ext > 21 days (EcoChem PJ)<br>Solids/Wastes:<br>J(+)/UJ(-) if ext. > 14 and < 42 days<br>J(+)/R(-) if ext. > 42 days (EcoChem PJ)<br><br>J(+)/UJ(-) if analysis >40 days | 1 |
| Tuning | DFTPP<br>Beginning of each 12 hour period<br>Method acceptance criteria | R(+/-) all analytes in all samples associated with the tune | 5A |
| Initial Calibration (Minimum 5 stds.) | RRF > 0.05 | (EcoChem PJ, see TM-06)<br>If MDL= reporting limit:<br>J(+)/R(-) if RRF < 0.05<br><br>If reporting limit > MDL:<br>note in worksheet if RRF <0.05 | 5A |
| | %RSD < 30% | (EcoChem PJ, see TM-06)<br>J(+) if %RSD > 30% | 5A |
| Continuing Calibration (Prior to each 12 hr. shift) | RRF > 0.05 | (EcoChem PJ, see TM-06)<br>If MDL= reporting limit:<br>J(+)/R(-) if RRF < 0.05<br><br>If reporting limit > MDL:<br>note in worksheet if RRF <0.05 | 5B |
| | %D <25% | (EcoChem PJ, see TM-06)<br>If > +/-90%: J+/R-<br>If -90% to -26%: J+ (high bias)<br>If 26% to 90%: J+/UJ- (low bias) | 5B |
| Method Blank | One per matrix per batch<br>No results > CRQL | U(+) if sample (+) result is less than CRQL and less than appropriate 5X or 10X rule (raise sample value to CRQL) | 7 |
| | | U(+) if sample (+) result is greater than or equal to CRQL and less than appropriate 5X and 10X rule (at reported sample value) | 7 |
| | No TICs present | R(+) TICs using 10X rule | 7 |
| Field Blanks (Not Required) | No results > CRQL | Apply 5X/10X rule; U(+) < action level | 6 |



Copyright 2005 EcoChem, Inc.

# EcoChem Validation Guidelines for Semivolatile Analysis by GC/MS (Based on Organic NFG 1999)

| VALIDATION QC ELEMENT | ACCEPTANCE CRITERIA | ACTION | REASON CODE |
|---|---|---|---|
| MS/MSD (recovery) | One per matrix per batch<br>Use method acceptance criteria | Qualify parent only unless other QC indicates systematic problems:<br>J(+) if both %R > UCL<br>J(+)/UJ(-) if both %R < LCL<br>J(+)/R(-) if both %R < 10%<br>PJ if only one %R outlier | 8 |
| MS/MSD (RPD) | One per matrix per batch<br>Use method acceptance criteria | J(+) in parent sample if RPD > CL | 9 |
| LCS<br>low conc. H2O SVOA | One per lab batch<br>Within method control limits | J(+) assoc. cmpd if > UCL<br>J(+)/R(-) assoc. cmpd if < LCL<br>J(+)/R(-) all cmpds if half are < LCL | 10 |
| LCS<br>regular SVOA (H2O & solid) | One per lab batch<br>Lab or method control limits | J(+) if %R > UCL J(+)/UJ(-) if %R <LCL<br>J(+)/R(-) if %R < 10% (EcoChem PJ) | 10 |
| LCS/LCSD<br>*(if required)* | One set per matrix and batch of 20 samples<br>RPD < 35% | J(+)/UJ(-) assoc. cmpd. in all samples | 9 |
| Surrogates | Minimum of 3 acid and 3 base/neutral compounds<br>Use method acceptance criteria | Do not qualify if only 1 acid and/or 1 B/N surrogate is out unless <10%<br>J(+) if %R > UCL J(+)/UJ(-) if %R < LCL<br>J(+)/R(-) if %R < 10% | 13 |
| Internal Standards | Added to all samples<br>Acceptable Range: IS area 50% to 200% of CCAL area<br>RT within 30 seconds of CC RT | J(+) if > 200%<br>J(+)/UJ(-) if < 50%<br>J(+)/R(-) if < 25%<br>RT>30 seconds, narrate and Notify PM | 19 |
| Field Duplicates | Use QAPP limits. If no QAPP:<br>Solids: RPD <50%<br>OR absolute diff. < 2X RL (for results < 5X RL)<br><br>Aqueous: RPD <35%<br>OR absolute diff. < 1X RL (for results < 5X RL) | Narrate and qualify if required by project<br>(EcoChem PJ) | 9 |
| TICs | Major ions (>10%) in reference must be present in sample; intensities agree within 20%; check identification | NJ the TIC unless:<br>R(+) common laboratory contaminants<br>See Technical Director for ID issues | 4 |
| Quantitation/ Identification | RRT within 0.06 of standard RRT<br>Ion relative intensity within 20% of standard<br>All ions in std. at > 10% intensity must be present in sample | See Technical Director if outliers | 14<br>21 (false +) |



Copyright 2005 EcoChem, Inc.

# EcoChem Validation Guidelines for Pesticides, PCBs, Herbicides, and Phenol by GC/ECD (Based on Organic NFG 1999 & EPA SW-846 Methods 8081/8082/8041/8151)

| VALIDATION QC ELEMENT | ACCEPTANCE CRITERIA | ACTION | REASON CODE |
|---|---|---|---|
| Cooler Temperature | 4°C ±2° | J(+)/UJ(-) if greater than 6 deg. C (EcoChem PJ) | 1 |
| Holding Time | Water: 7 days from collection<br>Soil: 14 days from collection<br>Analysis: 40 days from extraction | J(+)/UJ(-) if ext/analyzed > HT<br>J(+)/R(-) if ext/analyzed > 3X HT (EcoChem PJ) | 1 |
| Resolution Check | Beginning of ICAL Sequence<br>Within RTW Resolution >90% | Narrate (Use Professional Judgement to qualify) | 14 |
| Instrument Performance (Breakdown) | DDT Breakdown: < 20%<br>Endrin Breakdown: <20%<br>Combined Breakdown: <30%<br>Compounds within RTW | J(+) DDT NJ(+) DDD and/or DDE<br>R(-) DDT - If (+) for either DDE or DDD<br><br>J(+) Endrin NJ(+) EK and/or EA<br>R(-) Endrin - If (+) for either EK or EA | 5A |
| Retention Times | Surrogates:<br>TCX (+/- 0.05); DCB (+/- 0.10)<br>Target compounds:<br>elute before heptachlor epoxide (+/- 0.05)<br>elute after heptachlor epoxide (+/- 0.07) | NJ(+)/R(-) results for analytes with RT shifts<br>For full DV, use PJ based on examination of raw data | 5B |
| Initial Calibration | Pesticides: Low=CRQL, Mid=4X, High=16X<br>Multiresponse - one point Calibration<br>%RSD<20%<br>%RSD<30% for surr; two comp. may exceed if <30%<br>Resolution in Mix A and Mix B >90% | J(+)/UJ(-) | 5A |
| Continuing Calibration | Alternating PEM standard and INDA/INDB standards every 12 hours (each preceeded by an inst. Blank)<br>%D < 25%<br><br>Resolution >90% in IND mixes; 100% for PEM | J(+)/UJ(-) J(+)R(-) if %D > 90%<br><br>PJ for resolution | 5B |
| Method Blank | One per matrix per batch<br>No results > CRQL | U(+) if sample result is < CRQL and < 5X rule (raise sample value to CRQL)<br>U(+) if sample result is > or equal to CRQL and < 5X rule (at reported sample value) | 7 |
| Instrument Blanks | Analyzed at the beginning of every 12 hour sequence<br>No analyte > 1/2 CRQL | Same as Method Blank | 7 |
| Field Blanks | Not addressed by NFG<br>No results > CRQL | Apply 5X rule; U(+) < action level | 6 |



Copyright 2005 EcoChem, Inc.

# EcoChem Validation Guidelines for Pesticides, PCBs, Herbicides, and Phenol by GC/ECD (Based on Organic NFG 1999 & EPA SW-846 Methods 8081/8082/8041/8151)

| VALIDATION QC ELEMENT | ACCEPTANCE CRITERIA | ACTION | REASON CODE |
|---|---|---|---|
| MS/MSD (recovery) | One set per matrix per batch<br>Method Acceptance Criteria | Qualify parent only unless other QC indicates systematic problems:<br>J(+) if both %R > UCL<br>J(+)/UJ(-) if both %R < LCL<br>J(+)/R(-) if both %R < 10%<br>PJ if only one %R outlier | 8 |
| MS/MSD (RPD) | One set per matrix per batch<br>Method Acceptance Criteria | J(+) in parent sample if RPD > CL | 9 |
| LCS | One per SDG<br>Method Acceptance Criteria | J(+) if %R > UCL J(+)/UJ(-) if %R < LCL<br>J(+)/R(-) using PJ if %R <<LCL (< 10%) | 10 |
| LCS/LCSD<br>*(if required)* | One set per matrix and batch of 20 samples<br>RPD < 35% | J(+)/UJ(-) assoc. cmpd. in all samples | 9 |
| Surrogates | TCX and DCB added to every sample<br>%R = 30-150% | J(+)/UJ(-) if both %R = 10 - 60%<br>J(+) if both >150%<br>J(+)/R(-) if any %R <10% | 13 |
| Quantitation/ Identification | Quantitated using ICAL calibration factor (CF)<br><br>RPD between columns <40% | J(+) if RPD = 40 - 60%<br>NJ(+) if RPD >60%<br>EcoChem PJ - See TM-08 | 3 |
| Two analyses for one sample | Report only one result per analyte | "DNR" results that should not be used to avoid reporting two results for one sample | 11 |
| Sample Clean-up | GPC required for soil samples<br>Florisil required for all samples<br>Sulfur is optional<br><br>Clean-up standard check %R within CLP limits | J(+)/UJ(-) if %R < LCL<br>J(+) if %R > UCL | 14 |
| Field Duplicates | Use QAPP limits. If no QAPP:<br>Solids: RPD <50%<br>OR absolute diff. < 2X RL (for results < 5X RL)<br><br>Aqueous: RPD <35%<br>OR absolute diff. < 1X RL (for results < 5X RL) | Narrate<br>(Qualifiy if required by project QAPP) | 9 |



Copyright 2005 EcoChem, Inc.

# EcoChem Validation Guidelines for Dioxin/Furan Analysis by HRMS
## (Based on EPA Reg. 10 SOP, Rev. 2, 1996 & EPA SW-846, Methods 1613b and 8290)

| VALIDATION QC ELEMENT | ACCEPTANCE CRITERIA | ACTION | REASON CODE |
|---|---|---|---|
| Cooler/Storage Temperature | Waters/Solids < 4°C<br>Tissues <-10°C | EcoChem PJ, see TM-05 | 1 |
| Holding Time | Extraction - Water: 30 days from collection<br>*Note:* Under CWA, SDWA, and RCRA the HT for H2O is 7 days*<br>Extraction - Soil: 30 days from collection<br>Analysis: 40 days from extraction | J(+)/UJ(-) if ext > 30 days<br>J(+)/UJ(-) if analysis > 40 Days<br>EcoChem PJ, see TM-05 | 1 |
| Mass Resolution | >=10,000 resolving power at m/z 304.9824<br>Exact mass of m/z 380.9760 w/in 5 ppm of theoretical value (380.97410 to 380.97790) .<br>Analyzed prior to ICAL and at the start and end of each 12 hr. shift | R(+/-) if not met | 14 |
| Window Defining Mix and Column Performance Mix | Window defining mixture/Isomer specificity std run before ICAL and CCAL<br>Valley < 25% (valley = (x/y)*100%)<br>x = ht. of TCDD<br>y = baseline to bottom of valley<br>For all isomers eluting near 2378-TCDD/TCDF isomers (TCDD only for 8290) | J(+) if valley > 25% | 5A (ICAL)<br>5B (CCAL |
| Initial Calibration | Minimum of five standards<br>%RSD < 20% for native compounds<br>%RSD <30% for labeled compounds<br>(%RSD <35% for labeled compounds under 1613b) | J(+) natives if %RSD > 20% | 5A |
| | Abs. RT of $^{13}C_{12}$-1234-TCDD<br>>25 min on DB5<br>>15 min on DB-225 | EcoChem PJ, see TM-05 | |
| | Ion Abundance ratios within QC limits<br>(Table 8 of method 8290)<br>(Table 9 of method 1613B) | EcoChem PJ, see TM-05 | |
| | S/N ratio > 10 for all native and labeled compounds in CS1 std. | If <10, elevate Det. Limit or R(-) | |



Copyright 2007 EcoChem, Inc.

# EcoChem Validation Guidelines for Dioxin/Furan Analysis by HRMS
## (Based on EPA Reg. 10 SOP, Rev. 2, 1996 & EPA SW-846, Methods 1613b and 8290)

| VALIDATION QC ELEMENT | ACCEPTANCE CRITERIA | ACTION | REASON CODE |
|---|---|---|---|
| Continuing Calibration | Analyzed at the start and end of each 12 hour shift.<br>%D+/-20% for native compounds<br>%D +/-30% for labeled compounds<br>(Must meet limits in Table 6, Method 1613B)<br>(If %Ds in the closing CCAL are w/in 25%/35% the avg RF from the two CCAL may be used to calculate samples per Method 8290, Section 8.3.2.4) | Do not qualify labeled compounds. Narrate in report for labeled compound %D outliers.<br>For native compound %D outliers:<br>8290: J(+)/UJ(-) if %D = 20% - 75%<br>J(+)/R(-) if %D > 75%<br>1613: J(+)/UJ(-) if %D is outside Table 6 limits<br>J(+)/R(-) if %D is +/- 75% of Table 6 limit | 5B |
| | Abs. RT of $^{13}C_{12}$-1234-TCDD and $^{13}C12$-123789-HxCDD +/- 15 sec of ICAL. | EcoChem PJ, see ICAL section of TM-05 | |
| | RRT of all other compounds must meet Table 2 of 1613B. | EcoChem PJ, see TM-05 | |
| | Ion Abundance ratios within QC limits<br>(Table 8 of method 8290)<br>(Table 9 of method 1613B) | EcoChem PJ, see TM-05 | |
| | S/N ratio > 10 | If <10, elevate Det. Limit or R(-) | |
| Method Blank | One per matrix per batch<br>No positive results | If sample result <5X action level, qualify U at reported value. | 7 |
| Field Blanks (Not Required) | No positive results | If sample result <5X action level, qualify U at reported value. | 6 |
| LCS / OPR | Concentrations must meet limits in Table 6, Method 1613B or lab limits. | J(+) if %R > UCL<br>J(+)/UJ(-) if %R < LCL<br>J(+)/R(-) using PJ if %R <<LCL (< 10%) | 10 |
| MS/MSD (recovery) | May not analyze MS/MSD<br>%R should meet lab limits. | Qualify parent only unless other QC indicates systematic problems:<br>J(+) if both %R > UCL<br>J(+)/UJ(-) if both %R < LCL<br>J(+)/R(-) if both %R < 10%<br>PJ if only one %R outlier | 8 |
| MS/MSD (RPD) | May not analyze MS/MSD<br>RPD < 20% | J(+) in parent sample if RPD > CL | 9 |



Copyright 2007 EcoChem, Inc.

# EcoChem Validation Guidelines for Dioxin/Furan Analysis by HRMS
## (Based on EPA Reg. 10 SOP, Rev. 2, 1996 & EPA SW-846, Methods 1613b and 8290)

| VALIDATION QC ELEMENT | ACCEPTANCE CRITERIA | ACTION | REASON CODE |
|---|---|---|---|
| Lab Duplicate | RPD <25% if present. | J(+)/UJ(-) if outside limts | 9 |
| Labeled Compounds / Internal Standards | *Method 8290:* %R = 40% - 135% in all samples<br>*Method 1613B:* %R must meet limits specified in Table 7, Method 1613 | J(+)/UJ(-) if %R = 10% to LCL<br>J(+) if %R > UCL<br>J(+)/R(-) if %R < 10% | 13 |
| Quantitation/ Identification | Ions for analyte, IS, and rec. std. must max w/in 2 sec.<br>S/N >2.5<br>IA ratios meet limits in Table 9 of 1613B or Table 8 of 8290<br>RRTs w/in limits in Table 2 of 1613B | If RT criteria not met, use PJ (see TM-05)<br>If S/N criteria not met, J(+).<br>if unlabelled ion abundance not met, change to EMPC<br>If labelled ion abundance not met, J(+). | 21 |
| EMPC (estimated maximum possible concentration) | If quantitation idenfication criteria are not met, laboratory should report an EMPC value. | If laboratory correctly reported an EMPC value, qualify with U to indicate that the value is a detection limit. | 14 |
| Interferences | PCDF interferences from PCDPE | If both detected, change PCDF result to EMPC | 14 |
| Second Column Confirmation | All 2378-TCDF hits must be confirmed on a DB-225 (or equiv) column. All QC specs in this table must be met for the confirmation analysis. | Report lower of the two values.<br>If not performed use PJ (see TM-05). | 3 |
| Field Duplicates | Use QAPP limits. If no QAPP:<br>Solids: RPD <50%<br>OR absolute diff. < 2X RL (for results < 5X RL)<br>Aqueous: RPD <35%<br>OR absolute diff. < 1X RL (for results < 5X RL) | Narrate and qualify if required by project (EcoChem PJ) | 9 |
| Two analyses for one sample | Report only one result per analyte | "DNR" results that should not be used | 11 |



Copyright 2007 EcoChem, Inc.

# EcoChem Validation Guidelines for PCB Congener Analysis by HRMS (Based on EPA Reg. 10 SOP, Rev. 1, 12/1995 & EPA SW-846, Method 1668)

| VALIDATION QC ELEMENT | ACCEPTANCE CRITERIA | ACTION | REASON CODE |
|---|---|---|---|
| Cooler/Storage Temperature | Waters/Solids <4°C<br>Tissues <-10°C | EcoChem PJ, see TM-05 | 1 |
| Holding Time | Samples: Up to one year if stored in the dark & temp as above.<br><br>Extracts: Up to 1 year if stored at <-10°C and in the dark | J(+)/UJ(-) if HT > 1 year<br>EcoChem PJ, see TM-05 | 1 |
| Mass Resolution | >=10,000 resolving power at m/z 330.9792<br><5 ppm deviation from each m/z listed in Table 7 of method.<br>Analyzed prior to ICAL and at the beginning<br>and end of each 12 hr. shift | R(+/-) if not met | 14 |
| Column Resolution 209 Congener Solution | Mix of all 209 PCBs run prior to each ICAL<br>and each 12 hour shift<br>RT of PCB209 must be > 55 min<br>PCB 156 & 157 must coelute w/in 2 sec<br>PCB34 & 23 and PCB187 & 182 must be resolved<br>where ( (x/y)*100%) < 40%<br>x = ht. of valley and y = ht of shortest peak | J(+) if valley >40% | 5A (ICAL)<br>5B (CCAL) |
| Initial Calibration | Minimum of five standards<br>%RSD < 20% for native compounds<br>%RSD < 35% for labeled compounds | J(+) natives if %RSD > 20% | 5A |
| | Ion Abundance ratios within QC limits<br>(Method 1668, Table 8) in CS1 std. | EcoChem PJ, see TM-05 | |
| | S/N ratio > 10 for all native and labeled compounds in CS1 std. | If <10, elevate Det. Limit or R(-) | |
| Continuing Calibration | Every 12 hours: Concentrations must meet criteria specified in Method 1668, Table 6 | J(+)/(UJ(-) natives if %D = 30% - 50%<br>J(+)/R(-) natives if %D > 75% | 5B |
| | Absolute RT of all Labelled Compounds and Window Defining Congeners must be +/- 15 sec of RT in ICAL<br>RRT of all compounds must meet Table 2 of method. | EcoChem PJ, see ICAL section of TM-05 | |
| | S/N ratio > 10 | If <10, elevate Det. Limit or R(-) | |
| | Ion Abundance ratios must meet criteria specified in Method 1668, Table 8 | EcoChem PJ, see TM-05 | |
| Method Blank | One per matrix per batch<br>No positive results | If sample result <5X action level,<br>qualify U at reported value. | 7 |



Copyright 2006 EcoChem, Inc.

# EcoChem Validation Guidelines for PCB Congener Analysis by HRMS (Based on EPA Reg. 10 SOP, Rev. 1, 12/1995 & EPA SW-846, Method 1668)

| VALIDATION QC ELEMENT | ACCEPTANCE CRITERIA | ACTION | REASON CODE |
|---|---|---|---|
| Rinse/Field Blank (if required) | One per matrix per batch<br>No positive results | If sample result <5X action level, qualify U at reported value. | 6 |
| LCS / OPR | One per matrix per batch<br>%R Values w/in limits specified in Method 1668, Table 6 | J(+) if %R > UCL<br>J(+)/UJ(-) if %R < LCL<br>J(+)/R(-) using PJ if %R <<LCL (< 10%) | 10 |
| MS/MSD (if required) | Accuracy: %R values within laboratory limits | Qualify parent sample only unless other QC indicates systematic problems:<br>J(+) if both %R > UCL<br>J(+)/UJ(-) if both %R < LCL<br>J(+)/R(-) if both %R < 10%<br>PJ if only one %R outlier | 8 |
| | Precision: RPD < 20% | J(+) in parent sample if RPD > 20% | 9 |
| Duplicate (if required) | RPD <25% | J(+)/UJ(-) if outside limts | 9 |
| Labeled Compounds / Internal Standards | %R must meet limits specified in Method 1668, Table 6. | J(+)/UJ(-) if %R = 10% to LCL<br>J(+) if %R > UCL<br>J(+)/R(-) if %R < 10% | 13 |
| Quantitation/ Identification | Ions for analyte, IS, and rec. std. must max w/in 2 sec.<br>S/N >2.5<br>Ion abundance (IA ratios) must meet limits stated in Table 8 of Method 1668<br>Relative retention times (RRT) must be w/in limits stated in Table 2 of Method 1668 | If RT criteria not met, use PJ (see TM-05)<br>J(+) if S/N criteria not met<br>if unlabelled ion abundance not met, change to EMPC<br>J(+) if labelled ion abundance not met. | 21 |
| Interferences | Lock masses must not deviate +/- 20% | Change result to EMPC | 14 |
| Field Duplicates | Use QAPP limits. If no QAPP:<br>Solids: RPD <50%<br>OR absolute diff. < 2X RL (for results < 5X RL)<br><br>Aqueous: RPD <35%<br>OR absolute diff. < 1X RL (for results < 5X RL) | Narrate and qualify if required by project (EcoChem PJ) | 9 |
| Two analyses for one sample | Report only one result per analyte | "DNR" results that should not be used to avoid reporting two results for one sample | 11 |



Copyright 2006 EcoChem, Inc.

# EcoChem Validation Guidelines for Metals Analysis by ICP (Based on Inorganic NFG 1994 & 2004)

| VALIDATION QC ELEMENT | ACCEPTANCE CRITERIA | ACTION | REASON CODE |
|---|---|---|---|
| Cooler Temperature and Preservation | Cooler temperature: 4°C ±2°<br>Waters: Nitric Acid to pH < 2<br>For Dissolved Metals: 0.45um filter & preserve after filtration<br>Tissues: Frozen | EcoChem Professional Judgment - no qualification based on cooler temperature outliers<br>J(+)/UJ(-) if pH preservation requirements are not met | 1 |
| Holding Time | 180 days from date sampled<br>Frozen tissues - HT extended to 2 years | J(+)/UJ(-) if holding time exceeded | 1 |
| Initial Calibration | Blank + minimum 1 standard<br>If more than 1 standard, r > 0.995 | J(+)/UJ(-) if r < 0.995 (multi point cal) | 5A |
| Initial Calibration Verification (ICV) | Independent source analyzed immediately after calibration<br>%R within ±10% of true value | J(+)/UJ(-) if %R 75-89%<br>J(+) if %R = 111-125%<br>R(+) if %R > 125%<br>R(+/-) if %R < 75% | 5A |
| Continuing Calibration Verification (CCV) | Every ten samples, immediately following ICV/ICB and at end of run<br>%R within ±10% of true value | J(+)/UJ(-) if %R = 75-89%<br>J(+) if %R 111-125%<br>R(+) if %R > 125%<br>R(+/-) if %R < 75% | 5B |
| Initial and Continuing Calibration Blank (ICB/CCB) | After each ICV and CCV<br>every ten samples and end of run<br>\| blank \| < IDL (MDL) | Action level is 5x absolute value of blank conc.<br>For (+) blanks, U(+) results < action level<br>For (-) blanks, J(+)/UJ(-) results < action level<br>(Refer to TM-02 for additional information) | 7 |
| Reporting Limit Standard | 2x RL analyzed beginning of run<br>Not required for Al, Ba, Ca, Fe, Mg, Na, K<br>%R = 70%-130% (50%-150% Sb, Pb, Tl) | R(-)/J(+) < 2x RL if %R <50% (< 30% Sb, Pb, Tl)<br>J(+) < 2x RL, UJ(-) if %R 50-69% (30-49% Sb, Pb,Tl)<br>J(+) < 2x RL if %R 130-180% (150-200% Sb, Pb, Tl)<br>R(+) < 2x RL if %R > 180% (200% Sb, Pb, Tl) | 14 |
| Interference Check Samples (ICSA/ICSAB) | ICSAB %R 80 - 120% for all spiked elements<br>\| ICSA \| < MDL for all unspiked elements except: K, Na | For samples with Al, Ca, Fe, or Mg > ICS levels<br>R(+/-) if %R < 50%<br>J(+) if %R >120%<br>J(+)/UJ(-) if %R= 50 to 79%<br>Use Professional Judgment for ICSA to determine if bias is present<br>see TM-09 for additional details | 17 |
| Method Blank | One per matrix per batch<br>(batch not to exceed 20 samples)<br>blank < MDL | Action level is 5x blank concentration<br>U(+) results < action level | 7 |
| Laboratory Control Sample (LCS) | One per matrix per batch<br>Blank Spike: %R within 80-120% | R(+/-) if %R < 50%<br>J(+)/UJ(-) if %R = 50-79%<br>J(+) if %R >120% | 10 |
| | CRM: Result within manufacturer's certified acceptance range or project guidelines | J(+)/UJ(-) if < LCL,<br>J(+) if > UCL | |



Copyright 2006 EcoChem, Inc.

# EcoChem Validation Guidelines for Metals Analysis by ICP
# (Based on Inorganic NFG 1994 & 2004)

| VALIDATION QC ELEMENT | ACCEPTANCE CRITERIA | ACTION | REASON CODE |
|---|---|---|---|
| Matrix Spikes | One per matrix per batch<br>75-125% for samples less than 4x spike level | J(+) if %R > 125%<br>J(+)/UJ(-) if %R < 75%<br>J(+)/R(-) if %R < 30% or<br>J(+)/UJ(-) if Post Spike %R 75-125%<br>Qualify all samples in batch | 8 |
| Post-digestion Spike | If Matrix Spike is outside 75-125%,<br>spike at twice the sample conc. | No qualifiers assigned based on this element | |
| Laboratory Duplicate (or MS/MSD) | One per matrix per batch<br>RPD < 20% for samples > 5x RL<br>Diff < RL for samples >RL and < 5x RL<br>(Diff < 2x RL for solids) | J(+)/UJ(-) if RPD > 20% or diff > RL (2x RL for solids)<br>qualify all samples in batch | 9 |
| Serial Dilution | 5x dilution one per matrix<br>%D < 10% for original sample conc. > 50x MDL | J(+)/UJ(-) if %D >10%<br>qualify all samples in batch | 16 |
| Field Blank | Blank < MDL | Action level is 5x blank conc.<br>U(+) sample values < action level<br>in associated field samples only | 6 |
| Field Duplicate | For results > 5x RL:<br>Water: RPD < 35% Solid: RPD < 50%<br>For results < 5 x RL:<br>Water: Diff < RL Solid: Diff < 2x RL | J(+)/UJ(-) in parent samples only | 9 |
| Linear Range | Sample concentrations must fall within range | J values over range | 20 |



Copyright 2006 EcoChem, Inc.

# EcoChem Validation Guidelines for Metals Analysis by ICP-MS (Based on Inorganic NFG 1994 & 2004)

| VALIDATION QC ELEMENT | ACCEPTANCE CRITERIA | ACTION | REASON CODE |
|---|---|---|---|
| Cooler Temperature and Preservation | Cooler temperature: 4°C ±2°<br>Waters: Nitric Acid to pH < 2<br>For Dissolved Metals: 0.45um filter & preserve after filtration | EcoChem Professional Judgment - no qualification based on cooler temperature outliers<br>J(+)/UJ(-) if pH preservation requirements are not met | 1 |
| Holding Time | 180 days from date sampled<br>Frozen tissues - HT extended to 2 years | J(+)/UJ(-) if holding time exceeded | 1 |
| Tune | Prior to ICAL<br>monitoring compounds analyzed 5 times wih Std Dev. ≤ 5%<br>mass calibration <0.1 amu from True Value<br>Resolution < 0.9 AMU @ 10% peak height or <0.75 amu @ 5% peak height | Use Professional Judgment to evaluate tune<br>J(+)/UJ(-) if tune criteria not met | 5A |
| Initial Calibration | Blank + minimum 1 standard<br>If more than 1 standard, r>0.995 | J(+)/UJ(-) if r<0.995 (for multi point cal) | 5A |
| Initial Calibration Verification (ICV) | Independent source analyzed immediately after calibration<br>%R within ±10% of true value | J(+)/UJ(-) if %R 75-89%<br>J(+) if %R = 111-125%<br>R(+) if %R > 125%<br>R(+/-) if %R < 75% | 5A |
| Continuing Calibration Verification (CCV) | Every ten samples, immediately following ICV/ICB and at end of run<br>±10% of true value | J(+)/UJ(-) if %R = 75-89%<br>J(+) if %R 111-125%<br>R(+) if %R > 125%<br>R(+/-) if %R < 75% | 5B |
| Initial and Continuing Calibration Blanks (ICB/CCB) | After each ICV and CCV<br>every ten samples and end of run<br>\| blank \| < IDL (MDL) | Action level is 5x absolute value of blank conc.<br>For (+) blanks, U(+) results < action level<br>For (-) blanks, J(+)/UJ(-) results < action level<br>refer to TM-02 for additional details | 7 |
| Reporting Limit Standard (CRI) | 2x RL analyzed beginning of run<br>Not required for Al, Ba, Ca, Fe, Mg, Na, K<br>%R = 70%-130% (50%-150% Co,Mn, Zn) | R(-),(+) < 2x RL if %R < 50% (< 30% Co,Mn, Zn)<br>J(+) < 2x RL, UJ(-) if %R 50-69% (30%-49% Co,Mn, Zn)<br>J(+) < 2x RL if %R 130%-180% (150%-200% Co,Mn, Zn)<br>R(+) < 2x RL if %R > 180% (200% Co, Mn, Zn) | 14 |
| Interference Check Samples (ICSA/ICSAB) | Required by SW 6020, but not 200.8<br>ICSAB %R 80% - 120% for all spiked elements<br>\| ICSA \| < IDL (MDL) for all unspiked elements | For samples with Al, Ca, Fe, or Mg > ICS levels<br>R(+/-) if %R < 50%<br>J(+) if %R >120%<br>J(+)/UJ(-) if %R = 50% to 79%<br>Use Professional Judgment for ICSA to determine if bias is present<br>see TM-09 for additional details | 17 |
| Method Blank | One per matrix per batch<br>(batch not to exceed 20 samples)<br>blank < MDL | Action level is 5x blank concentration<br>U(+) results < action level | 7 |



Copyright 2006 EcoChem, Inc.

# EcoChem Validation Guidelines for Metals Analysis by ICP-MS
# (Based on Inorganic NFG 1994 & 2004)

| VALIDATION QC ELEMENT | ACCEPTANCE CRITERIA | ACTION | REASON CODE |
|---|---|---|---|
| Laboratory Control Sample (LCS) | One per matrix per batch<br>Blank Spike: %R within 80%-120% | R(+/-) if %R < 50%<br>J(+)/UJ(-) if %R = 50-79%<br>J(+) if %R >120% | 10 |
| | CRM: Result within manufacturer's certified acceptance range or project guidelines | J(+)/UJ(-) if < LCL,<br>J(+) if > UCL | |
| Matrix Spike/ Matrix Spike Duplicate (MS/MSD) | One per matrix per batch<br>75-125% for samples where results do not exceed 4x spike level | J(+) if %R>125%<br>J(+)/UJ(-) if %R <75%<br>J(+)/R(-) if %R<30% or<br>J(+)/UJ(-) if Post Spike %R 75%-125%<br>Qualify all samples in batch | 8 |
| Post-digestion Spike | If Matrix Spike is outside 75-125%,<br>Spike parent sample at 2x the sample conc. | No qualifiers assigned based on this element | |
| Laboratory Duplicate (or MS/MSD) | One per matrix per batch<br>RPD < 20% for samples > 5x RL<br>Diff < RL for samples > RL and < 5 x RL<br>(Diff < 2x RL for solids) | J(+)/UJ(-) if RPD > 20% or diff > RL<br>all samples in batch | 9 |
| Serial Dilution | 5x dilution one per matrix<br>%D < 10% for original sample values > 50x MDL | J(+)/UJ(-) if %D >10%<br>All samples in batch | 16 |
| Internal Standards | Every sample<br>SW6020: 60%-125% of cal blank IS<br>200.8: 30%-120% of cal blank IS | J (+)/UJ (-) all analytes associated with IS outlier | 19 |
| Field Blank | Blank < MDL | Action level is 5x blank conc.<br>U(+) sample values < AL<br>in associated field samples only | 6 |
| Field Duplicate | For results > 5x RL:<br>Water: RPD < 35% Solid: RPD < 50%<br>For results < 5 x RL:<br>Water: Diff < RL Solid: Diff < 2x RL | J(+)/UJ(-) in parent samples only | 9 |
| Linear Range | Sample concentrations must fall within range | J values over range | 20 |



Copyright 2006 EcoChem, Inc.

# EcoChem Validation Guidelines for Mercury Analysis by CVAA (Based on Inorganic NFG 1994 & 2004)

| VALIDATION QC ELEMENT | ACCEPTANCE CRITERIA | ACTION | REASON CODE |
|---|---|---|---|
| Cooler Temperature and Preservation | Cooler temperature: 4°C ±2°<br>Waters: Nitric Acid to pH < 2<br>For Dissolved Metals: 0.45um filter & preserve after filtration | EcoChem Professional Judgment - no qualification based on cooler temperature outliers<br>J(+)/UJ(-) if pH preservation requirements are not met | 1 |
| Holding Time | 28 days from date sampled<br>Frozen tissues: HT extended to 6 months | J(+)/UJ(-) if holding time exceeded | 1 |
| Initial Calibration | Blank + 4 standards, one at RL<br>r > 0.995 | J(+)/UJ(-) if r<0.995 | 5A |
| Initial Calibration Verification (ICV) | Independent source analyzed immediately after calibration<br>%R within ±20% of true value | J(+)/UJ(-) if %R = 65%-79%<br>J(+) if %R = 121-135%<br>R(+/-) if %R < 65% R(+) if %R > 135% | 5A |
| Continuing Calibration Verification (CCV) | Every ten samples, immediately following ICV/ICB and at end of run<br>%R within ±20% of true value | J(+)/UJ(-) if %R = 65%-79%<br>J(+) if %R = 121-135%<br>R(+/-) if %R < 65% R(+) if %R > 135% | 5B |
| Initial and Continuing Calibration Blanks (ICB/CCB) | after each ICV and CCV<br>every ten samples and end of run<br>\| blank \| < IDL (MDL) | Action level is 5x absolute value of blank conc.<br>For (+) blanks, U(+) results < action level<br>For (-) blanks, J(+)/UJ(-) results < action level<br>refer to TM-02 for additional details | 7 |
| Reporting Limit Standard (CRA) | conc at RL - analyzed beginning of run<br>%R = 70-130% | R(-),(+)<2xRL if %R <50%<br>J(+)<2x RL, UJ(-) if %R 50-69%<br>J(+) <2x RL if %R 130-180%<br>R(+)<2x RL if %R>180% | 14 |
| Method Blank | One per matrix per batch<br>(batch not to exceed 20 samples)<br>blank < MDL | Action level is 5x blank concentration<br>U(+) results < action level | 7 |
| Laboratory Control Sample (LCS) | One per matrix per batch | | 10 |
| | Blank Spike: %R within 80-120% | R(+/-) if %R < 50%<br>J(+)/UJ(-) if %R = 50-79%<br>J(+) if %R >120% | |
| | CRM: Result within manufacturer's certified acceptance range or project guidelines | J(+)/UJ(-) if < LCL,<br>J(+) if > UCL | |
| Matrix Spike/Matrix Spike Duplicate (MS/MSD) | One per matrix per batch<br>5% frequency<br>75-125% for samples less than 4x spike level | J(+) if %R>125%<br>J(+)/UJ(-) if %R <75%<br>J(+)/R(-) if %R<30%<br>all samples in batch | 8 |
| Laboratory Duplicate (or MS/MSD) | One per matrix per batch<br>RPD < 20% for samples > 5x RL<br>Diff < RL for samples > RL and < 5x RL<br>(Diff < 2x RL for solids) | J(+)/UJ(-) if RPD > 20% or diff > RL<br>all samples in batch | 9 |



Copyright 2006 EcoChem, Inc.

# EcoChem Validation Guidelines for Mercury Analysis by CVAA (Based on Inorganic NFG 1994 & 2004)

| VALIDATION QC ELEMENT | ACCEPTANCE CRITERIA | ACTION | REASON CODE |
|---|---|---|---|
| Field Blank | Blank < MDL | Action level is 5x blank conc.<br>U(+) sample values < action level<br>in associated field samples only | 6 |
| Field Duplicate | For results > 5x RL:<br>Water: RPD < 35% Solid: RPD < 50%<br>For results < 5x RL:<br>Water: Diff<RL Solid: Diff < 2x RL | J(+)/UJ(-) in parent samples only | 9 |
| Linear Range | Sample concentrations must be less than 110% of high standard | J values over range | 20 |



Copyright 2006 EcoChem, Inc.

# EcoChem Validation Guidelines for Conventional Chemistry Analysis (Based on EPA Standard Methods)

| VALIDATION QC ELEMENT | ACCEPTANCE CRITERIA | ACTION | REASON CODE |
|---|---|---|---|
| Cooler Temperature and Preservation | Cooler Temperature 4°C ±2°C<br>Preservation: Method Specific | Use Professional Judgment to qualify based to qualify for coole temp outliers<br>J(+)/UJ(-) if preservation requirements not met | 1 |
| Holding Time | Method Specific | Professional Judgment<br>J(+)/UJ(-) if holding time exceeded<br>J(+)/R(-) if HT exceeded by > 3X | 1 |
| Initial Calibration | Method specific<br>r>0.995 | Use professional judgment<br>J(+)/UJ(-) for r < 0.995 | 5A |
| Initial Calibration Verification (ICV) | Where applicable to method<br>Independent source analyzed immediately after calibration<br>%R method specific, usually 90% - 110% | R(+/-) if %R significantly < LCL<br>J(+)/UJ(-) if %R < LCL<br>J(+) if %R > UCL<br>R(+) if %R significantly > UCL | 5A |
| Continuing Cal Verification (CCV) | Where applicable to method<br>Every ten samples, immed. following ICV/ICB and end of run<br>%R method specific, usually 90% - 110% | R(+/-) if %R significantly < LCL<br>J(+)/UJ(-) if %R < LCL<br>J(+) if %R > UCL<br>R(+) if %R significantly > UCL | 5B |
| Initial and Continuing Cal Blanks (ICB/CCB) | Where applicable to method<br>After each ICV and CCV every ten samples and end of run<br>\| blank\| < MDL | Action level is 5x absolute value of blank conc.<br>For (+) blanks, U(+) results < action level<br>For (-) blanks, J(+)/UJ(-) results < action level<br>refer to TM-02 for additional details | 7 |
| Method Blank | One per matrix per batch<br>(not to exceed 20 samples)<br>blank < MDL | Action level is 5x absolute value of blank conc.<br>For (+) blk value, U(+) results < action level<br>For (-) blk value, J(+)/UJ(-) results < action level | 7 |
| Laboratory Control Sample | Waters:<br>One per matrix per batch<br>%R (80-120%) | R(+/-) if %R < 50%<br>J(+)/UJ(-) if %R = 50-79%<br>J(+) if %R >120% | 10 |
| | Soils:<br>One per matrix per batch<br>Result within manufacturer's certified acceptance range | J(+)/UJ(-) if < LCL,<br>J(+) if > UCL | 10 |
| Matrix Spike | One per matrix per batch; 5% frequency<br>75-125% for samples less than 4 x spike level | J(+) if %R > 125% or < 75%<br>UJ(-) if %R = 30-74%<br>R(+/-) results < IDL if %R < 30% | 8 |
| Laboratory Duplicate | One per matrix per batch<br>RPD <20% for samples > 5x RL<br>Diff <RL for samples >RL and <5 x RL<br>(may use RPD < 35%, Diff < 2X RL for solids) | J(+)/UJ(-) if RPD > 20% or diff > RL<br>all samples in batch | 9 |



Copyright 2006 EcoChem, Inc.

# EcoChem Validation Guidelines for Conventional Chemistry Analysis (Based on EPA Standard Methods)

| VALIDATION QC ELEMENT | ACCEPTANCE CRITERIA | ACTION | REASON CODE |
|---|---|---|---|
| Field Blank | blank < MDL | Action level is 5x blank conc.<br>U(+) sample values < action level<br>in associated field samples only | 6 |
| Field Duplicate | For results > 5X RL:<br>Water: RPD < 35% Solid: RPD < 50%<br>For results < 5 x RL:<br>Water: Diff<RL Solid: Diff < 2X RL | J(+)/UJ(-) in parent samples only | 9 |



Copyright 2006 EcoChem, Inc.

EcoChem, INC.
Environmental Data Quality

# APPENDIX B
# QUALIFIED DATA SUMMARY TABLE

# Qualified Data Summary Table
## San Jacinto Texas DOT Right of Way Soil Sampling

| SDG | Sample ID | Laboratory ID | Method | Analyte | Result | Units | Lab Qualifier | Validation Qualifier | Validation Reason |
|---|---|---|---|---|---|---|---|---|---|
| K1008732 | TxDOT001-SO-0-12-N | K1008732-001 | ICPAES_3050B | Magnesium | 1050 | mg/kg | N | J | 8 |
| K1008732 | TxDOT001-SO-0-12-N | K1008732-001DUP | ICPAES_3050B | Magnesium | 1310 | mg/kg | | J | 8 |
| K1008732 | TxDOT002-SO-0-12-N | K1008732-002 | ICPAES_3050B | Magnesium | 2010 | mg/kg | N | J | 8 |
| K1008732 | TxDOT003-SO-0-12-N | K1008732-003 | ICPAES_3050B | Magnesium | 1290 | mg/kg | N | J | 8 |
| K1008732 | TxDOT004-SO-0-12-N | K1008732-004 | ICPAES_3050B | Magnesium | 1390 | mg/kg | N | J | 8 |
| K1008732 | TxDOT004-SO-48-60-N | K1008732-005 | ICPAES_3050B | Magnesium | 1110 | mg/kg | N | J | 8 |
| K1008732 | TxDOT005-SO-0-12-N | K1008732-006 | ICPAES_3050B | Magnesium | 3000 | mg/kg | N | J | 8 |
| K1008732 | TxDOT006-SO-0-6-N | K1008732-007 | ICPAES_3050B | Magnesium | 1360 | mg/kg | N | J | 8 |
| K1008732 | TxDOT007-SO-0-12-N | K1008732-008 | ICPAES_3050B | Magnesium | 1160 | mg/kg | N | J | 8 |
| K1008732 | TxDOT008-SO-0-12-N | K1008732-009 | ICPAES_3050B | Magnesium | 656 | mg/kg | N | J | 8 |
| K1008732 | TxDOT009-SO-0-12-N | K1008732-010 | ICPAES_3050B | Magnesium | 1780 | mg/kg | N | J | 8 |
| K1008732 | TxDOT010-SO-0-12-N | K1008732-011 | ICPAES_3050B | Magnesium | 2990 | mg/kg | N | J | 8 |
| K1008732 | TxDOT011-SO-0-8-N | K1008732-012 | ICPAES_3050B | Magnesium | 2050 | mg/kg | N | J | 8 |
| K1008732 | TxDOT012-SO-0-12-N | K1008732-013 | ICPAES_3050B | Magnesium | 1820 | mg/kg | N | J | 8 |
| K1008732 | TxDOT012-SO-48-60-N | K1008732-014 | ICPAES_3050B | Magnesium | 1500 | mg/kg | N | J | 8 |
| K1008732 | TxDOT006-SO-0-6-D | K1008732-015 | ICPAES_3050B | Magnesium | 1430 | mg/kg | N | J | 8 |
| K1008732 | SoFW-901A | K1008732-016 | ICP-AES_CLAA | Barium | 0.21 | ug | J | U | 7 |
| K1008732 | SoFW-901A | K1008732-016 | ICP-AES_CLAA | Chromium | 0.4 | ug | J | U | 7 |
| K1008732 | SoFW-901A | K1008732-016 | ICP-AES_CLAA | Copper | 0.1 | ug | U | UJ | 7 |
| K1008732 | SoFW-901A | K1008732-016 | ICP-AES_CLAA | Magnesium | 50.1 | ug | | U | 6 |
| K1008732 | SoFW-901A | K1008732-016 | ICP-AES_CLAA | Nickel | 0.11 | ug | J | U | 6 |
| K1008732 | SoFW-901A | K1008732-016 | ICP-AES_CLAA | Zinc | 4.2 | ug | | U | 6 |
| K1008732 | FB-902 | K1008732-017 | ICP-AES_CLAA | Aluminum | 2.3 | ug | J | U | 7 |
| K1008732 | FB-902 | K1008732-017 | ICP-AES_CLAA | Barium | 0.26 | ug | J | U | 7 |
| K1008732 | FB-902 | K1008732-017 | ICP-AES_CLAA | Chromium | 0.2 | ug | J | U | 7 |
| K1008732 | FB-902 | K1008732-017 | ICP-AES_CLAA | Copper | 0.1 | ug | U | UJ | 7 |
| K1008732 | FB-902 | K1008732-017 | ICP-AES_CLAA | Manganese | 0.2 | ug | J | U | 7 |
| K1008732 | TxDOT011-SO-0-8-N | K1008732-012 | SW8270C_3541 | bis(2-Ethylhexyl)phthalate | 0.08 | mg/kg | J | J | 8,9 |
| K1008732 | SoFW-901A | K1008732-016 | SW8270C_3541 | bis(2-Ethylhexyl)phthalate | 0.94 | ug | J | U | 7 |
| E1000886 | TxDOT001-SO-0-12-N | E1000886-001 | EPA1613B | 2,3,4,6,7,8-Hexachlorodibenzo-p-furan | 0.243 | ng/kg | JK | U | 22 |
| E1000886 | TxDOT001-SO-0-12-N | E1000886-001 | EPA1668A | 3,3',4,4',5-Pentachlorobiphenyl | 6.55 | ng/kg | JK | U | 22 |
| E1000886 | TxDOT001-SO-0-12-N | E1000886-001 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 1.01 | ng/kg | CJ | DNR | 11 |
| E1000886 | TxDOT001-SO-0-12-N | E1000886-001 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-furan | 0.0883 | ng/kg | JK | U | 22 |
| E1000886 | TxDOT001-SO-0-12-N | E1000886-001 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin | 0.349 | ng/kg | JK | U | 22 |
| E1000886 | TxDOT001-SO-0-12-N | E1000886-001 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-furan | 0.137 | ng/kg | JK | U | 22 |

Qualified Data Summary Table
San Jacinto Texas DOT Right of Way Soil Sampling

| SDG | Sample ID | Laboratory ID | Method | Analyte | Result | Units | Lab Qualifier | Validation Qualifier | Validation Reason |
|---|---|---|---|---|---|---|---|---|---|
| E1000886 | TxDOT001-SO-0-12-N | E1000886-001 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-furan | 0.372 | ng/kg | JK | U | 22 |
| E1000886 | TxDOT001-SO-0-12-N | E1000886-001 | EPA1613B | 1,2,3,4,7,8,9-Heptachlorodibenzo-p-furan | 0.264 | ng/kg | JK | U | 22 |
| E1000886 | TxDOT002-SO-0-12-N | E1000886-002 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-furan | 0.0929 | ng/kg | JK | U | 22 |
| E1000886 | TxDOT002-SO-0-12-N | E1000886-002 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 22 | ng/kg | C | DNR | 11 |
| E1000886 | TxDOT002-SO-0-12-N | E1000886-002 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin | 0.982 | ng/kg | JK | U | 22 |
| E1000886 | TxDOT003-SO-0-12-N | E1000886-003 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-furan | 0.335 | ng/kg | JK | U | 22 |
| E1000886 | TxDOT003-SO-0-12-N | E1000886-003 | EPA1668A | 2,3,3',4,4',5,5'-Heptachlorobiphenyl | 7.09 | ng/kg | JK | U | 22 |
| E1000886 | TxDOT003-SO-0-12-N | E1000886-003 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin | 0.18 | ng/kg | JK | U | 22 |
| E1000886 | TxDOT003-SO-0-12-N | E1000886-003 | EPA1668A | 2,3,4,4',5-Pentachlorobiphenyl | 9.81 | ng/kg | JK | U | 22 |
| E1000886 | TxDOT003-SO-0-12-N | E1000886-003 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin | 0.51 | ng/kg | JK | U | 22 |
| E1000886 | TxDOT003-SO-0-12-N | E1000886-003 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin | 0.186 | ng/kg | JK | U | 22 |
| E1000886 | TxDOT003-SO-0-12-N | E1000886-003 | EPA1613B | 1,2,3,4,7,8,9-Heptachlorodibenzo-p-furan | 0.185 | ng/kg | JK | U | 22 |
| E1000886 | TxDOT003-SO-0-12-N | E1000886-003 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 31.8 | ng/kg | C | DNR | 11 |
| E1000886 | TxDOT004-SO-0-12-N | E1000886-004 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 194 | ng/kg | C | DNR | 11 |
| E1000886 | TxDOT004-SO-0-12-N | E1000886-004 | EPA1668A | 3,3',4,4',5-Pentachlorobiphenyl | 7.27 | ng/kg | JK | U | 22 |
| E1000886 | TxDOT004-SO-0-12-N | E1000886-004 | EPA1668A | 3,4,4',5-Tetrachlorobiphenyl | 2.31 | ng/kg | JK | U | 22 |
| E1000886 | TxDOT004-SO-48-60-N | E1000886-005 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 1.46 | ng/kg | C | DNR | 11 |
| E1000886 | TxDOT004-SO-48-60-N | E1000886-005 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin | 0.341 | ng/kg | JK | U | 22 |
| E1000886 | TxDOT004-SO-48-60-N | E1000886-005 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-furan | 0.113 | ng/kg | JK | U | 22 |
| E1000886 | TxDOT004-SO-48-60-N | E1000886-005 | EPA1613B | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-furan | 0.395 | ng/kg | BJ | U | 7 |
| E1000886 | TxDOT004-SO-48-60-N | E1000886-005 | EPA1668A | 2,3',4,4',5,5'-Hexachlorobiphenyl | 2.9 | ng/kg | JK | U | 22 |
| E1000886 | TxDOT004-SO-48-60-N | E1000886-005 | EPA1668A | 3,3',4,4'-Tetrachlorobiphenyl | 3.48 | ng/kg | JK | U | 22 |
| E1000886 | TxDOT005-SO-0-12-N | E1000886-006 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 46 | ng/kg | C | DNR | 11 |
| E1000886 | TxDOT006-SO-0-6-N | E1000886-007 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 0.461 | ng/kg | CJ | DNR | 11 |
| E1000886 | TxDOT006-SO-0-6-N | E1000886-007 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-furan | 0.21 | ng/kg | JK | U | 22 |
| E1000886 | TxDOT006-SO-0-6-N | E1000886-007 | EPA1668A | 3,3',4,4'-Tetrachlorobiphenyl | 31.2 | ng/kg | JK | U | 22 |
| E1000886 | TxDOT006-SO-0-6-N | E1000886-007 | EPA1613B | 1,2,3,4,7,8,9-Heptachlorodibenzo-p-furan | 0.4 | ng/kg | JK | U | 22 |
| E1000886 | TxDOT006-SO-0-6-N | E1000886-007 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin | 0.182 | ng/kg | JK | U | 22 |
| E1000886 | TxDOT007-SO-0-12-N | E1000886-008 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 0.938 | ng/kg | CJK | DNR | 11 |
| E1000886 | TxDOT007-SO-0-12-N | E1000886-008 | EPA1668A | 2,3',4,4',5'-Pentachlorobiphenyl | 12.1 | ng/kg | JK | U | 22 |
| E1000886 | TxDOT007-SO-0-12-N | E1000886-008 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin | 0.372 | ng/kg | JK | U | 22 |
| E1000886 | TxDOT007-SO-0-12-N | E1000886-008 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 0.775 | ng/kg | JK | U | 22 |
| E1000886 | TxDOT008-SO-0-12-N | E1000886-009 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin | 0.429 | ng/kg | JK | U | 22 |
| E1000886 | TxDOT008-SO-0-12-N | E1000886-009 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 0.654 | ng/kg | CJK | DNR | 11 |
| E1000886 | TxDOT008-SO-0-12-N | E1000886-009 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-furan | 0.338 | ng/kg | JK | U | 22 |

Qualified Data Summary Table
San Jacinto Texas DOT Right of Way Soil Sampling

| SDG | Sample ID | Laboratory ID | Method | Analyte | Result | Units | Lab Qualifier | Validation Qualifier | Validation Reason |
|---|---|---|---|---|---|---|---|---|---|
| E1000886 | TxDOT008-SO-0-12-N | E1000886-009 | EPA1613B | 2,3,4,7,8-Pentachlorodibenzo-p-furan | 0.149 | ng/kg | JK | U | 22 |
| E1000886 | TxDOT009-SO-0-12-N | E1000886-010 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 2.45 | ng/kg | C | DNR | 11 |
| E1000886 | TxDOT009-SO-0-12-N | E1000886-010 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin | 0.238 | ng/kg | JK | U | 22 |
| E1000886 | TxDOT009-SO-0-12-N | E1000886-010 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-furan | 0.273 | ng/kg | JK | U | 22 |
| E1000886 | TxDOT009-SO-0-12-N | E1000886-010 | EPA1613B | 2,3,4,7,8-Pentachlorodibenzo-p-furan | 0.339 | ng/kg | JK | U | 22 |
| E1000886 | TxDOT009-SO-0-12-N | E1000886-010 | EPA1668A | 2,3',4,4',5'-Pentachlorobiphenyl | 21.3 | ng/kg | JK | U | 22 |
| E1000886 | TxDOT010-SO-0-12-N | E1000886-011 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 25.7 | ng/kg | C | DNR | 11 |
| E1000886 | TxDOT010-SO-0-12-N | E1000886-011 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-furan | 0.439 | ng/kg | U,D | DNR | 11 |
| E1000886 | TxDOT010-SO-0-12-N | E1000886-011 | EPA1613B | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin | 285 | ng/kg | B,D | DNR | 11 |
| E1000886 | TxDOT010-SO-0-12-N | E1000886-011 | EPA1613B | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-furan | 58.8 | ng/kg | B,D | DNR | 11 |
| E1000886 | TxDOT010-SO-0-12-N | E1000886-011 | EPA1613B | 1,2,3,4,7,8,9-Heptachlorodibenzo-p-furan | 4.96 | ng/kg | J,D | DNR | 11 |
| E1000886 | TxDOT010-SO-0-12-N | E1000886-011 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin | 1.56 | ng/kg | J,D | DNR | 11 |
| E1000886 | TxDOT010-SO-0-12-N | E1000886-011 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-furan | 5.31 | ng/kg | J,D | DNR | 11 |
| E1000886 | TxDOT010-SO-0-12-N | E1000886-011 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin | 10.8 | ng/kg | J,D | DNR | 11 |
| E1000886 | TxDOT010-SO-0-12-N | E1000886-011 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-furan | 2.7 | ng/kg | J,D | DNR | 11 |
| E1000886 | TxDOT010-SO-0-12-N | E1000886-011 | EPA1613B | Octachlorodibenzo-p-dioxin | 4940 | ng/kg | BE | DNR | 20 |
| E1000886 | TxDOT010-SO-0-12-N | E1000886-011 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-furan | 0.0823 | ng/kg | JK | U | 22 |
| E1000886 | TxDOT010-SO-0-12-N | E1000886-011 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin | 0.321 | ng/kg | U,D | DNR | 11 |
| E1000886 | TxDOT010-SO-0-12-N | E1000886-011 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-furan | 1.8 | ng/kg | JK,D | DNR | 11 |
| E1000886 | TxDOT010-SO-0-12-N | E1000886-011 | EPA1613B | 2,3,4,6,7,8-Hexachlorodibenzo-p-furan | 1.71 | ng/kg | J,D | DNR | 11 |
| E1000886 | TxDOT010-SO-0-12-N | E1000886-011 | EPA1613B | 2,3,4,7,8-Pentachlorodibenzo-p-furan | 2.1 | ng/kg | JK,D | DNR | 11 |
| E1000886 | TxDOT010-SO-0-12-N | E1000886-011 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 6.15 | ng/kg | D | DNR | 11 |
| E1000886 | TxDOT010-SO-0-12-N | E1000886-011 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 30.1 | ng/kg | C,D | DNR | 11 |
| E1000886 | TxDOT010-SO-0-12-N | E1000886-011 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin | 6.21 | ng/kg | J,D | DNR | 11 |
| E1000886 | TxDOT010-SO-0-12-N | E1000886-011 | EPA1613B | Octachlorodibenzo-p-furan | 287 | ng/kg | B,D | DNR | 11 |
| E1000886 | TxDOT011-SO-0-8-N | E1000886-012 | EPA1668A | 3,4,4',5-Tetrachlorobiphenyl | 1.77 | ng/kg | JK | U | 22 |
| E1000886 | TxDOT011-SO-0-8-N | E1000886-012 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 9.8 | ng/kg | C | DNR | 11 |
| E1000886 | TxDOT011-SO-0-8-N | E1000886-012 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-furan | 0.696 | ng/kg | JP | J | 14 |
| E1000886 | TxDOT011-SO-0-8-N | E1000886-012 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-furan | 0.0667 | ng/kg | JK | U | 22 |
| E1000886 | TxDOT012-SO-0-12-N | E1000886-013 | EPA1668A | Coelution of PCB 156 and 157 | 1.86 | ng/kg | JK | U | 22 |
| E1000886 | TxDOT012-SO-0-12-N | E1000886-013 | EPA1668A | 2,3,3',4,4'-Pentachlorobiphenyl | 3.67 | ng/kg | BJ | U | 7 |
| E1000886 | TxDOT012-SO-0-12-N | E1000886-013 | EPA1668A | 2,3',4,4',5-Pentachlorobiphenyl | 8.3 | ng/kg | BJ | U | 7 |
| E1000886 | TxDOT012-SO-0-12-N | E1000886-013 | EPA1613B | Octachlorodibenzo-p-furan | 0.177 | ng/kg | BJK | U | 22 |
| E1000886 | TxDOT012-SO-48-60-N | E1000886-014 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-furan | 0.029 | ng/kg | JK | U | 22 |
| E1000886 | TxDOT012-SO-48-60-N | E1000886-014 | EPA1668A | Coelution of PCB 156 and 157 | 1.97 | ng/kg | JK | U | 22 |

Qualified Data Summary Table
San Jacinto Texas DOT Right of Way Soil Sampling

| SDG | Sample ID | Laboratory ID | Method | Analyte | Result | Units | Lab Qualifier | Validation Qualifier | Validation Reason |
|---|---|---|---|---|---|---|---|---|---|
| E1000886 | TxDOT012-SO-48-60-N | E1000886-014 | EPA1668A | 2,3',4,4',5-Pentachlorobiphenyl | 10.1 | ng/kg | BJ | U | 7 |
| E1000886 | TxDOT012-SO-48-60-N | E1000886-014 | EPA1668A | 2,3,3',4,4'-Pentachlorobiphenyl | 3.35 | ng/kg | BJ | U | 7 |
| E1000886 | TxDOT006-SO-0-6-D | E1000886-015 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 0.563 | ng/kg | CJK | DNR | 11 |
| E1000886 | TxDOT006-SO-0-6-D | E1000886-015 | EPA1668A | 2,3',4,4',5'-Pentachlorobiphenyl | 4.33 | ng/kg | JK | U | 22 |
| E1000886 | TxDOT006-SO-0-6-D | E1000886-015 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 0.101 | ng/kg | JK | U | 22 |
| E1000886 | TxDOT006-SO-0-6-D | E1000886-015 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-furan | 0.328 | ng/kg | JK | U | 22 |
| E1000886 | SoFW-901A | E1000886-016 | EPA1613B | Octachlorodibenzo-p-dioxin | 7.04 | pg | BJ | U | 7 |

EcoChem, INC.
Environmental Data Quality

# APPENDIX C
# COMMUNICATION RECORDS

## Melissa Swanson

**From:** Melissa Swanson
**Sent:** Wednesday, September 08, 2010 11:18 AM
**To:** 'Craig Hutchings'
**Cc:** 'Tom Schulz'
**Subject:** RE: E1000866 status
**Attachments:** DV_QUALS_20100908.zip

Hi Craig,

Here is the qualified EDD of the dioxin and PCB congener data. Multiple qualifiers were applied for ion abundance outliers (U-22), method blank contamination (U-7) and designating duplicate results (DNR-11), either dilution or column confirmation. One result each was qualified for exceeding linear calibration range (DNR-20) and chlorodiphenyl ether interference (J-14).

Please contact me with any questions you may have.

Also, we are planning to get the corrected electronic SJWP reports to you today or tomorrow, hardcopy to follow.

Regards,
Melissa

**Melissa Swanson**
**EcoChem, Inc.**
***Project Chemist***

710 Second Ave, Suite 660, Seattle, WA 98104
DIRECT: 206.233.9332 ext. 102 • FAX: 206.233.0114
EMAIL: mswanson@ecochem.net

As Environmental Quality Assurance Specialists, EcoChem, Inc. is dedicated to developing data into reliable and accessible environmental information Through proper planning and focused QA coordination and oversight, we ensure data of known quality and usability. We prepare specific QA/QC documents
and implement data management solutions that accomplish your program needs.

Confidential - This electronic mail communication may contain privileged and confidential attorney-client information and attorney work products. If you received this electronic communication in error or are not the intended recipient, please delete this communication without using, copying, or otherwise disseminating it. Please notify sender that you received this communication in error.

---

**From:** Craig Hutchings [mailto:chutchings@integral-corp.com]
**Sent:** Wednesday, September 08, 2010 9:00 AM
**To:** Melissa Swanson
**Subject:** RE: E1000866 status

Melissa,
Yes, please send the qualified EDDs as soon as they are ready but hold the report until all fractions are complete. If you could provide a thumbnail sketch of why qualifiers were assigned with the qualified EDD that would be helpful. Something as simple as copying the sentence from the DV report "Data were estimated due to X and Y? would be sufficient.

Thanks.

Craig Hutchings | Scientist
Integral Consulting Inc. | www.integral-corp.com
1205 West Bay Drive NW | Olympia, WA 98502
Tel: 360.705.3534, ext. 17 | Cell: 360.485.3679 | Fax: 360.705.3669

HEALTH ENVIRONMENT TECHNOLOGY SUSTAINABILITY

---

**From:** Melissa Swanson [mailto:mswanson@ecochem.net]
**Sent:** Wednesday, September 08, 2010 8:36 AM
**To:** Craig Hutchings
**Subject:** RE: E1000866 status

Hi Craig,

I wanted to confirm we are holding the reports for dioxin and PCB cong. until we have completed all the other fractions? But you want the qualified EDD as they are completed.

Regards,
Melissa

**Melissa Swanson**
**EcoChem, Inc.**
***Project Chemist***

710 Second Ave, Suite 660, Seattle, WA 98104
DIRECT: 206.233.9332 ext. 102 • FAX: 206.233.0114
EMAIL: mswanson@ecochem.net

As Environmental Quality Assurance Specialists, EcoChem, Inc. is dedicated to developing data into reliable and accessible environmental information Through proper planning and focused QA coordination and oversight, we ensure data of known quality and usability. We prepare specific QA/QC documents
and implement data management solutions that accomplish your program needs.

Confidential - This electronic mail communication may contain privileged and confidential attorney-client information and attorney work products. If you received this electronic communication in error or are not the intended recipient, please delete this communication without using, copying, or otherwise disseminating it. Please notify sender that you received this communication in error.

---

**From:** Craig Hutchings [mailto:chutchings@integral-corp.com]
**Sent:** Tuesday, September 07, 2010 3:05 PM
**To:** Melissa Swanson
**Subject:** RE: E1000866 status

Melissa,
That's great, I wasn't expecting anything before Thursday so it is more than acceptable.
Thanks.

Craig Hutchings | Scientist
Integral Consulting Inc. | www.integral-corp.com
1205 West Bay Drive NW | Olympia, WA 98502
Tel: 360.705.3534, ext. 17 | Cell: 360.485.3679 | Fax: 360.705.3669

HEALTH ENVIRONMENT TECHNOLOGY SUSTAINABILITY

---

**From:** Melissa Swanson [mailto:mswanson@ecochem.net]
**Sent:** Tuesday, September 07, 2010 3:03 PM
**To:** Craig Hutchings
**Subject:** RE: E1000866 status

Hi Craig,

Validation of the dioxins and PCB congeners is complete. I'm hoping to complete secondary today. The qualified EDD should go out by tomorrow before noon. I have an appt this evening and cannot stay past 5, I'm not sure I can finish it before then. Is that acceptable?

Regards,
Melissa

**Melissa Swanson**
**EcoChem, Inc.**
***Project Chemist***

710 Second Ave, Suite 660, Seattle, WA 98104
DIRECT: 206.233.9332 ext. 102 · FAX: 206.233.0114
EMAIL: mswanson@ecochem.net

As Environmental Quality Assurance Specialists, EcoChem, Inc. is dedicated to developing data into reliable and accessible environmental information Through proper planning and focused QA coordination and oversight, we ensure data of known quality and usability. We prepare specific QA/QC documents
and implement data management solutions that accomplish your program needs.

Confidential - This electronic mail communication may contain privileged and confidential attorney-client information and attorney work products. If you received this electronic communication in error or are not the intended recipient, please delete this communication without using, copying, or otherwise disseminating it. Please notify sender that you received this communication in error.

---

**From:** Craig Hutchings [mailto:chutchings@integral-corp.com]
**Sent:** Tuesday, September 07, 2010 2:07 PM
**To:** Melissa Swanson
**Subject:** E1000866 status

Melissa,
Are you still on target for completing the DV of E1000866 PCDD/Fs? Can you also give me an ETA for PCB congeners? The data for the Aroclors, metals, VOCs, and SVOCs should be out of CAS tomorrow so you'll probably see it on Thursday.

Thanks.

Craig Hutchings | Scientist
Integral Consulting Inc. | www.integral-corp.com
1205 West Bay Drive NW | Olympia, WA 98502
Tel: 360.705.3534, ext. 17 | Cell: 360.485.3679 | Fax: 360.705.3669

HEALTH ENVIRONMENT TECHNOLOGY SUSTAINABILITY

## Jeremy Maute

**From:** Melissa Swanson
**Sent:** Monday, September 13, 2010 10:08 AM
**To:** Jeremy Maute
**Subject:** FW: SJWP, K1008732, Metals wipe samples, Confirm missing Hg data

Please print this an include with your worksheets.

Regards,
Melissa

**Melissa Swanson**
**EcoChem, Inc.**
***Project Chemist***

710 Second Ave, Suite 660, Seattle, WA 98104
DIRECT: 206.233.9332 ext. 102 • FAX: 206.233.0114
EMAIL: mswanson@ecochem.net

As Environmental Quality Assurance Specialists, EcoChem, Inc. is dedicated to developing data into reliable and accessible environmental information.
Through proper planning and focused QA coordination and oversight, we ensure data of known quality and usability. We prepare specific QA/QC documents
and implement data management solutions that accomplish your program needs.

Confidential - This electronic mail communication may contain privileged and confidential attorney-client information and attorney work products.
If you received this electronic communication in error or are not the intended recipient, please delete this communication without using, copying,
or otherwise disseminating it. Please notify sender that you received this communication in error.

---

**From:** Craig Hutchings [mailto:chutchings@integral-corp.com]
**Sent:** Monday, September 13, 2010 10:07 AM
**To:** Melissa Swanson
**Subject:** RE: SJWP, K1008732, Metals wipe samples, Confirm missing Hg data

Probably, but that's not CAS' fault. Just note it and review what you have.

Thanks for checking.

Craig Hutchings | Scientist
Integral Consulting Inc. | www.integral-corp.com
1205 West Bay Drive NW | Olympia, WA 98502
Tel: 360.705.3534, ext. 17 | Cell: 360.485.3679 | Fax: 360.705.3669

HEALTH ENVIRONMENT TECHNOLOGY SUSTAINABILITY

---

**From:** Melissa Swanson [mailto:mswanson@ecochem.net]
**Sent:** Monday, September 13, 2010 10:02 AM
**To:** Craig Hutchings; Greg Salata
**Subject:** FW: SJWP, K1008732, Metals wipe samples, Confirm missing Hg data

Hello all,

It has been brought to my attention that Hg was not reported with the wipe samples (see below). Was it supposed to be?

Regards,
Melissa

**Melissa Swanson**
**EcoChem, Inc.**
***Project Chemist***

710 Second Ave, Suite 660, Seattle, WA 98104
DIRECT: 206.233.9332 ext. 102 • FAX: 206.233.0114
EMAIL: mswanson@ecochem.net

As Environmental Quality Assurance Specialists, EcoChem, Inc. is dedicated to developing data into reliable and accessible environmental information.
Through proper planning and focused QA coordination and oversight, we ensure data of known quality and usability. We prepare specific QA/QC documents
and implement data management solutions that accomplish your program needs.

Confidential - This electronic mail communication may contain privileged and confidential attorney-client information and attorney work products.
If you received this electronic communication in error or are not the intended recipient, please delete this communication without using, copying,
or otherwise disseminating it. Please notify sender that you received this communication in error.

---

**From:** Jeremy Maute
**Sent:** Monday, September 13, 2010 10:01 AM
**To:** Melissa Swanson
**Subject:** SJWP, K1008732, Metals wipe samples, Confirm missing Hg data

Hi Melissa,

I noticed that there were no Hg (7471) results for the two wipe samples in SDG: K1008732. The COC notes that metals analysis should be performed on these two samples. Can you find out if the mercury results were supposed to be reported?

Thank you.

Regards,

Jeremy Maute

EcoChem, INC.
Environmental Data Quality

# DATA VALIDATION REPORT

## SAN JACINTO RIVER WASTE PITS
## Big Star Soil Sampling

**Prepared for:**

Integral Consulting, Inc.
1205 West Bay Dr. NW
Olympia, Washington 98502

**Prepared by:**

EcoChem, Inc.
710 Second Avenue, Suite 660
Seattle, Washington 98104

EcoChem Project: C22130-4

December 8, 2010

**Approved for Release**

Melissa Swanson

## Basis for Data Validation

This report summarizes the results of the validation (Stage 2A, Stage 2B, and Stage 3/4) performed on soil and quality control (QC) sample data for the San Jacinto River – Big Star Soil Sampling. A complete list of samples is provided in the **Sample Index**. Laboratory batch ID numbers and associated level of validation are provided at the beginning of each technical section

Samples were analyzed by Columbia Analytical Services, Kelso, Washington and Columbia Analytical Services, Houston, Texas. The analytical methods and EcoChem project chemists are listed below.

<table>
<tr><th>Analysis</th><th>Method of Analysis</th><th>Primary Review</th><th>Secondary Review</th></tr>
<tr><td>Volatile Organic Compounds</td><td>EPA8260B</td><td rowspan="2">D. Kerlin</td><td rowspan="3">M. Swanson</td></tr>
<tr><td>Semivolatile Organic Compounds</td><td>SW8270C</td></tr>
<tr><td>Polychlorinated Biphenyls (Aroclors)</td><td>SW8082</td><td rowspan="2">M. Brindle</td></tr>
<tr><td>Pesticides</td><td>SW8081B</td><td></td></tr>
<tr><td>Dioxin & Furan Compounds</td><td>EPA 1613B</td><td>M. Swanson</td><td>M. Brindle</td></tr>
<tr><td>Metals</td><td>ICPAES_3050B, ICPMS_3050B, SW7470A/7471A</td><td rowspan="4">J. Maute</td><td rowspan="4">M. Swanson</td></tr>
<tr><td>Cyanide</td><td>SW9012A</td></tr>
<tr><td>Total Organic Carbon</td><td>EPA9060</td></tr>
<tr><td>Total Solids</td><td>EPA160.3</td></tr>
</table>

The data were reviewed using guidance and quality control criteria documented in the analytical methods; the *Sampling and Analysis Plan: Sediment Study San Jacinto River Waste Pits Superfund Site* (Integral/AnchorQEA, April 2010); *USEPA National Functional Guidelines for Chlorinated Dioxin/Furan Data Review* (USEPA, September 2005); *National Functional Guidelines for Organic Data Review* (USEPA 1999);.and *USEPA National Functional Guidelines for Inorganic Data Review* (USEPA, October 2004).

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

Data qualifier definitions, reason codes, and validation criteria are included as **Appendix A**. The qualified data summary table is included as **Appendix B.** Data Validation Worksheets and the associated communication records will be kept on file at EcoChem, Inc. A qualified laboratory electronic data deliverable (EDD) was also submitted with this report.

Sample Index
San Jacinto Big Star Soil Sampling

| Sample ID | Kelso Lab ID | Houston Lab ID | SVOC | VOC | PCB Aroclors | Pesticides | Dioxins | Metals | Cyanide | TOC/TS |
|---|---|---|---|---|---|---|---|---|---|---|
| SL0001 | K1012914-001 | E1001239-001 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| SL0002 | K1012914-002 | E1001239-002 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| SL0003 | K1012914-003 | E1001239-003 | | | | | ✓ | | | ✓ |
| SL0004 | K1012914-004 | E1001239-004 | | | | | ✓ | | | ✓ |
| SL0005 | K1012914-005 | E1001239-005 | | | | | ✓ | | | ✓ |
| SL0006 | K1012914-006 | E1001239-006 | | | | | ✓ | | | ✓ |
| SL0007 | K1012914-007 | E1001239-007 | | | | | ✓ | | | ✓ |
| SL0008 | K1012914-008 | E1001239-008 | | | | | ✓ | | | ✓ |
| SL0009 | K1012914-009 | E1001239-009 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| SL0010 | K1012914-010 | E1001239-010 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| SL0011 | K1012914-028 | E1001239-011 | | | | | ✓ | | | ✓ |
| SL0012 | K1012914-011 | E1001239-012 | | | | | ✓ | | | ✓ |
| SL0013 | K1012914-012 | E1001239-013 | | | | | ✓ | | | ✓ |
| SL0014 | K1012914-013 | E1001239-014 | | | | | ✓ | | | ✓ |
| SL0015 | K1012914-014 | E1001239-015 | | | | | ✓ | | | ✓ |
| SL0016 | K1012914-015 | E1001239-016 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| SL0017 | K1012914-016 | E1001239-017 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| SL0018 | K1012914-017 | E1001239-018 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| SL0019 | K1012914-018 | E1001239-019 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| SL0020 | K1012914-019 | E1001239-020 | | | | | ✓ | | | ✓ |
| SL0021 | K1012914-020 | E1001240-001 | | | | | ✓ | | | ✓ |
| SL0022 | K1012914-021 | E1001240-002 | | | | | ✓ | | | ✓ |
| SL0023 | K1012914-022 | E1001240-003 | | | | | ✓ | | | ✓ |
| SL0024 | K1012914-023 | E1001240-004 | | | | | ✓ | | | ✓ |
| SL0025 | K1012914-024 | E1001240-005 | | | | | ✓ | | | ✓ |
| SL0026 | K1012914-025 | E1001240-006 | | | | | ✓ | | | ✓ |
| SL0027 | K1012914-026 | E1001240-007 | | | | | ✓ | | | ✓ |
| SL0028 | K1012914-027 | E1001240-008 | | | | | ✓ | | | ✓ |
| FW0001 | K1012914-029 | E1001240-009 | ✓ | | ✓ | ✓ | ✓ | ✓ | | |
| FW0002 | K1012914-030 | E1001240-010 | ✓ | | ✓ | ✓ | ✓ | ✓ | | |
| FW0003 | K1012914-031 | E1001240-011 | ✓ | | ✓ | ✓ | ✓ | ✓ | | |

# DATA VALIDATION REPORT
# San Jacinto Big Star Soil Sampling
# Priority Pollutant Volatile Organic Compounds by Method SW8260B

This report documents the review of analytical data from the analyses of soil samples and the associated laboratory and field quality control (QC) samples. Samples were analyzed by Columbia Analytical Services, Inc., Kelso, Washington. Refer to the **Sample Index** for a complete list of samples

| SDG | Number of Samples | Validation Level |
|---|---|---|
| K1012914 | 8 Soils | Stage 4 |

## I. DATA PACKAGE COMPLETENESS

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

## II. EDD TO HARDCOPY VERIFICATION

Ten percent (10%) of the results in the laboratory electronic data deliverable (EDD) were verified by comparison to the hardcopy laboratory data package. No errors were noted.

## III. TECHNICAL DATA VALIDATION

The quality control (QC) requirements that were reviewed are listed in the following table.

| | | | |
|---|---|---|---|
| 1 | Sample Receipt, Preservation, and Holding Times | | Laboratory Control Samples (LCS/LCSD) |
| | GC/MS Instrument Performance Check | 1 | Field Replicates |
| | Initial Calibration (ICAL) | | Internal Standards |
| | Continuing Calibration (CCAL) | | Reporting Limits |
| 2 | Laboratory Blanks | | Reported Results |
| 1 | Field (Trip) Blanks | | Compound Identification (Full validation only) |
| | Surrogate Compounds | 1 | Calculation Verification (Full validation only) |
| | Matrix Spikes/Matrix Spike Duplicates (MS/MSD) | | |

[1] ***Quality control results are discussed below, but no data were qualified.***
[2] ***Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed below.***

### Sample Receipt, Preservation, and Holding Times

As stated in validation guidance documents, sample shipping coolers should arrive at the laboratory within the advisory temperature range of 2° to 6°C. The laboratory received sample coolers with temperatures less than the lower limit, the lowest at -0.8°C. These outliers did not impact data quality; no data were qualified.

## Laboratory Blanks

To assess the impact of each blank contaminant on the reported sample results, an action level is established at five times the concentration detected in the blank (ten times for common contaminants). If a contaminant is detected in an associated field sample and the concentration is less than the action level, the result is qualified (U-7) at the reported concentration to indicate an elevation of the reporting limit. No action is taken if the sample result is greater than the action level or for non-detected results.

Method blanks were analyzed at the appropriate frequency. Methylene chloride was detected in the method blank. This analyte was qualified as not detected (U-7) in all samples.

## Field Blanks

No field blanks (filter wipes) were submitted for volatile organic analysis.

## Field Replicates

Two sets of field replicates, SL0017 & SL0018 and SL0019 & SL0020 were submitted. Field precision was acceptable.

## Calculation Verification

Calculation verifications were performed for this SDG. No calculation or transcription errors were found.

## OVERALL ASSESSMENT

As determined by this evaluation, the laboratory followed the specified analytical method. Accuracy was acceptable, as demonstrated by the surrogate, laboratory control sample/laboratory control sample duplicate (LCS/LCSD) and matrix spike/matrix spike duplicate (MS/MSD) percent recovery (%R) values. Precision was also acceptable as demonstrated by the LCS/LCSD, MS/MSD, and field replicate relative percent difference (RPD) values.

Data were qualified as not detected based on method blank contamination.

All data, as qualified, are acceptable for use.

# DATA VALIDATION REPORT
# San Jacinto Big Star Soil Sampling
# Priority Pollutant Semivolatile Organic Compounds
# by Method SW8270C

This report documents the review of analytical data from the analysis of soil samples and the associated laboratory and field quality control (QC) samples. Samples were analyzed by Columbia Analytical Services, Inc., Kelso, Washington. Refer to the **Sample Index** for a complete list of samples.

| SDG | Number of Samples | Validation Level |
|---|---|---|
| K1012914 | 8 Soil<br>3 Filter Wipes | Stage 4<br>Stage 2A |

## I. DATA PACKAGE COMPLETENESS

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

## II. EDD TO HARDCOPY VERIFICATION

Ten percent (10%) of the results in the laboratory EDD were verified by comparison to the hardcopy laboratory data package. No errors were noted.

## III. TECHNICAL DATA VALIDATION

The QC requirements that were reviewed are listed below.

| | | | |
|---|---|---|---|
| 1 | Sample Receipt, Preservation, and Holding Times | 1 | Laboratory Control Samples (LCS/LCSD) |
| | GC/MS Instrument Performance Check | 1 | Field Replicates |
| | Initial Calibration (ICAL) | | Internal Standards |
| | Continuing Calibration (CCAL) | | Target Analyte List |
| 1 | Laboratory Blanks | 1 | Reporting Limits (MDL and MRL) |
| 2 | Field Blanks | 2 | Compound Identification |
| 2 | Surrogate Compounds | | Reported Results |
| | Matrix Spikes/Matrix Spike Duplicates (MS/MSD) | 1 | Calculation Verification (Full validation only) |

[1] ***Quality control results are discussed below, but no data were qualified.***
[2] ***Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed below.***

### Sample Receipt, Preservation, and Holding Times

As stated in validation guidance documents, sample shipping coolers should arrive at the laboratory within the advisory temperature range of 2° to 6°C. The laboratory received sample

coolers with temperatures less than the lower limit, the lowest at -0.8°C. These outliers did not impact data quality; no data were qualified.

## Laboratory Blanks

To assess the impact of each blank contaminant on the reported sample results, an action level is established at five times the concentration detected in the blank (ten times for common contaminants). If a contaminant is detected in an associated field sample and the concentration is less than the action level, the result is qualified (U-7) at the reported concentration to indicate an elevation of the reporting limit. No action is taken if the sample result is greater than the action level or for non-detected results.

Method blanks were analyzed at the appropriate frequency. Phenol was detected in the method blanks; however all results were not detected, no data were qualified.

## Field Blanks

Laboratory blanks are used to evaluate all associated field blanks. The field blanks for this project are filter wipe samples. Sample FW0003 was a master filter wipe blank; it was used to evaluate all other filter wipe blanks. Any remaining positive results in other field blanks are then used to evaluate all associated samples. To evaluate the effect on the sample data, action levels of five times the blank concentrations (ten times for common contaminants) were established.

Two filter wipes, FW0001 and FW0002, were associated with field samples. Based on contamination reported in the master filter wipe FW0003, diethyl phthalate and di-n-butyl phthalate were qualified as not detected (U-6) in filter wipes FW0001 and FW0002. No positive results remained after qualifiers based on the master wipe blank contamination were issued.

## Surrogate Compounds

The percent recovery (%R) values phenol-d6 and 2,4,6-tribromophenol were less than 10% in Sample FW0002. The associated acid fraction results were not detected and were rejected (R-13) in this sample.

## Laboratory Control Samples

The laboratory control sample/laboratory control sample duplicate (LCS/LCSD) relative percent difference (RPD) value for 2,4-dinitrophenol was greater than the control limit. This analyte was not detected in the associated samples; no data were qualified.

## Field Replicates

Two sets of field replicates, SL0017 & SL0018 and SL0019 & SL0020, were submitted. The RPD value for di-n-octyl phthalate was greater than the control limit for the pair SL0017 &

SL0018; all other field precision was acceptable. No data were qualified based on field replicate precision outliers. Data users should consider the impact of field precision outliers on the reported results.

## Reporting Limits

Samples SL0002, SL0017, SL0018, SL0019, and SL0020 were analyzed a dilution (10x) due to matrix interference due to non target background interference. The reporting limits were elevated accordingly.

## Compound Identification

The laboratory reported benzidine as a tentatively identified compound; it was not included in the calibration standards and could not be calibrated for quantitatively. All the benzidine results were not detected, the detection limits were rejected (R-4).

## Calculation Verification

Calculation verifications were performed for this SDG. No calculation or transcription errors were found.

## OVERALL ASSESSMENT

As determined by this evaluation, the laboratory followed the specified analytical method. With the exceptions noted above, accuracy was acceptable, as demonstrated by the surrogate, matrix spike/matrix spike duplicate (MS/MSD), and LCS/LCSD %R values. With the exceptions noted above, precision was also acceptable as demonstrated by the MS/MSD, LCS/LCSD, and field replicate RPD values.

Data were qualified as not detected based on field blank contamination.

Data were rejected due to surrogate recovery outliers, and compound identification. Data that has been rejected should not be used for any reason.

All other data, as qualified, are acceptable for use.

# DATA VALIDATION REPORT
# San Jacinto Big Star Soil Sampling
# Priority Pollutant PCB Aroclors by Method SW8082

This report documents the review of analytical data from the analysis of soil samples and the associated laboratory quality control (QC) samples. Samples were analyzed by Columbia Analytical Services, Kelso, Washington. Refer to the **Sample Index** for a complete list of samples.

| SDG | Number of Samples | Validation Level |
|---|---|---|
| K1012914 | 8 Soil<br>3 Wipes | Stage 4<br>Stage 2A |

## I. DATA PACKAGE COMPLETENESS

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

## II. EDD TO HARDCOPY VERIFICATION

Ten percent (10%) of the results in the laboratory EDD were verified by comparison to the hardcopy laboratory data package. No errors were noted.

## III. TECHNICAL DATA VALIDATION

The QC requirements that were reviewed are listed in the following table

| | | | |
|---|---|---|---|
| 1 | Sample Receipt, Preservation, and Holding Times | | Matrix Spikes/Matrix Spike Duplicate (MS/MSD) |
| | Initial Calibration (ICAL) | 1 | Field Replicates |
| | Continuing Calibration (CCAL) | | Reporting Limits |
| | Laboratory Blanks | 1 | Compound Identification |
| 1 | Field Blanks | | Reported Results |
| 2 | Surrogate Compounds | 1 | Calculation Verification (Full Validation only) |
| | Laboratory Control Samples (LCS/LCSD) | | |

[1] ***Quality control results are discussed below, but no data were qualified.***
[2] ***Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed below.***

### Sample Receipt, Preservation, and Holding Times

As stated in validation guidance documents, sample shipping coolers should arrive at the laboratory within the advisory temperature range of 2° to 6°C. The laboratory received sample coolers with temperatures less than the lower limit, the lowest at -0.8°C. These outliers did not impact data quality; no data were qualified.

## Field Blanks

Laboratory blanks are used to evaluate all associated field blanks. The field blanks for this project are filter wipe samples. Three filter wipes, FW0001, FW0002, and FW0003, were submitted. No target analytes were detected in these blanks.

## Surrogate Compounds

The percent recovery (%R) value for decachlorobiphenyl in Sample SL0009 was less than the lower control limit, at 59%. No target analytes were detected in this sample, results were estimated (UJ-13).

## Field Replicates

Two sets of field replicates, SL0017 & SL0018 and SL0019 & SL0020, were submitted. No target analytes were detected; field precision was acceptable.

## Compound Identification

The reported compound identifications were verified by using the quantitation reports (comparing the reported concentrations for each congener used for Aroclor identification), and also by comparing the patterns in the sample chromatogram to the patterns in the standard chromatogram. All compound identifications were acceptable.

## Calculation Verification

Calculation verifications were performed for this SDG. No calculation or transcription errors were found.

# IV. OVERALL ASSESSMENT

As determined by this evaluation, the laboratory followed the specified analytical method. With the exceptions noted above, accuracy was acceptable, as demonstrated by the surrogate, laboratory control sample/laboratory control sample duplicate (LCS/LCSD), and matrix spike/matrix spike duplicate (MS/MSD) %R values. Precision was also acceptable as demonstrated by the LCS/LCSD, MS/MSD, and field replicate relative percent difference (RPD) values.

Data were qualified based on a surrogate recovery outlier.

All data, as qualified, are acceptable for use.

# DATA VALIDATION REPORT
# San Jacinto Big Star Soil Sampling
# Priority Pollutant Pesticides by Method SW8081A

This report documents the review of analytical data from the analysis of soil samples and the associated laboratory quality control (QC) samples. Samples were analyzed by Columbia Analytical Services, Kelso, Washington. Refer to the **Sample Index** for a complete list of samples.

| SDG | Number of Samples | Validation Level |
|---|---|---|
| K1012914 | 8 Soil<br>3 Wipes | Stage 4<br>Stage 2A |

## I. DATA PACKAGE COMPLETENESS

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

## II. EDD TO HARDCOPY VERIFICATION

Ten percent (10%) of the results in the laboratory EDD were verified by comparison to the hardcopy laboratory data package. No errors were noted.

## III. TECHNICAL DATA VALIDATION

The QC requirements that were reviewed are listed in the following table

| | | | |
|---|---|---|---|
| 1 | Sample Receipt, Preservation, and Holding Times | 1 | Laboratory Control Samples (LCS/LCSD) |
| | Initial Calibration (ICAL) | | Matrix Spikes/Matrix Spike Duplicate (MS/MSD) |
| | Continuing Calibration (CCAL) | 1 | Field Replicates |
| | Instrument Performance | | Reporting Limits |
| | Laboratory Blanks | 2 | Compound Identification |
| 1 | Field Blanks | | Reported Results |
| | Surrogate Compounds | 1 | Calculation Verification (Full Validation only) |

[1] ***Quality control results are discussed below, but no data were qualified.***
[2] ***Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed below.***

### Sample Receipt, Preservation, and Holding Times

As stated in validation guidance documents, sample shipping coolers should arrive at the laboratory within the advisory temperature range of 2° to 6°C. The laboratory received sample coolers with temperatures less than the lower limit, the lowest at -0.8°C. These outliers did not impact data quality; no data were qualified.

## Field Blanks

Laboratory blanks are used to evaluate all associated field blanks. The field blanks for this project are filter wipe samples. Three filter wipes, FW0001, FW0002, and FW0003, were submitted. No target analytes were detected in these blanks.

## Laboratory Control Samples

The relative percent difference (RPD) values for alpha-BHC, gamma-BHC, heptachlor, and aldrin were greater than the control limit in the laboratory control sample/laboratory control sample duplicate (LCS/LCSD) associated with the filter wipe samples. These analytes were not detected in the associated samples; no data were qualified.

## Field Replicates

Two sets of field replicates, SL0017 & SL0018 and SL0019 & SL0020, were submitted. Field precision was acceptable.

## Compound Identification

The results from the two analytical columns were compared for agreement. In cases where the RPD value between the two columns was greater than 40%, the reported result was "P" flagged by the laboratory. Because the elevated RPD value may indicate the presence of an interferent, resulting in a high bias, if the RPD value is greater than 25% but less than 60%, the reported value is estimated (J-3). If the RPD value is greater than 60%, the result is qualified as a tentative identification (NJ-3). Two results for 4,4'-DDT were estimated (J-3) and three results for 4,4'-DDT were tentatively identified (NJ-3).

## Calculation Verification

Calculation verifications were performed for this SDG. No calculation or transcription errors were found.

# IV. OVERALL ASSESSMENT

As determined by this evaluation, the laboratory followed the specified analytical method. Accuracy was acceptable, as demonstrated by the surrogate, matrix spike/matrix spike duplicate (MS/MSD), and LCS/LCSD percent recovery (%R) values. With the exceptions noted above, precision was also acceptable as demonstrated by the MS/MSD, LCS/LCSD, and field replicate RPD values.

Data were estimated or tentatively identified because confirmation criteria were not met.

All data, as qualified, are acceptable for use.

# DATA VALIDATION REPORT
# San Jacinto Big Star Soil Sampling
# Dioxin/Furan Compounds by EPA 1613B

This report documents the review of analytical data from the analyses of soil samples and the associated laboratory quality control (QC) samples. Columbia Analytical Services, Houston, Texas, analyzed the samples. Refer to the **Sample Index** for a complete list of samples.

| SDG | Number of Samples | Validation Level |
|---|---|---|
| E1001239 | 20 Soil | EPA Stage 2B |
| E1001240 | 8 Soil<br>3 Filter Wipes | EPA Stage 4<br>Stage 2A |

## I. DATA PACKAGE COMPLETENESS

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

## II. EDD TO HARDCOPY VERIFICATION

Ten percent (10%) of the results in the laboratory EDD were verified by comparison to the hardcopy laboratory data package. No errors were noted.

## III. TECHNICAL DATA VALIDATION

The QC requirements that were reviewed are listed in the following table.

| | | | |
|---|---|---|---|
| 1 | Sample Receipt, Preservation, and Holding Times | 1 | Matrix Spike/Matrix Spike Duplicate (MS/MSD) |
| | GC/MS Instrument Performance Check | 2 | Laboratory Control Samples (LCS/LCSD) |
| | Initial Calibration (ICAL) | | Reference Material (RM) |
| | Calibration Verification (CVER) | 1 | Field Replicates |
| | Isomer Specificity | | Target Analyte List |
| 1 | Laboratory Blanks | 2 | Reported Results |
| 1 | Field Blanks | 2 | Compound Identification |
| | Labeled Compound Recovery | 1 | Calculation Verification (EPA Stage 4 only) |

[1] ***Quality control results are discussed below, but no data were qualified.***
[2] ***Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed below.***

## Sample Receipt, Preservation, and Holding Times

As stated in validation guidance documents, sample shipping coolers should arrive at the laboratory within the advisory temperature range of 2° to 6°C. The laboratory received a sample cooler with a temperature less than the lower limit, at 1°C. This outlier did not impact data quality; no data were qualified.

## Laboratory Blanks

To assess the impact of each blank contaminant on the reported sample results, an action level is established at five times the concentration detected in the blank. If a contaminant is detected in an associated field sample and the concentration is less than the action level, the result is qualified (U-7) at the reported concentration to indicate an elevation of the reporting limit. No action is taken if the sample result is greater than the action level or for non-detected results.

The laboratory assigned "K" flags to values when a peak was detected but did not meet identification criteria. These values cannot be considered as positive identifications, but are "estimated maximum possible concentrations". When these occurred in the method blank the results were considered false positives. No action levels were established for these analytes.

Method blanks were analyzed at the appropriate frequency. Contaminant levels, associated samples, and action levels are documented in the data validation worksheets. Various target analytes were detected in the method blanks; however, no data were qualified.

## Field Blanks

Laboratory blanks are used to evaluate all associated field blanks. The field blanks for this project are filter wipe samples. Sample FW0003 was a master filter wipe blank; it was used to evaluate all other filter wipe blanks. Any remaining positive results in other field blanks are then used to evaluate all associated samples. To evaluate the effect on the sample data, action levels of five times the blank concentrations were established.

***SDG E1001240:*** Three filter wipe blanks, FW0001, FW0002, and FW0003, were submitted with this SDG. No target analytes were detected in these blanks.

## Matrix Spike/Matrix Spike Duplicate

Matrix spike/matrix spike duplicate (MS/MSD) samples were not analyzed. Accuracy and precision were evaluated using the laboratory control sample/laboratory control sample duplicate (LCS/LCSD).

## Laboratory Control Samples

***SDG E1001240:*** The LCS/LCSD percent recovery (%R) values for 1,2,3,4,6,7,8-HpCDF were greater than the upper control limit for extraction batch 123876. Associated results were estimated (J-10).

## Field Replicates

Two-tiered acceptance criteria were used to evaluate precision. For results greater than five times (5x) the reporting limit (RL), the control limit for the relative percent difference (RPD) or relative standard deviation (RSD) is 50%. For results less than 5x the RL, the absolute difference between the sample and replicate must be less than two times (2x) the RL. No data were qualified based on field replicate precision outliers. Users of the data should consider the impact of field precision outliers on the reported results.

***SDG E1001239:*** Two sets of field replicates were submitted, SL0017 & SL0018 and SL0019 & SL0020. All field precision criteria were met.

## Reported Results

Reported concentrations for several compounds were greater than the calibrated linear range of the instrument; the laboratory flagged these results with an "E". Affected sample extracts were diluted and re-analyzed; both sets of data were reported and reviewed. The results for these compounds from the original analyses were qualified as do-not-report (DNR-20) and should be reported from the diluted analyses. All other results in the diluted analyses were qualified (DNR-11) and the original results should be reported. Affected samples are listed below.

***SDG E1001239:*** The result for OCDD exceeded the calibrated range in Samples SL0019 and SL0020. These samples were diluted (10x) and re-analyzed.

***SDG E1001240:*** The result for OCDD exceeded the calibrated range in Samples SL0021, SL0022, SL0025, and SL0028. These samples were diluted (10x) and re-analyzed.

## Compound Identification

The laboratory assigned "K" flags to results where a peak was detected but did not meet ion ratio criteria. The reported values cannot be considered positive identifications for these analytes. These results were considered potential false positives or estimated maximum possible concentrations (EMPC) and were qualified as not detected (U-22) at the reported values. Laboratory blank values flagged "K" were considered non-detects.

All positive results for 2,3,7,8-TCDF were confirmed on a DB-225 column as required by the method. The 2,3,7,8-TCDF results from the DB-5 column were qualified do-not-report (DNR-11) in favor of the results from the DB-225 column.

### Calculation Verification

***SDG E1001240:*** Calculation verifications were performed for this SDG. No calculation or transcription errors were found.

## IV. OVERALL ASSESSMENT

As determined by this evaluation, the laboratory followed the specified analytical method. With the exception noted above, accuracy was acceptable, as demonstrated by labeled compound and LCS/LCSD %R values. Precision was also acceptable as demonstrated by the LCS/LCSD and field replicate RPD values.

Data were qualified as not detected due to ion ratio outliers. Data were estimated based on LCS/LCSD %R outliers.

Data were flagged do-not-report (DNR) due to linear calibration range outliers and to indicate which result (from multiple reported analyses) should not be used. Data that has been flagged DNR should not be used for any purpose.

All other data, as qualified, are acceptable for use.

# DATA VALIDATION REPORT
# San Jacinto Big Star Soil Sampling
# Priority Pollutant Metals by Methods SW6010B, SW6020A, SW7470A, and SW7471A

This report documents the review of analytical data from the analyses of soil samples and the associated laboratory quality control (QC) samples. Columbia Analytical Services, Houston, Texas, analyzed the samples. Refer to the **Sample Index** for a complete list of samples.

| SDG | Number of Samples | Validation Level |
|---|---|---|
| K1012914 | 8 Soil<br>3 Wipes | Stage 3<br>Stage 2A |

## I. DATA PACKAGE COMPLETENESS

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

## I. EDD TO HARDCOPY VERIFICATION

Ten percent (10%) of the results in the laboratory EDD were verified by comparison to the hardcopy laboratory data package. No errors were noted.

## III. TECHNICAL DATA VALIDATION

The QC requirements that were reviewed are listed below.

| | | | |
|---|---|---|---|
| 1 | Sample Receipt, Preservation, and Holding Times | | Matrix Spike Samples |
| | Initial Calibration | | Laboratory Duplicates |
| | Continuing Calibration Verification | 1 | Field Replicates |
| 2 | CRDL Standards | | Interference Check Samples |
| 2 | Laboratory Blanks | | Serial Dilutions |
| 2 | Field Blanks | | ICP-MS Internal Standards |
| | Laboratory Control Samples (LCS/LCSD) | | Reporting Limits (MDL and MRL) |
| 1 | Reference Materials | 1 | Calculation Verification (Stage 3 only) |

[1] ***Quality control results are discussed below, but no data were qualified***
[2] ***Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed below.***

## Sample Receipt, Preservation, and Holding Times

As stated in validation guidance documents, sample shipping coolers should arrive at the laboratory within the advisory temperature range of 2° to 6°C. The laboratory received sample coolers with temperatures less than the lower limit, the lowest at -0.8°C. These outliers did not impact data quality; no data were qualified.

## CRDL Standards

Contract required detection limit (CRDL) standards were analyzed at the beginning of each analytical sequence. Percent recovery (%R) values were less than the lower control limit of 70% for arsenic, cadmium and chromium, at 45%, 52%, and 60%, respectively. Results for these analytes that are less than twice (<2x) the reporting limit (RL) were estimated (J-14) to indicate a possible low bias.

## Laboratory Blanks

To assess the impact of each blank contaminant on the reported sample results, an action level is established at five times the concentration detected in the blank. If a contaminant is detected in an associated field sample and the concentration is less than the action level, the result is qualified (U-7) at the reported concentration to indicate an elevation of the reporting limit. No action is taken if the sample result is greater than the action level or for non-detected results.

Several analytes were found at levels less than the negative MDL in some instrument blanks. Action levels of five times the absolute value of the blank concentrations were established for negative blanks. Results less than the action levels in the associated samples were estimated (J/UJ-7) to indicate a potential low bias.

Positive results for target analytes were reported in the method and instrument blanks. Beryllium (3 results), cadmium (2 results), and silver (5 results) were qualified as not detected (U-7) in associated samples.

## Field Blanks

Laboratory blanks are used to evaluate all associated field blanks. The field blanks for this project are filter wipe samples. Sample FW0003 was a master filter wipe blank; it was used to evaluate all other filter wipe blanks. Any remaining positive results in other field blanks are then used to evaluate all associated samples. To evaluate the effect on the sample data, action levels of five times the blank concentrations were established.

Two filter wipes, FW0001 and FW0002, were associated with field samples. Based on contamination reported in the master filter wipe FW0003, arsenic, chromium, copper, thallium, and zinc were qualified as not detected (U-6) in filter wipes FW0001 and FW0002. Positive

results for nickel remained in filter wipes FW0001 and FW0002 and for mercury in filter wipe FW0001. Because associated results were detected at levels greater than the action levels, no field sample results were qualified based on filter wipe blank contamination.

### Reference Materials

The certified reference material (CRM) ERA lot number D065540 was analyzed with the soil samples. All recoveries were within the certified acceptance ranges.

### Field Replicates

Two sets of field replicates, SL0017 & SL0018, and SL0019 & SL0020, were submitted. Field precision was acceptable.

### Calculation Verification

Several results were verified by recalculation from the raw data. No calculation or transcription errors were noted.

## IV. OVERALL ASSESSMENT

As determined by this evaluation, the laboratory followed the specified analytical methods. Accuracy was acceptable, as demonstrated by the laboratory control sample/laboratory control sample duplicate (LCS/LCSD) and matrix spike (MS) %R values. Precision was also acceptable as demonstrated by the LCS/LCSD, laboratory duplicate, and field replicate relative percent difference (RPD) values.

Data were estimated and/or detection limits were elevated based on laboratory and field blank results. Data were also estimated based on CRDL %R outliers

All data, as qualified, are acceptable for use.

# DATA VALIDATION REPORT
# San Jacinto Big Star Soil Sampling
# Conventional Parameters

This report documents the review of analytical data from the analysis of sediment samples and the associated laboratory quality control (QC) samples. Columbia Analytical Services, Kelso, Washington, analyzed the samples. Refer to the **Sample Index** for a complete list of samples.

| SDG | Number of Samples | Validation Level |
|---|---|---|
| K1012914 | 8 Sediment<br>28 Sediment | Stage 3 Cyanide<br>Stage 2B TOC & Total Solids |

The analytical tests that were performed are summarized below.

| Parameter | Method |
|---|---|
| Total Organic Carbon (TOC) | SW9060 |
| Total Cyanide | EPA 9012A |
| Total Solids | EPA 160.3 |

## I. DATA PACKAGE COMPLETENESS

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

## II. EDD TO HARDCOPY VERIFICATION

Ten percent (10%) of the results in the laboratory EDD were verified by comparison to the hardcopy laboratory data package. No errors were noted.

## III. TECHNICAL DATA VALIDATION

The QC requirements that were reviewed are listed in the following table.

| | | | |
|---|---|---|---|
| 1 | Sample Receipt, Preservation, and Holding Times | | Matrix Spikes (MS) and Matrix Spike Duplicates (MSD) |
| | Initial Calibration | | Laboratory Duplicates |
| | Calibration Verification | 1 | Field Replicates |
| | Laboratory Blanks | | Reporting Limits |
| | Laboratory Control Samples (LCS) | 1 | Calculation Verification |

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

## Sample Receipt, Preservation, and Holding Times

As stated in validation guidance documents, sample shipping coolers should arrive at the laboratory within the advisory temperature range of 2° to 6°C. The laboratory received sample coolers with temperatures less than the lower limit, the lowest at -0.8°C. These outliers did not impact data quality; no data were qualified.

## Field Replicates

Two sets of field replicates, SL0017 & SL0018 and SL0019 & SL0020, were submitted. The relative percent difference (RPD) value for cyanide was greater than the control limit for the pair SL0019 & SL0020; all other field precision was acceptable. No data were qualified based on field replicate precision outliers. Data users should consider the impact of field precision outliers on the reported results.

## Calculation Verification

Several cyanide analysis results were verified by recalculation from the raw data. No calculation or transcription errors were noted.

# IV. OVERALL ASSESSMENT

As determined by this evaluation, the laboratory followed the specified analytical methods. Accuracy was acceptable as demonstrated by the matrix spike/matrix spike duplicate (MS/MSD), and laboratory control sample (LCS) percent recovery (%R) values. Precision was also acceptable as demonstrated by the laboratory duplicate and field replicate RPD values.

No data were qualified for any reason.

All data, as reported, are acceptable for use.

EcoChem, INC.
Environmental Data Quality

# APPENDIX A

# DATA QUALIFIER DEFINITIONS, REASON CODES, AND CRITERIA TABLES

# DATA VALIDATION QUALIFIER CODES
# Based on National Functional Guidelines

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

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

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

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

# DATA QUALIFIER REASON CODES

| | |
|---|---|
| 1 | Holding Time/Sample Preservation |
| 2 | Chromatographic pattern in sample does not match pattern of calibration standard. |
| 3 | Compound Confirmation |
| 4 | Tentatively Identified Compound (TIC) (associated with NJ only) |
| 5A | Calibration (initial) |
| 5B | Calibration (continuing) |
| 6 | Field Blank Contamination |
| 7 | Lab Blank Contamination (e.g., method blank, instrument, etc.) |
| 8 | Matrix Spike(MS & MSD) Recoveries |
| 9 | Precision (all replicates) |
| 10 | Laboratory Control Sample Recoveries |
| 11 | A more appropriate result is reported (associated with “R” and “DNR” only) |
| 12 | Reference Material |
| 13 | Surrogate Spike Recoveries (a.k.a., labeled compounds & recovery standards) |
| 14 | Other (define in validation report) |
| 15 | GFAA Post Digestion Spike Recoveries |
| 16 | ICP Serial Dilution % Difference |
| 17 | ICP Interference Check Standard Recovery |
| 18 | Trip Blank Contamination |
| 19 | Internal Standard Performance (e.g., area, retention time, recovery) |
| 20 | Linear Range Exceeded |
| 21 | Potential False Positives |
| 22 | Elevated Detection Limit Due to Interference (i.e., laboratory, chemical and/or matrix) |

# EcoChem Validation Guidelines for Volatile Analysis by GC/MS (Based on Organic NFG 1999)

| VALIDATION QC ELEMENT | ACCEPTANCE CRITERIA | ACTION | REASON CODE |
|---|---|---|---|
| Cooler Temperature | 4°C±2°C<br>Water: HCl to pH < 2 | J(+)/UJ(-) if greater than 6 deg. C (EcoChem PJ) | 1 |
| Hold Time | Waters: 14 days preserved<br>7 Days: unpreserved (for aromatics)<br><br>Solids: 14 Days | J(+)/UJ(-) if hold times exceeded<br>If exceeded by > 3X HT: J(+)/R(-) (EcoChem PJ) | 1 |
| Tuning | BFB<br>Beginning of each 12 hour period<br>Method acceptance criteria | R(+/-) all analytes in all samples associated with the tune | 5A |
| Initial Calibration (Minimum 5 stds.) | RRF > 0.05 | (EcoChem PJ, see TM-06)<br>If MDL= reporting limit:<br>J(+)/R(-) if RRF < 0.05<br><br>If reporting limit > MDL:<br>note in worksheet if RRF <0.05 | 5A |
| | %RSD < 30% | (EcoChem PJ, see TM-06)<br>J(+) if %RSD > 30% | 5A |
| Continuing Calibration (Prior to each 12 hr. shift) | RRF > 0.05 | (EcoChem PJ, see TM-06)<br>If MDL= reporting limit:<br>J(+)/R(-) if RRF < 0.05<br><br>If reporting limit > MDL:<br>note in worksheet if RRF <0.05 | 5B |
| | %D <25% | (EcoChem PJ, see TM-06)<br>If > +/-90%: J+/R-<br>If -90% to -26%: J+ (high bias)<br>If 26% to 90%: J+/UJ- (low bias) | 5B |
| Method Blank | One per matrix per batch<br>No results > CRQL | U(+) if sample (+) result is less than CRQL and less than appropriate 5X or 10X rule (raise sample value to CRQL) | 7 |
| | | U(+) if sample (+) result is greater than or equal to CRQL and less than appropriate 5X and 10X rule (at reported sample value) | 7 |
| | No TICs present | R(+) TICs using 10X rule | 7 |
| Storage Blank | One per SDG<br><CRQL | U(+) the specific analyte(s) results in all assoc.samples using the 5x or 10x rule | 7 |
| Trip Blank | Frequency as per project QAPP | Same as method blank for positive results remaining in trip blank after method blank qualifiers are assigned | 18 |
| Field Blanks (if required in QAPP) | No results > CRQL | Apply 5X/10X rule; U(+) < action level | 6 |



Copyright 2005 EcoChem, Inc.

# EcoChem Validation Guidelines for Volatile Analysis by GC/MS (Based on Organic NFG 1999)

| VALIDATION QC ELEMENT | ACCEPTANCE CRITERIA | ACTION | REASON CODE |
|---|---|---|---|
| MS/MSD (recovery) | One per matrix per batch<br>Use method acceptance criteria | Qualify parent only unless other QC indicates systematic problems:<br>J(+) if both %R > UCL<br>J(+)/UJ(-) if both %R < LCL<br>J(+)/R(-) if both %R < 10%<br>PJ if only one %R outlier | 8 |
| MS/MSD (RPD) | One per matrix per batch<br>Use method acceptance criteria | J(+) in parent sample if RPD > CL | 9 |
| LCS<br>*low conc. H2O VOA* | One per lab batch<br>Within method control limits | J(+) assoc. cmpd if > UCL<br>J(+)/R(-) assoc. cmpd if < LCL<br>J(+)/R(-) all cmpds if half are < LCL | 10 |
| LCS<br>*regular VOA (H2O & solid)* | One per lab batch<br>Lab or method control limits | J(+) if %R > UCL J(+)/UJ(-) if %R <LCL<br>J(+)/R(-) if %R < 10% (EcoChem PJ) | 10 |
| LCS/LCSD<br>*(if required)* | One set per matrix and batch of 20 samples<br>RPD < 35% | J(+)/UJ(-) assoc. cmpd. in all samples | 9 |
| Surrogates | Added to all samples<br>Within method control limits | J(+) if %R >UCL<br>J(+)/UJ(-) if %R <LCL but >10% (see PJ[1])<br>J(+)/R(-) if <10% | 13 |
| Internal Standard (IS) | Added to all samples<br>Acceptable Range: IS area 50% to 200% of CCAL area<br>RT within 30 seconds of CC RT | J(+) if > 200%<br>J(+)/UJ(-) if < 50%<br>J(+)/R(-) if < 25%<br>RT>30 seconds, narrate and Notify PM | 19 |
| Field Duplicates | Use QAPP limits. If no QAPP:<br>Solids: RPD <50%<br>OR absolute diff. < 2X RL (for results < 5X RL)<br><br>Aqueous: RPD <35%<br>OR absolute diff. < 1X RL (for results < 5X RL) | Narrate and qualify if required by project<br>(EcoChem PJ) | 9 |
| TICs | Major ions (>10%) in reference must be present in sample; intensities agree within 20%; check identification | NJ the TIC unless:<br>R(+) common laboratory contaminants<br>See Technical Director for ID issues | 4 |
| Quantitation/ Identification | RRT within 0.06 of standard RRT<br>Ion relative intensity within 20% of standard<br>All ions in std. at > 10% intensity must be present in sample | See Technical Director if outliers | 14<br>21 (false +) |

**PJ[1]** No action if there are 4+ surrogates and only 1 outlier.



Copyright 2005 EcoChem, Inc.

# EcoChem Validation Guidelines for Semivolatile Analysis by GC/MS (Based on Organic NFG 1999)

| VALIDATION QC ELEMENT | ACCEPTANCE CRITERIA | ACTION | REASON CODE |
|---|---|---|---|
| Cooler Temperature | 4°C ±2° | J(+)/UJ(-) if greater than 6 deg. C (EcoChem PJ) | 1 |
| Holding Time | Water: 7 days from collection<br>Soil: 14 days from collection<br>Analysis: 40 days from extraction | Water:<br>J(+)/UJ(-) if ext. > 7 and < 21 days<br>J(+)/R(-) if ext > 21 days (EcoChem PJ)<br>Solids/Wastes:<br>J(+)/UJ(-) if ext. > 14 and < 42 days<br>J(+)/R(-) if ext. > 42 days (EcoChem PJ)<br><br>J(+)/UJ(-) if analysis >40 days | 1 |
| Tuning | DFTPP<br>Beginning of each 12 hour period<br>Method acceptance criteria | R(+/-) all analytes in all samples associated with the tune | 5A |
| Initial Calibration (Minimum 5 stds.) | RRF > 0.05 | (EcoChem PJ, see TM-06)<br>If MDL= reporting limit:<br>J(+)/R(-) if RRF < 0.05<br><br>If reporting limit > MDL:<br>note in worksheet if RRF <0.05 | 5A |
| | %RSD < 30% | (EcoChem PJ, see TM-06)<br>J(+) if %RSD > 30% | 5A |
| Continuing Calibration (Prior to each 12 hr. shift) | RRF > 0.05 | (EcoChem PJ, see TM-06)<br>If MDL= reporting limit:<br>J(+)/R(-) if RRF < 0.05<br><br>If reporting limit > MDL:<br>note in worksheet if RRF <0.05 | 5B |
| | %D <25% | (EcoChem PJ, see TM-06)<br>If > +/-90%: J+/R-<br>If -90% to -26%: J+ (high bias)<br>If 26% to 90%: J+/UJ- (low bias) | 5B |
| Method Blank | One per matrix per batch<br>No results > CRQL | U(+) if sample (+) result is less than CRQL and less than appropriate 5X or 10X rule (raise sample value to CRQL) | 7 |
| | | U(+) if sample (+) result is greater than or equal to CRQL and less than appropriate 5X and 10X rule (at reported sample value) | 7 |
| | No TICs present | R(+) TICs using 10X rule | 7 |
| Field Blanks (Not Required) | No results > CRQL | Apply 5X/10X rule; U(+) < action level | 6 |



Copyright 2005 EcoChem, Inc.

# EcoChem Validation Guidelines for Semivolatile Analysis by GC/MS (Based on Organic NFG 1999)

| VALIDATION QC ELEMENT | ACCEPTANCE CRITERIA | ACTION | REASON CODE |
|---|---|---|---|
| MS/MSD (recovery) | One per matrix per batch<br>Use method acceptance criteria | Qualify parent only unless other QC indicates systematic problems:<br>J(+) if both %R > UCL<br>J(+)/UJ(-) if both %R < LCL<br>J(+)/R(-) if both %R < 10%<br>PJ if only one %R outlier | 8 |
| MS/MSD (RPD) | One per matrix per batch<br>Use method acceptance criteria | J(+) in parent sample if RPD > CL | 9 |
| LCS<br>low conc. H2O SVOA | One per lab batch<br>Within method control limits | J(+) assoc. cmpd if > UCL<br>J(+)/R(-) assoc. cmpd if < LCL<br>J(+)/R(-) all cmpds if half are < LCL | 10 |
| LCS<br>regular SVOA (H2O & solid) | One per lab batch<br>Lab or method control limits | J(+) if %R > UCL J(+)/UJ(-) if %R <LCL<br>J(+)/R(-) if %R < 10% (EcoChem PJ) | 10 |
| LCS/LCSD<br>*(if required)* | One set per matrix and batch of 20 samples<br>RPD < 35% | J(+)/UJ(-) assoc. cmpd. in all samples | 9 |
| Surrogates | Minimum of 3 acid and 3 base/neutral compounds<br>Use method acceptance criteria | Do not qualify if only 1 acid and/or 1 B/N surrogate is out unless <10%<br>J(+) if %R > UCL J(+)/UJ(-) if %R < LCL<br>J(+)/R(-) if %R < 10% | 13 |
| Internal Standards | Added to all samples<br>Acceptable Range: IS area 50% to 200% of CCAL area<br>RT within 30 seconds of CC RT | J(+) if > 200%<br>J(+)/UJ(-) if < 50%<br>J(+)/R(-) if < 25%<br>RT>30 seconds, narrate and Notify PM | 19 |
| Field Duplicates | Use QAPP limits. If no QAPP:<br>Solids: RPD <50%<br>OR absolute diff. < 2X RL (for results < 5X RL)<br><br>Aqueous: RPD <35%<br>OR absolute diff. < 1X RL (for results < 5X RL) | Narrate and qualify if required by project<br>(EcoChem PJ) | 9 |
| TICs | Major ions (>10%) in reference must be present in sample; intensities agree within 20%; check identification | NJ the TIC unless:<br>R(+) common laboratory contaminants<br>See Technical Director for ID issues | 4 |
| Quantitation/ Identification | RRT within 0.06 of standard RRT<br>Ion relative intensity within 20% of standard<br>All ions in std. at > 10% intensity must be present in sample | See Technical Director if outliers | 14<br>21 (false +) |



Copyright 2005 EcoChem, Inc.

# EcoChem Validation Guidelines for Pesticides, PCBs, Herbicides, and Phenol by GC/ECD (Based on Organic NFG 1999 & EPA SW-846 Methods 8081/8082/8041/8151)

| VALIDATION QC ELEMENT | ACCEPTANCE CRITERIA | ACTION | REASON CODE |
|---|---|---|---|
| Cooler Temperature | 4°C ±2° | J(+)/UJ(-) if greater than 6 deg. C (EcoChem PJ) | 1 |
| Holding Time | Water: 7 days from collection<br>Soil: 14 days from collection<br>Analysis: 40 days from extraction | J(+)/UJ(-) if ext/analyzed > HT<br>J(+)/R(-) if ext/analyzed > 3X HT (EcoChem PJ) | 1 |
| Resolution Check | Beginning of ICAL Sequence<br>Within RTW Resolution >90% | Narrate (Use Professional Judgement to qualify) | 14 |
| Instrument Performance (Breakdown) | DDT Breakdown: < 20%<br>Endrin Breakdown: <20%<br>Combined Breakdown: <30%<br>Compounds within RTW | J(+) DDT NJ(+) DDD and/or DDE<br>R(-) DDT - If (+) for either DDE or DDD<br><br>J(+) Endrin NJ(+) EK and/or EA<br>R(-) Endrin - If (+) for either EK or EA | 5A |
| Retention Times | Surrogates:<br>TCX (+/- 0.05); DCB (+/- 0.10)<br>Target compounds:<br>elute before heptachlor epoxide (+/- 0.05)<br>elute after heptachlor epoxide (+/- 0.07) | NJ(+)/R(-) results for analytes with RT shifts<br>For full DV, use PJ based on examination of raw data | 5B |
| Initial Calibration | Pesticides: Low=CRQL, Mid=4X, High=16X<br>Multiresponse - one point Calibration<br>%RSD<20%<br>%RSD<30% for surr; two comp. may exceed if <30%<br>Resolution in Mix A and Mix B >90% | J(+)/UJ(-) | 5A |
| Continuing Calibration | Alternating PEM standard and INDA/INDB standards every 12 hours (each preceeded by an inst. Blank)<br>%D < 25%<br><br>Resolution >90% in IND mixes; 100% for PEM | J(+)/UJ(-) J(+)R(-) if %D > 90%<br><br>PJ for resolution | 5B |
| Method Blank | One per matrix per batch<br>No results > CRQL | U(+) if sample result is < CRQL and < 5X rule (raise sample value to CRQL)<br>U(+) if sample result is > or equal to CRQL and < 5X rule (at reported sample value) | 7 |
| Instrument Blanks | Analyzed at the beginning of every 12 hour sequence<br>No analyte > 1/2 CRQL | Same as Method Blank | 7 |
| Field Blanks | Not addressed by NFG<br>No results > CRQL | Apply 5X rule; U(+) < action level | 6 |



Copyright 2005 EcoChem, Inc.

# EcoChem Validation Guidelines for Pesticides, PCBs, Herbicides, and Phenol by GC/ECD (Based on Organic NFG 1999 & EPA SW-846 Methods 8081/8082/8041/8151)

| VALIDATION QC ELEMENT | ACCEPTANCE CRITERIA | ACTION | REASON CODE |
|---|---|---|---|
| MS/MSD (recovery) | One set per matrix per batch<br>Method Acceptance Criteria | Qualify parent only unless other QC indicates systematic problems:<br>J(+) if both %R > UCL<br>J(+)/UJ(-) if both %R < LCL<br>J(+)/R(-) if both %R < 10%<br>PJ if only one %R outlier | 8 |
| MS/MSD (RPD) | One set per matrix per batch<br>Method Acceptance Criteria | J(+) in parent sample if RPD > CL | 9 |
| LCS | One per SDG<br>Method Acceptance Criteria | J(+) if %R > UCL J(+)/UJ(-) if %R < LCL<br>J(+)/R(-) using PJ if %R <<LCL (< 10%) | 10 |
| LCS/LCSD<br>*(if required)* | One set per matrix and batch of 20 samples<br>RPD < 35% | J(+)/UJ(-) assoc. cmpd. in all samples | 9 |
| Surrogates | TCX and DCB added to every sample<br>%R = 30-150% | J(+)/UJ(-) if both %R = 10 - 60%<br>J(+) if both >150%<br>J(+)/R(-) if any %R <10% | 13 |
| Quantitation/ Identification | Quantitated using ICAL calibration factor (CF)<br><br>RPD between columns <40% | J(+) if RPD = 40 - 60%<br>NJ(+) if RPD >60%<br>EcoChem PJ - See TM-08 | 3 |
| Two analyses for one sample | Report only one result per analyte | "DNR" results that should not be used to avoid reporting two results for one sample | 11 |
| Sample Clean-up | GPC required for soil samples<br>Florisil required for all samples<br>Sulfur is optional<br><br>Clean-up standard check %R within CLP limits | J(+)/UJ(-) if %R < LCL<br>J(+) if %R > UCL | 14 |
| Field Duplicates | Use QAPP limits. If no QAPP:<br>Solids: RPD <50%<br>OR absolute diff. < 2X RL (for results < 5X RL)<br><br>Aqueous: RPD <35%<br>OR absolute diff. < 1X RL (for results < 5X RL) | Narrate<br>(Qualifiy if required by project QAPP) | 9 |



Copyright 2005 EcoChem, Inc.

# EcoChem Validation Guidelines for Dioxin/Furan Analysis by HRMS
## (Based on EPA Reg. 10 SOP, Rev. 2, 1996 & EPA SW-846, Methods 1613b and 8290)

| VALIDATION QC ELEMENT | ACCEPTANCE CRITERIA | ACTION | REASON CODE |
|---|---|---|---|
| Cooler/Storage Temperature | Waters/Solids < 4°C<br>Tissues <-10°C | EcoChem PJ, see TM-05 | 1 |
| Holding Time | Extraction - Water: 30 days from collection<br>*Note:* Under CWA, SDWA, and RCRA the HT for H2O is 7 days*<br>Extraction - Soil: 30 days from collection<br>Analysis: 40 days from extraction | J(+)/UJ(-) if ext > 30 days<br>J(+)/UJ(-) if analysis > 40 Days<br>EcoChem PJ, see TM-05 | 1 |
| Mass Resolution | >=10,000 resolving power at m/z 304.9824<br>Exact mass of m/z 380.9760 w/in 5 ppm of theoretical value (380.97410 to 380.97790) .<br>Analyzed prior to ICAL and at the start and end of each 12 hr. shift | R(+/-) if not met | 14 |
| Window Defining Mix and Column Performance Mix | Window defining mixture/Isomer specificity std run before ICAL and CCAL<br>Valley < 25% (valley = (x/y)*100%)<br>x = ht. of TCDD<br>y = baseline to bottom of valley<br>For all isomers eluting near 2378-TCDD/TCDF isomers (TCDD only for 8290) | J(+) if valley > 25% | 5A (ICAL)<br>5B (CCAL |
| Initial Calibration | Minimum of five standards<br>%RSD < 20% for native compounds<br>%RSD <30% for labeled compounds<br>(%RSD <35% for labeled compounds under 1613b) | J(+) natives if %RSD > 20% | 5A |
| | Abs. RT of $^{13}C_{12}$-1234-TCDD<br>>25 min on DB5<br>>15 min on DB-225 | EcoChem PJ, see TM-05 | |
| | Ion Abundance ratios within QC limits<br>(Table 8 of method 8290)<br>(Table 9 of method 1613B) | EcoChem PJ, see TM-05 | |
| | S/N ratio > 10 for all native and labeled compounds in CS1 std. | If <10, elevate Det. Limit or R(-) | |



Copyright 2007 EcoChem, Inc.

# EcoChem Validation Guidelines for Dioxin/Furan Analysis by HRMS
## (Based on EPA Reg. 10 SOP, Rev. 2, 1996 & EPA SW-846, Methods 1613b and 8290)

| VALIDATION QC ELEMENT | ACCEPTANCE CRITERIA | ACTION | REASON CODE |
|---|---|---|---|
| Continuing Calibration | Analyzed at the start and end of each 12 hour shift.<br>%D+/-20% for native compounds<br>%D +/-30% for labeled compounds<br>(Must meet limits in Table 6, Method 1613B)<br>(If %Ds in the closing CCAL are w/in 25%/35% the avg RF from the two CCAL may be used to calculate samples per Method 8290, Section 8.3.2.4) | Do not qualify labeled compounds. Narrate in report for labeled compound %D outliers.<br>For native compound %D outliers:<br>8290: J(+)/UJ(-) if %D = 20% - 75%<br>J(+)/R(-) if %D > 75%<br>1613: J(+)/UJ(-) if %D is outside Table 6 limits<br>J(+)/R(-) if %D is +/- 75% of Table 6 limit | 5B |
| | Abs. RT of $^{13}C_{12}$-1234-TCDD and $^{13}C12$-123789-HxCDD +/- 15 sec of ICAL. | EcoChem PJ, see ICAL section of TM-05 | |
| | RRT of all other compounds must meet Table 2 of 1613B. | EcoChem PJ, see TM-05 | |
| | Ion Abundance ratios within QC limits<br>(Table 8 of method 8290)<br>(Table 9 of method 1613B) | EcoChem PJ, see TM-05 | |
| | S/N ratio > 10 | If <10, elevate Det. Limit or R(-) | |
| Method Blank | One per matrix per batch<br>No positive results | If sample result <5X action level, qualify U at reported value. | 7 |
| Field Blanks (Not Required) | No positive results | If sample result <5X action level, qualify U at reported value. | 6 |
| LCS / OPR | Concentrations must meet limits in Table 6, Method 1613B or lab limits. | J(+) if %R > UCL<br>J(+)/UJ(-) if %R < LCL<br>J(+)/R(-) using PJ if %R <<LCL (< 10%) | 10 |
| MS/MSD (recovery) | May not analyze MS/MSD<br>%R should meet lab limits. | Qualify parent only unless other QC indicates systematic problems:<br>J(+) if both %R > UCL<br>J(+)/UJ(-) if both %R < LCL<br>J(+)/R(-) if both %R < 10%<br>PJ if only one %R outlier | 8 |
| MS/MSD (RPD) | May not analyze MS/MSD<br>RPD < 20% | J(+) in parent sample if RPD > CL | 9 |



Copyright 2007 EcoChem, Inc.

# EcoChem Validation Guidelines for Dioxin/Furan Analysis by HRMS
## (Based on EPA Reg. 10 SOP, Rev. 2, 1996 & EPA SW-846, Methods 1613b and 8290)

| VALIDATION QC ELEMENT | ACCEPTANCE CRITERIA | ACTION | REASON CODE |
|---|---|---|---|
| Lab Duplicate | RPD <25% if present. | J(+)/UJ(-) if outside limts | 9 |
| Labeled Compounds / Internal Standards | *Method 8290:* %R = 40% - 135% in all samples<br>*Method 1613B:* %R must meet limits specified in Table 7, Method 1613 | J(+)/UJ(-) if %R = 10% to LCL<br>J(+) if %R > UCL<br>J(+)/R(-) if %R < 10% | 13 |
| Quantitation/ Identification | Ions for analyte, IS, and rec. std. must max w/in 2 sec.<br>S/N >2.5<br>IA ratios meet limits in Table 9 of 1613B or Table 8 of 8290<br>RRTs w/in limits in Table 2 of 1613B | If RT criteria not met, use PJ (see TM-05)<br>If S/N criteria not met, J(+).<br>if unlabelled ion abundance not met, change to EMPC<br>If labelled ion abundance not met, J(+). | 21 |
| EMPC (estimated maximum possible concentration) | If quantitation idenfication criteria are not met, laboratory should report an EMPC value. | If laboratory correctly reported an EMPC value, qualify with U to indicate that the value is a detection limit. | 14 |
| Interferences | PCDF interferences from PCDPE | If both detected, change PCDF result to EMPC | 14 |
| Second Column Confirmation | All 2378-TCDF hits must be confirmed on a DB-225 (or equiv) column. All QC specs in this table must be met for the confirmation analysis. | Report lower of the two values.<br>If not performed use PJ (see TM-05). | 3 |
| Field Duplicates | Use QAPP limits. If no QAPP:<br>Solids: RPD <50%<br>OR absolute diff. < 2X RL (for results < 5X RL)<br>Aqueous: RPD <35%<br>OR absolute diff. < 1X RL (for results < 5X RL) | Narrate and qualify if required by project (EcoChem PJ) | 9 |
| Two analyses for one sample | Report only one result per analyte | "DNR" results that should not be used | 11 |



Copyright 2007 EcoChem, Inc.

# EcoChem Validation Guidelines for Metals Analysis by ICP (Based on Inorganic NFG 1994 & 2004)

| VALIDATION QC ELEMENT | ACCEPTANCE CRITERIA | ACTION | REASON CODE |
|---|---|---|---|
| Cooler Temperature and Preservation | Cooler temperature: 4°C ±2°<br>Waters: Nitric Acid to pH < 2<br>For Dissolved Metals: 0.45um filter & preserve after filtration<br>Tissues: Frozen | EcoChem Professional Judgment - no qualification based on cooler temperature outliers<br>J(+)/UJ(-) if pH preservation requirements are not met | 1 |
| Holding Time | 180 days from date sampled<br>Frozen tissues - HT extended to 2 years | J(+)/UJ(-) if holding time exceeded | 1 |
| Initial Calibration | Blank + minimum 1 standard<br>If more than 1 standard, r > 0.995 | J(+)/UJ(-) if r < 0.995 (multi point cal) | 5A |
| Initial Calibration Verification (ICV) | Independent source analyzed immediately after calibration<br>%R within ±10% of true value | J(+)/UJ(-) if %R 75-89%<br>J(+) if %R = 111-125%<br>R(+) if %R > 125%<br>R(+/-) if %R < 75% | 5A |
| Continuing Calibration Verification (CCV) | Every ten samples, immediately following ICV/ICB and at end of run<br>%R within ±10% of true value | J(+)/UJ(-) if %R = 75-89%<br>J(+) if %R 111-125%<br>R(+) if %R > 125%<br>R(+/-) if %R < 75% | 5B |
| Initial and Continuing Calibration Blank (ICB/CCB) | After each ICV and CCV<br>every ten samples and end of run<br>\| blank \| < IDL (MDL) | Action level is 5x absolute value of blank conc.<br>For (+) blanks, U(+) results < action level<br>For (-) blanks, J(+)/UJ(-) results < action level<br>(Refer to TM-02 for additional information) | 7 |
| Reporting Limit Standard | 2x RL analyzed beginning of run<br>Not required for Al, Ba, Ca, Fe, Mg, Na, K<br>%R = 70%-130% (50%-150% Sb, Pb, Tl) | R(-)/J(+) < 2x RL if %R <50% (< 30% Sb, Pb, Tl)<br>J(+) < 2x RL, UJ(-) if %R 50-69% (30-49% Sb, Pb,Tl)<br>J(+) < 2x RL if %R 130-180% (150-200% Sb, Pb, Tl)<br>R(+) < 2x RL if %R > 180% (200% Sb, Pb, Tl) | 14 |
| Interference Check Samples (ICSA/ICSAB) | ICSAB %R 80 - 120% for all spiked elements<br>\| ICSA \| < MDL for all unspiked elements except: K, Na | For samples with Al, Ca, Fe, or Mg > ICS levels<br>R(+/-) if %R < 50%<br>J(+) if %R >120%<br>J(+)/UJ(-) if %R= 50 to 79%<br>Use Professional Judgment for ICSA to determine if bias is present<br>see TM-09 for additional details | 17 |
| Method Blank | One per matrix per batch<br>(batch not to exceed 20 samples)<br>blank < MDL | Action level is 5x blank concentration<br>U(+) results < action level | 7 |
| Laboratory Control Sample (LCS) | One per matrix per batch<br>Blank Spike: %R within 80-120% | R(+/-) if %R < 50%<br>J(+)/UJ(-) if %R = 50-79%<br>J(+) if %R >120% | 10 |
| | CRM: Result within manufacturer's certified acceptance range or project guidelines | J(+)/UJ(-) if < LCL,<br>J(+) if > UCL | |



Copyright 2006 EcoChem, Inc.

# EcoChem Validation Guidelines for Metals Analysis by ICP
# (Based on Inorganic NFG 1994 & 2004)

| VALIDATION QC ELEMENT | ACCEPTANCE CRITERIA | ACTION | REASON CODE |
|---|---|---|---|
| Matrix Spikes | One per matrix per batch<br>75-125% for samples less than 4x spike level | J(+) if %R > 125%<br>J(+)/UJ(-) if %R < 75%<br>J(+)/R(-) if %R < 30% or<br>J(+)/UJ(-) if Post Spike %R 75-125%<br>Qualify all samples in batch | 8 |
| Post-digestion Spike | If Matrix Spike is outside 75-125%,<br>spike at twice the sample conc. | No qualifiers assigned based on this element | |
| Laboratory Duplicate (or MS/MSD) | One per matrix per batch<br>RPD < 20% for samples > 5x RL<br>Diff < RL for samples >RL and < 5x RL<br>(Diff < 2x RL for solids) | J(+)/UJ(-) if RPD > 20% or diff > RL (2x RL for solids)<br>qualify all samples in batch | 9 |
| Serial Dilution | 5x dilution one per matrix<br>%D < 10% for original sample conc. > 50x MDL | J(+)/UJ(-) if %D >10%<br>qualify all samples in batch | 16 |
| Field Blank | Blank < MDL | Action level is 5x blank conc.<br>U(+) sample values < action level<br>in associated field samples only | 6 |
| Field Duplicate | For results > 5x RL:<br>Water: RPD < 35% Solid: RPD < 50%<br>For results < 5 x RL:<br>Water: Diff < RL Solid: Diff < 2x RL | J(+)/UJ(-) in parent samples only | 9 |
| Linear Range | Sample concentrations must fall within range | J values over range | 20 |



Copyright 2006 EcoChem, Inc.

# EcoChem Validation Guidelines for Metals Analysis by ICP-MS (Based on Inorganic NFG 1994 & 2004)

| VALIDATION QC ELEMENT | ACCEPTANCE CRITERIA | ACTION | REASON CODE |
|---|---|---|---|
| Cooler Temperature and Preservation | Cooler temperature: 4°C ±2°<br>Waters: Nitric Acid to pH < 2<br>For Dissolved Metals: 0.45um filter & preserve after filtration | EcoChem Professional Judgment - no qualification based on cooler temperature outliers<br>J(+)/UJ(-) if pH preservation requirements are not met | 1 |
| Holding Time | 180 days from date sampled<br>Frozen tissues - HT extended to 2 years | J(+)/UJ(-) if holding time exceeded | 1 |
| Tune | Prior to ICAL<br>monitoring compounds analyzed 5 times wih Std Dev. ≤ 5%<br>mass calibration <0.1 amu from True Value<br>Resolution < 0.9 AMU @ 10% peak height or <0.75 amu @ 5% peak height | Use Professional Judgment to evaluate tune<br>J(+)/UJ(-) if tune criteria not met | 5A |
| Initial Calibration | Blank + minimum 1 standard<br>If more than 1 standard, r>0.995 | J(+)/UJ(-) if r<0.995 (for multi point cal) | 5A |
| Initial Calibration Verification (ICV) | Independent source analyzed immediately after calibration<br>%R within ±10% of true value | J(+)/UJ(-) if %R 75-89%<br>J(+) if %R = 111-125%<br>R(+) if %R > 125%<br>R(+/-) if %R < 75% | 5A |
| Continuing Calibration Verification (CCV) | Every ten samples, immediately following ICV/ICB and at end of run<br>±10% of true value | J(+)/UJ(-) if %R = 75-89%<br>J(+) if %R 111-125%<br>R(+) if %R > 125%<br>R(+/-) if %R < 75% | 5B |
| Initial and Continuing Calibration Blanks (ICB/CCB) | After each ICV and CCV<br>every ten samples and end of run<br>\| blank \| < IDL (MDL) | Action level is 5x absolute value of blank conc.<br>For (+) blanks, U(+) results < action level<br>For (-) blanks, J(+)/UJ(-) results < action level<br>refer to TM-02 for additional details | 7 |
| Reporting Limit Standard (CRI) | 2x RL analyzed beginning of run<br>Not required for Al, Ba, Ca, Fe, Mg, Na, K<br>%R = 70%-130% (50%-150% Co,Mn, Zn) | R(-),(+) < 2x RL if %R < 50% (< 30% Co,Mn, Zn)<br>J(+) < 2x RL, UJ(-) if %R 50-69% (30%-49% Co,Mn, Zn)<br>J(+) < 2x RL if %R 130%-180% (150%-200% Co,Mn, Zn)<br>R(+) < 2x RL if %R > 180% (200% Co, Mn, Zn) | 14 |
| Interference Check Samples (ICSA/ICSAB) | Required by SW 6020, but not 200.8<br>ICSAB %R 80% - 120% for all spiked elements<br>\| ICSA \| < IDL (MDL) for all unspiked elements | For samples with Al, Ca, Fe, or Mg > ICS levels<br>R(+/-) if %R < 50%<br>J(+) if %R >120%<br>J(+)/UJ(-) if %R = 50% to 79%<br>Use Professional Judgment for ICSA to determine if bias is present<br>see TM-09 for additional details | 17 |
| Method Blank | One per matrix per batch<br>(batch not to exceed 20 samples)<br>blank < MDL | Action level is 5x blank concentration<br>U(+) results < action level | 7 |



Copyright 2006 EcoChem, Inc.

# EcoChem Validation Guidelines for Metals Analysis by ICP-MS
# (Based on Inorganic NFG 1994 & 2004)

| VALIDATION QC ELEMENT | ACCEPTANCE CRITERIA | ACTION | REASON CODE |
|---|---|---|---|
| Laboratory Control Sample (LCS) | One per matrix per batch<br>Blank Spike: %R within 80%-120% | R(+/-) if %R < 50%<br>J(+)/UJ(-) if %R = 50-79%<br>J(+) if %R >120% | 10 |
| | CRM: Result within manufacturer's certified acceptance range or project guidelines | J(+)/UJ(-) if < LCL,<br>J(+) if > UCL | |
| Matrix Spike/ Matrix Spike Duplicate (MS/MSD) | One per matrix per batch<br>75-125% for samples where results do not exceed 4x spike level | J(+) if %R>125%<br>J(+)/UJ(-) if %R <75%<br>J(+)/R(-) if %R<30% or<br>J(+)/UJ(-) if Post Spike %R 75%-125%<br>Qualify all samples in batch | 8 |
| Post-digestion Spike | If Matrix Spike is outside 75-125%,<br>Spike parent sample at 2x the sample conc. | No qualifiers assigned based on this element | |
| Laboratory Duplicate (or MS/MSD) | One per matrix per batch<br>RPD < 20% for samples > 5x RL<br>Diff < RL for samples > RL and < 5 x RL<br>(Diff < 2x RL for solids) | J(+)/UJ(-) if RPD > 20% or diff > RL<br>all samples in batch | 9 |
| Serial Dilution | 5x dilution one per matrix<br>%D < 10% for original sample values > 50x MDL | J(+)/UJ(-) if %D >10%<br>All samples in batch | 16 |
| Internal Standards | Every sample<br>SW6020: 60%-125% of cal blank IS<br>200.8: 30%-120% of cal blank IS | J (+)/UJ (-) all analytes associated with IS outlier | 19 |
| Field Blank | Blank < MDL | Action level is 5x blank conc.<br>U(+) sample values < AL<br>in associated field samples only | 6 |
| Field Duplicate | For results > 5x RL:<br>Water: RPD < 35% Solid: RPD < 50%<br>For results < 5 x RL:<br>Water: Diff < RL Solid: Diff < 2x RL | J(+)/UJ(-) in parent samples only | 9 |
| Linear Range | Sample concentrations must fall within range | J values over range | 20 |



Copyright 2006 EcoChem, Inc.

# EcoChem Validation Guidelines for Mercury Analysis by CVAA (Based on Inorganic NFG 1994 & 2004)

| VALIDATION QC ELEMENT | ACCEPTANCE CRITERIA | ACTION | REASON CODE |
|---|---|---|---|
| Cooler Temperature and Preservation | Cooler temperature: 4°C ±2°<br>Waters: Nitric Acid to pH < 2<br>For Dissolved Metals: 0.45um filter & preserve after filtration | EcoChem Professional Judgment - no qualification based on cooler temperature outliers<br>J(+)/UJ(-) if pH preservation requirements are not met | 1 |
| Holding Time | 28 days from date sampled<br>Frozen tissues: HT extended to 6 months | J(+)/UJ(-) if holding time exceeded | 1 |
| Initial Calibration | Blank + 4 standards, one at RL<br>r > 0.995 | J(+)/UJ(-) if r<0.995 | 5A |
| Initial Calibration Verification (ICV) | Independent source analyzed immediately after calibration<br>%R within ±20% of true value | J(+)/UJ(-) if %R = 65%-79%<br>J(+) if %R = 121-135%<br>R(+/-) if %R < 65% R(+) if %R > 135% | 5A |
| Continuing Calibration Verification (CCV) | Every ten samples, immediately following ICV/ICB and at end of run<br>%R within ±20% of true value | J(+)/UJ(-) if %R = 65%-79%<br>J(+) if %R = 121-135%<br>R(+/-) if %R < 65% R(+) if %R > 135% | 5B |
| Initial and Continuing Calibration Blanks (ICB/CCB) | after each ICV and CCV<br>every ten samples and end of run<br>\| blank \| < IDL (MDL) | Action level is 5x absolute value of blank conc.<br>For (+) blanks, U(+) results < action level<br>For (-) blanks, J(+)/UJ(-) results < action level<br>refer to TM-02 for additional details | 7 |
| Reporting Limit Standard (CRA) | conc at RL - analyzed beginning of run<br>%R = 70-130% | R(-),(+)<2xRL if %R <50%<br>J(+)<2x RL, UJ(-) if %R 50-69%<br>J(+) <2x RL if %R 130-180%<br>R(+)<2x RL if %R>180% | 14 |
| Method Blank | One per matrix per batch<br>(batch not to exceed 20 samples)<br>blank < MDL | Action level is 5x blank concentration<br>U(+) results < action level | 7 |
| Laboratory Control Sample (LCS) | One per matrix per batch | | 10 |
| | Blank Spike: %R within 80-120% | R(+/-) if %R < 50%<br>J(+)/UJ(-) if %R = 50-79%<br>J(+) if %R >120% | |
| | CRM: Result within manufacturer's certified acceptance range or project guidelines | J(+)/UJ(-) if < LCL,<br>J(+) if > UCL | |
| Matrix Spike/Matrix Spike Duplicate (MS/MSD) | One per matrix per batch<br>5% frequency<br>75-125% for samples less than 4x spike level | J(+) if %R>125%<br>J(+)/UJ(-) if %R <75%<br>J(+)/R(-) if %R<30%<br>all samples in batch | 8 |
| Laboratory Duplicate (or MS/MSD) | One per matrix per batch<br>RPD < 20% for samples > 5x RL<br>Diff < RL for samples > RL and < 5x RL<br>(Diff < 2x RL for solids) | J(+)/UJ(-) if RPD > 20% or diff > RL<br>all samples in batch | 9 |



Copyright 2006 EcoChem, Inc.

# EcoChem Validation Guidelines for Mercury Analysis by CVAA (Based on Inorganic NFG 1994 & 2004)

| VALIDATION QC ELEMENT | ACCEPTANCE CRITERIA | ACTION | REASON CODE |
|---|---|---|---|
| Field Blank | Blank < MDL | Action level is 5x blank conc.<br>U(+) sample values < action level<br>in associated field samples only | 6 |
| Field Duplicate | For results > 5x RL:<br>Water: RPD < 35% Solid: RPD < 50%<br>For results < 5x RL:<br>Water: Diff<RL Solid: Diff < 2x RL | J(+)/UJ(-) in parent samples only | 9 |
| Linear Range | Sample concentrations must be less than 110% of high standard | J values over range | 20 |



Copyright 2006 EcoChem, Inc.

# EcoChem Validation Guidelines for Conventional Chemistry Analysis (Based on EPA Standard Methods)

| VALIDATION QC ELEMENT | ACCEPTANCE CRITERIA | ACTION | REASON CODE |
|---|---|---|---|
| Cooler Temperature and Preservation | Cooler Temperature 4°C ±2°C<br>Preservation: Method Specific | Use Professional Judgment to qualify based to qualify for coole temp outliers<br>J(+)/UJ(-) if preservation requirements not met | 1 |
| Holding Time | Method Specific | Professional Judgment<br>J(+)/UJ(-) if holding time exceeded<br>J(+)/R(-) if HT exceeded by > 3X | 1 |
| Initial Calibration | Method specific<br>r>0.995 | Use professional judgment<br>J(+)/UJ(-) for r < 0.995 | 5A |
| Initial Calibration Verification (ICV) | Where applicable to method<br>Independent source analyzed immediately after calibration<br>%R method specific, usually 90% - 110% | R(+/-) if %R significantly < LCL<br>J(+)/UJ(-) if %R < LCL<br>J(+) if %R > UCL<br>R(+) if %R significantly > UCL | 5A |
| Continuing Cal Verification (CCV) | Where applicable to method<br>Every ten samples, immed. following ICV/ICB and end of run<br>%R method specific, usually 90% - 110% | R(+/-) if %R significantly < LCL<br>J(+)/UJ(-) if %R < LCL<br>J(+) if %R > UCL<br>R(+) if %R significantly > UCL | 5B |
| Initial and Continuing Cal Blanks (ICB/CCB) | Where applicable to method<br>After each ICV and CCV every ten samples and end of run<br>\| blank\| < MDL | Action level is 5x absolute value of blank conc.<br>For (+) blanks, U(+) results < action level<br>For (-) blanks, J(+)/UJ(-) results < action level<br>refer to TM-02 for additional details | 7 |
| Method Blank | One per matrix per batch<br>(not to exceed 20 samples)<br>blank < MDL | Action level is 5x absolute value of blank conc.<br>For (+) blk value, U(+) results < action level<br>For (-) blk value, J(+)/UJ(-) results < action level | 7 |
| Laboratory Control Sample | Waters:<br>One per matrix per batch<br>%R (80-120%) | R(+/-) if %R < 50%<br>J(+)/UJ(-) if %R = 50-79%<br>J(+) if %R >120% | 10 |
| | Soils:<br>One per matrix per batch<br>Result within manufacturer's certified acceptance range | J(+)/UJ(-) if < LCL,<br>J(+) if > UCL | 10 |
| Matrix Spike | One per matrix per batch; 5% frequency<br>75-125% for samples less than 4 x spike level | J(+) if %R > 125% or < 75%<br>UJ(-) if %R = 30-74%<br>R(+/-) results < IDL if %R < 30% | 8 |
| Laboratory Duplicate | One per matrix per batch<br>RPD <20% for samples > 5x RL<br>Diff <RL for samples >RL and <5 x RL<br>(may use RPD < 35%, Diff < 2X RL for solids) | J(+)/UJ(-) if RPD > 20% or diff > RL<br>all samples in batch | 9 |



Copyright 2006 EcoChem, Inc.

# EcoChem Validation Guidelines for Conventional Chemistry Analysis (Based on EPA Standard Methods)

| VALIDATION QC ELEMENT | ACCEPTANCE CRITERIA | ACTION | REASON CODE |
|---|---|---|---|
| Field Blank | blank < MDL | Action level is 5x blank conc.<br>U(+) sample values < action level<br>in associated field samples only | 6 |
| Field Duplicate | For results > 5X RL:<br>Water: RPD < 35% Solid: RPD < 50%<br>For results < 5 x RL:<br>Water: Diff<RL Solid: Diff < 2X RL | J(+)/UJ(-) in parent samples only | 9 |



Copyright 2006 EcoChem, Inc.

EcoChem, INC.
Environmental Data Quality

# APPENDIX B
# QUALIFIED DATA SUMMARY TABLE

Qualified Data Summary Table
San Jacinto Big Star Soil Sampling

| SDG | Sample ID | Laboratory ID | Method | Analyte | Result | Units | Lab Qualifier | Validation Qualifier | Validation Reason |
|---|---|---|---|---|---|---|---|---|---|
| E1001239 | SL0001 | E1001239-001 | EPA1613B | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-furan | 0.833 | ng/kg | JK | U | 22 |
| E1001239 | SL0001 | E1001239-001 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin | 0.306 | ng/kg | JK | U | 22 |
| E1001239 | SL0001 | E1001239-001 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin | 0.171 | ng/kg | JK | U | 22 |
| E1001239 | SL0001 | E1001239-001 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 17.3 | ng/kg | C | DNR | 11 |
| E1001239 | SL0002 | E1001239-002 | EPA1613B | 1,2,3,4,7,8,9-Heptachlorodibenzo-p-furan | 0.177 | ng/kg | JK | U | 22 |
| E1001239 | SL0002 | E1001239-002 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin | 0.0984 | ng/kg | JK | U | 22 |
| E1001239 | SL0002 | E1001239-002 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin | 0.122 | ng/kg | JK | U | 22 |
| E1001239 | SL0002 | E1001239-002 | EPA1613B | 2,3,4,7,8-Pentachlorodibenzo-p-furan | 0.476 | ng/kg | JK | U | 22 |
| E1001239 | SL0002 | E1001239-002 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 14.2 | ng/kg | C | DNR | 11 |
| E1001239 | SL0003 | E1001239-003 | EPA1613B | 1,2,3,4,7,8,9-Heptachlorodibenzo-p-furan | 0.448 | ng/kg | JK | U | 22 |
| E1001239 | SL0003 | E1001239-003 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin | 0.317 | ng/kg | JK | U | 22 |
| E1001239 | SL0003 | E1001239-003 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-furan | 0.641 | ng/kg | JK | U | 22 |
| E1001239 | SL0003 | E1001239-003 | EPA1613B | 2,3,4,7,8-Pentachlorodibenzo-p-furan | 0.451 | ng/kg | JK | U | 22 |
| E1001239 | SL0003 | E1001239-003 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 14.3 | ng/kg | C | DNR | 11 |
| E1001239 | SL0004 | E1001239-004 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin | 1.94 | ng/kg | JK | U | 22 |
| E1001239 | SL0004 | E1001239-004 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-furan | 0.462 | ng/kg | JK | U | 22 |
| E1001239 | SL0004 | E1001239-004 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 10.5 | ng/kg | C | DNR | 11 |
| E1001239 | SL0005 | E1001239-005 | EPA1613B | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-furan | 0.281 | ng/kg | JK | U | 22 |
| E1001239 | SL0005 | E1001239-005 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin | 0.151 | ng/kg | JK | U | 22 |
| E1001239 | SL0005 | E1001239-005 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-furan | 0.101 | ng/kg | JK | U | 22 |
| E1001239 | SL0005 | E1001239-005 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin | 0.182 | ng/kg | JK | U | 22 |
| E1001239 | SL0005 | E1001239-005 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 1.9 | ng/kg | K | U | 22 |
| E1001239 | SL0005 | E1001239-005 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 9.56 | ng/kg | C | DNR | 11 |
| E1001239 | SL0006 | E1001239-006 | EPA1613B | 1,2,3,4,7,8,9-Heptachlorodibenzo-p-furan | 0.15 | ng/kg | JK | U | 22 |
| E1001239 | SL0006 | E1001239-006 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin | 0.266 | ng/kg | JK | U | 22 |
| E1001239 | SL0006 | E1001239-006 | EPA1613B | 2,3,4,6,7,8-Hexachlorodibenzo-p-furan | 0.066 | ng/kg | JK | U | 22 |
| E1001239 | SL0006 | E1001239-006 | EPA1613B | 2,3,4,7,8-Pentachlorodibenzo-p-furan | 0.224 | ng/kg | JK | U | 22 |
| E1001239 | SL0006 | E1001239-006 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 10.8 | ng/kg | C | DNR | 11 |
| E1001239 | SL0007 | E1001239-007 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin | 0.855 | ng/kg | JK | U | 22 |
| E1001239 | SL0007 | E1001239-007 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-furan | 0.215 | ng/kg | JK | U | 22 |
| E1001239 | SL0007 | E1001239-007 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin | 0.15 | ng/kg | JK | U | 22 |
| E1001239 | SL0007 | E1001239-007 | EPA1613B | 2,3,4,7,8-Pentachlorodibenzo-p-furan | 0.271 | ng/kg | JK | U | 22 |
| E1001239 | SL0007 | E1001239-007 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 0.158 | ng/kg | JK | U | 22 |
| E1001239 | SL0007 | E1001239-007 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 0.8 | ng/kg | CJ | DNR | 11 |
| E1001239 | SL0008 | E1001239-008 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin | 0.225 | ng/kg | JK | U | 22 |
| E1001239 | SL0008 | E1001239-008 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-furan | 0.346 | ng/kg | JK | U | 22 |
| E1001239 | SL0008 | E1001239-008 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-furan | 0.0952 | ng/kg | JK | U | 22 |
| E1001239 | SL0008 | E1001239-008 | EPA1613B | 2,3,4,6,7,8-Hexachlorodibenzo-p-furan | 0.106 | ng/kg | JK | U | 22 |
| E1001239 | SL0008 | E1001239-008 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 1.28 | ng/kg | C | DNR | 11 |
| E1001239 | SL0009 | E1001239-009 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin | 0.103 | ng/kg | JK | U | 22 |
| E1001239 | SL0009 | E1001239-009 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin | 0.0984 | ng/kg | JK | U | 22 |
| E1001239 | SL0009 | E1001239-009 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-furan | 0.21 | ng/kg | JK | U | 22 |
| E1001239 | SL0009 | E1001239-009 | EPA1613B | 2,3,4,7,8-Pentachlorodibenzo-p-furan | 0.111 | ng/kg | JK | U | 22 |
| E1001239 | SL0009 | E1001239-009 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 5.37 | ng/kg | C | DNR | 11 |
| E1001239 | SL0010 | E1001239-010 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-furan | 0.289 | ng/kg | JK | U | 22 |
| E1001239 | SL0010 | E1001239-010 | EPA1613B | 2,3,4,7,8-Pentachlorodibenzo-p-furan | 0.117 | ng/kg | JK | U | 22 |
| E1001239 | SL0010 | E1001239-010 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 0.48 | ng/kg | JK | U | 22 |
| E1001239 | SL0010 | E1001239-010 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 2.26 | ng/kg | C | DNR | 11 |
| E1001239 | SL0010 | E1001239-010 | EPA1613B | Octachlorodibenzo-p-furan | 3.09 | ng/kg | JK | U | 22 |
| E1001239 | SL0011 | E1001239-011 | EPA1613B | 1,2,3,4,7,8,9-Heptachlorodibenzo-p-furan | 0.69 | ng/kg | JK | U | 22 |
| E1001239 | SL0011 | E1001239-011 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin | 0.531 | ng/kg | JK | U | 22 |
| E1001239 | SL0011 | E1001239-011 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-furan | 0.531 | ng/kg | JK | U | 22 |
| E1001239 | SL0011 | E1001239-011 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin | 0.205 | ng/kg | JK | U | 22 |
| E1001239 | SL0011 | E1001239-011 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-furan | 0.269 | ng/kg | JK | U | 22 |

Qualified Data Summary Table
San Jacinto Big Star Soil Sampling

| SDG | Sample ID | Laboratory ID | Method | Analyte | Result | Units | Lab Qualifier | Validation Qualifier | Validation Reason |
|---|---|---|---|---|---|---|---|---|---|
| E1001239 | SL0011 | E1001239-011 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 2.53 | ng/kg | C | DNR | 11 |
| E1001239 | SL0012 | E1001239-012 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-furan | 1.37 | ng/kg | JK | U | 22 |
| E1001239 | SL0012 | E1001239-012 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-furan | 0.632 | ng/kg | JK | U | 22 |
| E1001239 | SL0012 | E1001239-012 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 2.44 | ng/kg | C | DNR | 11 |
| E1001239 | SL0013 | E1001239-013 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin | 1.06 | ng/kg | JK | U | 22 |
| E1001239 | SL0013 | E1001239-013 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-furan | 0.655 | ng/kg | JK | U | 22 |
| E1001239 | SL0013 | E1001239-013 | EPA1613B | 2,3,4,6,7,8-Hexachlorodibenzo-p-furan | 0.282 | ng/kg | JK | U | 22 |
| E1001239 | SL0013 | E1001239-013 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 22.2 | ng/kg | C | DNR | 11 |
| E1001239 | SL0014 | E1001239-014 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-furan | 0.856 | ng/kg | JK | U | 22 |
| E1001239 | SL0014 | E1001239-014 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-furan | 0.351 | ng/kg | JK | U | 22 |
| E1001239 | SL0014 | E1001239-014 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 14.8 | ng/kg | C | DNR | 11 |
| E1001239 | SL0015 | E1001239-015 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-furan | 0.63 | ng/kg | JK | U | 22 |
| E1001239 | SL0015 | E1001239-015 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 6.56 | ng/kg | C | DNR | 11 |
| E1001239 | SL0016 | E1001239-016 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin | 0.915 | ng/kg | JK | U | 22 |
| E1001239 | SL0016 | E1001239-016 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 1.1 | ng/kg | K | U | 22 |
| E1001239 | SL0016 | E1001239-016 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 4.45 | ng/kg | C | DNR | 11 |
| E1001239 | SL0017 | E1001239-017 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin | 0.522 | ng/kg | JK | U | 22 |
| E1001239 | SL0017 | E1001239-017 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin | 2.74 | ng/kg | JK | U | 22 |
| E1001239 | SL0017 | E1001239-017 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-furan | 0.525 | ng/kg | JK | U | 22 |
| E1001239 | SL0018 | E1001239-018 | EPA1613B | 1,2,3,4,7,8,9-Heptachlorodibenzo-p-furan | 0.818 | ng/kg | JK | U | 22 |
| E1001239 | SL0018 | E1001239-018 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-furan | 1.08 | ng/kg | JK | U | 22 |
| E1001239 | SL0019 | E1001239-019 | EPA1613B | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin | 199 | ng/kg | D | DNR | 11 |
| E1001239 | SL0019 | E1001239-019 | EPA1613B | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-furan | 13.3 | ng/kg | JK,D | DNR | 11 |
| E1001239 | SL0019 | E1001239-019 | EPA1613B | 1,2,3,4,7,8,9-Heptachlorodibenzo-p-furan | 2.5 | ng/kg | U,D | DNR | 11 |
| E1001239 | SL0019 | E1001239-019 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin | 0.652 | ng/kg | JK | U | 22 |
| E1001239 | SL0019 | E1001239-019 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin | 2.27 | ng/kg | U,D | DNR | 11 |
| E1001239 | SL0019 | E1001239-019 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-furan | 3.71 | ng/kg | U,D | DNR | 11 |
| E1001239 | SL0019 | E1001239-019 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin | 2.5 | ng/kg | U,D | DNR | 11 |
| E1001239 | SL0019 | E1001239-019 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-furan | 2.75 | ng/kg | U,D | DNR | 11 |
| E1001239 | SL0019 | E1001239-019 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin | 2.29 | ng/kg | U,D | DNR | 11 |
| E1001239 | SL0019 | E1001239-019 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-furan | 3.48 | ng/kg | U,D | DNR | 11 |
| E1001239 | SL0019 | E1001239-019 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin | 2.34 | ng/kg | U,D | DNR | 11 |
| E1001239 | SL0019 | E1001239-019 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-furan | 1.52 | ng/kg | U,D | DNR | 11 |
| E1001239 | SL0019 | E1001239-019 | EPA1613B | 2,3,4,6,7,8-Hexachlorodibenzo-p-furan | 3.38 | ng/kg | U,D | DNR | 11 |
| E1001239 | SL0019 | E1001239-019 | EPA1613B | 2,3,4,7,8-Pentachlorodibenzo-p-furan | 1.66 | ng/kg | U,D | DNR | 11 |
| E1001239 | SL0019 | E1001239-019 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 2.45 | ng/kg | U,D | DNR | 11 |
| E1001239 | SL0019 | E1001239-019 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 2.5 | ng/kg | U,D | DNR | 11 |
| E1001239 | SL0019 | E1001239-019 | EPA1613B | Octachlorodibenzo-p-dioxin | 11500 | ng/kg | BE | DNR | 20 |
| E1001239 | SL0019 | E1001239-019 | EPA1613B | Octachlorodibenzo-p-furan | 57.8 | ng/kg | J,D | DNR | 11 |
| E1001239 | SL0020 | E1001239-020 | EPA1613B | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin | 212 | ng/kg | D | DNR | 11 |
| E1001239 | SL0020 | E1001239-020 | EPA1613B | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-furan | 11.2 | ng/kg | JK,D | DNR | 11 |
| E1001239 | SL0020 | E1001239-020 | EPA1613B | 1,2,3,4,7,8,9-Heptachlorodibenzo-p-furan | 3.87 | ng/kg | U,D | DNR | 11 |
| E1001239 | SL0020 | E1001239-020 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin | 2.91 | ng/kg | U,D | DNR | 11 |
| E1001239 | SL0020 | E1001239-020 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin | 0.559 | ng/kg | JK | U | 22 |
| E1001239 | SL0020 | E1001239-020 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-furan | 2.28 | ng/kg | U,D | DNR | 11 |
| E1001239 | SL0020 | E1001239-020 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin | 2.93 | ng/kg | U,D | DNR | 11 |
| E1001239 | SL0020 | E1001239-020 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-furan | 1.72 | ng/kg | U,D | DNR | 11 |
| E1001239 | SL0020 | E1001239-020 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin | 2.84 | ng/kg | U,D | DNR | 11 |
| E1001239 | SL0020 | E1001239-020 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-furan | 2.2 | ng/kg | U,D | DNR | 11 |
| E1001239 | SL0020 | E1001239-020 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin | 2.33 | ng/kg | U,D | DNR | 11 |
| E1001239 | SL0020 | E1001239-020 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-furan | 1.99 | ng/kg | U,D | DNR | 11 |
| E1001239 | SL0020 | E1001239-020 | EPA1613B | 2,3,4,6,7,8-Hexachlorodibenzo-p-furan | 2.37 | ng/kg | U,D | DNR | 11 |
| E1001239 | SL0020 | E1001239-020 | EPA1613B | 2,3,4,7,8-Pentachlorodibenzo-p-furan | 2.26 | ng/kg | U,D | DNR | 11 |
| E1001239 | SL0020 | E1001239-020 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 2.82 | ng/kg | U,D | DNR | 11 |

Qualified Data Summary Table
San Jacinto Big Star Soil Sampling

| SDG | Sample ID | Laboratory ID | Method | Analyte | Result | Units | Lab Qualifier | Validation Qualifier | Validation Reason |
|---|---|---|---|---|---|---|---|---|---|
| E1001239 | SL0020 | E1001239-020 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 1.62 | ng/kg | CK | DNR | 11 |
| E1001239 | SL0020 | E1001239-020 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 4.2 | ng/kg | U,D | DNR | 11 |
| E1001239 | SL0020 | E1001239-020 | EPA1613B | Octachlorodibenzo-p-dioxin | 13400 | ng/kg | BE | DNR | 20 |
| E1001239 | SL0020 | E1001239-020 | EPA1613B | Octachlorodibenzo-p-furan | 54.7 | ng/kg | J,D | DNR | 11 |
| E1001240 | SL0021 | E1001240-001 | EPA1613B | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin | 1570 | ng/kg | B,D | DNR | 11 |
| E1001240 | SL0021 | E1001240-001 | EPA1613B | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-furan | 151 | ng/kg | D | DNR | 11 |
| E1001240 | SL0021 | E1001240-001 | EPA1613B | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-furan | 103 | ng/kg | | J | 10 |
| E1001240 | SL0021 | E1001240-001 | EPA1613B | 1,2,3,4,7,8,9-Heptachlorodibenzo-p-furan | 8 | ng/kg | U,D | DNR | 11 |
| E1001240 | SL0021 | E1001240-001 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin | 1.54 | ng/kg | U,D | DNR | 11 |
| E1001240 | SL0021 | E1001240-001 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin | 2.43 | ng/kg | JK | U | 22 |
| E1001240 | SL0021 | E1001240-001 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-furan | 5.65 | ng/kg | J,D | DNR | 11 |
| E1001240 | SL0021 | E1001240-001 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin | 16.4 | ng/kg | JK,D | DNR | 11 |
| E1001240 | SL0021 | E1001240-001 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-furan | 2.85 | ng/kg | U,D | DNR | 11 |
| E1001240 | SL0021 | E1001240-001 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-furan | 2.19 | ng/kg | JK | U | 22 |
| E1001240 | SL0021 | E1001240-001 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin | 1.77 | ng/kg | U,D | DNR | 11 |
| E1001240 | SL0021 | E1001240-001 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-furan | 4.04 | ng/kg | U,D | DNR | 11 |
| E1001240 | SL0021 | E1001240-001 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin | 2.12 | ng/kg | U,D | DNR | 11 |
| E1001240 | SL0021 | E1001240-001 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-furan | 2.73 | ng/kg | U,D | DNR | 11 |
| E1001240 | SL0021 | E1001240-001 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-furan | 0.777 | ng/kg | JK | U | 22 |
| E1001240 | SL0021 | E1001240-001 | EPA1613B | 2,3,4,6,7,8-Hexachlorodibenzo-p-furan | 3.62 | ng/kg | U,D | DNR | 11 |
| E1001240 | SL0021 | E1001240-001 | EPA1613B | 2,3,4,7,8-Pentachlorodibenzo-p-furan | 2.95 | ng/kg | U,D | DNR | 11 |
| E1001240 | SL0021 | E1001240-001 | EPA1613B | 2,3,4,7,8-Pentachlorodibenzo-p-furan | 1 | ng/kg | JK | U | 22 |
| E1001240 | SL0021 | E1001240-001 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 2.02 | ng/kg | U,D | DNR | 11 |
| E1001240 | SL0021 | E1001240-001 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 0.347 | ng/kg | JK | U | 22 |
| E1001240 | SL0021 | E1001240-001 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 1.73 | ng/kg | U,D | DNR | 11 |
| E1001240 | SL0021 | E1001240-001 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 2.86 | ng/kg | C | DNR | 11 |
| E1001240 | SL0021 | E1001240-001 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 2.32 | ng/kg | D | DNR | 11 |
| E1001240 | SL0021 | E1001240-001 | EPA1613B | Octachlorodibenzo-p-dioxin | 18000 | ng/kg | BE | DNR | 20 |
| E1001240 | SL0021 | E1001240-001 | EPA1613B | Octachlorodibenzo-p-furan | 1330 | ng/kg | B,D | DNR | 11 |
| E1001240 | SL0022 | E1001240-002 | EPA1613B | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin | 1590 | ng/kg | B,D | DNR | 11 |
| E1001240 | SL0022 | E1001240-002 | EPA1613B | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-furan | 163 | ng/kg | D | DNR | 11 |
| E1001240 | SL0022 | E1001240-002 | EPA1613B | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-furan | 129 | ng/kg | | J | 10 |
| E1001240 | SL0022 | E1001240-002 | EPA1613B | 1,2,3,4,7,8,9-Heptachlorodibenzo-p-furan | 4.65 | ng/kg | U,D | DNR | 11 |
| E1001240 | SL0022 | E1001240-002 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin | 3.91 | ng/kg | J,D | DNR | 11 |
| E1001240 | SL0022 | E1001240-002 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-furan | 1.72 | ng/kg | U,D | DNR | 11 |
| E1001240 | SL0022 | E1001240-002 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin | 19.5 | ng/kg | JK,D | DNR | 11 |
| E1001240 | SL0022 | E1001240-002 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-furan | 1.49 | ng/kg | U,D | DNR | 11 |
| E1001240 | SL0022 | E1001240-002 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin | 12 | ng/kg | JK,D | DNR | 11 |
| E1001240 | SL0022 | E1001240-002 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-furan | 1.95 | ng/kg | U,D | DNR | 11 |
| E1001240 | SL0022 | E1001240-002 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin | 1.37 | ng/kg | U,D | DNR | 11 |
| E1001240 | SL0022 | E1001240-002 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin | 1.09 | ng/kg | JK | U | 22 |
| E1001240 | SL0022 | E1001240-002 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-furan | 1.54 | ng/kg | U,D | DNR | 11 |
| E1001240 | SL0022 | E1001240-002 | EPA1613B | 2,3,4,6,7,8-Hexachlorodibenzo-p-furan | 11.2 | ng/kg | J,D | DNR | 11 |
| E1001240 | SL0022 | E1001240-002 | EPA1613B | 2,3,4,7,8-Pentachlorodibenzo-p-furan | 1.6 | ng/kg | U,D | DNR | 11 |
| E1001240 | SL0022 | E1001240-002 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 1.57 | ng/kg | U,D | DNR | 11 |
| E1001240 | SL0022 | E1001240-002 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 0.336 | ng/kg | JK | U | 22 |
| E1001240 | SL0022 | E1001240-002 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 1.56 | ng/kg | K,D | U | 22 |
| E1001240 | SL0022 | E1001240-002 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 1.97 | ng/kg | U,D | DNR | 11 |
| E1001240 | SL0022 | E1001240-002 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 2.58 | ng/kg | C | DNR | 11 |
| E1001240 | SL0022 | E1001240-002 | EPA1613B | Octachlorodibenzo-p-dioxin | 18300 | ng/kg | BE | DNR | 20 |
| E1001240 | SL0022 | E1001240-002 | EPA1613B | Octachlorodibenzo-p-furan | 1340 | ng/kg | B,D | DNR | 11 |
| E1001240 | SL0023 | E1001240-003 | EPA1613B | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-furan | 2 | ng/kg | J | J | 10 |
| E1001240 | SL0023 | E1001240-003 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin | 0.97 | ng/kg | JK | U | 22 |
| E1001240 | SL0023 | E1001240-003 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 0.392 | ng/kg | CJK | DNR | 11 |

Qualified Data Summary Table
San Jacinto Big Star Soil Sampling

| SDG | Sample ID | Laboratory ID | Method | Analyte | Result | Units | Lab Qualifier | Validation Qualifier | Validation Reason |
|---|---|---|---|---|---|---|---|---|---|
| E1001240 | SL0024 | E1001240-004 | EPA1613B | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-furan | 8.08 | ng/kg | | J | 10 |
| E1001240 | SL0024 | E1001240-004 | EPA1613B | 1,2,3,4,7,8,9-Heptachlorodibenzo-p-furan | 0.522 | ng/kg | JK | U | 22 |
| E1001240 | SL0024 | E1001240-004 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin | 0.404 | ng/kg | JK | U | 22 |
| E1001240 | SL0024 | E1001240-004 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-furan | 0.266 | ng/kg | JK | U | 22 |
| E1001240 | SL0024 | E1001240-004 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 0.218 | ng/kg | JK | U | 22 |
| E1001240 | SL0024 | E1001240-004 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 1.24 | ng/kg | C | DNR | 11 |
| E1001240 | SL0025 | E1001240-005 | EPA1613B | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin | 777 | ng/kg | B,D | DNR | 11 |
| E1001240 | SL0025 | E1001240-005 | EPA1613B | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-furan | 50.6 | ng/kg | D | DNR | 11 |
| E1001240 | SL0025 | E1001240-005 | EPA1613B | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-furan | 38 | ng/kg | | J | 10 |
| E1001240 | SL0025 | E1001240-005 | EPA1613B | 1,2,3,4,7,8,9-Heptachlorodibenzo-p-furan | 2.85 | ng/kg | U,D | DNR | 11 |
| E1001240 | SL0025 | E1001240-005 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin | 1.15 | ng/kg | U,D | DNR | 11 |
| E1001240 | SL0025 | E1001240-005 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-furan | 5.94 | ng/kg | J,D | DNR | 11 |
| E1001240 | SL0025 | E1001240-005 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin | 11.6 | ng/kg | JK,D | DNR | 11 |
| E1001240 | SL0025 | E1001240-005 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-furan | 1.95 | ng/kg | U,D | DNR | 11 |
| E1001240 | SL0025 | E1001240-005 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin | 7.56 | ng/kg | JK,D | DNR | 11 |
| E1001240 | SL0025 | E1001240-005 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-furan | 2.38 | ng/kg | U,D | DNR | 11 |
| E1001240 | SL0025 | E1001240-005 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin | 0.943 | ng/kg | U,D | DNR | 11 |
| E1001240 | SL0025 | E1001240-005 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-furan | 1.39 | ng/kg | U,D | DNR | 11 |
| E1001240 | SL0025 | E1001240-005 | EPA1613B | 2,3,4,6,7,8-Hexachlorodibenzo-p-furan | 2.35 | ng/kg | U,D | DNR | 11 |
| E1001240 | SL0025 | E1001240-005 | EPA1613B | 2,3,4,7,8-Pentachlorodibenzo-p-furan | 1.5 | ng/kg | U,D | DNR | 11 |
| E1001240 | SL0025 | E1001240-005 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 1.65 | ng/kg | U,D | DNR | 11 |
| E1001240 | SL0025 | E1001240-005 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 1.81 | ng/kg | D | DNR | 11 |
| E1001240 | SL0025 | E1001240-005 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 2.1 | ng/kg | U,D | DNR | 11 |
| E1001240 | SL0025 | E1001240-005 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 2.15 | ng/kg | C | DNR | 11 |
| E1001240 | SL0025 | E1001240-005 | EPA1613B | Octachlorodibenzo-p-dioxin | 6510 | ng/kg | BE | DNR | 20 |
| E1001240 | SL0025 | E1001240-005 | EPA1613B | Octachlorodibenzo-p-furan | 593 | ng/kg | B,D | DNR | 11 |
| E1001240 | SL0026 | E1001240-006 | EPA1613B | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-furan | 13.8 | ng/kg | | J | 10 |
| E1001240 | SL0026 | E1001240-006 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin | 0.294 | ng/kg | JK | U | 22 |
| E1001240 | SL0026 | E1001240-006 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 0.253 | ng/kg | JK | U | 22 |
| E1001240 | SL0026 | E1001240-006 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 1.53 | ng/kg | C | DNR | 11 |
| E1001240 | SL0027 | E1001240-007 | EPA1613B | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-furan | 18.7 | ng/kg | | J | 10 |
| E1001240 | SL0027 | E1001240-007 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-furan | 1.51 | ng/kg | JK | U | 22 |
| E1001240 | SL0027 | E1001240-007 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-furan | 0.787 | ng/kg | JK | U | 22 |
| E1001240 | SL0027 | E1001240-007 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 0.197 | ng/kg | JK | U | 22 |
| E1001240 | SL0027 | E1001240-007 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 3.5 | ng/kg | C | DNR | 11 |
| E1001240 | SL0028 | E1001240-008 | EPA1613B | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin | 212 | ng/kg | B,D | DNR | 11 |
| E1001240 | SL0028 | E1001240-008 | EPA1613B | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-furan | 11.3 | ng/kg | | J | 10 |
| E1001240 | SL0028 | E1001240-008 | EPA1613B | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-furan | 15.3 | ng/kg | JK,D | DNR | 11 |
| E1001240 | SL0028 | E1001240-008 | EPA1613B | 1,2,3,4,7,8,9-Heptachlorodibenzo-p-furan | 1.95 | ng/kg | U,D | DNR | 11 |
| E1001240 | SL0028 | E1001240-008 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin | 1.41 | ng/kg | U,D | DNR | 11 |
| E1001240 | SL0028 | E1001240-008 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-furan | 1.8 | ng/kg | U,D | DNR | 11 |
| E1001240 | SL0028 | E1001240-008 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-furan | 1.74 | ng/kg | JK | U | 22 |
| E1001240 | SL0028 | E1001240-008 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin | 1.95 | ng/kg | U,D | DNR | 11 |
| E1001240 | SL0028 | E1001240-008 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-furan | 1.48 | ng/kg | U,D | DNR | 11 |
| E1001240 | SL0028 | E1001240-008 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin | 3.52 | ng/kg | JK,D | DNR | 11 |
| E1001240 | SL0028 | E1001240-008 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-furan | 1.63 | ng/kg | U,D | DNR | 11 |
| E1001240 | SL0028 | E1001240-008 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin | 1.51 | ng/kg | U,D | DNR | 11 |
| E1001240 | SL0028 | E1001240-008 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-furan | 1.77 | ng/kg | U,D | DNR | 11 |
| E1001240 | SL0028 | E1001240-008 | EPA1613B | 2,3,4,6,7,8-Hexachlorodibenzo-p-furan | 0.78 | ng/kg | JK | U | 22 |
| E1001240 | SL0028 | E1001240-008 | EPA1613B | 2,3,4,6,7,8-Hexachlorodibenzo-p-furan | 1.73 | ng/kg | U,D | DNR | 11 |
| E1001240 | SL0028 | E1001240-008 | EPA1613B | 2,3,4,7,8-Pentachlorodibenzo-p-furan | 1.91 | ng/kg | U,D | DNR | 11 |
| E1001240 | SL0028 | E1001240-008 | EPA1613B | 2,3,4,7,8-Pentachlorodibenzo-p-furan | 0.874 | ng/kg | JK | U | 22 |
| E1001240 | SL0028 | E1001240-008 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 1.29 | ng/kg | U,D | DNR | 11 |
| E1001240 | SL0028 | E1001240-008 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 1.73 | ng/kg | C | DNR | 11 |

Qualified Data Summary Table
San Jacinto Big Star Soil Sampling

| SDG | Sample ID | Laboratory ID | Method | Analyte | Result | Units | Lab Qualifier | Validation Qualifier | Validation Reason |
|---|---|---|---|---|---|---|---|---|---|
| E1001240 | SL0028 | E1001240-008 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 1.19 | ng/kg | D | DNR | 11 |
| E1001240 | SL0028 | E1001240-008 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 1.71 | ng/kg | U,D | DNR | 11 |
| E1001240 | SL0028 | E1001240-008 | EPA1613B | Octachlorodibenzo-p-dioxin | 4810 | ng/kg | BE | DNR | 20 |
| E1001240 | SL0028 | E1001240-008 | EPA1613B | Octachlorodibenzo-p-furan | 103 | ng/kg | B,D | DNR | 11 |
| E1001240 | FW0002 | E1001240-010 | EPA1613B | Octachlorodibenzo-p-dioxin | 4.31 | pg | JK | U | 22 |
| K1012914 | SL0001 | K1012914-001 | ICPMS_3050B | Arsenic | 0.92 | mg/kg | | J | 14 |
| K1012914 | SL0001 | K1012914-001 | ICPMS_3050B | Cadmium | 0.029 | mg/kg | | J | 14 |
| K1012914 | SL0001 | K1012914-002 | ICPMS_3050B | Arsenic | 0.92 | mg/kg | | J | 14 |
| K1012914 | SL0002 | K1012914-002 | ICPMS_3050B | Cadmium | 0.04 | mg/kg | | J | 14 |
| K1012914 | SL0002 | K1012914-002 | ICPAES_3050B | Silver | 0.5 | mg/kg | J | U | 7 |
| K1012914 | SL0009 | K1012914-009 | ICPMS_3050B | Cadmium | 0.045 | mg/kg | | J | 14 |
| K1012914 | SL0009 | K1012914-009 | ICPAES_3050B | Silver | 0.6 | mg/kg | J | U | 7 |
| K1012914 | SL0010 | K1012914-010 | ICPAES_3050B | Beryllium | 0.1 | mg/kg | J | U | 7 |
| K1012914 | SL0010 | K1012914-010 | ICPMS_3050B | Cadmium | 0.027 | mg/kg | | J | 14 |
| K1012914 | SL0010 | K1012914-010 | ICPAES_3050B | Silver | 0.7 | mg/kg | J | U | 7 |
| K1012914 | SL0018 | K1012914-017 | ICPAES_3050B | Silver | 0.5 | mg/kg | J | U | 7 |
| K1012914 | SL0019 | K1012914-018 | ICPAES_3050B | Silver | 0.9 | mg/kg | J | U | 7 |
| K1012914 | FW0001 | K1012914-029 | ICPMS_3050B | Arsenic | 0.07 | ug | J | U | 6 |
| K1012914 | FW0001 | K1012914-029 | ICPAES_3050B | Beryllium | 0.01 | ug | J | U | 7 |
| K1012914 | FW0001 | K1012914-029 | ICPMS_3050B | Cadmium | 0.003 | ug | J | U | 7 |
| K1012914 | FW0001 | K1012914-029 | ICPMS_3050B | Chromium | 2.6 | ug | | U | 6 |
| K1012914 | FW0001 | K1012914-029 | ICPAES_3050B | Copper | 1.6 | ug | | U | 6 |
| K1012914 | FW0001 | K1012914-029 | ICPAES_3050B | Thallium | 48 | ug | | U | 6 |
| K1012914 | FW0001 | K1012914-029 | ICPAES_3050B | Zinc | 66.9 | ug | | U | 6 |
| K1012914 | FW0002 | K1012914-030 | ICPMS_3050B | Arsenic | 0.09 | ug | J | U | 6 |
| K1012914 | FW0002 | K1012914-030 | ICPAES_3050B | Beryllium | 0.01 | mg/kg | J | U | 7 |
| K1012914 | FW0002 | K1012914-030 | ICPMS_3050B | Chromium | 2.06 | ug | X | U | 6 |
| K1012914 | FW0002 | K1012914-030 | ICPAES_3050B | Copper | 1.4 | mg/kg | | U | 6 |
| K1012914 | FW0002 | K1012914-030 | ICPAES_3050B | Thallium | 105 | mg/kg | | U | 6 |
| K1012914 | FW0002 | K1012914-030 | ICPAES_3050B | Zinc | 62 | mg/kg | | U | 6 |
| K1012914 | FW0003 | K1012914-031 | ICPMS_3050B | Cadmium | 0.002 | ug | J | U | 7 |
| K1012914 | SL0002 | K1012914-002 | SW8081A_3541 | 4,4'-DDT | 0.87 | ug/kg | JP | NJ | 3 |
| K1012914 | SL0009 | K1012914-009 | SW8082_3541 | Aroclor 1016 | 0.019 | mg/kg | U | UJ | 13 |
| K1012914 | SL0009 | K1012914-009 | SW8082_3541 | Aroclor 1221 | 0.019 | mg/kg | U | UJ | 13 |
| K1012914 | SL0009 | K1012914-009 | SW8082_3541 | Aroclor 1232 | 0.019 | mg/kg | U | UJ | 13 |
| K1012914 | SL0009 | K1012914-009 | SW8082_3541 | Aroclor 1242 | 0.019 | mg/kg | U | UJ | 13 |
| K1012914 | SL0009 | K1012914-009 | SW8082_3541 | Aroclor 1248 | 0.019 | mg/kg | U | UJ | 13 |
| K1012914 | SL0009 | K1012914-009 | SW8082_3541 | Aroclor 1254 | 0.019 | mg/kg | U | UJ | 13 |
| K1012914 | SL0009 | K1012914-009 | SW8082_3541 | Aroclor 1260 | 0.019 | mg/kg | U | UJ | 13 |
| K1012914 | SL0009 | K1012914-009 | SW8082_3541 | Aroclor 1262 | 0.019 | mg/kg | U | UJ | 13 |
| K1012914 | SL0009 | K1012914-009 | SW8082_3541 | Aroclor 1268 | 0.019 | mg/kg | U | UJ | 13 |
| K1012914 | SL0010 | K1012914-010 | SW8081A_3541 | 4,4'-DDT | 1.6 | ug/kg | JP | J | 3 |
| K1012914 | SL0018 | K1012914-017 | SW8081A_3541 | 4,4'-DDT | 1 | ug/kg | JP | J | 3 |
| K1012914 | SL0019 | K1012914-018 | SW8081A_3541 | 4,4'-DDT | 0.94 | ug/kg | JP | NJ | 3 |
| K1012914 | SL0020 | K1012914-019 | SW8081A_3541 | 4,4'-DDT | 1.2 | ug/kg | JP | NJ | 3 |
| K1012914 | SL0001 | K1012914-001 | SW8270C_3541 | Benzidine | 120 | ug/kg | U | R | 4 |
| K1012914 | SL0002 | K1012914-002 | SW8270C_3541 | Benzidine | 1200 | ug/kg | U | R | 4 |
| K1012914 | SL0009 | K1012914-009 | SW8270C_3541 | Benzidine | 120 | ug/kg | U | R | 4 |
| K1012914 | SL0010 | K1012914-010 | SW8270C_3541 | Benzidine | 120 | ug/kg | U | R | 4 |
| K1012914 | SL0017 | K1012914-016 | SW8270C_3541 | Benzidine | 1200 | ug/kg | U | R | 4 |
| K1012914 | SL0018 | K1012914-017 | SW8270C_3541 | Benzidine | 1300 | ug/kg | U | R | 4 |
| K1012914 | SL0019 | K1012914-018 | SW8270C_3541 | Benzidine | 1200 | ug/kg | U | R | 4 |
| K1012914 | SL0020 | K1012914-019 | SW8270C_3541 | Benzidine | 1200 | ug/kg | U | R | 4 |
| K1012914 | FW0001 | K1012914-029 | SW8270C_3541 | Benzidine | 4 | ug | U | R | 4 |

Qualified Data Summary Table
San Jacinto Big Star Soil Sampling

| SDG | Sample ID | Laboratory ID | Method | Analyte | Result | Units | Lab Qualifier | Validation Qualifier | Validation Reason |
|---|---|---|---|---|---|---|---|---|---|
| K1012914 | FW0001 | K1012914-029 | SW8270C_3541 | Diethyl phthalate | 0.52 | ug | | U | 6 |
| K1012914 | FW0001 | K1012914-029 | SW8270C_3541 | Di-n-butyl phthalate | 0.94 | ug | | U | 6 |
| K1012914 | FW0002 | K1012914-030 | SW8270C_3541 | 2,4,6-Trichlorophenol | 0.5 | ug | U | R | 13 |
| K1012914 | FW0002 | K1012914-030 | SW8270C_3541 | 2,4-Dichlorophenol | 0.5 | ug | U | R | 13 |
| K1012914 | FW0002 | K1012914-030 | SW8270C_3541 | 2,4-Dimethylphenol | 2 | ug | U | R | 13 |
| K1012914 | FW0002 | K1012914-030 | SW8270C_3541 | 2,4-Dinitrophenol | 4 | ug | U | R | 13 |
| K1012914 | FW0002 | K1012914-030 | SW8270C_3541 | 2-Chlorophenol | 0.5 | ug | U | R | 13 |
| K1012914 | FW0002 | K1012914-030 | SW8270C_3541 | 2-Nitrophenol | 0.5 | ug | U | R | 13 |
| K1012914 | FW0002 | K1012914-030 | SW8270C_3541 | 4,6-Dinitro-2-methylphenol | 2 | ug | U | R | 13 |
| K1012914 | FW0002 | K1012914-030 | SW8270C_3541 | 4-Chloro-3-methylphenol | 0.5 | ug | U | R | 13 |
| K1012914 | FW0002 | K1012914-030 | SW8270C_3541 | 4-Nitrophenol | 2 | ug | U | R | 13 |
| K1012914 | FW0002 | K1012914-030 | SW8270C_3541 | Benzidine | 4 | ug | U | R | 4 |
| K1012914 | FW0002 | K1012914-030 | SW8270C_3541 | Diethyl phthalate | 0.3 | ug | | U | 6 |
| K1012914 | FW0002 | K1012914-030 | SW8270C_3541 | Di-n-butyl phthalate | 1.7 | ug | | U | 6 |
| K1012914 | FW0002 | K1012914-030 | SW8270C_3541 | Pentachlorophenol | 1 | ug | U | R | 13 |
| K1012914 | FW0002 | K1012914-030 | SW8270C_3541 | Phenol | 0.5 | ug | U | R | 13 |
| K1012914 | FW0003 | K1012914-031 | SW8270C_3541 | Benzidine | 4 | ug | U | R | 4 |
| K1012914 | SL0001 | K1012914-001 | EPA8260B | Methylene Chloride | 4.6 | ug/kg | J | U | 7 |
| K1012914 | SL0002 | K1012914-002 | EPA8260B | Methylene Chloride | 5.1 | ug/kg | J | U | 7 |
| K1012914 | SL0009 | K1012914-009 | EPA8260B | Methylene Chloride | 5.3 | ug/kg | J | U | 7 |
| K1012914 | SL0010 | K1012914-010 | EPA8260B | Methylene Chloride | 5.1 | ug/kg | J | U | 7 |
| K1012914 | SL0017 | K1012914-016 | EPA8260B | Methylene Chloride | 9.7 | ug/kg | J | U | 7 |
| K1012914 | SL0018 | K1012914-017 | EPA8260B | Methylene Chloride | 10 | ug/kg | J | U | 7 |
| K1012914 | SL0019 | K1012914-018 | EPA8260B | Methylene Chloride | 8.1 | ug/kg | J | U | 7 |
| K1012914 | SL0020 | K1012914-019 | EPA8260B | Methylene Chloride | 8.1 | ug/kg | J | U | 7 |

Integral Consulting Inc.
1205 West Bay Drive NW
Olympia, WA 98502

telephone: 360.705.3534
facsimile: 360.705.3669
www.integral-corp.com

# MEMORANDUM

| | |
|---|---|
| **To:** | File |
| **From:** | Craig Hutchings |
| **Date:** | January 11, 2011 |
| **Subject:** | Data Quality Assessment - Big Star Property Soils Asbestos Data |
| **Project No.:** | C643-1003 |

This memorandum documents the data quality assessment of asbestos data of eight soil samples collected from the Big Star Property in support of the Time Critical Removal Action (TCRA) at the San Jacinto River Waste Pits (SJRWP) Superfund Site. These samples were collected to gain information on the possible presence of priority pollutant list chemicals in the area to be used in the performance of the TCRA.

The samples were analyzed by EMSL Analytical, Inc. of San Leandro, California by EPA method 600/R-93/116 using polarized light microscopy with preparation by CARB 435 (milling). Project-specific data quality objectives for asbestos were not specified in the Removal Action Work Plan(RAWP) (Anchor 2010), RAWP addendum (Anchor QEA and Integral 2010), or the draft Soil Sampling Plan (Integral 2010); therefore, asbestos data quality was assessed based on the information provided in the referenced analytical methods, data package completeness, sample handling and holding times, and field replicates. The list of samples analyzed for asbestos are provided in Table 1.

Table 1. Big Star Soil Samples

| Sample | Laboratory ID | Date Sampled |
|---|---|---|
| SL0001 | 091010094-0001 | 11/15/2010 |
| SL0002 | 091010094-0002 | 11/15/2010 |
| SL0009 | 091010094-0003 | 11/15/2010 |
| SL0010 | 091010094-0004 | 11/15/2010 |
| SL0017 | 091010094-0005 | 11/15/2010 |

| | | |
|---|---|---|
| SL0018 | 091010094-0006 | 11/15/2010 |
| SL0019 | 091010094-0007 | 11/15/2010 |
| SL0020 | 091010094-0008 | 11/15/2010 |

### Data Package Completeness

The data package was complete and included a summary of sample results, laboratory bench sheets, and the sample chain-of-custody form. Copies of the laboratory bench sheets were reviewed and no transcription errors were noted.

### Sample Receipt and Holding Time

Samples were received in good condition with complete chain-of-custody forms. All analyses took place within the 180 day holding time specified in the RAWP addendum (Anchor QEA and Integral 2010).

### Analytical Method and Reporting Limits

The requested analytical methods were performed and the requested analytical sensitivity of 0.25% was achieved.

### Field Replicates

Two sets of field duplicates were submitted: Samples SL0017 and SL0018 (SJTS009-A) and SL0019 and SL0020 (SJST009-B). No asbestos was detected in any sample and precision was determined to be acceptable.

### Overall Assessment

All data, as reported, are acceptable for their intended use.

## REFERENCES

Anchor QEA, 2010. Draft Removal Action Work Plan San Jacinto River Waste Pits Superfund Site. Prepared for McGinnes Industrial Maintenance Corporation, International Paper Company, and U.S. Environmental Protection Agency, Region 6. Anchor QEA, Ocean Springs, MS.

Anchor QEA and Integral, 2010. Draft Addendum to the Removal Action Work Plan (RAWP) for the Time Critical Removal Action (TCRA), San Jacinto River Waste Pits

Superfund Site. October 28, 2010. Prepared for McGinnes Industrial Maintenance Corporation, International Paper Company, and U.S. Environmental Protection Agency, Region 6. Anchor QEA, Ocean Springs, MS, and Integral Consulting Inc., Seattle, WA.

Integral, 2010. Draft Sampling and Analysis Plan: Soil Study. San Jacinto River Waste Pits Superfund Site. Prepared for McGinnes Industrial Maintenance Corporation, International Paper Company, and U.S. Environmental Protection Agency, Region 6. Integral Consulting Inc., Seattle, WA.

EcoChem, INC.
Environmental Data Quality

# DATA VALIDATION REPORT

## SAN JACINTO RIVER WASTE PITS
## Guardrail TCLP Sample

**Prepared for:**

Integral Consulting, Inc.
1205 West Bay Dr. NW
Olympia, Washington 98502

**Prepared by:**

EcoChem, Inc.
710 Second Avenue, Suite 660
Seattle, Washington 98104

EcoChem Project: C22130-10

May 2, 2011

**Approved for Release**

Melissa Swanson

## Basis for Data Validation

This report summarizes the results of summary validation (Stage 2B) performed on soil and quality control (QC) sample data collected for the San Jacinto River Guardrail TCLP project. The sample ID is provided in the **Sample Index**.

The sample was analyzed by Columbia Analytical Services, Inc., Kelso, Washington. The analytical methods and EcoChem project chemists are listed below.

| Analysis | Method of Analysis | Primary Review | Secondary Review |
|---|---|---|---|
| Metals (TCLP – Iron only) | SW6010C | J. Maute | M. Swanson |

The data were reviewed using guidance and quality control criteria documented in the analytical methods; the *Sampling and Analysis Plan: Soil Study San Jacinto River Waste Pits Superfund Site* (Integral, December 2010); and *USEPA National Functional Guidelines for Inorganic Data Review* (USEPA, October 2004).

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

Data qualifier validation criteria are included as **Appendix A**. Data Validation Worksheets will be kept on file at EcoChem, Inc. A qualified laboratory electronic data deliverable (EDD) was also submitted with this report.

Sample Index
San Jacinto River Waste Pits
Guardrail TCLP Sample

| SDG | Sample ID | Laboratory ID | Iron |
|---|---|---|---|
| K1102664 | SJWC01-032811 | K1102664-001 | ✓ |

# DATA VALIDATION REPORT
# San Jacinto River Waste Pits
# Guardrail TCLP Sample
# Lead by Method SW6010C

This report documents the review of analytical data from the analyses of one soil sample and the associated laboratory quality control (QC) samples. Columbia Analytical Services, Inc., Kelso, Washington analyzed the samples. Refer to the Sample Index for a complete list of samples.

| SDG | Number of Samples | Validation Level |
|---|---|---|
| K1102664 | 1 Soil | Stage 2B |

## I. DATA PACKAGE COMPLETENESS

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

## I. EDD TO HARDCOPY VERIFICATION

Ten percent (10%) of the results in the laboratory EDD were verified by comparison to the hardcopy laboratory data package. No errors were noted.

## III. TECHNICAL DATA VALIDATION

The QC requirements that were reviewed are listed below.

| | | |
|---|---|---|
| 1 | Sample Receipt, Preservation, and Holding Times | Matrix Spike Sample |
| | Initial Calibration | Laboratory Duplicates |
| | Continuing Calibration Verification | Interference Check Samples |
| | CRDL Standards | Serial Dilutions |
| | Laboratory Blanks | Reporting Limits (MDL and MRL) |
| | Laboratory Control Sample (LCS) | Reported Results |

[1] ***Quality control results are discussed below, but no data were qualified***
[2] ***Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed below.***

### Sample Receipt, Preservation, and Holding Times

As stated in validation guidance documents, sample shipping coolers should arrive at the laboratory within the advisory temperature range of 2° to 6°C. The laboratory received the sample cooler with a temperature less than the lower limit, at 0.0°C. The outlier did not impact data quality; no data were qualified.

## IV. OVERALL ASSESSMENT

As determined by this evaluation, the laboratory followed the specified analytical method. Accuracy was acceptable, as demonstrated by the laboratory control sample (LCS) and matrix spike sample (MS) recovery values. Precision was acceptable as demonstrated by the laboratory duplicate relative percent difference (RPD) value.

No data were qualified for any reason.

All data, as reported, are acceptable for use.

EcoChem, INC.
Environmental Data Quality

# APPENDIX A
# CRITERIA TABLES

# EcoChem Validation Guidelines for Metals Analysis by ICP (Based on Inorganic NFG 1994 & 2004)

| VALIDATION QC ELEMENT | ACCEPTANCE CRITERIA | ACTION | REASON CODE |
|---|---|---|---|
| Cooler Temperature and Preservation | Cooler temperature: 4°C ±2°<br>Waters: Nitric Acid to pH < 2<br>For Dissolved Metals: 0.45um filter & preserve after filtration<br>Tissues: Frozen | EcoChem Professional Judgment - no qualification based on cooler temperature outliers<br>J(+)/UJ(-) if pH preservation requirements are not met | 1 |
| Holding Time | 180 days from date sampled<br>Frozen tissues - HT extended to 2 years | J(+)/UJ(-) if holding time exceeded | 1 |
| Initial Calibration | Blank + minimum 1 standard<br>If more than 1 standard, r > 0.995 | J(+)/UJ(-) if r < 0.995 (multi point cal) | 5A |
| Initial Calibration Verification (ICV) | Independent source analyzed immediately after calibration<br>%R within ±10% of true value | J(+)/UJ(-) if %R 75-89%<br>J(+) if %R = 111-125%<br>R(+) if %R > 125%<br>R(+/-) if %R < 75% | 5A |
| Continuing Calibration Verification (CCV) | Every ten samples, immediately following ICV/ICB and at end of run<br>%R within ±10% of true value | J(+)/UJ(-) if %R = 75-89%<br>J(+) if %R 111-125%<br>R(+) if %R > 125%<br>R(+/-) if %R < 75% | 5B |
| Initial and Continuing Calibration Blank (ICB/CCB) | After each ICV and CCV<br>every ten samples and end of run<br>\| blank \| < IDL (MDL) | Action level is 5x absolute value of blank conc.<br>For (+) blanks, U(+) results < action level<br>For (-) blanks, J(+)/UJ(-) results < action level<br>(Refer to TM-02 for additional information) | 7 |
| Reporting Limit Standard | 2x RL analyzed beginning of run<br>Not required for Al, Ba, Ca, Fe, Mg, Na, K<br>%R = 70%-130% (50%-150% Sb, Pb, Tl) | R(-)/J(+) < 2x RL if %R <50% (< 30% Sb, Pb, Tl)<br>J(+) < 2x RL, UJ(-) if %R 50-69% (30-49% Sb, Pb,Tl)<br>J(+) < 2x RL if %R 130-180% (150-200% Sb, Pb, Tl)<br>R(+) < 2x RL if %R > 180% (200% Sb, Pb, Tl) | 14 |
| Interference Check Samples (ICSA/ICSAB) | ICSAB %R 80 - 120% for all spiked elements<br>\| ICSA \| < MDL for all unspiked elements except: K, Na | For samples with Al, Ca, Fe, or Mg > ICS levels<br>R(+/-) if %R < 50%<br>J(+) if %R >120%<br>J(+)/UJ(-) if %R= 50 to 79%<br>Use Professional Judgment for ICSA to determine if bias is present<br>see TM-09 for additional details | 17 |
| Method Blank | One per matrix per batch<br>(batch not to exceed 20 samples)<br>blank < MDL | Action level is 5x blank concentration<br>U(+) results < action level | 7 |
| Laboratory Control Sample (LCS) | One per matrix per batch<br>Blank Spike: %R within 80-120% | R(+/-) if %R < 50%<br>J(+)/UJ(-) if %R = 50-79%<br>J(+) if %R >120% | 10 |
| | CRM: Result within manufacturer's certified acceptance range or project guidelines | J(+)/UJ(-) if < LCL,<br>J(+) if > UCL | |



Copyright 2006 EcoChem, Inc.

# EcoChem Validation Guidelines for Metals Analysis by ICP
# (Based on Inorganic NFG 1994 & 2004)

| VALIDATION QC ELEMENT | ACCEPTANCE CRITERIA | ACTION | REASON CODE |
|---|---|---|---|
| Matrix Spikes | One per matrix per batch<br>75-125% for samples less than 4x spike level | J(+) if %R > 125%<br>J(+)/UJ(-) if %R < 75%<br>J(+)/R(-) if %R < 30% or<br>J(+)/UJ(-) if Post Spike %R 75-125%<br>Qualify all samples in batch | 8 |
| Post-digestion Spike | If Matrix Spike is outside 75-125%,<br>spike at twice the sample conc. | No qualifiers assigned based on this element | |
| Laboratory Duplicate (or MS/MSD) | One per matrix per batch<br>RPD < 20% for samples > 5x RL<br>Diff < RL for samples >RL and < 5x RL<br>(Diff < 2x RL for solids) | J(+)/UJ(-) if RPD > 20% or diff > RL (2x RL for solids)<br>qualify all samples in batch | 9 |
| Serial Dilution | 5x dilution one per matrix<br>%D < 10% for original sample conc. > 50x MDL | J(+)/UJ(-) if %D >10%<br>qualify all samples in batch | 16 |
| Field Blank | Blank < MDL | Action level is 5x blank conc.<br>U(+) sample values < action level<br>in associated field samples only | 6 |
| Field Duplicate | For results > 5x RL:<br>Water: RPD < 35% Solid: RPD < 50%<br>For results < 5 x RL:<br>Water: Diff < RL Solid: Diff < 2x RL | J(+)/UJ(-) in parent samples only | 9 |
| Linear Range | Sample concentrations must fall within range | J values over range | 20 |



Copyright 2006 EcoChem, Inc.

EcoChem, INC.
Environmental Data Quality

# DATA VALIDATION REPORT - ADDENDUM

## SAN JACINTO RIVER WASTE PITS
## Soil Study

**Prepared for:**

Integral Consulting, Inc.
1205 West Bay Dr. NW
Olympia, Washington 98502

**Prepared by:**

EcoChem, Inc.
710 Second Avenue, Suite 660
Seattle, Washington 98104

EcoChem Project: C22130-8

June 7, 2011

**Approved for Release**

Melissa Swanson

## Basis for Data Validation

This report summarizes the results of the validation (Stage 2B) performed on soil and quality control (QC) sample data for the San Jacinto River Soil Study. A complete list of samples is provided in the **Sample Index**. Laboratory batch ID numbers and associated level of validation are provided at the beginning of each technical section

Samples were analyzed by Columbia Analytical Services, Inc., Kelso, Washington. The analytical method and EcoChem project chemists are listed below.

| Analysis | Method of Analysis | Primary Review | Secondary Review |
|---|---|---|---|
| Volatile Organic Compounds | SW8260C | G. Esler | M. Swanson |

The data were reviewed using guidance and quality control criteria documented in the analytical methods; the *Sampling and Analysis Plan: Soil Study San Jacinto River Waste Pits Superfund Site* (Integral, December 2010) and *National Functional Guidelines for Organic Data Review* (USEPA 1999, 2008).

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

Data validation criteria are included as **Appendix A**. Data Validation Worksheets will be kept on file at EcoChem, Inc. A qualified laboratory electronic data deliverable (EDD) was also submitted with this report.

Sample Index
San Jacinto River Waste Pits - Soil Study
CAS Kelso

| SDG | Sample ID | Laboratory ID | Matrix | VOC |
|---|---|---|---|---|
| K1101236 | SL0060 | K1101236-001 | Soil | ✓ |
| K1101236 | SL0061 | K1101236-002 | Soil | ✓ |
| K1101236 | SL0062 | K1101236-003 | Soil | ✓ |
| K1101236 | SL0063 | K1101236-004 | Soil | ✓ |
| K1101236 | SL0064 | K1101236-005 | Soil | ✓ |
| K1101236 | SL0065 | K1101236-006 | Soil | ✓ |
| K1101236 | SL0066 | K1101236-007 | Soil | ✓ |
| K1101236 | SL0067 | K1101236-008 | Soil | ✓ |
| K1101236 | SL0068 | K1101236-009 | Soil | ✓ |
| K1101236 | SL0069 | K1101236-010 | Soil | ✓ |
| K1101236 | SL0070 | K1101236-011 | Soil | ✓ |
| K1101236 | SL0071 | K1101236-012 | Soil | ✓ |
| K1101236 | SL0072 | K1101236-013 | Soil | ✓ |
| K1101236 | SL0073 | K1101236-014 | Soil | ✓ |
| K1101236 | SL0074 | K1101236-015 | Soil | ✓ |
| K1101236 | SL0075 | K1101236-016 | Soil | ✓ |
| K1101236 | SL0076 | K1101236-017 | Soil | ✓ |
| K1101236 | SL0077 | K1101236-018 | Soil | ✓ |
| K1101236 | SL0078 | K1101236-019 | Soil | ✓ |
| K1101236 | SL0079 | K1101236-020 | Soil | ✓ |
| K1101236 | SL0080 | K1101236-021 | Soil | ✓ |
| K1101241 | SL0091 | K1101241-001 | Soil | ✓ |
| K1101241 | SL0092 | K1101241-002 | Soil | ✓ |
| K1101241 | SL0093 | K1101241-003 | Soil | ✓ |
| K1101241 | SL0094 | K1101241-004 | Soil | ✓ |
| K1101241 | SL0095 | K1101241-005 | Soil | ✓ |
| K1101241 | SL0096 | K1101241-006 | Soil | ✓ |
| K1101241 | SL0097 | K1101241-007 | Soil | ✓ |
| K1101241 | SL0098 | K1101241-008 | Soil | ✓ |
| K1101241 | SL0099 | K1101241-009 | Soil | ✓ |
| K1101241 | SL0100 | K1101241-010 | Soil | ✓ |
| K1101241 | SL0101 | K1101241-011 | Soil | ✓ |
| K1101241 | SL0102 | K1101241-012 | Soil | ✓ |
| K1101241 | SL0103 | K1101241-013 | Soil | ✓ |
| K1101241 | SL0104 | K1101241-014 | Soil | ✓ |
| K1101241 | SL0105 | K1101241-015 | Soil | ✓ |
| K1101241 | SL0106 | K1101241-016 | Soil | ✓ |
| K1101241 | SL0107 | K1101241-017 | Soil | ✓ |
| K1101241 | SL0109 | K1101241-019 | Soil | ✓ |
| K1101241 | SL0110 | K1101241-020 | Soil | ✓ |
| K1101241 | SL0111 | K1101241-021 | Soil | ✓ |
| K1101241 | SL0112 | K1101241-022 | Soil | ✓ |

# DATA VALIDATION REPORT
# San Jacinto River Waste Pits
# Soil Study
# Volatile Organic Compounds by Method SW8260C

This report documents the review of analytical data from the analyses of soil samples and the associated laboratory and field quality control (QC) samples. Samples were analyzed by Columbia Analytical Services, Inc., Kelso, Washington. Refer to the **Sample Index** for a complete list of samples

| SDG | Number of Samples | Validation Level |
|---|---|---|
| K1101236 | 21 Soil | Stage 2B |
| K1101241 | 21 Soil | Stage 2B |

## I. DATA PACKAGE COMPLETENESS

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

***SDGs K1101236 & K1101241:*** In the initial submission of data for these SDG the analyte 1,2,3,-trichlorobenzene was not included. The laboratory resubmitted these SDG for this analyte.

## II. EDD TO HARDCOPY VERIFICATION

Ten percent (10%) of the results in the laboratory electronic data deliverable (EDD) were verified by comparison to the hardcopy laboratory data package. No errors were noted.

## III. TECHNICAL DATA VALIDATION

The quality control (QC) requirements that were reviewed are listed in the following table.

| | | | |
|---|---|---|---|
| 1 | Sample Receipt, Preservation, and Holding Times | | Matrix Spikes/Matrix Spike Duplicates (MS/MSD) |
| | GC/MS Instrument Performance Check | | Laboratory Control Samples (LCS/LCSD) |
| | Initial Calibration (ICAL) | 1 | Field Replicates |
| | Continuing Calibration (CCAL) | | Internal Standards |
| | Laboratory Blanks | | Reporting Limits |
| | Field (Trip) Blanks | | Reported Results |
| | Surrogate Compounds | | |

[1] ***Quality control results are discussed below, but no data were qualified.***
[2] ***Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed below.***

## Sample Receipt, Preservation, and Holding Times

The validation guidance documents state that sample shipping coolers should arrive at the laboratory within the advisory temperature range of 2° to 6°C. The laboratory received sample coolers with temperatures less than the lower limit, the lowest at -0.6°C. These outliers did not impact data quality; no data were qualified.

## Field Replicates

The following acceptance criteria were used to evaluate precision: the relative percent difference (RPD) control limit is 50% for results greater than 5x the reporting limit (RL). The absolute difference between the sample and replicate must be less than 2x the RL for results less than 5x the RL. No data were qualified based on field replicate precision outliers. Data users should consider the impact of field precision outliers on the reported results.

***SDG K1101236:*** One pair of field replicates was submitted, Samples SL0062 & SL0063. The analyte 1,2,3-trichlorobenzene was not detected in either sample, field precision was acceptable.

***SDG K1101241:*** One pair of field replicates was submitted, Samples SL0093 & SL0095. The analyte 1,2,3-trichlorobenzene was not detected in either sample, field precision was acceptable.

## OVERALL ASSESSMENT

As determined by this evaluation, the laboratory followed the specified analytical method. Accuracy was acceptable as demonstrated by the surrogate, matrix spike/matrix spike duplicate (MS/MSD), and laboratory control sample/laboratory control sample duplicate (LCS/LCSD) percent recovery values. Precision was also acceptable as demonstrated by the MS/MSD, LCS/LCSD, and field replicate RPD values.

No data were qualified for any reason.

All data, as reported, are acceptable for use.

EcoChem, INC.
Environmental Data Quality

# APPENDIX A
# CRITERIA TABLES

# EcoChem Validation Guidelines for Volatile Analysis by GC/MS (Based on Organic NFG 1999)

| VALIDATION QC ELEMENT | ACCEPTANCE CRITERIA | ACTION | REASON CODE |
|---|---|---|---|
| Cooler Temperature | 4°C±2°C<br>Water: HCl to pH < 2 | J(+)/UJ(-) if greater than 6 deg. C (EcoChem PJ) | 1 |
| Hold Time | Waters: 14 days preserved<br>7 Days: unpreserved (for aromatics)<br><br>Solids: 14 Days | J(+)/UJ(-) if hold times exceeded<br>If exceeded by > 3X HT: J(+)/R(-) (EcoChem PJ) | 1 |
| Tuning | BFB<br>Beginning of each 12 hour period<br>Method acceptance criteria | R(+/-) all analytes in all samples associated with the tune | 5A |
| Initial Calibration (Minimum 5 stds.) | RRF > 0.05 | (EcoChem PJ, see TM-06)<br>If MDL= reporting limit:<br>J(+)/R(-) if RRF < 0.05<br><br>If reporting limit > MDL:<br>note in worksheet if RRF <0.05 | 5A |
| | %RSD < 30% | (EcoChem PJ, see TM-06)<br>J(+) if %RSD > 30% | 5A |
| Continuing Calibration (Prior to each 12 hr. shift) | RRF > 0.05 | (EcoChem PJ, see TM-06)<br>If MDL= reporting limit:<br>J(+)/R(-) if RRF < 0.05<br><br>If reporting limit > MDL:<br>note in worksheet if RRF <0.05 | 5B |
| | %D <25% | (EcoChem PJ, see TM-06)<br>If > +/-90%: J+/R-<br>If -90% to -26%: J+ (high bias)<br>If 26% to 90%: J+/UJ- (low bias) | 5B |
| Method Blank | One per matrix per batch<br>No results > CRQL | U(+) if sample (+) result is less than CRQL and less than appropriate 5X or 10X rule (raise sample value to CRQL) | 7 |
| | | U(+) if sample (+) result is greater than or equal to CRQL and less than appropriate 5X and 10X rule (at reported sample value) | 7 |
| | No TICs present | R(+) TICs using 10X rule | 7 |
| Storage Blank | One per SDG<br><CRQL | U(+) the specific analyte(s) results in all assoc.samples using the 5x or 10x rule | 7 |
| Trip Blank | Frequency as per project QAPP | Same as method blank for positive results remaining in trip blank after method blank qualifiers are assigned | 18 |
| Field Blanks (if required in QAPP) | No results > CRQL | Apply 5X/10X rule; U(+) < action level | 6 |



Copyright 2005 EcoChem, Inc.

# EcoChem Validation Guidelines for Volatile Analysis by GC/MS (Based on Organic NFG 1999)

| VALIDATION QC ELEMENT | ACCEPTANCE CRITERIA | ACTION | REASON CODE |
|---|---|---|---|
| MS/MSD (recovery) | One per matrix per batch<br>Use method acceptance criteria | Qualify parent only unless other QC indicates systematic problems:<br>J(+) if both %R > UCL<br>J(+)/UJ(-) if both %R < LCL<br>J(+)/R(-) if both %R < 10%<br>PJ if only one %R outlier | 8 |
| MS/MSD (RPD) | One per matrix per batch<br>Use method acceptance criteria | J(+) in parent sample if RPD > CL | 9 |
| LCS<br>*low conc. H2O VOA* | One per lab batch<br>Within method control limits | J(+) assoc. cmpd if > UCL<br>J(+)/R(-) assoc. cmpd if < LCL<br>J(+)/R(-) all cmpds if half are < LCL | 10 |
| LCS<br>*regular VOA (H2O & solid)* | One per lab batch<br>Lab or method control limits | J(+) if %R > UCL J(+)/UJ(-) if %R <LCL<br>J(+)/R(-) if %R < 10% (EcoChem PJ) | 10 |
| LCS/LCSD<br>*(if required)* | One set per matrix and batch of 20 samples<br>RPD < 35% | J(+)/UJ(-) assoc. cmpd. in all samples | 9 |
| Surrogates | Added to all samples<br>Within method control limits | J(+) if %R >UCL<br>J(+)/UJ(-) if %R <LCL but >10% (see PJ[1])<br>J(+)/R(-) if <10% | 13 |
| Internal Standard (IS) | Added to all samples<br>Acceptable Range: IS area 50% to 200% of CCAL area<br>RT within 30 seconds of CC RT | J(+) if > 200%<br>J(+)/UJ(-) if < 50%<br>J(+)/R(-) if < 25%<br>RT>30 seconds, narrate and Notify PM | 19 |
| Field Duplicates | Use QAPP limits. If no QAPP:<br>Solids: RPD <50%<br>OR absolute diff. < 2X RL (for results < 5X RL)<br><br>Aqueous: RPD <35%<br>OR absolute diff. < 1X RL (for results < 5X RL) | Narrate and qualify if required by project<br>(EcoChem PJ) | 9 |
| TICs | Major ions (>10%) in reference must be present in sample; intensities agree within 20%; check identification | NJ the TIC unless:<br>R(+) common laboratory contaminants<br>See Technical Director for ID issues | 4 |
| Quantitation/ Identification | RRT within 0.06 of standard RRT<br>Ion relative intensity within 20% of standard<br>All ions in std. at > 10% intensity must be present in sample | See Technical Director if outliers | 14<br>21 (false +) |

**PJ[1]** No action if there are 4+ surrogates and only 1 outlier.



Copyright 2005 EcoChem, Inc.

# EcoChem Validation Guidelines for Volatile Analysis by GC/MS (Based on Organic NFG 1999)

| VALIDATION QC ELEMENT | ACCEPTANCE CRITERIA | ACTION | REASON CODE |
|---|---|---|---|
| Cooler Temperature | 4°C±2°C<br>Water: HCl to pH < 2 | J(+)/UJ(-) if greater than 6 deg. C (EcoChem PJ) | 1 |
| Hold Time | Waters: 14 days preserved<br>7 Days: unpreserved (for aromatics)<br><br>Solids: 14 Days | J(+)/UJ(-) if hold times exceeded<br>If exceeded by > 3X HT: J(+)/R(-) (EcoChem PJ) | 1 |
| Tuning | BFB<br>Beginning of each 12 hour period<br>Method acceptance criteria | R(+/-) all analytes in all samples associated with the tune | 5A |
| Initial Calibration (Minimum 5 stds.) | RRF > 0.05 | (EcoChem PJ, see TM-06)<br>If MDL= reporting limit:<br>J(+)/R(-) if RRF < 0.05<br><br>If reporting limit > MDL:<br>note in worksheet if RRF <0.05 | 5A |
| | %RSD < 30% | (EcoChem PJ, see TM-06)<br>J(+) if %RSD > 30% | 5A |
| Continuing Calibration (Prior to each 12 hr. shift) | RRF > 0.05 | (EcoChem PJ, see TM-06)<br>If MDL= reporting limit:<br>J(+)/R(-) if RRF < 0.05<br><br>If reporting limit > MDL:<br>note in worksheet if RRF <0.05 | 5B |
| | %D <25% | (EcoChem PJ, see TM-06)<br>If > +/-90%: J+/R-<br>If -90% to -26%: J+ (high bias)<br>If 26% to 90%: J+/UJ- (low bias) | 5B |
| Method Blank | One per matrix per batch<br>No results > CRQL | U(+) if sample (+) result is less than CRQL and less than appropriate 5X or 10X rule (raise sample value to CRQL) | 7 |
| | | U(+) if sample (+) result is greater than or equal to CRQL and less than appropriate 5X and 10X rule (at reported sample value) | 7 |
| | No TICs present | R(+) TICs using 10X rule | 7 |
| Storage Blank | One per SDG<br><CRQL | U(+) the specific analyte(s) results in all assoc.samples using the 5x or 10x rule | 7 |
| Trip Blank | Frequency as per project QAPP | Same as method blank for positive results remaining in trip blank after method blank qualifiers are assigned | 18 |
| Field Blanks (if required in QAPP) | No results > CRQL | Apply 5X/10X rule; U(+) < action level | 6 |



Copyright 2005 EcoChem, Inc.

# EcoChem Validation Guidelines for Volatile Analysis by GC/MS (Based on Organic NFG 1999)

| VALIDATION QC ELEMENT | ACCEPTANCE CRITERIA | ACTION | REASON CODE |
|---|---|---|---|
| MS/MSD (recovery) | One per matrix per batch<br>Use method acceptance criteria | Qualify parent only unless other QC indicates systematic problems:<br>J(+) if both %R > UCL<br>J(+)/UJ(-) if both %R < LCL<br>J(+)/R(-) if both %R < 10%<br>PJ if only one %R outlier | 8 |
| MS/MSD (RPD) | One per matrix per batch<br>Use method acceptance criteria | J(+) in parent sample if RPD > CL | 9 |
| LCS<br>*low conc. H2O VOA* | One per lab batch<br>Within method control limits | J(+) assoc. cmpd if > UCL<br>J(+)/R(-) assoc. cmpd if < LCL<br>J(+)/R(-) all cmpds if half are < LCL | 10 |
| LCS<br>*regular VOA (H2O & solid)* | One per lab batch<br>Lab or method control limits | J(+) if %R > UCL J(+)/UJ(-) if %R <LCL<br>J(+)/R(-) if %R < 10% (EcoChem PJ) | 10 |
| LCS/LCSD<br>*(if required)* | One set per matrix and batch of 20 samples<br>RPD < 35% | J(+)/UJ(-) assoc. cmpd. in all samples | 9 |
| Surrogates | Added to all samples<br>Within method control limits | J(+) if %R >UCL<br>J(+)/UJ(-) if %R <LCL but >10% (see PJ[1])<br>J(+)/R(-) if <10% | 13 |
| Internal Standard (IS) | Added to all samples<br>Acceptable Range: IS area 50% to 200% of CCAL area<br>RT within 30 seconds of CC RT | J(+) if > 200%<br>J(+)/UJ(-) if < 50%<br>J(+)/R(-) if < 25%<br>RT>30 seconds, narrate and Notify PM | 19 |
| Field Duplicates | Use QAPP limits. If no QAPP:<br>Solids: RPD <50%<br>OR absolute diff. < 2X RL (for results < 5X RL)<br><br>Aqueous: RPD <35%<br>OR absolute diff. < 1X RL (for results < 5X RL) | Narrate and qualify if required by project<br>(EcoChem PJ) | 9 |
| TICs | Major ions (>10%) in reference must be present in sample; intensities agree within 20%; check identification | NJ the TIC unless:<br>R(+) common laboratory contaminants<br>See Technical Director for ID issues | 4 |
| Quantitation/ Identification | RRT within 0.06 of standard RRT<br>Ion relative intensity within 20% of standard<br>All ions in std. at > 10% intensity must be present in sample | See Technical Director if outliers | 14<br>21 (false +) |

**PJ[1]** No action if there are 4+ surrogates and only 1 outlier.



Copyright 2005 EcoChem, Inc.

EcoChem, INC.
Environmental Data Quality

# DATA VALIDATION REPORT

## SAN JACINTO RIVER WASTE PITS
## Radiochemistry Study

**Prepared for:**

Anchor QEA, LLC.
720 Olive Way, Suite 1900
Seattle, Washington 98101

**Prepared by:**

EcoChem, Inc.
710 Second Avenue, Suite 660
Seattle, Washington 98104

EcoChem Project: C20709-1

August 22, 2011

**Approved for Release**

Melissa Swanson

## Basis for Data Validation

This report summarizes the results of the validation (Stage 2B and Stage 4) performed on sediment and quality control (QC) sample data for the San Jacinto River Soil Study. A complete list of samples is provided in the **Sample Index**. Laboratory batch ID numbers and associated level of validation are provided at the beginning of each technical section

Samples were analyzed by Teledyne Brown Engineering, Inc., Knoxville, Tennessee. The analytical methods and EcoChem project chemists are listed below.

| Analysis | Method of Analysis | Primary Review | Secondary Review |
|---|---|---|---|
| Cesium-137 | Gamma Emission<br>Lab SOP TBE-2007 | E. Clayton | C. Ransom |
| Lead-210 | Beta Emission<br>Lab SOP TBE-2015 | | |

The data were reviewed using guidance and quality control criteria documented in the analytical methods; the *Sampling and Analysis Plan: Soil Study San Jacinto River Waste Pits Superfund Site* (Integral, December 2010); and *Multi-Agency Radiological Laboratory Analytical Protocols Manual - Volume 1* (July 2004).

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

There were no qualified data; qualifier definitions, reason codes, and validation criteria are included as **Appendix A**. Data Validation Worksheets and the associated communication records will be kept on file at EcoChem, Inc.

Sample Index
San Jacinto River Waste Pits
Radiochemistry

| SDG | Sample ID | Lab ID | Cs-137 | Pb-210 |
|---|---|---|---|---|
| L46416 | SJRI-DUP-01 | L46416-1 | ✓ | ✓ |
| L46416 | SJRI-DUP-02 | L46416-2 | ✓ | ✓ |
| L46416 | SJRI-DUP-03 | L46416-3 | ✓ | ✓ |
| L46416 | SJRI-DUP-04 | L46416-4 | ✓ | ✓ |
| L46416 | SJRI-DUP-05 | L46416-5 | ✓ | ✓ |
| L46416 | SJRI001-0-2.5N | L46416-6 | ✓ | ✓ |
| L46416 | SJRI001-7.5-10N | L46416-7 | ✓ | ✓ |
| L46416 | SJRI001-15-17.5N | L46416-8 | ✓ | ✓ |
| L46416 | SJRI001-22.5-25N | L46416-9 | ✓ | ✓ |
| L46416 | SJRI001-30-32.5N | L46416-10 | ✓ | ✓ |
| L46416 | SJRI001-37.5-40N | L46416-11 | ✓ | ✓ |
| L46416 | SJRI001-45-47.5N | L46416-12 | ✓ | ✓ |
| L46416 | SJRI001-52.5-55N | L46416-13 | ✓ | ✓ |
| L46416 | SJRI001-60-62.5N | L46416-14 | ✓ | ✓ |
| L46416 | SJRI001-70-72.5N | L46416-15 | ✓ | ✓ |
| L46416 | SJRI001-80-82.5N | L46416-16 | ✓ | ✓ |
| L46416 | SJRI002-0-2.5N | L46416-17 | ✓ | ✓ |
| L46416 | SJRI002-7.5-10N | L46416-18 | ✓ | ✓ |
| L46416 | SJRI002-15-20N | L46416-19 | ✓ | ✓ |
| L46416 | SJRI002-22.5-25N | L46416-20 | ✓ | ✓ |
| L46416 | SJRI002-30-32.5N | L46416-21 | ✓ | ✓ |
| L46416 | SJRI002-37.5-40N | L46416-22 | ✓ | ✓ |
| L46416 | SJRI002-45-47.5N | L46416-23 | ✓ | ✓ |
| L46416 | SJRI002-52.5-55N | L46416-24 | ✓ | ✓ |
| L46416 | SJRI002-60-62.5N | L46416-25 | ✓ | ✓ |
| L46416 | SJRI002-70-72.5N | L46416-26 | ✓ | ✓ |
| L46416 | SJRI002-80-82.5N | L46416-27 | ✓ | ✓ |
| L46416 | SJRI003-0-2.5N | L46416-28 | ✓ | ✓ |
| L46416 | SJRI003-7.5-10N | L46416-29 | ✓ | ✓ |
| L46416 | SJRI003-15-17.5N | L46416-30 | ✓ | ✓ |
| L46416 | SJRI003-22.5-25N | L46416-31 | ✓ | ✓ |
| L46416 | SJRI003-30-32.5N | L46416-32 | ✓ | ✓ |
| L46416 | SJRI003-37.5-40N | L46416-33 | ✓ | ✓ |
| L46416 | SJRI003-42.5-45N | L46416-34 | ✓ | ✓ |
| L46416 | SJRI003-45-50N | L46416-37 | ✓ | ✓ |
| L46416 | SJRI003-52.5-55N | L46416-38 | ✓ | ✓ |
| L46416 | SJRI003-60-62.5N | L46416-39 | ✓ | ✓ |
| L46416 | SJRI003-70-72.5N | L46416-40 | ✓ | ✓ |
| L46416 | SJRI003-80-82.5N | L46416-41 | ✓ | ✓ |
| L46416 | SJRI004-0-2.5N | L46416-42 | ✓ | ✓ |
| L46416 | SJRI004-7.5-10N | L46416-43 | ✓ | ✓ |
| L46416 | SJRI002-12.5-15N | L46416-44 | ✓ | ✓ |
| L46420 | SJRI004-15-17.5N | L46420-1 | ✓ | ✓ |
| L46420 | SJRI004-22.5-25N | L46420-2 | ✓ | ✓ |
| L46420 | SJRI004-30-32.5N | L46420-3 | ✓ | ✓ |
| L46420 | SJRI004-37.5-40N | L46420-4 | ✓ | ✓ |
| L46420 | SJRI004-45-47.5N | L46420-5 | ✓ | ✓ |
| L46420 | SJRI004-52.5-55N | L46420-6 | ✓ | ✓ |
| L46420 | SJRI004-60-62.5N | L46420-7 | ✓ | ✓ |

Sample Index
San Jacinto River Waste Pits
Radiochemistry

| SDG | Sample ID | Lab ID | Cs-137 | Pb-210 |
|---|---|---|---|---|
| L46420 | SJRI004-70-72.5N | L46420-8 | ✓ | ✓ |
| L46420 | SJRI004-80-82.5N | L46420-9 | ✓ | ✓ |
| L46420 | SJRI005-0-2.5N | L46420-10 | ✓ | ✓ |
| L46420 | SJRI005-7.5-10N | L46420-11 | ✓ | ✓ |
| L46420 | SJRI005-15-17.5N | L46420-12 | ✓ | ✓ |
| L46420 | SJRI005-22.5-25N | L46420-13 | ✓ | ✓ |
| L46420 | SJRI005-30-32.5N | L46420-14 | ✓ | ✓ |
| L46420 | SJRI005-37.5-40N | L46420-15 | ✓ | ✓ |
| L46420 | SJRI005-45-47.5N | L46420-16 | ✓ | ✓ |
| L46420 | SJRI005-52.5-55N | L46420-17 | ✓ | ✓ |
| L46420 | SJRI005-60-62.5N | L46420-18 | ✓ | ✓ |
| L46420 | SJRI005-70-72.5N | L46420-19 | ✓ | ✓ |
| L46420 | SJRI005-80-82.5N | L46420-20 | ✓ | ✓ |
| L46420 | SJRI006-0-2.5N | L46420-21 | ✓ | ✓ |
| L46420 | SJRI006-5-7.5N | L46420-22 | ✓ | ✓ |
| L46420 | SJRI006-7.5-12.5N | L46420-25 | ✓ | ✓ |
| L46420 | SJRI006-15-17.5N | L46420-26 | ✓ | ✓ |
| L46420 | SJRI006-22.5-25N | L46420-27 | ✓ | ✓ |
| L46420 | SJRI006-30-32.5N | L46420-28 | ✓ | ✓ |
| L46420 | SJRI006-37.5-40N | L46420-29 | ✓ | ✓ |
| L46420 | SJRI006-45-47.5N | L46420-30 | ✓ | ✓ |
| L46420 | SJRI006-52.5-55N | L46420-31 | ✓ | ✓ |
| L46420 | SJRI006-60-62.5N | L46420-32 | ✓ | ✓ |
| L46420 | SJRI006-70-72.5N | L46420-33 | ✓ | ✓ |
| L46420 | SJRI006-80-82.5N | L46420-34 | ✓ | ✓ |
| L46420 | SJRI007-0-2.5N | L46420-35 | ✓ | ✓ |
| L46420 | SJRI007-7.5-10N | L46420-36 | ✓ | ✓ |
| L46420 | SJRI007-15-17.5N | L46420-37 | ✓ | ✓ |
| L46420 | SJRI007-22.5-25N | L46420-38 | ✓ | ✓ |
| L46420 | SJRI007-30-32.5N | L46420-39 | ✓ | ✓ |
| L46420 | SJRI007-37.5-40N | L46420-40 | ✓ | ✓ |
| L46420 | SJRI007-45-47.5N | L46420-41 | ✓ | ✓ |
| L46420 | SJRI007-52.5-55N | L46420-42 | ✓ | ✓ |
| L46420 | SJRI007-60-62.5N | L46420-43 | ✓ | ✓ |
| L46421 | SJRI007-70-72.5N | L46421-1 | ✓ | ✓ |
| L46421 | SJRI007-80-82.5N | L46421-2 | ✓ | ✓ |
| L46421 | SJRI008-0-2.5N | L46421-3 | ✓ | ✓ |
| L46421 | SJRI008-7.5-10N | L46421-4 | ✓ | ✓ |
| L46421 | SJRI008-15-17.5N | L46421-5 | ✓ | ✓ |
| L46421 | SJRI008-22.5-25N | L46421-6 | ✓ | ✓ |
| L46421 | SJRI008-27.5-30N | L46421-7 | ✓ | ✓ |
| L46421 | SJRI008-30-35N | L46421-10 | ✓ | ✓ |
| L46421 | SJRI008-37.5-40N | L46421-11 | ✓ | ✓ |
| L46421 | SJRI008-45-47.5N | L46421-12 | ✓ | ✓ |
| L46421 | SJRI008-52.5-55N | L46421-13 | ✓ | ✓ |
| L46421 | SJRI008-60-62.5N | L46421-14 | ✓ | ✓ |
| L46421 | SJRI008-70-72.5N | L46421-15 | ✓ | ✓ |
| L46421 | SJRI008-80-82.5N | L46421-16 | ✓ | ✓ |
| L46421 | SJRI009-0-2.5N | L46421-17 | ✓ | ✓ |

Sample Index
San Jacinto River Waste Pits
Radiochemistry

| SDG | Sample ID | Lab ID | Cs-137 | Pb-210 |
|---|---|---|---|---|
| L46421 | SJRI009-7.5-10N | L46421-18 | ✓ | ✓ |
| L46421 | SJRI009-15-17.5N | L46421-19 | ✓ | ✓ |
| L46421 | SJRI009-22.5-25N | L46421-20 | ✓ | ✓ |
| L46421 | SJRI009-30-32.5N | L46421-21 | ✓ | ✓ |
| L46421 | SJRI009-37.5-40N | L46421-22 | ✓ | ✓ |
| L46421 | SJRI009-45-47.5N | L46421-23 | ✓ | ✓ |
| L46421 | SJRI009-52.5-55N | L46421-24 | ✓ | ✓ |
| L46421 | SJRI009-60-62.5N | L46421-25 | ✓ | ✓ |
| L46421 | SJRI009-70-72.5N | L46421-26 | ✓ | ✓ |
| L46421 | SJRI009-80-82.5N | L46421-27 | ✓ | ✓ |
| L46421 | SJRI010-0-2.5N | L46421-28 | ✓ | ✓ |
| L46421 | SJRI010-7.5-10N | L46421-29 | ✓ | ✓ |
| L46421 | SJRI010-15-17.5N | L46421-30 | ✓ | ✓ |
| L46421 | SJRI010-22.5-25N | L46421-31 | ✓ | ✓ |
| L46421 | SJRI010-30-32.5N | L46421-32 | ✓ | ✓ |
| L46421 | SJRI010-37.5-40N | L46421-33 | ✓ | ✓ |
| L46421 | SJRI010-45-47.5N | L46421-34 | ✓ | ✓ |
| L46421 | SJRI010-52.5-55N | L46421-35 | ✓ | ✓ |
| L46421 | SJRI010-57.5-60N | L46421-36 | ✓ | ✓ |
| L46421 | SJRI010-60-65N | L46421-39 | ✓ | ✓ |
| L46421 | SJRI010-70-72.5N | L46421-40 | ✓ | ✓ |
| L46421 | SJRI010-80-82.5N | L46421-41 | ✓ | ✓ |

# DATA VALIDATION REPORT
# San Jacinto River Waste Pits
# Radioisotope Coring Study
# Cesium-137 by Gamma Emission (Lab SOP TBE-2007)

This report documents the review of analytical data from the analysis of sediment samples and the associated laboratory and field quality control (QC) samples. Samples were analyzed by Teledyne Brown Engineering, Inc., Knoxville, Tennessee. Refer to the **Sample Index** for a complete list of samples.

| SDG | Number of Samples | Validation Level |
|---|---|---|
| L46416 | 46 Sediment | EPA Stage 2B |
| L46420 | 43 Sediment | EPA Stage 2B |
| L46421 | 41 Sediment | EPA Stage 4 |

## I. COMPLETENESS

All contract-required deliverables were submitted by the laboratory. The laboratory followed contract-required corrective action processes and all anomalies were discussed in the case narrative.

## II. EDD TO HARDCOPY VERIFICATION

A 10% verification of the electronic data deliverable (EDD) results was performed by comparison to the hardcopy laboratory data package. Laboratory QC results were also verified (10%). Errors were found.

***SDG L46416:*** The EDD was missing Cs-137 results for Samples SJRI-DUP-01, SJRI-DUP-02, SJRI-DUP-03, SJRI-DUP-04, and SJRI-DUP-05. The laboratory resubmitted the EDD to include those results.

## III. TECHNICAL DATA VALIDATION

The QC requirements that were reviewed are listed below.

| | | |
|---|---|---|
| Sample Receipt, Preservation, and Holding Times | 1 | Field Duplicates |
| Initial Calibration | | Reported Results |
| Continuing Calibration | | Minimum Detectable Concentration (MDC) |
| Background Counts | 1 | Calculation Verification |
| Laboratory Duplicates | | |

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

### Field Duplicates

Five sets of field duplicates were submitted:

| SDG | Sample | Duplicate |
|---|---|---|
| L46416 | SJRI003-45-50N | SJRI-DUP-02 |
| L46416 | SJRI002-15-20N | SJRI-DUP-04 |
| L46420 | SJRI-6-7.5-12.5N | SJRI-DUP-05 |
| L46421 | SJRI010-60-65N | SJRI-DUP-01 |
| L46421 | SJRI008-30-35N | SJRI-DUP-03 |

There were no positive results for Cs-137 in any of these samples. Field precision was acceptable.

### Calculation Verification

***SDG L46421:*** Several results were verified by recalculation from the raw data. No calculation or transcription errors were noted.

## IV. OVERALL ASSESSMENT

On the basis of this evaluation, the laboratory followed the specified analytical method. Accuracy was acceptable, as indicated by the calibration of the detectors using National Institute of Standards and Tedhnology (NIST) traceable standards. Precision was also acceptable, as demonstrated by the laboratory duplicate relative error ratios and the field duplicate relative percent difference values.

No data were qualified for any reason.

All data, as reported, are acceptable for use.

# DATA VALIDATION REPORT
# San Jacinto River Waste Pits
# Radioisotope Coring Study
# Lead-210 by Beta Emission (Lab SOP TBE-2015)

This report documents the review of analytical data from the analysis of sediment samples and the associated laboratory and field quality control (QC) samples. Samples were analyzed by Teledyne Brown Engineering, Inc., Knoxville, Tennessee. Refer to the **Sample Index** for a complete list of samples.

| SDG | Number of Samples | Validation Level |
|---|---|---|
| L46416 | 46 Sediment | EPA Stage 2B |
| L46420 | 43 Sediment | EPA Stage 2B |
| L46421 | 41 Sediment | EPA Stage 4 |

## I. COMPLETENESS

All contract-required deliverables were submitted by the laboratory. The laboratory followed contract-required corrective action processes and all anomalies were discussed in the case narrative.

## II. EDD TO HARDCOPY VERIFICATION

A 10% verification of the electronic data deliverable (EDD) results was performed by comparison to the hardcopy laboratory data package. Laboratory QC results were also verified (10%). The following errors were noted:

***SDG L46416:*** The EDD was missing Pb-210 results for Samples SJRI-DUP-01, SJRI-DUP-02, SJRI-DUP-03, SJRI-DUP-04, and SJRI-DUP-05. The laboratory resubmitted the EDD to include those results.

## III. TECHNICAL DATA VALIDATION

The QC requirements that were reviewed are listed below.

| | | |
|---|---|---|
| Sample Receipt, Preservation, and Holding Times | | Matrix Spike/Matrix Spiek Duplicates (MS/MSD) |
| Initial Calibration | | Laboratory Duplicates |
| Continuing Calibration | 1 | Field Duplicates |
| Background Counts | | Reported Results |
| Laboratory Blanks | | Minimum Detectable Concentration (MDC) |
| Laboratory Control Samples (LCS/LCSD) | 1 | Calculation Verification |
| Chemical Yield | | |

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

## Field Duplicates

Five sets of field duplicates were submitted:

| SDG | Sample | Duplicate |
|---|---|---|
| L46416 | SJRI003-45-50N | SJRI-DUP-02 |
| L46416 | SJRI002-15-20N | SJRI-DUP-04 |
| L46420 | SJRI-6-7.5-12.5N | SJRI-DUP-05 |
| L46421 | SJRI010-60-65N | SJRI-DUP-01 |
| L46421 | SJRI008-30-35N | SJRI-DUP-03 |

For field duplicate pair SJRI003-45-50N and SJRI-DUP-02, the relative percent difference (RPD) value for Pb-210 was greater than the control limit of 50%, at 51%. Although no data were qualified based on RPD outliers, data users should take field precision into account when interpreting sample data.

## Calculation Verification

***SDG L46421:*** Several results were verified by recalculation from the raw data. No calculation or transcription errors were noted.

# IV. OVERALL ASSESSMENT

On the basis of this evaluation, the laboratory followed the specified analytical method. Accuracy was acceptable as indicated by the laboratory control sample/laboratory control sample duplicate and matrix spike/matrix spike duplicate (MS/MSD) recoveries. With the exception noted above, precision was acceptable as demonstrated by the laboratory duplicate relative error ratios, field duplicate RPD values, and MS/MSD RPD values.

No data were qualified for any reason.

All data, as reported, are acceptable for use.

EcoChem, INC.
Environmental Data Quality

# APPENDIX A

# DATA QUALIFIER DEFINITIONS, REASON CODES, AND CRITERIA TABLES

# DATA VALIDATION QUALIFIER CODES
# Based on National Functional Guidelines

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

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

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

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

# DATA QUALIFIER REASON CODES

| | |
|---|---|
| 1 | Holding Time/Sample Preservation |
| 2 | Chromatographic pattern in sample does not match pattern of calibration standard. |
| 3 | Compound Confirmation |
| 4 | Tentatively Identified Compound (TIC) (associated with NJ only) |
| 5A | Calibration (initial) |
| 5B | Calibration (continuing) |
| 6 | Field Blank Contamination |
| 7 | Lab Blank Contamination (e.g., method blank, instrument, etc.) |
| 8 | Matrix Spike(MS & MSD) Recoveries |
| 9 | Precision (all replicates) |
| 10 | Laboratory Control Sample Recoveries |
| 11 | A more appropriate result is reported (associated with “R” and “DNR” only) |
| 12 | Reference Material |
| 13 | Surrogate Spike Recoveries (a.k.a., labeled compounds & recovery standards) |
| 14 | Other (define in validation report) |
| 15 | GFAA Post Digestion Spike Recoveries |
| 16 | ICP Serial Dilution % Difference |
| 17 | ICP Interference Check Standard Recovery |
| 18 | Trip Blank Contamination |
| 19 | Internal Standard Performance (e.g., area, retention time, recovery) |
| 20 | Linear Range Exceeded |
| 21 | Potential False Positives |
| 22 | Elevated Detection Limit Due to Interference (i.e., laboratory, chemical and/or matrix) |

# National Functional Guidelines (1997)/MARLAP (2004)
# Pb 210 by Beta Emission

| VALIDATION QC ELEMENT | ACCEPTANCE CRITERIA | ACTION | REASON CODE |
|---|---|---|---|
| Preservation | Water Only: Nitric Acid to pH < 2 | J(+)/UJ(-) if preservation requirements are not met | 1 |
| Holding Time | 180 days from date sampled | J(+)/UJ(-) if preserved > 180 days but < 360 days<br>R(+) if aqueous non preserved > 180 days<br>R(+) if preserved > 360 days | 1 |
| Initial Calibration | Blank + 1 standard | Use Professional judgment if ICAL information not provided | 5A |
| Calibration Verification | Independent Source | J(+)/UJ(-) if counts are not within laboratory control limtis | 5B |
| Background Counts | Background counts performed at least monthly and prior to sample analysis | J(+)/UJ(-) if checks were not performed or if laboratory control limits not met | 5B |
| Laboratory Blanks | Results ≤MDA + 2σ | Action level is 5x blk result<br>For (+) blk value, U(+) values < action level<br>for (-) blk, J(+)/UJ(-) < action level | 7 |
| Laboratory Control Sample | One per matrix per batch<br>%R (80-120%) | R(+/-) if %R < 50%<br>J(+)/UJ(-) if %R = 50-79%<br>J(+) if %R >120% | 10 |
| Matrix Spike/Matrix Spike Duplicate (%R) | One per matrix per batch<br>60 - 140% for samples less than 4 x spike added<br>( May use QAPP or lab limits depending on project) | J(+) if %R>140%<br>J(+)/UJ(-) if %R <60%<br>J(+)/R(-) if %R<10% | 8 |
| Laboratory Duplicate | One per matrix per batch<br>RPD ≤20% (water) & ≤ 35% (soils) for samples > 5x MDA<br>for results < 5x MDA, relative error ration (RER) between -2 and 2 | J(+)/UJ(-) if RPD or RER outside of limits | 9 |
| Field Blanks | Results ≤MDA + 2σ | Action level is 5x abs. value of blk conc.<br>*Qualify only if client requests*<br>U(+) values < action level<br>in associated samples | 6 |
| Field Duplicate | For results > 5X MDA:<br>Water: RPD < 35% Solid: RPD < 50%<br>For results < 5 x MDA:<br>Water: Diff<RL Solid: Diff < 2X MDA | May use different limits depending on QAPP<br>J(+)/UJ(-) in parent samples only if RPD or difference is outside of control limits | 9 |



Copyright 2010 EcoChem, Inc

# National Functional Guidelines (1997)/MARLAP (2004)
# Gamma Spectroscopy

| VALIDATION QC ELEMENT | ACCEPTANCE CRITERIA | ACTION | REASON CODE |
|---|---|---|---|
| Preservation | Water Only: Nitric Acid to pH < 2 | J(+)/UJ(-) if preservation requirements are not met | 1 |
| Holding Time | 180 days from date sampled | J(+)/UJ(-) if preserved > 180 days but < 360 days<br>R(+) if aqueous non preserved > 180 days<br>R(+) if preserved > 360 days | 1 |
| Initial Calibration | Self-absorption curves prepared for each counting system (planchets 0 to 150mg). Counting error<5%. Efficiency at 0% solids at least ≥20% | Use Professional judgment if ICAL information not provided<br>Calibration Verification shows if system is in calibration | 5A |
| Calibration Verification | Energy calibration and detector efficiency checks performed at least weekly | J(+)/UJ(-) if checks were not performed<br>R(+/-) if lab control limits not met | 5B |
| Background Counts | Background counts performed within week and prior to sample analysis | J(+)/UJ(-) if checks were not performed<br>R(+/-) if lab control limits not met | 5B |
| Laboratory Blanks | Results ≤MDA + 2σ | Action level is 5x blk result<br>For (+) blk value, U(+) values < action level<br>for (-) blk, J(+)/UJ(-) < action level | 7 |
| Laboratory Control Sample | One per matrix per batch<br>%R (80-120%) LCS activity between 5X and 30X the associated MDA | R(+/-) if %R < 50%<br>J(+)/UJ(-) if %R = 50-79%<br>J(+) if %R >120% | 10 |
| Matrix Spike/Matrix Spike Duplicate (%R) | One per matrix per batch<br>60 - 140% for samples less than 4 x spike added<br>( May use QAPP or lab limits depending on project) | J(+) if %R>140%<br>J(+)/UJ(-) if %R <60%<br>J(+)/R(-) if %R<10% | 8 |
| Laboratory Duplicate | One per matrix per batch<br>RPD ≤20% (water) & ≤ 35% (soils) for samples > 5x MDA<br>for results < 5x MDA, relative error ration (RER) between -2 and 2 | J(+)/UJ(-) if RPD or RER outside of limits | 9 |
| Field Blanks | Results ≤MDA + 2σ | Action level is 5x abs. value of blk conc.<br>*Qualify only if client requests*<br>U(+) values < action level<br>in associated samples | 6 |
| Field Duplicate | For results > 5X MDA:<br>Water: RPD < 35% Solid: RPD < 50%<br>For results < 5 x MDA:<br>Water: Diff<RL Solid: Diff < 2X MDA | May use different limits depending on QAPP<br>J(+)/UJ(-) in parent samples only if RPD or difference is outside of control limits | 9 |



Copyright 2010 EcoChem, Inc

EcoChem, INC.
Environmental Data Quality

# DATA VALIDATION REPORT

## SAN JACINTO RIVER WASTE PITS
## River Bed Property Study

**Prepared for:**

Integral Consulting, Inc.
1205 West Bay Dr. NW
Olympia, Washington 98502

**Prepared by:**

EcoChem, Inc.
710 Second Avenue, Suite 660
Seattle, Washington 98104

EcoChem Project: C22130-12

August 25, 2011

**Approved for Release**

Melissa Swanson

## Basis for Data Validation

This report summarizes the results of the validation (Stage 2B and Stage 3) performed on soil and quality control (QC) sample data for the San Jacinto River Bed Property Study. A complete list of samples is provided in the **Sample Index**. Laboratory batch ID numbers and associated level of validation are provided at the beginning of each technical section.

Samples were analyzed by Columbia Analytical Services, Inc., Kelso, Washington. The analytical methods and EcoChem project chemists are listed below.

| Analysis | Method of Analysis | Primary Review | Secondary Review |
|---|---|---|---|
| Specific Gravity | ASTM D 854 | M. Swanson | C. Mott |
| Particle Size | PSEP | | |
| Total Solids | EPA 160.3M | | |

The data were reviewed using guidance and quality control criteria documented in the analytical methods; the *Sampling and Analysis Plan: Sediment Study San Jacinto River Waste Pits Superfund Site* (Integral/Anchor QEA, April 2010) and *USEPA National Functional Guidelines for Inorganic Data Review* (USEPA, October 2004).

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

Data qualifier definitions, reason codes, and validation criteria are included as **Appendix A**. The qualified data summary table is included as **Appendix B.** Data Validation Worksheets and the associated communication records will be kept on file at EcoChem, Inc. A qualified laboratory electronic data deliverable (EDD) was also submitted with this report.

Sample Index
San Jacinto River Waste Pits
River Bed Property Study

| SDG | Sample ID | Lab ID | Grain Size | Specific Gravity |
|---|---|---|---|---|
| K1103485 | SJBP043-GR1-N | K1103485-002 | ✓ | ✓ |
| K1103485 | SJBP044-GR1-N | K1103485-003 | ✓ | ✓ |
| K1103485 | SJBP074-GR1-N | K1103485-005 | ✓ | ✓ |
| K1103485 | SJBP071-GR1-N | K1103485-006 | ✓ | ✓ |
| K1103485 | SJBP068-GR1-N | K1103485-007 | ✓ | ✓ |
| K1103485 | SJBP077-GR1-N | K1103485-008 | ✓ | ✓ |
| K1103485 | SJBP082-GR1-N | K1103485-009 | ✓ | ✓ |
| K1103485 | SJBP029-GR1-N | K1103485-011 | ✓ | ✓ |
| K1103485 | SJBP001-GR1-N | K1103485-012 | ✓ | ✓ |
| K1103485 | SJBP007-GR1-N | K1103485-013 | ✓ | ✓ |
| K1103485 | SJBP009-GR1-N | K1103485-014 | ✓ | ✓ |
| K1103485 | SJBP091-GR1-N | K1103485-015 | ✓ | ✓ |
| K1103485 | SJBP019-GR1-N | K1103485-016 | ✓ | ✓ |
| K1103485 | SJBP052-GR1-N | K1103485-018 | ✓ | ✓ |
| K1103485 | SJBP053-GR1-N | K1103485-019 | ✓ | ✓ |
| K1103485 | SJBP055-GR1-N | K1103485-020 | ✓ | ✓ |
| K1103485 | SJBP057-GR1-N | K1103485-022 | ✓ | ✓ |
| K1103485 | SJBP079-GR1-N | K1103485-024 | ✓ | ✓ |
| K1103485 | SJBPDUP-1 | K1103485-025 | ✓ | ✓ |
| K1103485 | SJBP095-GR1-N | K1103485-027 | ✓ | ✓ |
| K1103485 | SJBP083-GR1-N | K1103485-030 | ✓ | ✓ |
| K1103485 | SJBP087-GR1-N | K1103485-032 | ✓ | ✓ |
| K1104244 | SJBP035-GR1-N | K1104244-001 | ✓ | ✓ |
| K1104244 | SJBP072-GR1-N | K1104244-002 | ✓ | ✓ |
| K1104244 | SJBP017-GR1-N | K1104244-003 | ✓ | ✓ |
| K1104244 | SJBP050-GR1-N | K1104244-004 | ✓ | ✓ |
| K1104244 | SJBP056-GR1-N | K1104244-005 | ✓ | ✓ |
| K1104244 | SJBP080-GR1-N | K1104244-006 | ✓ | ✓ |
| K1104244 | SJBP081-GR1-N | K1104244-007 | ✓ | ✓ |
| K1104244 | SJBP098-GR1-N | K1104244-008 | ✓ | ✓ |
| K1104244 | SJBPDUP-2 | K1104244-009 | ✓ | ✓ |
| K1104871 | SJBP069-GR2-N | K1104871-001 | ✓ | ✓ |

# DATA VALIDATION REPORT
# San Jacinto River Waste Pits
# River Bed Property Study
# Conventional Parameters

This report documents the review of analytical data from the analysis of soil samples and the associated laboratory quality control (QC) samples. Samples were analyzed by Columbia Analytical Services, Inc., Kelso, Washington. Refer to the **Sample Index** for a complete list of samples.

| SDG | Number of Samples | Validation Level |
|---|---|---|
| K1103485 | 22 Soil | Stage 2B |
| K1104244 | 9 Soil | Stage 3 |
| K1104871 | 1 Soil | Stage 2B |

The analytical tests that were performed are summarized below.

| Parameter | Method |
|---|---|
| Specific Gravity | ASTM D854 |
| Particle Size | PSEP |
| Total Solids | EPA 160.3M |

## I. DATA PACKAGE COMPLETENESS

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

***SDG K1103485:*** The jars and/or lids of six samples submitted with this SDG arrived at the laboratory broken. The laboratory contacted the client, Integral, who cancelled the analyses of those samples.

## II. EDD TO HARDCOPY VERIFICATION

Ten percent (10%) of the results in the laboratory EDD were verified by comparison to the hardcopy laboratory data package.

## III. TECHNICAL DATA VALIDATION

The QC requirements that were reviewed are listed in the following table.

| | | | |
|---|---|---|---|
| 1 | Sample Receipt, Preservation, and Holding Times | | Reported Results |
| 2 | Laboratory Replicates | 1 | Calculation Verification |
| 1 | Field Replicates | | |

[1] ***Quality control results are discussed below, but no data were qualified.***
[2] ***Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed below.***

## Sample Receipt, Preservation, and Holding Times

As stated in validation guidance documents, sample shipping coolers should arrive at the laboratory within the advisory temperature range of 2° to 6°C. The laboratory received sample coolers with temperatures greater than the upper limit, the highest recorded value at 15.1°C. Several sample coolers contained no cooling agent. These outliers did not impact data quality; no data were qualified.

## Laboratory Replicates

The following acceptance criteria were used to evaluate precision: the relative standard deviation (RSD) laboratory control limit is 27% for fractions of greater than five percent of total sample mass.

***SDG K1103485:*** In the triplicate analysis using Sample SJBP043-GR1-N, the RPD value for fine sand was greater than the control limit, at 74.1%. The result for fine sand was estimated (J-9) in the parent sample.

## Field Replicates

The following acceptance criteria were used to evaluate precision: the relative percent difference (RPD) control limit is 50% for results greater than five percent of the total sample mass. No data were qualified based on field replicate precision outliers. Data users should consider the impact of field precision outliers on the reported results.

***SDG K1103485:*** One pair of field replicates, Samples SJBP044-GRN-1 & SJBPDUP-1, was submitted. The RPD value for very fine sand (73.1%) was greater than the control limit.

***SDGs K1103485 & K1104244:*** One pair of field replicates, Samples SJBP087-GRN-1 & SJBPDUP-2, was submitted. Field precision was acceptable.

## Calculation Verification

***SDG K1104244:*** Calculation verifications were performed for this SDG. No calculation or transcription errors were found.

# IV. OVERALL ASSESSMENT

As determined by this evaluation, the laboratory followed the specified analytical methods. With the exceptions noted above, precision was acceptable as demonstrated by the laboratory duplicate samples and field replicate RPD values.

One data point was estimated due to a laboratory replicate precision outlier.

All data, as qualified, are acceptable for use.

EcoChem, INC.
Environmental Data Quality

# APPENDIX A

# DATA QUALIFIER DEFINITIONS, REASON CODES, AND CRITERIA TABLES

# DATA VALIDATION QUALIFIER CODES
# Based on National Functional Guidelines

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

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

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

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

# DATA QUALIFIER REASON CODES

| | |
|---|---|
| 1 | Holding Time/Sample Preservation |
| 2 | Chromatographic pattern in sample does not match pattern of calibration standard. |
| 3 | Compound Confirmation |
| 4 | Tentatively Identified Compound (TIC) (associated with NJ only) |
| 5A | Calibration (initial) |
| 5B | Calibration (continuing) |
| 6 | Field Blank Contamination |
| 7 | Lab Blank Contamination (e.g., method blank, instrument, etc.) |
| 8 | Matrix Spike(MS & MSD) Recoveries |
| 9 | Precision (all replicates) |
| 10 | Laboratory Control Sample Recoveries |
| 11 | A more appropriate result is reported (associated with “R” and “DNR” only) |
| 12 | Reference Material |
| 13 | Surrogate Spike Recoveries (a.k.a., labeled compounds & recovery standards) |
| 14 | Other (define in validation report) |
| 15 | GFAA Post Digestion Spike Recoveries |
| 16 | ICP Serial Dilution % Difference |
| 17 | ICP Interference Check Standard Recovery |
| 18 | Trip Blank Contamination |
| 19 | Internal Standard Performance (e.g., area, retention time, recovery) |
| 20 | Linear Range Exceeded |
| 21 | Potential False Positives |
| 22 | Elevated Detection Limit Due to Interference (i.e., laboratory, chemical and/or matrix) |

# EcoChem Validation Guidelines for Conventional Chemistry Analysis (Based on EPA Standard Methods)

| VALIDATION QC ELEMENT | ACCEPTANCE CRITERIA | ACTION | REASON CODE |
|---|---|---|---|
| Cooler Temperature and Preservation | Cooler Temperature 4°C ±2°C<br>Preservation: Method Specific | Use Professional Judgment to qualify based to qualify for coole temp outliers<br>J(+)/UJ(-) if preservation requirements not met | 1 |
| Holding Time | Method Specific | Professional Judgment<br>J(+)/UJ(-) if holding time exceeded<br>J(+)/R(-) if HT exceeded by > 3X | 1 |
| Initial Calibration | Method specific<br>r>0.995 | Use professional judgment<br>J(+)/UJ(-) for r < 0.995 | 5A |
| Initial Calibration Verification (ICV) | Where applicable to method<br>Independent source analyzed immediately after calibration<br>%R method specific, usually 90% - 110% | R(+/-) if %R significantly < LCL<br>J(+)/UJ(-) if %R < LCL<br>J(+) if %R > UCL<br>R(+) if %R significantly > UCL | 5A |
| Continuing Cal Verification (CCV) | Where applicable to method<br>Every ten samples, immed. following ICV/ICB and end of run<br>%R method specific, usually 90% - 110% | R(+/-) if %R significantly < LCL<br>J(+)/UJ(-) if %R < LCL<br>J(+) if %R > UCL<br>R(+) if %R significantly > UCL | 5B |
| Initial and Continuing Cal Blanks (ICB/CCB) | Where applicable to method<br>After each ICV and CCV every ten samples and end of run<br>\| blank\| < MDL | Action level is 5x absolute value of blank conc.<br>For (+) blanks, U(+) results < action level<br>For (-) blanks, J(+)/UJ(-) results < action level<br>refer to TM-02 for additional details | 7 |
| Method Blank | One per matrix per batch<br>(not to exceed 20 samples)<br>blank < MDL | Action level is 5x absolute value of blank conc.<br>For (+) blk value, U(+) results < action level<br>For (-) blk value, J(+)/UJ(-) results < action level | 7 |
| Laboratory Control Sample | Waters:<br>One per matrix per batch<br>%R (80-120%) | R(+/-) if %R < 50%<br>J(+)/UJ(-) if %R = 50-79%<br>J(+) if %R >120% | 10 |
| | Soils:<br>One per matrix per batch<br>Result within manufacturer's certified acceptance range | J(+)/UJ(-) if < LCL,<br>J(+) if > UCL | 10 |
| Matrix Spike | One per matrix per batch; 5% frequency<br>75-125% for samples less than 4 x spike level | J(+) if %R > 125% or < 75%<br>UJ(-) if %R = 30-74%<br>R(+/-) results < IDL if %R < 30% | 8 |
| Laboratory Duplicate | One per matrix per batch<br>RPD <20% for samples > 5x RL<br>Diff <RL for samples >RL and <5 x RL<br>(may use RPD < 35%, Diff < 2X RL for solids) | J(+)/UJ(-) if RPD > 20% or diff > RL<br>all samples in batch | 9 |



Copyright 2006 EcoChem, Inc.

# EcoChem Validation Guidelines for Conventional Chemistry Analysis (Based on EPA Standard Methods)

| VALIDATION QC ELEMENT | ACCEPTANCE CRITERIA | ACTION | REASON CODE |
|---|---|---|---|
| Field Blank | blank < MDL | Action level is 5x blank conc.<br>U(+) sample values < action level<br>in associated field samples only | 6 |
| Field Duplicate | For results > 5X RL:<br>Water: RPD < 35% Solid: RPD < 50%<br>For results < 5 x RL:<br>Water: Diff<RL Solid: Diff < 2X RL | J(+)/UJ(-) in parent samples only | 9 |



Copyright 2006 EcoChem, Inc.

EcoChem, INC.
Environmental Data Quality

# APPENDIX B
# QUALIFIED DATA SUMMARY TABLE

Qualified Data Summary Table
San Jacinto Waste Pits
River Bed Property Study

| SDG | Sample ID | Lab ID | Method | Analyte | Result | Units | Lab Qualifier | Validation Qualifier | Validation Reason |
|---|---|---|---|---|---|---|---|---|---|
| K1103485 | SJBP043-GR1-N | K1103485-002 | PSEP | Fine Sand | 1.49 | % | | J | 9 |

EcoChem, INC.
Environmental Data Quality

# DATA VALIDATION REPORT

## SAN JACINTO RIVER WASTE PITS
## Residential Soil Sampling Study

**Prepared for:**

Integral Consulting, Inc.
1205 West Bay Dr. NW
Olympia, Washington 98502

**Prepared by:**

EcoChem, Inc.
710 Second Avenue, Suite 660
Seattle, Washington 98104

EcoChem Project: C22130-14

September 1, 2011

**Approved for Release**

Melissa Swanson

## Basis for Data Validation

This report summarizes the results of full validation (Stage 3/4) performed on soil and quality control (QC) sample data for the San Jacinto River Residential Soil Sampling Study. A complete list of samples is provided in the **Sample Index**. Laboratory batch ID numbers and associated level of validation are provided at the beginning of each technical section.

Samples were analyzed by Columbia Analytical Services, Inc., Kelso, Washington and Columbia Analytical Services, Inc., Houston, Texas. The analytical methods and EcoChem project chemists are listed below.

| Analysis | Method of Analysis | Primary Review | Secondary Review |
|---|---|---|---|
| Dioxin & Furan Compounds | EPA1613B | M. Swanson | C. Ransom |
| Total Organic Carbon | SW9060M | J. Maute | M. Swanson |
| Particle Size | PSEP | | |
| Total Solids | EPA 160.3M | | |

The data were reviewed using guidance and quality control criteria documented in the analytical methods; the *Sampling and Analysis Plan: Soil Study, San Jacinto River Waste Pits Superfund Site* (Integral, December 2010); Draft Addendum 2 to the Soil *Sampling and Analysis Plan for Residential Soil Sampling, San Jacinto River Waste Pits Superfund Site* (Integral/Anchor QEA, June 2011); *USEPA National Functional Guidelines for Chlorinated Dioxin/Furan Data Review* (USEPA, September 2005); and *USEPA National Functional Guidelines for Inorganic Data Review* (USEPA, October 2004).

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

Data qualifier definitions, reason codes, and validation criteria are included as **Appendix A**. The qualified data summary table is included as **Appendix B.** Data Validation Worksheets and the associated communication records will be kept on file at EcoChem, Inc. A qualified laboratory electronic data deliverable (EDD) was also submitted with this report.

Sample Index
San Jacinto River Waste Pits - Residential Soil Sampling
Columbia Analytical Services - Houston

| Sample ID | Laboratory ID | Dioxins |
|---|---|---|
| SJRS001 - A | E1100817-001 | ✓ |
| SJRS001 - A - DUP | E1100817-002 | ✓ |
| SJRS002 - A | E1100817-003 | ✓ |
| SJRS003 - A | E1100817-004 | ✓ |
| SJRS004 - A | E1100817-005 | ✓ |
| SJRS005 - A | E1100817-006 | ✓ |
| SJRS006 - A | E1100817-007 | ✓ |
| SJRS007 - A | E1100817-008 | ✓ |
| SJRS008 - A | E1100817-009 | ✓ |
| SJRS009 - A | E1100817-010 | ✓ |
| SJRS010 - A | E1100817-011 | ✓ |
| RSRM - 900 | E1100817-012 | ✓ |
| RSFW - 901S | E1100817-013 | ✓ |

Sample Index
San Jacinto River Waste Pits - Residential Soil Sampling
Columbia Analytical Services - Kelso

| Sample ID | Laboratory ID | Grain Size | TOC | Total Solids |
|---|---|---|---|---|
| SJRS001 - A | K1107527-001 | ✓ | ✓ | ✓ |
| SJRS001 - A - DUP | K1107527-002 | ✓ | ✓ | ✓ |
| SJRS002 - A | K1107527-003 | ✓ | ✓ | ✓ |
| SJRS003 - A | K1107527-004 | ✓ | ✓ | ✓ |
| SJRS004 - A | K1107527-005 | ✓ | ✓ | ✓ |
| SJRS005 - A | K1107527-006 | ✓ | ✓ | ✓ |
| SJRS006 - A | K1107527-007 | ✓ | ✓ | ✓ |
| SJRS007 - A | K1107527-008 | ✓ | ✓ | ✓ |
| SJRS008 - A | K1107527-009 | ✓ | ✓ | ✓ |
| SJRS009 - A | K1107527-010 | ✓ | ✓ | ✓ |
| SJRS010 - A | K1107527-011 | ✓ | ✓ | ✓ |

# DATA VALIDATION REPORT
# San Jacinto River Waste Pits
# Residential Soil Sampling
# Dioxin/Furan Compounds by EPA 1613B

This report documents the review of analytical data from the analysis of soil samples and the associated laboratory and field quality control (QC) samples. Columbia Analytical Services, Houston, Texas, analyzed the samples. Refer to the **Sample Index** for a complete list of samples.

| SDG | Number of Samples | Validation Level |
|---|---|---|
| E1100817 | 12 Soil & 1 Filter Wipe | EPA Stage 4 |

## I. DATA PACKAGE COMPLETENESS

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

## II. EDD TO HARDCOPY VERIFICATION

Ten percent (10%) of the results in the laboratory EDD were verified by comparison to the hardcopy laboratory data package. No errors were noted.

## III. TECHNICAL DATA VALIDATION

The QC requirements that were reviewed are listed in the following table.

| | | | |
|---|---|---|---|
| 1 | Sample Receipt, Preservation, and Holding Times | 1 | Matrix Spike/Matrix Spike Duplicates (MS/MSD) |
| | GC/MS Instrument Performance Check | | Laboratory Control Samples (LCS/LCSD) |
| | Initial Calibration (ICAL) | 1 | Reference Materials (RM) |
| | Calibration Verification (CVER) | 1 | Field Replicates |
| | Isomer Specificity | | Target Analyte List |
| 1 | Laboratory Blanks | | Reported Results |
| 1 | Field Blanks | 2 | Compound Identification |
| | Labeled Compound Recovery | 1 | Calculation Verification (EPA Stage 4 only) |

[1] ***Quality control results are discussed below, but no data were qualified.***
[2] ***Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed below.***

### Sample Receipt, Preservation, and Holding Times

As stated in validation guidance documents, sample shipping coolers should arrive at the laboratory within the advisory temperature range of 2° to 6°C. The laboratory received both sample coolers with temperatures less than the lower limit, at 1°C. It was determined that these outliers did not impact data quality; therefore no qualifiers were assigned.

## Laboratory Blanks

Positive results for OCDD were reported in both method blanks; however, these results were assigned K-flags by the laboratory indicating the detected peak did not meet ion ratio criteria. These K-flagged values cannot be considered as positive identifications; therefore they were treated as non-detects. No qualification of data was necessary.

## Field Blanks

One filter wipe blank, RSFW-901S, was submitted. A K-flagged result for OCDD was reported. This value was treated as a non-detect. No data were qualified.

## Matrix Spike/Matrix Spike Duplicates

Matrix spike/matrix spike duplicate (MS/MSD) samples were not analyzed. Laboratory accuracy and precision were evaluated using the laboratory control sample/laboratory control sample duplicate (LCS/LCSD) recovery and relative percent difference (RPD) values.

## Reference Materials

The NIST standard reference material SRM-1944 was submitted to the laboratory with the field samples and identified as Sample RSRM-900. For all analytes with concentrations greater than the reporting limit (RL), EcoChem evaluated the results using the 95% confidence interval of the true value (reference value ± the uncertainty value as stated by NIST).

Eight of the 25 results were slightly outside of the 95% confidence interval of the true value (reference value ± uncertainty as stated by NIST). The SRM results were then evaluated using the EcoChem default criteria of ±20% of the 95% confidence interval; all results were within these criteria. No data were qualified based on SRM results.

## Field Replicates

One set of field replicates, SJRS001-A & SJRS001-A -DUP, were submitted. For results greater than 5x the RL, all RPD values were less than the control limit of 50%. For results less than 5x the RL, the difference between the sample and replicate was less than 2x the RL. All field precision criteria were met.

## Compound Identification

When a peak is detected but the ion ratio does not meet the criteria for compound identification, the laboratory assigns a K-flag to the result. During validation, these results were considered potential false positives, or estimated maximum possible concentrations (EMPC), and were qualified as not detected (U-22) at the reported concentrations.

All positive results for 2,3,7,8-TCDF were confirmed on a DB-225 column as required by the method. Results from both columns were reported. The 2,3,7,8-TCDF results from the DB-5 column were qualified do-not-report (DNR-11) in favor of the results from the DB-225 column.

The 1,2,3,7,8-PeCDF and 1,2,3,4,7,8-HxCDF results in Sample RSRM-900 were assigned P-flags by the laboratory to indicate the presence of diphenyl ether interference. These results were estimated (J-14) to indicate a potential high bias.

### Calculation Verification

Several results were verified by recalculation from the raw data. No calculation or transcription errors were noted.

## IV. OVERALL ASSESSMENT

As determined by this evaluation, the laboratory followed the specified analytical method. Accuracy was acceptable as demonstrated by the labeled compound and LCS/LCSD %R values. Precision was acceptable as indicated by the LCS/LCSD and field replicate RPD values.

Data were qualified as not detected due to ion ratio outliers. Data were estimated due to diphenyl ether interference.

Data were flagged as do-not-report (DNR) to indicate which result (from multiple reported analyses) should not be used.

Data that has been flagged DNR should not be used for any purpose. All other data, as qualified, are acceptable for use.

# DATA VALIDATION REPORT
# San Jacinto River Waste Pits
# Residential Soil Sampling
# Conventional Parameters

This report documents the review of analytical data from the analysis of soil samples and the associated laboratory quality control (QC) samples. Samples were analyzed by Columbia Analytical Services, Inc., Kelso, Washington. Refer to the **Sample Index** for a complete list of samples.

| SDG | Number of Samples | Validation Level |
|---|---|---|
| K1107527 | 11 Soil | Stage 3 |

The analytical tests that were performed are summarized below.

| Parameter | Method |
|---|---|
| Total Organic Carbon (TOC) | SW9060M |
| Particle Size | PSEP |
| Total Solids | EPA 160.3M |

## I. DATA PACKAGE COMPLETENESS

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

## II. EDD TO HARDCOPY VERIFICATION

Ten percent (10%) of the results in the laboratory EDD were verified by comparison to the hardcopy laboratory data package. No errors were noted.

## III. TECHNICAL DATA VALIDATION

The QC requirements that were reviewed are listed in the following table.

| | | | |
|---|---|---|---|
| 1 | Sample Receipt, Preservation, and Holding Times | | Laboratory Replicates |
| | Initial Calibration | 1 | Field Replicates |
| | Calibration Verification | | Reported Results |
| | Laboratory Blanks | | Reporting Limits |
| | Laboratory Control Samples (LCS) | 1 | Calculation Verification |
| | Matrix Spikes/Matrix Spike Duplicates (MS/MSD) | | |

[1] ***Quality control results are discussed below, but no data were qualified.***
[2] ***Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed below.***

## Sample Receipt, Preservation, and Holding Times

As stated in validation guidance documents, sample shipping coolers should arrive at the laboratory within the advisory temperature range of 2° to 6°C. The laboratory received sample coolers with temperatures less than the lower limit, the lowest at 0.5°C. It was determined that these outliers did not impact data quality; therefore no qualifiers were assigned.

## Field Replicates

One set of field replicates, SJRS001-A & SJRS001-A-DUP, was submitted. The relative percent difference (RPD) value for fine sand (95.3%) was greater than the control limit of 50%. Fine sand represented less than 5% of the total weight in Sample SJRS001-A (3.58%) and greater than 5% of the total weight in Sample SJRS001-A-DUP (10.1%). No data were qualified based on field replicate precision outliers. Data users should consider the impact of field precision outliers on the reported results.

## Calculation Verification

Calculation verifications were performed. No calculation or transcription errors were found.

# IV. OVERALL ASSESSMENT

As determined by this evaluation, the laboratory followed the specified analytical methods. Accuracy was acceptable as demonstrated by the matrix spike/matrix spike duplicate (MS/MSD) and laboratory control sample percent recovery values. With the exception noted above, precision was acceptable as demonstrated by the MS/MSD, laboratory duplicate, and field replicate RPD values.

No data were qualified for any reason.

All data, as reported, are acceptable for use.

EcoChem, INC.
Environmental Data Quality

# APPENDIX A

# DATA QUALIFIER DEFINITIONS, REASON CODES, AND CRITERIA TABLES

# DATA VALIDATION QUALIFIER CODES
# Based on National Functional Guidelines

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

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

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

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

# DATA QUALIFIER REASON CODES

| | |
|---|---|
| 1 | Holding Time/Sample Preservation |
| 2 | Chromatographic pattern in sample does not match pattern of calibration standard. |
| 3 | Compound Confirmation |
| 4 | Tentatively Identified Compound (TIC) (associated with NJ only) |
| 5A | Calibration (initial) |
| 5B | Calibration (continuing) |
| 6 | Field Blank Contamination |
| 7 | Lab Blank Contamination (e.g., method blank, instrument, etc.) |
| 8 | Matrix Spike(MS & MSD) Recoveries |
| 9 | Precision (all replicates) |
| 10 | Laboratory Control Sample Recoveries |
| 11 | A more appropriate result is reported (associated with “R” and “DNR” only) |
| 12 | Reference Material |
| 13 | Surrogate Spike Recoveries (a.k.a., labeled compounds & recovery standards) |
| 14 | Other (define in validation report) |
| 15 | GFAA Post Digestion Spike Recoveries |
| 16 | ICP Serial Dilution % Difference |
| 17 | ICP Interference Check Standard Recovery |
| 18 | Trip Blank Contamination |
| 19 | Internal Standard Performance (e.g., area, retention time, recovery) |
| 20 | Linear Range Exceeded |
| 21 | Potential False Positives |
| 22 | Elevated Detection Limit Due to Interference (i.e., laboratory, chemical and/or matrix) |

# EcoChem Validation Guidelines for Dioxin/Furan Analysis by HRMS
## (Based on EPA Reg. 10 SOP, Rev. 2, 1996 & EPA SW-846, Methods 1613b and 8290)

| VALIDATION QC ELEMENT | ACCEPTANCE CRITERIA | ACTION | REASON CODE |
|---|---|---|---|
| Cooler/Storage Temperature | Waters/Solids < 4°C<br>Tissues <-10°C | EcoChem PJ, see TM-05 | 1 |
| Holding Time | Extraction - Water: 30 days from collection<br>*Note:* Under CWA, SDWA, and RCRA the HT for H2O is 7 days*<br>Extraction - Soil: 30 days from collection<br>Analysis: 40 days from extraction | J(+)/UJ(-) if ext > 30 days<br>J(+)/UJ(-) if analysis > 40 Days<br>EcoChem PJ, see TM-05 | 1 |
| Mass Resolution | >=10,000 resolving power at m/z 304.9824<br>Exact mass of m/z 380.9760 w/in 5 ppm of theoretical value (380.97410 to 380.97790) .<br>Analyzed prior to ICAL and at the start and end of each 12 hr. shift | R(+/-) if not met | 14 |
| Window Defining Mix and Column Performance Mix | Window defining mixture/Isomer specificity std run before ICAL and CCAL<br>Valley < 25% (valley = (x/y)*100%)<br>x = ht. of TCDD<br>y = baseline to bottom of valley<br>For all isomers eluting near 2378-TCDD/TCDF isomers (TCDD only for 8290) | J(+) if valley > 25% | 5A (ICAL)<br>5B (CCAL |
| Initial Calibration | Minimum of five standards<br>%RSD < 20% for native compounds<br>%RSD <30% for labeled compounds<br>(%RSD <35% for labeled compounds under 1613b) | J(+) natives if %RSD > 20% | 5A |
| | Abs. RT of $^{13}C_{12}$-1234-TCDD<br>>25 min on DB5<br>>15 min on DB-225 | EcoChem PJ, see TM-05 | |
| | Ion Abundance ratios within QC limits<br>(Table 8 of method 8290)<br>(Table 9 of method 1613B) | EcoChem PJ, see TM-05 | |
| | S/N ratio > 10 for all native and labeled compounds in CS1 std. | If <10, elevate Det. Limit or R(-) | |



Copyright 2007 EcoChem, Inc.

# EcoChem Validation Guidelines for Dioxin/Furan Analysis by HRMS
## (Based on EPA Reg. 10 SOP, Rev. 2, 1996 & EPA SW-846, Methods 1613b and 8290)

| VALIDATION QC ELEMENT | ACCEPTANCE CRITERIA | ACTION | REASON CODE |
|---|---|---|---|
| Continuing Calibration | Analyzed at the start and end of each 12 hour shift.<br>%D+/-20% for native compounds<br>%D +/-30% for labeled compounds<br>(Must meet limits in Table 6, Method 1613B)<br>(If %Ds in the closing CCAL are w/in 25%/35% the avg RF from the two CCAL may be used to calculate samples per Method 8290, Section 8.3.2.4) | Do not qualify labeled compounds. Narrate in report for labeled compound %D outliers.<br>For native compound %D outliers:<br>8290: J(+)/UJ(-) if %D = 20% - 75%<br>J(+)/R(-) if %D > 75%<br>1613: J(+)/UJ(-) if %D is outside Table 6 limits<br>J(+)/R(-) if %D is +/- 75% of Table 6 limit | 5B |
| | Abs. RT of $^{13}C_{12}$-1234-TCDD and $^{13}C12$-123789-HxCDD +/- 15 sec of ICAL. | EcoChem PJ, see ICAL section of TM-05 | |
| | RRT of all other compounds must meet Table 2 of 1613B. | EcoChem PJ, see TM-05 | |
| | Ion Abundance ratios within QC limits<br>(Table 8 of method 8290)<br>(Table 9 of method 1613B) | EcoChem PJ, see TM-05 | |
| | S/N ratio > 10 | If <10, elevate Det. Limit or R(-) | |
| Method Blank | One per matrix per batch<br>No positive results | If sample result <5X action level, qualify U at reported value. | 7 |
| Field Blanks (Not Required) | No positive results | If sample result <5X action level, qualify U at reported value. | 6 |
| LCS / OPR | Concentrations must meet limits in Table 6, Method 1613B or lab limits. | J(+) if %R > UCL<br>J(+)/UJ(-) if %R < LCL<br>J(+)/R(-) using PJ if %R <<LCL (< 10%) | 10 |
| MS/MSD (recovery) | May not analyze MS/MSD<br>%R should meet lab limits. | Qualify parent only unless other QC indicates systematic problems:<br>J(+) if both %R > UCL<br>J(+)/UJ(-) if both %R < LCL<br>J(+)/R(-) if both %R < 10%<br>PJ if only one %R outlier | 8 |
| MS/MSD (RPD) | May not analyze MS/MSD<br>RPD < 20% | J(+) in parent sample if RPD > CL | 9 |



Copyright 2007 EcoChem, Inc.

# EcoChem Validation Guidelines for Dioxin/Furan Analysis by HRMS
## (Based on EPA Reg. 10 SOP, Rev. 2, 1996 & EPA SW-846, Methods 1613b and 8290)

| VALIDATION QC ELEMENT | ACCEPTANCE CRITERIA | ACTION | REASON CODE |
|---|---|---|---|
| Lab Duplicate | RPD <25% if present. | J(+)/UJ(-) if outside limts | 9 |
| Labeled Compounds / Internal Standards | *Method 8290:* %R = 40% - 135% in all samples<br>*Method 1613B:* %R must meet limits specified in Table 7, Method 1613 | J(+)/UJ(-) if %R = 10% to LCL<br>J(+) if %R > UCL<br>J(+)/R(-) if %R < 10% | 13 |
| Quantitation/ Identification | Ions for analyte, IS, and rec. std. must max w/in 2 sec.<br>S/N >2.5<br>IA ratios meet limits in Table 9 of 1613B or Table 8 of 8290<br>RRTs w/in limits in Table 2 of 1613B | If RT criteria not met, use PJ (see TM-05)<br>If S/N criteria not met, J(+).<br>if unlabelled ion abundance not met, change to EMPC<br>If labelled ion abundance not met, J(+). | 21 |
| EMPC (estimated maximum possible concentration) | If quantitation idenfication criteria are not met, laboratory should report an EMPC value. | If laboratory correctly reported an EMPC value, qualify with U to indicate that the value is a detection limit. | 14 |
| Interferences | PCDF interferences from PCDPE | If both detected, change PCDF result to EMPC | 14 |
| Second Column Confirmation | All 2378-TCDF hits must be confirmed on a DB-225 (or equiv) column. All QC specs in this table must be met for the confirmation analysis. | Report lower of the two values.<br>If not performed use PJ (see TM-05). | 3 |
| Field Duplicates | Use QAPP limits. If no QAPP:<br>Solids: RPD <50%<br>OR absolute diff. < 2X RL (for results < 5X RL)<br>Aqueous: RPD <35%<br>OR absolute diff. < 1X RL (for results < 5X RL) | Narrate and qualify if required by project (EcoChem PJ) | 9 |
| Two analyses for one sample | Report only one result per analyte | "DNR" results that should not be used | 11 |



Copyright 2007 EcoChem, Inc.

# EcoChem Validation Guidelines for Conventional Chemistry Analysis (Based on EPA Standard Methods)

| VALIDATION QC ELEMENT | ACCEPTANCE CRITERIA | ACTION | REASON CODE |
|---|---|---|---|
| Cooler Temperature and Preservation | Cooler Temperature 4°C ±2°C<br>Preservation: Method Specific | Use Professional Judgment to qualify based to qualify for coole temp outliers<br>J(+)/UJ(-) if preservation requirements not met | 1 |
| Holding Time | Method Specific | Professional Judgment<br>J(+)/UJ(-) if holding time exceeded<br>J(+)/R(-) if HT exceeded by > 3X | 1 |
| Initial Calibration | Method specific<br>r>0.995 | Use professional judgment<br>J(+)/UJ(-) for r < 0.995 | 5A |
| Initial Calibration Verification (ICV) | Where applicable to method<br>Independent source analyzed immediately after calibration<br>%R method specific, usually 90% - 110% | R(+/-) if %R significantly < LCL<br>J(+)/UJ(-) if %R < LCL<br>J(+) if %R > UCL<br>R(+) if %R significantly > UCL | 5A |
| Continuing Cal Verification (CCV) | Where applicable to method<br>Every ten samples, immed. following ICV/ICB and end of run<br>%R method specific, usually 90% - 110% | R(+/-) if %R significantly < LCL<br>J(+)/UJ(-) if %R < LCL<br>J(+) if %R > UCL<br>R(+) if %R significantly > UCL | 5B |
| Initial and Continuing Cal Blanks (ICB/CCB) | Where applicable to method<br>After each ICV and CCV every ten samples and end of run<br>\| blank\| < MDL | Action level is 5x absolute value of blank conc.<br>For (+) blanks, U(+) results < action level<br>For (-) blanks, J(+)/UJ(-) results < action level<br>refer to TM-02 for additional details | 7 |
| Method Blank | One per matrix per batch<br>(not to exceed 20 samples)<br>blank < MDL | Action level is 5x absolute value of blank conc.<br>For (+) blk value, U(+) results < action level<br>For (-) blk value, J(+)/UJ(-) results < action level | 7 |
| Laboratory Control Sample | Waters:<br>One per matrix per batch<br>%R (80-120%) | R(+/-) if %R < 50%<br>J(+)/UJ(-) if %R = 50-79%<br>J(+) if %R >120% | 10 |
| | Soils:<br>One per matrix per batch<br>Result within manufacturer's certified acceptance range | J(+)/UJ(-) if < LCL,<br>J(+) if > UCL | 10 |
| Matrix Spike | One per matrix per batch; 5% frequency<br>75-125% for samples less than 4 x spike level | J(+) if %R > 125% or < 75%<br>UJ(-) if %R = 30-74%<br>R(+/-) results < IDL if %R < 30% | 8 |
| Laboratory Duplicate | One per matrix per batch<br>RPD <20% for samples > 5x RL<br>Diff <RL for samples >RL and <5 x RL<br>(may use RPD < 35%, Diff < 2X RL for solids) | J(+)/UJ(-) if RPD > 20% or diff > RL<br>all samples in batch | 9 |



Copyright 2006 EcoChem, Inc.

# EcoChem Validation Guidelines for Conventional Chemistry Analysis (Based on EPA Standard Methods)

| VALIDATION QC ELEMENT | ACCEPTANCE CRITERIA | ACTION | REASON CODE |
|---|---|---|---|
| Field Blank | blank < MDL | Action level is 5x blank conc.<br>U(+) sample values < action level<br>in associated field samples only | 6 |
| Field Duplicate | For results > 5X RL:<br>Water: RPD < 35% Solid: RPD < 50%<br>For results < 5 x RL:<br>Water: Diff<RL Solid: Diff < 2X RL | J(+)/UJ(-) in parent samples only | 9 |



Copyright 2006 EcoChem, Inc.

EcoChem, INC.
Environmental Data Quality

# APPENDIX B
# QUALIFIED DATA SUMMARY TABLE

Qualified Data Summary Table
San Jacinto River Waste Pits - Residential Soil Sampling

| SDG | Sample ID | Laboratory ID | Method | Analyte | Result | Units | Lab Qualifier | Validation Qualifier | Validation Reason |
|---|---|---|---|---|---|---|---|---|---|
| E1100817 | SJRS001 - A | E1100817-001 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin | 0.324 | ng/kg | JK | U | 22 |
| E1100817 | SJRS001 - A | E1100817-001 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin | 0.506 | ng/kg | JK | U | 22 |
| E1100817 | SJRS001 - A | E1100817-001 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 0.991 | ng/kg | CJK | DNR | 11 |
| E1100817 | SJRS001 - A - DUP | E1100817-002 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 0.325 | ng/kg | JK | U | 22 |
| E1100817 | SJRS001 - A - DUP | E1100817-002 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin | 0.423 | ng/kg | JK | U | 22 |
| E1100817 | SJRS001 - A - DUP | E1100817-002 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin | 1.31 | ng/kg | JK | U | 22 |
| E1100817 | SJRS001 - A - DUP | E1100817-002 | EPA1613B | 2,3,4,7,8-Pentachlorodibenzo-p-furan | 0.47 | ng/kg | JK | U | 22 |
| E1100817 | SJRS001 - A - DUP | E1100817-002 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 1.18 | ng/kg | C | DNR | 11 |
| E1100817 | SJRS001 - A - DUP | E1100817-002 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 0.807 | ng/kg | JK | U | 22 |
| E1100817 | SJRS002 - A | E1100817-003 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin | 0.339 | ng/kg | JK | U | 22 |
| E1100817 | SJRS002 - A | E1100817-003 | EPA1613B | 2,3,4,6,7,8-Hexachlorodibenzo-p-furan | 0.425 | ng/kg | JK | U | 22 |
| E1100817 | SJRS002 - A | E1100817-003 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 0.508 | ng/kg | CJK | DNR | 11 |
| E1100817 | SJRS003 - A | E1100817-004 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin | 0.364 | ng/kg | JK | U | 22 |
| E1100817 | SJRS003 - A | E1100817-004 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-furan | 0.359 | ng/kg | JK | U | 22 |
| E1100817 | SJRS003 - A | E1100817-004 | EPA1613B | 2,3,4,7,8-Pentachlorodibenzo-p-furan | 0.368 | ng/kg | JK | U | 22 |
| E1100817 | SJRS003 - A | E1100817-004 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 1.77 | ng/kg | C | DNR | 11 |
| E1100817 | SJRS003 - A | E1100817-004 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 1.27 | ng/kg | K | U | 22 |
| E1100817 | SJRS004 - A | E1100817-005 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 0.531 | ng/kg | JK | U | 22 |
| E1100817 | SJRS004 - A | E1100817-005 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 15.2 | ng/kg | C | DNR | 11 |
| E1100817 | SJRS005 - A | E1100817-006 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin | 0.244 | ng/kg | JK | U | 22 |
| E1100817 | SJRS005 - A | E1100817-006 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin | 0.391 | ng/kg | JK | U | 22 |
| E1100817 | SJRS005 - A | E1100817-006 | EPA1613B | 1,2,3,4,7,8,9-Heptachlorodibenzo-p-furan | 0.25 | ng/kg | JK | U | 22 |
| E1100817 | SJRS005 - A | E1100817-006 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 0.93 | ng/kg | CJK | DNR | 11 |
| E1100817 | SJRS006 - A | E1100817-007 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin | 1.12 | ng/kg | JK | U | 22 |
| E1100817 | SJRS006 - A | E1100817-007 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin | 1.31 | ng/kg | JK | U | 22 |
| E1100817 | SJRS006 - A | E1100817-007 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-furan | 0.666 | ng/kg | JK | U | 22 |
| E1100817 | SJRS006 - A | E1100817-007 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-furan | 0.953 | ng/kg | JK | U | 22 |
| E1100817 | SJRS006 - A | E1100817-007 | EPA1613B | 1,2,3,4,7,8,9-Heptachlorodibenzo-p-furan | 0.436 | ng/kg | JK | U | 22 |
| E1100817 | SJRS006 - A | E1100817-007 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 2.87 | ng/kg | CK | DNR | 11 |
| E1100817 | SJRS007 - A | E1100817-008 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin | 0.401 | ng/kg | JK | U | 22 |
| E1100817 | SJRS007 - A | E1100817-008 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin | 0.721 | ng/kg | JK | U | 22 |
| E1100817 | SJRS007 - A | E1100817-008 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-furan | 0.292 | ng/kg | JK | U | 22 |
| E1100817 | SJRS007 - A | E1100817-008 | EPA1613B | 2,3,4,7,8-Pentachlorodibenzo-p-furan | 0.539 | ng/kg | JK | U | 22 |
| E1100817 | SJRS007 - A | E1100817-008 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-furan | 0.642 | ng/kg | JK | U | 22 |
| E1100817 | SJRS007 - A | E1100817-008 | EPA1613B | 1,2,3,4,7,8,9-Heptachlorodibenzo-p-furan | 0.704 | ng/kg | JK | U | 22 |

Qualified Data Summary Table
San Jacinto River Waste Pits - Residential Soil Sampling

| SDG | Sample ID | Laboratory ID | Method | Analyte | Result | Units | Lab Qualifier | Validation Qualifier | Validation Reason |
|---|---|---|---|---|---|---|---|---|---|
| E1100817 | SJRS007 - A | E1100817-008 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 0.974 | ng/kg | CJK | DNR | 11 |
| E1100817 | SJRS008 - A | E1100817-009 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 0.216 | ng/kg | JK | U | 22 |
| E1100817 | SJRS008 - A | E1100817-009 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-furan | 0.307 | ng/kg | JK | U | 22 |
| E1100817 | SJRS008 - A | E1100817-009 | EPA1613B | 1,2,3,4,7,8,9-Heptachlorodibenzo-p-furan | 0.618 | ng/kg | JK | U | 22 |
| E1100817 | SJRS008 - A | E1100817-009 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 1.44 | ng/kg | C | DNR | 11 |
| E1100817 | SJRS009 - A | E1100817-010 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 0.295 | ng/kg | JK | U | 22 |
| E1100817 | SJRS009 - A | E1100817-010 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-furan | 0.37 | ng/kg | JK | U | 22 |
| E1100817 | SJRS009 - A | E1100817-010 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-furan | 0.176 | ng/kg | JK | U | 22 |
| E1100817 | SJRS009 - A | E1100817-010 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 1.43 | ng/kg | C | DNR | 11 |
| E1100817 | SJRS009 - A | E1100817-010 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 0.948 | ng/kg | JK | U | 22 |
| E1100817 | SJRS010 - A | E1100817-011 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 0.681 | ng/kg | JK | U | 22 |
| E1100817 | SJRS010 - A | E1100817-011 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin | 1.23 | ng/kg | JK | U | 22 |
| E1100817 | SJRS010 - A | E1100817-011 | EPA1613B | 2,3,4,7,8-Pentachlorodibenzo-p-furan | 1.15 | ng/kg | JK | U | 22 |
| E1100817 | SJRS010 - A | E1100817-011 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-furan | 2.93 | ng/kg | JK | U | 22 |
| E1100817 | SJRS010 - A | E1100817-011 | EPA1613B | 1,2,3,4,7,8,9-Heptachlorodibenzo-p-furan | 1.42 | ng/kg | JK | U | 22 |
| E1100817 | SJRS010 - A | E1100817-011 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 4.18 | ng/kg | C | DNR | 11 |
| E1100817 | RSRM - 900 | E1100817-012 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-furan | 45.5 | ng/kg | P | J | 14 |
| E1100817 | RSRM - 900 | E1100817-013 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-furan | 243 | ng/kg | P | J | 14 |
| E1100817 | RSRM - 900 | E1100817-013 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 178 | ng/kg | C | DNR | 11 |
| E1100817 | RSFW - 901S | E1100817-014 | EPA1613B | Octachlorodibenzo-p-dioxin | 7.14 | pg | BJK | U | 22 |

EcoChem, INC.
Environmental Data Quality

# DATA VALIDATION REPORT

## SAN JACINTO RIVER WASTE PITS
## Sediment Addendum I

**Prepared for:**

Integral Consulting, Inc.
1205 West Bay Dr. NW
Olympia, Washington 98502

**Prepared by:**

EcoChem, Inc.
710 Second Avenue, Suite 660
Seattle, Washington 98104

EcoChem Project: C22130-15

December 28, 2011

**Approved for Release**

Melissa Swanson

## Basis for Data Validation

This report summarizes the results of validation (Stages 2A, 2B, & 3/4) performed on sediment and quality control (QC) sample data for the San Jacinto River Sediment Addendum I. A complete list of samples is provided in the **Sample Index**. Laboratory batch ID numbers and associated level of validation are provided at the beginning of each technical section.

Samples were analyzed by Columbia Analytical Services, Inc., Kelso, Washington and Columbia Analytical Services, Inc., Houston, Texas. The analytical methods and EcoChem project chemists are listed below.

| Analysis | Method of Analysis | Primary Review | Secondary Review |
|---|---|---|---|
| Dioxin & Furan Compounds | EPA1613B | M. Swanson | C. Mott |
| Total Organic Carbon | SW9060M | | |
| Particle Size | PSEP | | |
| Total Solids | EPA 160.3M | | |

The data were reviewed using guidance and quality control criteria documented in the analytical methods; the *Sampling and Analysis Plan: Sediment Study, San Jacinto River Waste Pits Superfund Site* (Integral/Anchor QEA, April 2010); Addendum 1 (to the Sampling and Analysis Plan) - *Additional Upstream Sediment Sampling, San Jacinto River Waste Pits Superfund Site* (Integral/Anchor QEA, October 2011); *USEPA National Functional Guidelines for Chlorinated Dioxin/Furan Data Review* (USEPA, September 2005); and *USEPA National Functional Guidelines for Inorganic Data Review* (USEPA, October 2004).

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

Data qualifier definitions, reason codes, and validation criteria are included as **Appendix A**. The qualified data summary table is included as **Appendix B.** Data Validation Worksheets and the associated communication records will be kept on file at EcoChem, Inc. A qualified laboratory electronic data deliverable (EDD) was also submitted with this report.

Sample Index
San Jacinto River Waste Pits - Sediment Addendum I
Columbia Analytical Services - Houston

| SDG | Sample ID | Laboratory ID | Matrix | Dioxins |
|---|---|---|---|---|
| E1100989 | SD-002 | E1100989-002 | Sediment | ✓ |
| E1100989 | SD-007 | E1100989-007 | Sediment | ✓ |
| E1100989 | SD-008 | E1100989-008 | Sediment | ✓ |
| E1100989 | SD-009 | E1100989-009 | Sediment | ✓ |
| E1100989 | SD-010 | E1100989-010 | Sediment | ✓ |
| E1100989 | SD-011 | E1100989-011 | Sediment | ✓ |
| E1100989 | SD-015 | E1100989-015 | Sediment | ✓ |
| E1100989 | SD-016 | E1100989-016 | Sediment | ✓ |
| E1100989 | SD-017 | E1100989-017 | Sediment | ✓ |
| E1100989 | SD-019 | E1100989-019 | Sediment | ✓ |
| E1100990 | FW-001 | E1100990-001 | Filter Wipe | ✓ |
| E1100990 | FB-001 | E1100990-002 | Filter Wipe | ✓ |

Sample Index
San Jacinto River Waste Pits - Sediment Addendum 1
Columbia Analytical Services - Kelso

| SDG | Sample ID | Laboratory ID | Matrix | Grain Size | Total Solids |
|---|---|---|---|---|---|
| K1109729 | SD-001 | K1109729-001 | Sediment | ✓ | ✓ |
| K1109729 | SD-002 | K1109729-002 | Sediment | ✓ | ✓ |
| K1109729 | SD-003 | K1109729-003 | Sediment | ✓ | ✓ |
| K1109729 | SD-004 | K1109729-004 | Sediment | ✓ | ✓ |
| K1109729 | SD-005 | K1109729-005 | Sediment | ✓ | ✓ |
| K1109729 | SD-006 | K1109729-006 | Sediment | ✓ | ✓ |
| K1109729 | SD-007 | K1109729-007 | Sediment | ✓ | ✓ |
| K1109729 | SD-008 | K1109729-008 | Sediment | ✓ | ✓ |
| K1109729 | SD-009 | K1109729-009 | Sediment | ✓ | ✓ |
| K1109729 | SD-010 | K1109729-010 | Sediment | ✓ | ✓ |
| K1109729 | SD-011 | K1109729-011 | Sediment | ✓ | ✓ |
| K1109729 | SD-012 | K1109729-012 | Sediment | ✓ | ✓ |
| K1109729 | SD-013 | K1109729-013 | Sediment | ✓ | ✓ |
| K1109729 | SD-014 | K1109729-014 | Sediment | ✓ | ✓ |
| K1109729 | SD-015 | K1109729-015 | Sediment | ✓ | ✓ |
| K1109729 | SD-016 | K1109729-016 | Sediment | ✓ | ✓ |
| K1109729 | SD-017 | K1109729-017 | Sediment | ✓ | ✓ |
| K1109729 | SD-018 | K1109729-018 | Sediment | ✓ | ✓ |
| K1109729 | SD-019 | K1109729-019 | Sediment | ✓ | ✓ |
| K1109729 | SD-020 | K1109729-020 | Sediment | ✓ | ✓ |
| K1109729 | SD-021 | K1109729-021 | Sediment | ✓ | ✓ |

# DATA VALIDATION REPORT
# San Jacinto River Waste Pits
# Sediment Addendum I
# Dioxin/Furan Compounds by EPA 1613B

This report documents the review of analytical data from the analysis of sediment samples and the associated laboratory and field quality control (QC) samples. Columbia Analytical Services, Houston, Texas, analyzed the samples. Refer to the **Sample Index** for a complete list of samples.

| SDG | Number of Samples | Validation Level |
|---|---|---|
| E1100989 | 10 Sediment | EPA Stage 4 |
| E1100990 | 2 Filter Wipes | EPA Stage 2A |

## I. DATA PACKAGE COMPLETENESS

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

## II. EDD TO HARDCOPY VERIFICATION

Ten percent (10%) of the results in the laboratory EDD were verified by comparison to the hardcopy laboratory data package. No errors were noted.

## III. TECHNICAL DATA VALIDATION

The QC requirements that were reviewed are listed in the following table.

| | | | |
|---|---|---|---|
| 1 | Sample Receipt, Preservation, and Holding Times | | Labeled Compound Recovery |
| | GC/MS Instrument Performance Check | 1 | Matrix Spike/Matrix Spike Duplicates (MS/MSD) |
| | Initial Calibration (ICAL) | | Laboratory Control Samples (LCS/LCSD) |
| | Calibration Verification (CVER) | | Target Analyte List |
| | Isomer Specificity | | Reported Results |
| 1 | Laboratory Blanks | 2 | Compound Identification |
| 1 | Field Blanks | 1 | Calculation Verification (EPA Stage 4 only) |

[1] ***Quality control results are discussed below, but no data were qualified.***
[2] ***Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed below.***

## Sample Receipt, Preservation, and Holding Times

As stated in validation guidance documents, sample shipping coolers should arrive at the laboratory within the advisory temperature range of 2° to 6°C.

The laboratory received all the sample coolers with temperatures less than the lower limit, at 0.1°C. It was determined that these outliers did not impact data quality; therefore no qualifiers were assigned.

## Laboratory Blanks

***SDG E1100990:*** A positive result for OCDD was reported in the method blank however, this result was assigned a K-flag by the laboratory indicating the detected peak did not meet ion ratio criteria. This K-flagged value cannot be considered a positive identification; therefore it was treated as a non-detect. No data were qualified.

## Field Blanks

***SDG E1100990:*** Two filter wipe blanks, FW-001 and FB-001, were submitted with this SDG. A K-flagged result for OCDD was reported in both blank samples indicating the detected peaks did not meet ion ratio criteria. These values were treated as non-detects. No data were qualified.

## Matrix Spike/Matrix Spike Duplicates

Matrix spike/matrix spike duplicate (MS/MSD) samples were not analyzed. Laboratory accuracy and precision were evaluated using the laboratory control sample/laboratory control sample duplicate (LCS/LCSD) recovery and relative percent difference (RPD) values.

## Compound Identification

When a peak is detected but the ion ratio does not meet the criteria for compound identification, the laboratory assigns a K-flag to the result. During validation, these results were considered potential false positives, or estimated maximum possible concentrations (EMPC), and were qualified as not detected (U-22) at the reported concentrations.

All positive results for 2,3,7,8-TCDF were confirmed on a DB-225 column as required by the method. Results from both columns were reported. The 2,3,7,8-TCDF results from the DB-5 column were qualified do-not-report (DNR-11) in favor of the results from the DB-225 column.

## Calculation Verification

***SDG E1100989:*** Several results were verified by recalculation from the raw data. No calculation or transcription errors were noted.

## IV. OVERALL ASSESSMENT

As determined by this evaluation, the laboratory followed the specified analytical method. Accuracy was acceptable as demonstrated by the labeled compound and LCS/LCSD %R values. Precision was acceptable as indicated by the LCS/LCSD RPD values.

Data were qualified as not detected due to ion ratio outliers.

Data were flagged as do-not-report (DNR) to indicate which result (from multiple reported analyses) should not be used.

Data that has been flagged DNR should not be used for any purpose. All other data, as qualified, are acceptable for use.

# DATA VALIDATION REPORT
# San Jacinto River Waste Pits
# Sediment Addendum I
# Conventional Parameters

This report documents the review of analytical data from the analysis of sediment samples and the associated laboratory quality control (QC) samples. Samples were analyzed by Columbia Analytical Services, Inc., Kelso, Washington. Refer to the **Sample Index** for a complete list of samples.

| SDG | Number of Samples | Validation Level |
|---|---|---|
| K1109729 | 21 Sediment | Stage 3 |

The analytical tests that were performed are summarized below.

| Parameter | Method |
|---|---|
| Total Organic Carbon (TOC) | SW9060M |
| Particle Size | ASTM D422 |
| Total Solids | EPA 160.3M |

## I. DATA PACKAGE COMPLETENESS

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

## II. EDD TO HARDCOPY VERIFICATION

Ten percent (10%) of the results in the laboratory EDD were verified by comparison to the hardcopy laboratory data package. No errors were noted.

## III. TECHNICAL DATA VALIDATION

The QC requirements that were reviewed are listed in the following table.

| | | | |
|---|---|---|---|
| 2 | Sample Receipt, Preservation, and Holding Times | | Matrix Spikes/Matrix Spike Duplicates (MS/MSD) |
| | Initial Calibration | 2 | Laboratory Replicates |
| | Calibration Verification | | Reported Results |
| | Laboratory Blanks | | Reporting Limits |
| | Laboratory Control Samples (LCS) | 1 | Calculation Verification |

[1] ***Quality control results are discussed below, but no data were qualified.***
[2] ***Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed below.***

## Sample Receipt, Preservation, and Holding Times

As stated in validation guidance documents, sample shipping coolers should arrive at the laboratory within the advisory temperature range of 2° to 6°C. The laboratory received sample coolers with temperatures less than the lower limit, the lowest at -5°C. It was determined that these outliers did not impact data quality; therefore no qualifiers were assigned.

The samples for total organic carbon (TOC) were analyzed outside the hold time criterion of 28 days, at 32, 33, or 34 days. All results for TOC were estimated (J-1).

## Laboratory Duplicates

Sample SD-05 was analyzed in duplicate for grain size. The RPD value for the 0.005 mm fraction was greater than the control limit, at 36.6%. The result for the 0.005 mm fraction was estimated (J-9) in Sample SD-05.

## Calculation Verification

Calculation verifications were performed. No calculation or transcription errors were found.

# IV. OVERALL ASSESSMENT

As determined by this evaluation, the laboratory followed the specified analytical methods. Accuracy was acceptable as demonstrated by the matrix spike/matrix spike duplicate (MS/MSD) and laboratory control sample percent recovery values. With the exception noted above, precision was acceptable as demonstrated by the MS/MSD and laboratory duplicate RPD values.

Data were estimated due to hold time criterion outliers and a laboratory precision outlier.

All data, as qualified, are acceptable for use.

EcoChem, INC.
Environmental Data Quality

# APPENDIX A

# DATA QUALIFIER DEFINITIONS, REASON CODES, AND CRITERIA TABLES

# DATA VALIDATION QUALIFIER CODES
# Based on National Functional Guidelines

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

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

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

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

# DATA QUALIFIER REASON CODES

| | |
|---|---|
| 1 | Holding Time/Sample Preservation |
| 2 | Chromatographic pattern in sample does not match pattern of calibration standard. |
| 3 | Compound Confirmation |
| 4 | Tentatively Identified Compound (TIC) (associated with NJ only) |
| 5A | Calibration (initial) |
| 5B | Calibration (continuing) |
| 6 | Field Blank Contamination |
| 7 | Lab Blank Contamination (e.g., method blank, instrument, etc.) |
| 8 | Matrix Spike(MS & MSD) Recoveries |
| 9 | Precision (all replicates) |
| 10 | Laboratory Control Sample Recoveries |
| 11 | A more appropriate result is reported (associated with “R” and “DNR” only) |
| 12 | Reference Material |
| 13 | Surrogate Spike Recoveries (a.k.a., labeled compounds & recovery standards) |
| 14 | Other (define in validation report) |
| 15 | GFAA Post Digestion Spike Recoveries |
| 16 | ICP Serial Dilution % Difference |
| 17 | ICP Interference Check Standard Recovery |
| 18 | Trip Blank Contamination |
| 19 | Internal Standard Performance (e.g., area, retention time, recovery) |
| 20 | Linear Range Exceeded |
| 21 | Potential False Positives |
| 22 | Elevated Detection Limit Due to Interference (i.e., laboratory, chemical and/or matrix) |

# EcoChem Validation Guidelines for Dioxin/Furan Analysis by HRMS
## (Based on EPA Reg. 10 SOP, Rev. 2, 1996 & EPA SW-846, Methods 1613b and 8290)

| VALIDATION QC ELEMENT | ACCEPTANCE CRITERIA | ACTION | REASON CODE |
|---|---|---|---|
| Cooler/Storage Temperature | Waters/Solids < 4°C<br>Tissues <-10°C | EcoChem PJ, see TM-05 | 1 |
| Holding Time | Extraction - Water: 30 days from collection<br>*Note:* Under CWA, SDWA, and RCRA the HT for H2O is 7 days*<br>Extraction - Soil: 30 days from collection<br>Analysis: 40 days from extraction | J(+)/UJ(-) if ext > 30 days<br>J(+)/UJ(-) if analysis > 40 Days<br>EcoChem PJ, see TM-05 | 1 |
| Mass Resolution | >=10,000 resolving power at m/z 304.9824<br>Exact mass of m/z 380.9760 w/in 5 ppm of theoretical value (380.97410 to 380.97790) .<br>Analyzed prior to ICAL and at the start and end of each 12 hr. shift | R(+/-) if not met | 14 |
| Window Defining Mix and Column Performance Mix | Window defining mixture/Isomer specificity std run before ICAL and CCAL<br>Valley < 25% (valley = (x/y)*100%)<br>x = ht. of TCDD<br>y = baseline to bottom of valley<br>For all isomers eluting near 2378-TCDD/TCDF isomers (TCDD only for 8290) | J(+) if valley > 25% | 5A (ICAL)<br>5B (CCAL |
| Initial Calibration | Minimum of five standards<br>%RSD < 20% for native compounds<br>%RSD <30% for labeled compounds<br>(%RSD <35% for labeled compounds under 1613b) | J(+) natives if %RSD > 20% | 5A |
| | Abs. RT of $^{13}C_{12}$-1234-TCDD<br>>25 min on DB5<br>>15 min on DB-225 | EcoChem PJ, see TM-05 | |
| | Ion Abundance ratios within QC limits<br>(Table 8 of method 8290)<br>(Table 9 of method 1613B) | EcoChem PJ, see TM-05 | |
| | S/N ratio > 10 for all native and labeled compounds in CS1 std. | If <10, elevate Det. Limit or R(-) | |



Copyright 2007 EcoChem, Inc.

# EcoChem Validation Guidelines for Dioxin/Furan Analysis by HRMS
## (Based on EPA Reg. 10 SOP, Rev. 2, 1996 & EPA SW-846, Methods 1613b and 8290)

| VALIDATION QC ELEMENT | ACCEPTANCE CRITERIA | ACTION | REASON CODE |
|---|---|---|---|
| Continuing Calibration | Analyzed at the start and end of each 12 hour shift.<br>%D+/-20% for native compounds<br>%D +/-30% for labeled compounds<br>(Must meet limits in Table 6, Method 1613B)<br>(If %Ds in the closing CCAL are w/in 25%/35% the avg RF from the two CCAL may be used to calculate samples per Method 8290, Section 8.3.2.4) | Do not qualify labeled compounds. Narrate in report for labeled compound %D outliers.<br>For native compound %D outliers:<br>8290: J(+)/UJ(-) if %D = 20% - 75%<br>J(+)/R(-) if %D > 75%<br>1613: J(+)/UJ(-) if %D is outside Table 6 limits<br>J(+)/R(-) if %D is +/- 75% of Table 6 limit | 5B |
| | Abs. RT of $^{13}C_{12}$-1234-TCDD and $^{13}C12$-123789-HxCDD +/- 15 sec of ICAL. | EcoChem PJ, see ICAL section of TM-05 | |
| | RRT of all other compounds must meet Table 2 of 1613B. | EcoChem PJ, see TM-05 | |
| | Ion Abundance ratios within QC limits<br>(Table 8 of method 8290)<br>(Table 9 of method 1613B) | EcoChem PJ, see TM-05 | |
| | S/N ratio > 10 | If <10, elevate Det. Limit or R(-) | |
| Method Blank | One per matrix per batch<br>No positive results | If sample result <5X action level, qualify U at reported value. | 7 |
| Field Blanks (Not Required) | No positive results | If sample result <5X action level, qualify U at reported value. | 6 |
| LCS / OPR | Concentrations must meet limits in Table 6, Method 1613B or lab limits. | J(+) if %R > UCL<br>J(+)/UJ(-) if %R < LCL<br>J(+)/R(-) using PJ if %R <<LCL (< 10%) | 10 |
| MS/MSD (recovery) | May not analyze MS/MSD<br>%R should meet lab limits. | Qualify parent only unless other QC indicates systematic problems:<br>J(+) if both %R > UCL<br>J(+)/UJ(-) if both %R < LCL<br>J(+)/R(-) if both %R < 10%<br>PJ if only one %R outlier | 8 |
| MS/MSD (RPD) | May not analyze MS/MSD<br>RPD < 20% | J(+) in parent sample if RPD > CL | 9 |



Copyright 2007 EcoChem, Inc.

# EcoChem Validation Guidelines for Dioxin/Furan Analysis by HRMS
## (Based on EPA Reg. 10 SOP, Rev. 2, 1996 & EPA SW-846, Methods 1613b and 8290)

| VALIDATION QC ELEMENT | ACCEPTANCE CRITERIA | ACTION | REASON CODE |
|---|---|---|---|
| Lab Duplicate | RPD <25% if present. | J(+)/UJ(-) if outside limts | 9 |
| Labeled Compounds / Internal Standards | *Method 8290:* %R = 40% - 135% in all samples<br>*Method 1613B:* %R must meet limits specified in Table 7, Method 1613 | J(+)/UJ(-) if %R = 10% to LCL<br>J(+) if %R > UCL<br>J(+)/R(-) if %R < 10% | 13 |
| Quantitation/ Identification | Ions for analyte, IS, and rec. std. must max w/in 2 sec.<br>S/N >2.5<br>IA ratios meet limits in Table 9 of 1613B or Table 8 of 8290<br>RRTs w/in limits in Table 2 of 1613B | If RT criteria not met, use PJ (see TM-05)<br>If S/N criteria not met, J(+).<br>if unlabelled ion abundance not met, change to EMPC<br>If labelled ion abundance not met, J(+). | 21 |
| EMPC (estimated maximum possible concentration) | If quantitation idenfication criteria are not met, laboratory should report an EMPC value. | If laboratory correctly reported an EMPC value, qualify with U to indicate that the value is a detection limit. | 14 |
| Interferences | PCDF interferences from PCDPE | If both detected, change PCDF result to EMPC | 14 |
| Second Column Confirmation | All 2378-TCDF hits must be confirmed on a DB-225 (or equiv) column. All QC specs in this table must be met for the confirmation analysis. | Report lower of the two values.<br>If not performed use PJ (see TM-05). | 3 |
| Field Duplicates | Use QAPP limits. If no QAPP:<br>Solids: RPD <50%<br>OR absolute diff. < 2X RL (for results < 5X RL)<br>Aqueous: RPD <35%<br>OR absolute diff. < 1X RL (for results < 5X RL) | Narrate and qualify if required by project (EcoChem PJ) | 9 |
| Two analyses for one sample | Report only one result per analyte | "DNR" results that should not be used | 11 |



Copyright 2007 EcoChem, Inc.

# EcoChem Validation Guidelines for Conventional Chemistry Analysis (Based on EPA Standard Methods)

| VALIDATION QC ELEMENT | ACCEPTANCE CRITERIA | ACTION | REASON CODE |
|---|---|---|---|
| Cooler Temperature and Preservation | Cooler Temperature 4°C ±2°C<br>Preservation: Method Specific | Use Professional Judgment to qualify based to qualify for coole temp outliers<br>J(+)/UJ(-) if preservation requirements not met | 1 |
| Holding Time | Method Specific | Professional Judgment<br>J(+)/UJ(-) if holding time exceeded<br>J(+)/R(-) if HT exceeded by > 3X | 1 |
| Initial Calibration | Method specific<br>r>0.995 | Use professional judgment<br>J(+)/UJ(-) for r < 0.995 | 5A |
| Initial Calibration Verification (ICV) | Where applicable to method<br>Independent source analyzed immediately after calibration<br>%R method specific, usually 90% - 110% | R(+/-) if %R significantly < LCL<br>J(+)/UJ(-) if %R < LCL<br>J(+) if %R > UCL<br>R(+) if %R significantly > UCL | 5A |
| Continuing Cal Verification (CCV) | Where applicable to method<br>Every ten samples, immed. following ICV/ICB and end of run<br>%R method specific, usually 90% - 110% | R(+/-) if %R significantly < LCL<br>J(+)/UJ(-) if %R < LCL<br>J(+) if %R > UCL<br>R(+) if %R significantly > UCL | 5B |
| Initial and Continuing Cal Blanks (ICB/CCB) | Where applicable to method<br>After each ICV and CCV every ten samples and end of run<br>\| blank\| < MDL | Action level is 5x absolute value of blank conc.<br>For (+) blanks, U(+) results < action level<br>For (-) blanks, J(+)/UJ(-) results < action level<br>refer to TM-02 for additional details | 7 |
| Method Blank | One per matrix per batch<br>(not to exceed 20 samples)<br>blank < MDL | Action level is 5x absolute value of blank conc.<br>For (+) blk value, U(+) results < action level<br>For (-) blk value, J(+)/UJ(-) results < action level | 7 |
| Laboratory Control Sample | Waters:<br>One per matrix per batch<br>%R (80-120%) | R(+/-) if %R < 50%<br>J(+)/UJ(-) if %R = 50-79%<br>J(+) if %R >120% | 10 |
| | Soils:<br>One per matrix per batch<br>Result within manufacturer's certified acceptance range | J(+)/UJ(-) if < LCL,<br>J(+) if > UCL | 10 |
| Matrix Spike | One per matrix per batch; 5% frequency<br>75-125% for samples less than 4 x spike level | J(+) if %R > 125% or < 75%<br>UJ(-) if %R = 30-74%<br>R(+/-) results < IDL if %R < 30% | 8 |
| Laboratory Duplicate | One per matrix per batch<br>RPD <20% for samples > 5x RL<br>Diff <RL for samples >RL and <5 x RL<br>(may use RPD < 35%, Diff < 2X RL for solids) | J(+)/UJ(-) if RPD > 20% or diff > RL<br>all samples in batch | 9 |



Copyright 2006 EcoChem, Inc.

# EcoChem Validation Guidelines for Conventional Chemistry Analysis (Based on EPA Standard Methods)

| VALIDATION QC ELEMENT | ACCEPTANCE CRITERIA | ACTION | REASON CODE |
|---|---|---|---|
| Field Blank | blank < MDL | Action level is 5x blank conc.<br>U(+) sample values < action level<br>in associated field samples only | 6 |
| Field Duplicate | For results > 5X RL:<br>Water: RPD < 35% Solid: RPD < 50%<br>For results < 5 x RL:<br>Water: Diff<RL Solid: Diff < 2X RL | J(+)/UJ(-) in parent samples only | 9 |



Copyright 2006 EcoChem, Inc.

EcoChem, INC.
Environmental Data Quality

# APPENDIX B
# QUALIFIED DATA SUMMARY TABLE

Qualified Data Summary Table
San Jacinto River Waste Pits - Sediment Addendum I

| SDG | Sample ID | Laboratory ID | Method | Analyte | Result | Units | Lab Qualifier | Validation Qualifier | Validation Reason |
|---|---|---|---|---|---|---|---|---|---|
| K1109729 | SD-005 | K1109729-005 | D422 | Hydrometer Analysis passing 0.005 mm | 16.5 | percent | | J | 9 |
| E1100989 | SD-002 | E1100989-002 | EPA1613B | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-furan | 1.84 | ng/kg | JK | U | 22 |
| E1100989 | SD-002 | E1100989-002 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin | 1.12 | ng/kg | JK | U | 22 |
| E1100989 | SD-007 | E1100989-007 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 2.48 | ng/kg | CJ | DNR | 11 |
| E1100989 | SD-007 | E1100989-007 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 2.33 | ng/kg | JK | U | 22 |
| E1100989 | SD-008 | E1100989-008 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin | 0.947 | ng/kg | JK | U | 22 |
| E1100989 | SD-008 | E1100989-008 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 2.9 | ng/kg | C | DNR | 11 |
| E1100989 | SD-009 | E1100989-009 | EPA1613B | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-furan | 1.02 | ng/kg | JK | U | 22 |
| E1100989 | SD-015 | E1100989-015 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 8.04 | ng/kg | C | DNR | 11 |
| E1100989 | SD-016 | E1100989-016 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 2.98 | ng/kg | C | DNR | 11 |
| E1100989 | SD-019 | E1100989-019 | EPA1613B | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-furan | 0.779 | ng/kg | JK | U | 22 |
| E1100990 | FW-001 | E1100990-001 | EPA1613B | Octachlorodibenzo-p-dioxin | 2.78 | pg | BJK | U | 22 |
| E1100990 | FB-001 | E1100990-002 | EPA1613B | Octachlorodibenzo-p-dioxin | 5.05 | pg | BJK | U | 22 |
| K1109729 | SD-002 | K1109729-002 | EPA9060 | Organic carbon | 0.952 | percent | | J | 1 |
| K1109729 | SD-007 | K1109729-007 | EPA9060 | Organic carbon | 1.34 | percent | | J | 1 |
| K1109729 | SD-008 | K1109729-008 | EPA9060 | Organic carbon | 0.827 | percent | | J | 1 |
| K1109729 | SD-009 | K1109729-009 | EPA9060 | Organic carbon | 1.56 | percent | | J | 1 |
| K1109729 | SD-010 | K1109729-010 | EPA9060 | Organic carbon | 1.63 | percent | | J | 1 |
| K1109729 | SD-011 | K1109729-011 | EPA9060 | Organic carbon | 1.52 | percent | | J | 1 |
| K1109729 | SD-015 | K1109729-015 | EPA9060 | Organic carbon | 1.47 | percent | | J | 1 |
| K1109729 | SD-016 | K1109729-016 | EPA9060 | Organic carbon | 0.747 | percent | | J | 1 |
| K1109729 | SD-017 | K1109729-017 | EPA9060 | Organic carbon | 1.3 | percent | | J | 1 |
| K1109729 | SD-019 | K1109729-019 | EPA9060 | Organic carbon | 0.699 | percent | | J | 1 |

EcoChem, INC.
Environmental Data Quality

# DATA VALIDATION REPORT

## SAN JACINTO RIVER WASTE PITS
## Tissue Addendum I

**Prepared for:**

Integral Consulting, Inc.
1205 West Bay Dr. NW
Olympia, Washington 98502

**Prepared by:**

EcoChem, Inc.
710 Second Avenue, Suite 660
Seattle, Washington 98104

EcoChem Project: C22130-15

December 28, 2011

**Approved for Release**

Melissa Swanson

## Basis for Data Validation

This report summarizes the results of validation (Stages 2A, 2B, & 4) performed on tissue and quality control (QC) sample data for the San Jacinto River Tissue Addendum I. A complete list of samples is provided in the **Sample Index**. Laboratory batch ID numbers and associated level of validation are provided at the beginning of each technical section.

Samples were analyzed by Columbia Analytical Services, Inc., Kelso, Washington and Columbia Analytical Services, Inc., Houston, Texas. The analytical methods and EcoChem project chemists are listed below.

| Analysis | Method of Analysis | Primary Review | Secondary Review |
|---|---|---|---|
| Dioxin & Furan Compounds | EPA1613B | M. Swanson | C. Mott |
| Lipids | NOAA Lipid | | |

The data were reviewed using guidance and quality control criteria documented in the analytical methods; the *Sampling and Analysis Plan: Tissue Study, San Jacinto River Waste Pits Superfund Site* (Integral, September 2010); Addendum 1 (to the Sampling and Analysis Plan) - *Tissue Sampling and Analysis Plan for Additional Background Catfish and Crab Tissue Sampling, San Jacinto River Waste Pits Superfund Site* (Integral/Anchor QEA, October 2011); *USEPA National Functional Guidelines for Chlorinated Dioxin/Furan Data Review* (USEPA, September 2005).

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

Data qualifier definitions, reason codes, and validation criteria are included as **Appendix A**. The qualified data summary table is included as **Appendix B.** Data Validation Worksheets and the associated communication records will be kept on file at EcoChem, Inc. A qualified laboratory electronic data deliverable (EDD) was also submitted with this report.

Sample Index
San Jacinto River Waste Pits - Sediment Addendum 1
Columbia Analytical Services - Kelso

| SDG | Sample ID | Laboratory ID | Matrix | Dioxins |
|---|---|---|---|---|
| K1109729 | FW-0010 | K1109729-022 | Filter Wipe | ✓ |
| K1110455 | SJFCA5-LF2 | EQ1100542-07 | Tissue | ✓ |
| K1110455 | SJFCA5-LF1 | K1110455-004 | Tissue | ✓ |
| K1110455 | SJFCA5-LF2 | K1110455-008 | Tissue | ✓ |
| K1110455 | SJFCA5-LF3 | K1110455-012 | Tissue | ✓ |
| K1110455 | SJFCA5-LF4 | K1110455-016 | Tissue | ✓ |
| K1110455 | SJFCA5-LF5 | K1110455-020 | Tissue | ✓ |
| K1110455 | SJFCA5-LF6 | K1110455-024 | Tissue | ✓ |
| K1110455 | SJFCA5-LF7 | K1110455-028 | Tissue | ✓ |
| K1110455 | SJFCA5-LF8 | K1110455-032 | Tissue | ✓ |
| K1110455 | SJFCA5-LF9 | K1110455-036 | Tissue | ✓ |
| K1110455 | SJFCA5-LF10 | K1110455-040 | Tissue | ✓ |
| K1110455 | SJCA5-LF-HOMOGBLANK | K1110455-042 | Water | ✓ |
| K1110459 | SJFCA5-CR2 | EQ1100542-08 | Tissue | ✓ |
| K1110459 | SJFCA5-CR1 | K1110459-006 | Tissue | ✓ |
| K1110459 | SJFCA5-CR2 | K1110459-012 | Tissue | ✓ |
| K1110459 | SJFCA5-CR3 | K1110459-018 | Tissue | ✓ |
| K1110459 | SJFCA5-CR4 | K1110459-024 | Tissue | ✓ |
| K1110459 | SJFCA5-CR5 | K1110459-030 | Tissue | ✓ |
| K1110459 | SJFCA5-CR6 | K1110459-036 | Tissue | ✓ |
| K1110459 | SJFCA5-CR7 | K1110459-042 | Tissue | ✓ |
| K1110459 | SJFCA5-CR8 | K1110459-048 | Tissue | ✓ |
| K1110459 | SJFCA5-CR9 | K1110459-054 | Tissue | ✓ |
| K1110459 | SJFCA5-CR10 | K1110459-060 | Tissue | ✓ |
| K1110459 | SJCA5-CR-HOMOGBLANK | K1110459-061 | Water | ✓ |
| K1110460 | FW-0011 | K1110460-001 | Filter Wipe | ✓ |
| K1110460 | BT-0001 | K1110460-002 | Tissue | ✓ |
| K1110460 | BAIT-HOMOGBLANK | K1110460-003 | Water | ✓ |

# DATA VALIDATION REPORT
# San Jacinto River Waste Pits
# Tissue Addendum I
# Dioxin/Furan Compounds by EPA 1613B & Lipids

This report documents the review of analytical data from the analysis of tissue samples and the associated laboratory and field quality control (QC) samples. Columbia Analytical Services, Houston, Texas, analyzed the samples. Refer to the **Sample Index** for a complete list of samples.

| SDG | Number of Samples | Validation Level |
|---|---|---|
| K1109729 | 1 Filter Wipe | EPA Stage 2A |
| K1110455 | 10 Tissue & 1 Equipment Blank | EPA Stage 2A & 4 |
| K1110459 | 10 Tissue & 1 Equipment Blank | EPA Stage 2A & 2B |
| K1110460 | 1 Tissue, 1 Filter Wipe, & 1 Equipment Blank | EPA Stage 2A & 2B |

## I. DATA PACKAGE COMPLETENESS

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

## II. EDD TO HARDCOPY VERIFICATION

Ten percent (10%) of the results in the laboratory EDD were verified by comparison to the hardcopy laboratory data package. No errors were noted.

## III. TECHNICAL DATA VALIDATION

The QC requirements that were reviewed are listed in the following table.

| | | | |
|---|---|---|---|
| 1 | Sample Receipt, Preservation, and Holding Times | 1 | Matrix Spike/Matrix Spike Duplicates (MS/MSD) |
| | GC/MS Instrument Performance Check | 2 | Laboratory Duplicate |
| | Initial Calibration (ICAL) | | Laboratory Control Samples (LCS/LCSD) |
| | Calibration Verification (CVER) | | Target Analyte List |
| | Isomer Specificity | | Reported Results |
| 2 | Laboratory Blanks | 2 | Compound Identification |
| 2 | Field Blanks | 1 | Calculation Verification (EPA Stage 4 only) |
| | Labeled Compound Recovery | | |

[1] ***Quality control results are discussed below, but no data were qualified.***
[2] ***Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed below.***

## Sample Receipt, Preservation, and Holding Times

As stated in validation guidance documents, sample shipping coolers should arrive at the laboratory within the advisory temperature range of 2° to 6°C.

The laboratory received two sample coolers (SDG K1110455 and K1110459) with recorded temperatures less than the lower limit, the lowest at -50°C. It was determined that these outliers did not impact data quality; therefore no qualifiers were assigned.

## Laboratory Blanks

To assess the impact of any blank contaminant on the reported sample results, an action level is established at five times (5x) the concentration reported in the blank. If a contaminant is reported in an associated field sample and the concentration is less than the action level, the result is qualified as not detected (U-7). No action is taken if the sample result is greater than the action level, or for non-detected results. The laboratory assigned K-flags to values when a peak was detected but did not meet identification criteria. These values cannot be considered as positive identifications, but are "estimated maximum possible concentrations." When these occurred in the method blank the results were considered as false positives. No action levels were established for these analytes.

Method blanks were analyzed at the appropriate frequency. Contaminant levels, associated samples, and action levels are documented in the data validation worksheets. Various target analytes were detected in the method blanks, however only the following analytes required qualification in one or more samples:

***SDG K1110455:*** OCDD (3 tissue results, 1 equipment blank result)

***SDG K1110459:*** OCDD (4 tissue results)

***SDG K1110460:*** OCDD (1 tissue result)

## Field Blanks

To evaluate the effect on the sample data, action levels of 5x the blank concentrations were established. If a contaminant is detected in an associated field sample and the concentration is less than the action level, the result is qualified (U-6) at the reported concentration to indicate an elevation of the reporting limit. No action is taken if the sample result is greater than the action level, or for non-detected results.

The field blanks for this project are filter wipe samples and equipment rinsate blanks. Laboratory blanks are used to evaluate all associated field blanks. The contamination in the filter wipe blanks was further evaluated based on Sample FB-001 (the master filter wipe blank). There were no positive results reported with Sample FB-001. After qualifiers were issued based on method blanks, a result for OCDD remained in filter wipe Sample FW-0011. Results for OCDD were qualified as not detected (U-6) in eight tissue samples, two were blue crab and six were hardhead catfish.

***SDG K1109729:*** One filter wipe blank, FW-0010, was submitted with this SDG. A K-flagged result for OCDD was reported. This value was treated as a non-detect; no data were qualified.

***SDG K1110455:*** One equipment blank was submitted with this SDG. A positive result for total HpCDD remained after qualification for method blank contamination. Total homolog group results are not used to evaluate blank contamination; no data were qualified.

***SDG K1110459:*** One equipment blank was submitted with this SDG. A K-flagged result for OCDD was reported. This value was treated as a non-detect; no data were qualified.

***SDG K1110460:*** One filter wipe blank, FW-0011, and one equipment blank were submitted with this SDG. A positive result remained for OCDD in Sample FW-0011 after qualification for ion ratio outliers, method and field blank contamination. After qualification for ion ratio outliers no positive results remained in the equipment blank.

## Matrix Spike/Matrix Spike Duplicates

***SDGs K1109729, K1110460:*** Matrix spike/matrix spike duplicate (MS/MSD) samples were not analyzed. Laboratory accuracy and precision were evaluated using the laboratory control sample/laboratory control sample duplicate (LCS/LCSD) recovery and relative percent difference (RPD) values.

## Laboratory Duplicates

***SDG K1110455:*** Sample SJFCA5-LF2 was analyzed in duplicate. The RPD value for total TCDF was greater than the control limit, at 70%. The result for total TCDF in the parent sample was estimated (J-9).

***SDG K1110459:*** Sample SJFCA5-CR2 was analyzed in duplicate. The RPD value for total HpCDD was greater than the control limit, at 63%. The result for total HpCDD in the parent sample was estimated (J-9).

## Compound Identification

When a peak is detected but the ion ratio does not meet the criteria for compound identification, the laboratory assigns a K-flag to the result. During validation, these results were considered potential false positives, or estimated maximum possible concentrations (EMPC), and were qualified as not detected (U-22) at the reported concentrations.

All positive results for 2,3,7,8-TCDF were confirmed on a DB-225 column as required by the method. Only results from the DB-225 column were reported. No data were qualified.

## Calculation Verification

***SDG K1110455:*** Several results were verified by recalculation from the raw data. No calculation or transcription errors were noted.

## IV. OVERALL ASSESSMENT

As determined by this evaluation, the laboratory followed the specified analytical method. Accuracy was acceptable as demonstrated by the labeled compound, MS/MSD, and LCS/LCSD %R values. Precision was acceptable as indicated by the MS/MSD, LCS/LCSD and laboratory duplicate RPD values.

Data were qualified as not detected due to ion ratio outliers and method and field blank contamination. Data were estimated due to laboratory precision outliers.

All data, as qualified, are acceptable for use.

EcoChem, INC.
Environmental Data Quality

# APPENDIX A

# DATA QUALIFIER DEFINITIONS, REASON CODES, AND CRITERIA TABLES

# DATA VALIDATION QUALIFIER CODES
# Based on National Functional Guidelines

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

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

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

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

# DATA QUALIFIER REASON CODES

| | |
|---|---|
| 1 | Holding Time/Sample Preservation |
| 2 | Chromatographic pattern in sample does not match pattern of calibration standard. |
| 3 | Compound Confirmation |
| 4 | Tentatively Identified Compound (TIC) (associated with NJ only) |
| 5A | Calibration (initial) |
| 5B | Calibration (continuing) |
| 6 | Field Blank Contamination |
| 7 | Lab Blank Contamination (e.g., method blank, instrument, etc.) |
| 8 | Matrix Spike(MS & MSD) Recoveries |
| 9 | Precision (all replicates) |
| 10 | Laboratory Control Sample Recoveries |
| 11 | A more appropriate result is reported (associated with “R” and “DNR” only) |
| 12 | Reference Material |
| 13 | Surrogate Spike Recoveries (a.k.a., labeled compounds & recovery standards) |
| 14 | Other (define in validation report) |
| 15 | GFAA Post Digestion Spike Recoveries |
| 16 | ICP Serial Dilution % Difference |
| 17 | ICP Interference Check Standard Recovery |
| 18 | Trip Blank Contamination |
| 19 | Internal Standard Performance (e.g., area, retention time, recovery) |
| 20 | Linear Range Exceeded |
| 21 | Potential False Positives |
| 22 | Elevated Detection Limit Due to Interference (i.e., laboratory, chemical and/or matrix) |

# EcoChem Validation Guidelines for Dioxin/Furan Analysis by HRMS
## (Based on EPA Reg. 10 SOP, Rev. 2, 1996 & EPA SW-846, Methods 1613b and 8290)

| VALIDATION QC ELEMENT | ACCEPTANCE CRITERIA | ACTION | REASON CODE |
|---|---|---|---|
| Cooler/Storage Temperature | Waters/Solids < 4°C<br>Tissues <-10°C | EcoChem PJ, see TM-05 | 1 |
| Holding Time | Extraction - Water: 30 days from collection<br>*Note:* Under CWA, SDWA, and RCRA the HT for H2O is 7 days*<br>Extraction - Soil: 30 days from collection<br>Analysis: 40 days from extraction | J(+)/UJ(-) if ext > 30 days<br>J(+)/UJ(-) if analysis > 40 Days<br>EcoChem PJ, see TM-05 | 1 |
| Mass Resolution | >=10,000 resolving power at m/z 304.9824<br>Exact mass of m/z 380.9760 w/in 5 ppm of theoretical value (380.97410 to 380.97790) .<br>Analyzed prior to ICAL and at the start and end of each 12 hr. shift | R(+/-) if not met | 14 |
| Window Defining Mix and Column Performance Mix | Window defining mixture/Isomer specificity std run before ICAL and CCAL<br>Valley < 25% (valley = (x/y)*100%)<br>x = ht. of TCDD<br>y = baseline to bottom of valley<br>For all isomers eluting near 2378-TCDD/TCDF isomers (TCDD only for 8290) | J(+) if valley > 25% | 5A (ICAL)<br>5B (CCAL |
| Initial Calibration | Minimum of five standards<br>%RSD < 20% for native compounds<br>%RSD <30% for labeled compounds<br>(%RSD <35% for labeled compounds under 1613b) | J(+) natives if %RSD > 20% | 5A |
| | Abs. RT of $^{13}C_{12}$-1234-TCDD<br>>25 min on DB5<br>>15 min on DB-225 | EcoChem PJ, see TM-05 | |
| | Ion Abundance ratios within QC limits<br>(Table 8 of method 8290)<br>(Table 9 of method 1613B) | EcoChem PJ, see TM-05 | |
| | S/N ratio > 10 for all native and labeled compounds in CS1 std. | If <10, elevate Det. Limit or R(-) | |



Copyright 2007 EcoChem, Inc.

# EcoChem Validation Guidelines for Dioxin/Furan Analysis by HRMS
## (Based on EPA Reg. 10 SOP, Rev. 2, 1996 & EPA SW-846, Methods 1613b and 8290)

| VALIDATION QC ELEMENT | ACCEPTANCE CRITERIA | ACTION | REASON CODE |
|---|---|---|---|
| Continuing Calibration | Analyzed at the start and end of each 12 hour shift.<br>%D+/-20% for native compounds<br>%D +/-30% for labeled compounds<br>(Must meet limits in Table 6, Method 1613B)<br>(If %Ds in the closing CCAL are w/in 25%/35% the avg RF from the two CCAL may be used to calculate samples per Method 8290, Section 8.3.2.4) | Do not qualify labeled compounds. Narrate in report for labeled compound %D outliers.<br>For native compound %D outliers:<br>8290: J(+)/UJ(-) if %D = 20% - 75%<br>J(+)/R(-) if %D > 75%<br>1613: J(+)/UJ(-) if %D is outside Table 6 limits<br>J(+)/R(-) if %D is +/- 75% of Table 6 limit | 5B |
| | Abs. RT of $^{13}C_{12}$-1234-TCDD and $^{13}C12$-123789-HxCDD +/- 15 sec of ICAL. | EcoChem PJ, see ICAL section of TM-05 | |
| | RRT of all other compounds must meet Table 2 of 1613B. | EcoChem PJ, see TM-05 | |
| | Ion Abundance ratios within QC limits<br>(Table 8 of method 8290)<br>(Table 9 of method 1613B) | EcoChem PJ, see TM-05 | |
| | S/N ratio > 10 | If <10, elevate Det. Limit or R(-) | |
| Method Blank | One per matrix per batch<br>No positive results | If sample result <5X action level, qualify U at reported value. | 7 |
| Field Blanks (Not Required) | No positive results | If sample result <5X action level, qualify U at reported value. | 6 |
| LCS / OPR | Concentrations must meet limits in Table 6, Method 1613B or lab limits. | J(+) if %R > UCL<br>J(+)/UJ(-) if %R < LCL<br>J(+)/R(-) using PJ if %R <<LCL (< 10%) | 10 |
| MS/MSD (recovery) | May not analyze MS/MSD<br>%R should meet lab limits. | Qualify parent only unless other QC indicates systematic problems:<br>J(+) if both %R > UCL<br>J(+)/UJ(-) if both %R < LCL<br>J(+)/R(-) if both %R < 10%<br>PJ if only one %R outlier | 8 |
| MS/MSD (RPD) | May not analyze MS/MSD<br>RPD < 20% | J(+) in parent sample if RPD > CL | 9 |



Copyright 2007 EcoChem, Inc.

# EcoChem Validation Guidelines for Dioxin/Furan Analysis by HRMS
## (Based on EPA Reg. 10 SOP, Rev. 2, 1996 & EPA SW-846, Methods 1613b and 8290)

| VALIDATION QC ELEMENT | ACCEPTANCE CRITERIA | ACTION | REASON CODE |
|---|---|---|---|
| Lab Duplicate | RPD <25% if present. | J(+)/UJ(-) if outside limts | 9 |
| Labeled Compounds / Internal Standards | *Method 8290:* %R = 40% - 135% in all samples<br>*Method 1613B:* %R must meet limits specified in Table 7, Method 1613 | J(+)/UJ(-) if %R = 10% to LCL<br>J(+) if %R > UCL<br>J(+)/R(-) if %R < 10% | 13 |
| Quantitation/ Identification | Ions for analyte, IS, and rec. std. must max w/in 2 sec.<br>S/N >2.5<br>IA ratios meet limits in Table 9 of 1613B or Table 8 of 8290<br>RRTs w/in limits in Table 2 of 1613B | If RT criteria not met, use PJ (see TM-05)<br>If S/N criteria not met, J(+).<br>if unlabelled ion abundance not met, change to EMPC<br>If labelled ion abundance not met, J(+). | 21 |
| EMPC (estimated maximum possible concentration) | If quantitation idenfication criteria are not met, laboratory should report an EMPC value. | If laboratory correctly reported an EMPC value, qualify with U to indicate that the value is a detection limit. | 14 |
| Interferences | PCDF interferences from PCDPE | If both detected, change PCDF result to EMPC | 14 |
| Second Column Confirmation | All 2378-TCDF hits must be confirmed on a DB-225 (or equiv) column. All QC specs in this table must be met for the confirmation analysis. | Report lower of the two values.<br>If not performed use PJ (see TM-05). | 3 |
| Field Duplicates | Use QAPP limits. If no QAPP:<br>Solids: RPD <50%<br>OR absolute diff. < 2X RL (for results < 5X RL)<br>Aqueous: RPD <35%<br>OR absolute diff. < 1X RL (for results < 5X RL) | Narrate and qualify if required by project (EcoChem PJ) | 9 |
| Two analyses for one sample | Report only one result per analyte | "DNR" results that should not be used | 11 |



Copyright 2007 EcoChem, Inc.

EcoChem, INC.
Environmental Data Quality

# APPENDIX B
# QUALIFIED DATA SUMMARY TABLE

Qualified Data Summary Table
San Jacinto River Waste Pits - Tissue Addendum I

| SDG | Sample ID | Laboratory ID | Method | Analyte | Result | Units | Lab Qualifier | Validation Qualifier | Validation Reason |
|---|---|---|---|---|---|---|---|---|---|
| K1110455 | SJFCA5-LF2 | EQ1100542-07 | EPA1613B | Octachlorodibenzo-p-dioxin | 2.82 | ng/kg | J | U | 6 |
| K1110455 | SJFCA5-LF1 | K1110455-004 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin | 0.308 | ng/kg | JK | U | 22 |
| K1110455 | SJFCA5-LF1 | K1110455-004 | EPA1613B | Octachlorodibenzo-p-dioxin | 1.54 | ng/kg | BJK | U | 22 |
| K1110455 | SJFCA5-LF1 | K1110455-004 | EPA1613B | Octachlorodibenzo-p-furan | 0.204 | ng/kg | JK | U | 22 |
| K1110455 | SJFCA5-LF2 | K1110455-008 | EPA1613B | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin | 1.7 | ng/kg | BJK | U | 22 |
| K1110455 | SJFCA5-LF2 | K1110455-008 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-furan | 0.193 | ng/kg | JK | U | 22 |
| K1110455 | SJFCA5-LF2 | K1110455-008 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin | 0.583 | ng/kg | JK | U | 22 |
| K1110455 | SJFCA5-LF2 | K1110455-008 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-furan | 0.286 | ng/kg | JK | U | 22 |
| K1110455 | SJFCA5-LF2 | K1110455-008 | EPA1613B | Octachlorodibenzo-p-dioxin | 2.61 | ng/kg | BJ | U | 7 |
| K1110455 | SJFCA5-LF2 | K1110455-008 | EPA1613B | Tetrachlorodibenzofuran (Total) | 0.672 | ng/kg | J | J | 9 |
| K1110455 | SJFCA5-LF3 | K1110455-012 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-furan | 0.0549 | ng/kg | BJK | U | 22 |
| K1110455 | SJFCA5-LF3 | K1110455-012 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin | 1.05 | ng/kg | JK | U | 22 |
| K1110455 | SJFCA5-LF3 | K1110455-012 | EPA1613B | 2,3,4,6,7,8-Hexachlorodibenzo-p-furan | 0.0596 | ng/kg | JK | U | 22 |
| K1110455 | SJFCA5-LF3 | K1110455-012 | EPA1613B | Octachlorodibenzo-p-dioxin | 4.32 | ng/kg | BJ | U | 7 |
| K1110455 | SJFCA5-LF3 | K1110455-012 | EPA1613B | Octachlorodibenzo-p-furan | 0.262 | ng/kg | JK | U | 22 |
| K1110455 | SJFCA5-LF4 | K1110455-016 | EPA1613B | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin | 0.395 | ng/kg | JK | U | 22 |
| K1110455 | SJFCA5-LF4 | K1110455-016 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin | 0.105 | ng/kg | JK | U | 22 |
| K1110455 | SJFCA5-LF4 | K1110455-016 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin | 0.111 | ng/kg | JK | U | 22 |
| K1110455 | SJFCA5-LF4 | K1110455-016 | EPA1613B | 2,3,4,7,8-Pentachlorodibenzo-p-furan | 0.0803 | ng/kg | JK | U | 22 |
| K1110455 | SJFCA5-LF4 | K1110455-016 | EPA1613B | Octachlorodibenzo-p-dioxin | 0.767 | ng/kg | JK | U | 22 |
| K1110455 | SJFCA5-LF4 | K1110455-016 | EPA1613B | Octachlorodibenzo-p-furan | 0.0807 | ng/kg | JK | U | 22 |
| K1110455 | SJFCA5-LF5 | K1110455-020 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin | 0.026 | ng/kg | JK | U | 22 |
| K1110455 | SJFCA5-LF5 | K1110455-020 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin | 0.0504 | ng/kg | JK | U | 22 |
| K1110455 | SJFCA5-LF5 | K1110455-020 | EPA1613B | Octachlorodibenzo-p-dioxin | 0.584 | ng/kg | J | U | 6 |
| K1110455 | SJFCA5-LF6 | K1110455-024 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin | 0.0918 | ng/kg | JK | U | 22 |
| K1110455 | SJFCA5-LF6 | K1110455-024 | EPA1613B | 2,3,4,7,8-Pentachlorodibenzo-p-furan | 0.0641 | ng/kg | JK | U | 22 |
| K1110455 | SJFCA5-LF6 | K1110455-024 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 0.387 | ng/kg | JK | U | 22 |
| K1110455 | SJFCA5-LF6 | K1110455-024 | EPA1613B | Octachlorodibenzo-p-dioxin | 15.6 | ng/kg |  | U | 6 |
| K1110455 | SJFCA5-LF6 | K1110455-024 | EPA1613B | Octachlorodibenzo-p-furan | 0.096 | ng/kg | JK | U | 22 |
| K1110455 | SJFCA5-LF7 | K1110455-028 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin | 0.147 | ng/kg | JK | U | 22 |
| K1110455 | SJFCA5-LF7 | K1110455-028 | EPA1613B | Octachlorodibenzo-p-dioxin | 9.43 | ng/kg | J | U | 6 |
| K1110455 | SJFCA5-LF8 | K1110455-032 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin | 0.583 | ng/kg | JK | U | 22 |
| K1110455 | SJFCA5-LF8 | K1110455-032 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin | 0.283 | ng/kg | JK | U | 22 |
| K1110455 | SJFCA5-LF8 | K1110455-032 | EPA1613B | 2,3,4,7,8-Pentachlorodibenzo-p-furan | 0.0989 | ng/kg | JK | U | 22 |
| K1110455 | SJFCA5-LF8 | K1110455-032 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 0.274 | ng/kg | JK | U | 22 |

Qualified Data Summary Table
San Jacinto River Waste Pits - Tissue Addendum I

| SDG | Sample ID | Laboratory ID | Method | Analyte | Result | Units | Lab Qualifier | Validation Qualifier | Validation Reason |
|---|---|---|---|---|---|---|---|---|---|
| K1110455 | SJFCA5-LF8 | K1110455-032 | EPA1613B | Octachlorodibenzo-p-dioxin | 20.5 | ng/kg | | U | 6 |
| K1110455 | SJFCA5-LF9 | K1110455-036 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin | 0.102 | ng/kg | JK | U | 22 |
| K1110455 | SJFCA5-LF9 | K1110455-036 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin | 0.347 | ng/kg | JK | U | 22 |
| K1110455 | SJFCA5-LF9 | K1110455-036 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin | 0.126 | ng/kg | JK | U | 22 |
| K1110455 | SJFCA5-LF9 | K1110455-036 | EPA1613B | 2,3,4,7,8-Pentachlorodibenzo-p-furan | 0.085 | ng/kg | JK | U | 22 |
| K1110455 | SJFCA5-LF9 | K1110455-036 | EPA1613B | Octachlorodibenzo-p-dioxin | 12 | ng/kg | | U | 6 |
| K1110455 | SJFCA5-LF10 | K1110455-040 | EPA1613B | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin | 0.694 | ng/kg | BJK | U | 22 |
| K1110455 | SJFCA5-LF10 | K1110455-040 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 0.482 | ng/kg | JK | U | 22 |
| K1110455 | SJFCA5-LF10 | K1110455-040 | EPA1613B | Octachlorodibenzo-p-dioxin | 2.03 | ng/kg | BJ | U | 7 |
| K1110455 | SJCA5-LF-HOMOGBLANK | K1110455-042 | EPA1613B | Octachlorodibenzo-p-dioxin | 3.7 | pg/L | J | U | 7 |
| K1110459 | SJFCA5-CR1 | K1110459-006 | EPA1613B | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin | 0.257 | ng/kg | BJK | U | 22 |
| K1110459 | SJFCA5-CR1 | K1110459-006 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 0.118 | ng/kg | JK | U | 22 |
| K1110459 | SJFCA5-CR1 | K1110459-006 | EPA1613B | Octachlorodibenzo-p-dioxin | 0.963 | ng/kg | BJ | U | 7 |
| K1110459 | SJFCA5-CR1 | K1110459-006 | EPA1613B | Octachlorodibenzo-p-furan | 0.202 | ng/kg | JK | U | 22 |
| K1110459 | SJFCA5-CR2 | EQ1100542-08 | EPA1613B | Octachlorodibenzo-p-dioxin | 0.91 | ng/kg | *,JK | U | 22 |
| K1110459 | SJFCA5-CR2 | K1110459-012 | EPA1613B | Heptachlorodibenzo-p-dioxin (Total) | 0.177 | ng/kg | J | J | 9 |
| K1110459 | SJFCA5-CR2 | K1110459-012 | EPA1613B | Octachlorodibenzo-p-dioxin | 0.457 | ng/kg | BJK | U | 22 |
| K1110459 | SJFCA5-CR3 | K1110459-018 | EPA1613B | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin | 0.143 | ng/kg | BJK | U | 22 |
| K1110459 | SJFCA5-CR3 | K1110459-018 | EPA1613B | Octachlorodibenzo-p-dioxin | 0.989 | ng/kg | BJ | U | 7 |
| K1110459 | SJFCA5-CR4 | K1110459-024 | EPA1613B | Octachlorodibenzo-p-dioxin | 0.725 | ng/kg | BJ | U | 7 |
| K1110459 | SJFCA5-CR4 | K1110459-024 | EPA1613B | Octachlorodibenzo-p-furan | 0.22 | ng/kg | JK | U | 22 |
| K1110459 | SJFCA5-CR7 | K1110459-042 | EPA1613B | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin | 0.0804 | ng/kg | JK | U | 22 |
| K1110459 | SJFCA5-CR7 | K1110459-042 | EPA1613B | Octachlorodibenzo-p-dioxin | 0.384 | ng/kg | BJ | U | 7 |
| K1110459 | SJFCA5-CR8 | K1110459-048 | EPA1613B | Octachlorodibenzo-p-dioxin | 0.579 | ng/kg | J | U | 6 |
| K1110459 | SJFCA5-CR9 | K1110459-054 | EPA1613B | Octachlorodibenzo-p-dioxin | 0.335 | ng/kg | JK | U | 22 |
| K1110459 | SJFCA5-CR10 | K1110459-060 | EPA1613B | Octachlorodibenzo-p-dioxin | 0.444 | ng/kg | J | U | 6 |
| K1110459 | SJCA5-CR-HOMOGBLANK | K1110459-061 | EPA1613B | Octachlorodibenzo-p-dioxin | 4.35 | pg/L | BJK | U | 22 |
| K1110460 | FW-0011 | K1110460-001 | EPA1613B | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin | 3.92 | ng/kg | JK | U | 22 |
| K1110460 | FW-0011 | K1110460-001 | EPA1613B | Octachlorodibenzo-p-furan | 10.8 | ng/kg | JK | U | 22 |
| K1110460 | BT-0001 | K1110460-002 | EPA1613B | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin | 0.392 | ng/kg | BJK | U | 22 |
| K1110460 | BT-0001 | K1110460-002 | EPA1613B | Octachlorodibenzo-p-dioxin | 2.35 | ng/kg | BJ | U | 7 |
| K1110460 | BAIT-HOMOGBLANK | K1110460-003 | EPA1613B | Octachlorodibenzo-p-dioxin | 5.58 | pg/L | BJK | U | 22 |

EcoChem, INC.
Environmental Data Quality

# DATA VALIDATION REPORT

## SAN JACINTO RIVER WASTE PITS
## Southern Impoundments II Study

**Prepared for:**

Integral Consulting, Inc.
1205 West Bay Dr. NW
Olympia, Washington 98502

**Prepared by:**

EcoChem, Inc.
1011 Western Ave. Suite 1011
Seattle, WA 98104

EcoChem Project: C22130-16

August 6, 2012

**Approved for Release**

Melissa Swanson

## Basis for Data Validation

This report summarizes the results of validation (Stages 2A, 2B, & 3/4) performed on groundwater, sediment, soil and quality control (QC) sample data for the San Jacinto River Southern Impoundments II Study. Field sample ID, laboratory sample ID and requested analyses, compiled by laboratory, are provided in the **Sample Indices**. Laboratory batch ID numbers and associated level of validation are provided at the beginning of each technical section.

Samples were analyzed by ALS Environmental, Kelso, Washington and ALS Environmental, Houston, Texas. The analytical methods and EcoChem project chemists are listed below.

| Analysis | Method of Analysis | Primary Review | Secondary Review |
|---|---|---|---|
| Volatile Organic Compounds | EPA 8260C | M. Sam | M. Swanson |
| Semivolatile Organic Compounds | EPA 8270D | G. Esler | |
| Polychlorinated Biphenyl Aroclors | EPA 8082A | M. Sam | |
| Polychlorinated Biphenyl Congeners | EPA 1668A | M. Swanson | C. Mott |
| Dioxin & Furan Compounds | EPA 1613B | | C. Mott/G. Esler |
| Total & Dissolved Metals | SW6010, SW6020, SW7470A, SW7471B | M. Hernandez | D. Kerlin |
| Total Organic Carbon | SW9060M Walkley-Black | | |
| Particle Size | PSEP | | |
| Total Solids | EPA 160.3M | | |

The data were reviewed using guidance and quality control criteria documented in the analytical methods and the following project and guidance documents:

- Addendum 3 (to the Soil Sampling and Analysis Plan) - *Additional Soil Sampling South of Interstate Highway 10 (I-10), San Jacinto River Waste Pits Superfund Site* (Integral/Anchor QEA, April 2012)
- Addendum 2 (to the Sediment Sampling and Analysis Plan) - *Additional Sediment Sampling South of Interstate Highway 10 (I-10), San Jacinto River Waste Pits Superfund Site* (Integral/Anchor QEA, April 2012)
- Revised Addendum 1 (to the Groundwater Sampling and Analysis Plan) - *Additional Groundwater Sampling, San Jacinto River Waste Pits Superfund Site* (Integral/Anchor QEA, April 2012)
- *USEPA National Functional Guidelines for Chlorinated Dioxin/Furan Data Review* (USEPA, September 2005)
- *USEPA National Functional Guidelines for Organic Data Review* (USEPA 1999, 2008)
- *USEPA National Functional Guidelines for Inorganic Data Review* (USEPA October 2004).

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

Data qualifier definitions, reason codes, and validation criteria are included as **Appendix A**. The qualified data summary table is included as **Appendix B.** Data Validation Worksheets and the associated communication records will be kept on file at EcoChem, Inc. A qualified laboratory electronic data deliverable (EDD) was also submitted with this report.

# Sample Index
## San Jacinto River Waste Pits - Southern Impoundments
## CAS Kelso

| SDG | Sample ID | Lab ID | VOC | SVOC | Aroclors | Metals | Grain Size | TOC | WB-TOC | Total Solids | TSS/TDS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| K1204190 | SJMW003 | K1204190-001 | ✓ | ✓ | ✓ | ✓ | | | | | ✓ |
| K1204190 | TB_20120503 | K1204190-002 | ✓ | | | | | | | | |
| K1204190 | SJMW001 | K1204190-003 | ✓ | ✓ | ✓ | ✓ | | | | | ✓ |
| K1204192 | SL0311 | K1204192-001 | ✓ | | | | | | | | |
| K1204192 | SL0321 | K1204192-002 | ✓ | | | | | | | | |
| K1204192 | Trip Blank-1 47450 | K1204192-003 | ✓ | | | | | | | | |
| K1204226 | SL0301 | K1204226-001 | ✓ | ✓ | | ✓ | ✓ | ✓ | | ✓ | |
| K1204226 | SL0302 | K1204226-002 | ✓ | ✓ | | ✓ | ✓ | ✓ | | ✓ | |
| K1204226 | SL0303 | K1204226-003 | ✓ | ✓ | | ✓ | ✓ | ✓ | | ✓ | |
| K1204226 | SL0304 | K1204226-004 | | | | | ✓ | ✓ | | ✓ | |
| K1204226 | SL0305 | K1204226-005 | ✓ | ✓ | | ✓ | ✓ | ✓ | | ✓ | |
| K1204226 | SL0306 | K1204226-006 | | | | | ✓ | ✓ | | ✓ | |
| K1204226 | SL0307 | K1204226-007 | ✓ | ✓ | | ✓ | ✓ | ✓ | | ✓ | |
| K1204226 | SL0308 | K1204226-008 | | | | | ✓ | ✓ | | ✓ | |
| K1204226 | SL0309 | K1204226-009 | ✓ | ✓ | | ✓ | ✓ | ✓ | | ✓ | |
| K1204226 | SL0310 | K1204226-010 | | | | | ✓ | ✓ | | ✓ | |
| K1204226 | SL0312 | K1204226-011 | ✓ | ✓ | | ✓ | ✓ | ✓ | | ✓ | |
| K1204226 | SL0313 | K1204226-012 | ✓ | ✓ | | ✓ | ✓ | ✓ | | ✓ | |
| K1204226 | SL0314 | K1204226-013 | | | | | ✓ | ✓ | | ✓ | |
| K1204226 | SL0315 | K1204226-014 | ✓ | ✓ | | ✓ | ✓ | ✓ | | ✓ | |
| K1204226 | SL0316 | K1204226-015 | | | | | ✓ | ✓ | | ✓ | |
| K1204226 | SL0317 | K1204226-016 | ✓ | ✓ | | | ✓ | ✓ | | ✓ | |
| K1204226 | SL0318 | K1204226-017 | | | | | ✓ | ✓ | | ✓ | |
| K1204226 | SL0319 | K1204226-018 | ✓ | ✓ | | ✓ | ✓ | ✓ | | ✓ | |
| K1204226 | SL0320 | K1204226-019 | | | | | ✓ | ✓ | | ✓ | |
| K1204226 | SL0322 | K1204226-020 | ✓ | ✓ | | ✓ | ✓ | ✓ | | ✓ | |
| K1204226 | SL0323 | K1204226-021 | ✓ | ✓ | | ✓ | ✓ | ✓ | | ✓ | |
| K1204226 | SL0324 | K1204226-022 | | | | | ✓ | ✓ | | ✓ | |
| K1204226 | SL0325 | K1204226-023 | | | | | ✓ | ✓ | | ✓ | |
| K1204226 | SL0326 | K1204226-024 | ✓ | ✓ | | ✓ | ✓ | ✓ | | ✓ | |
| K1204226 | SL0327 | K1204226-025 | | | | | ✓ | ✓ | | ✓ | |
| K1204226 | SL0328 | K1204226-026 | ✓ | ✓ | | ✓ | ✓ | ✓ | | ✓ | |

# Sample Index
## San Jacinto River Waste Pits - Southern Impoundments
## CAS Kelso

| SDG | Sample ID | Lab ID | VOC | SVOC | Aroclors | Metals | Grain Size | TOC | WB-TOC | Total Solids | TSS/TDS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| K1204226 | SL0329 | K1204226-027 | | | | | ✓ | ✓ | | ✓ | |
| K1204226 | SL0330 | K1204226-028 | ✓ | ✓ | | ✓ | ✓ | ✓ | | ✓ | |
| K1204226 | SL0331 | K1204226-029 | | | | | ✓ | ✓ | | ✓ | |
| K1204265 | SD0001 | K1204265-001 | | ✓ | | ✓ | ✓ | | ✓ | ✓ | |
| K1204265 | SD0002 | K1204265-002 | | ✓ | | ✓ | ✓ | | ✓ | ✓ | |
| K1204265 | SD0003 | K1204265-003 | | ✓ | | ✓ | ✓ | | ✓ | ✓ | |
| K1204265 | SD0004 | K1204265-004 | | ✓ | | ✓ | ✓ | | ✓ | ✓ | |
| K1204265 | SD0005 | K1204265-005 | | ✓ | | ✓ | ✓ | | ✓ | ✓ | |
| K1204265 | SD0006 | K1204265-006 | | ✓ | | ✓ | ✓ | | ✓ | ✓ | |
| K1204265 | SD0007 | K1204265-007 | | ✓ | | ✓ | ✓ | | ✓ | ✓ | |
| K1204265 | SD0008 | K1204265-008 | | ✓ | | ✓ | ✓ | | ✓ | ✓ | |
| K1204265 | SD0009 | K1204265-009 | | ✓ | | ✓ | ✓ | | ✓ | ✓ | |
| K1204265 | SD0010 | K1204265-010 | | ✓ | | ✓ | ✓ | | ✓ | ✓ | |
| K1204265 | SD0011 | K1204265-011 | | ✓ | | ✓ | ✓ | | ✓ | ✓ | |
| K1204265 | SD0012 | K1204265-012 | | ✓ | | ✓ | ✓ | | ✓ | ✓ | |
| K1204265 | SD0013 | K1204265-013 | | ✓ | | ✓ | ✓ | | ✓ | ✓ | |
| K1204265 | FW0001 | K1204265-014 | | ✓ | | | | | | | |
| K1204265 | SD0014 | K1204265-015 | | | | ✓ | | ✓ | | ✓ | |
| K1204265 | FB0001 | K1204265-016 | | ✓ | | | | | | | |
| K1204325 | SL0342 | K1204325-002 | ✓ | ✓ | | ✓ | ✓ | | ✓ | ✓ | |
| K1204325 | SL0343 | K1204325-003 | | ✓ | | ✓ | ✓ | | ✓ | ✓ | |
| K1204325 | SL0344 | K1204325-004 | | ✓ | | ✓ | ✓ | | ✓ | ✓ | |
| K1204325 | SL0352 | K1204325-005 | | ✓ | | ✓ | ✓ | ✓ | | ✓ | |
| K1204325 | SL0385 | K1204325-006 | ✓ | ✓ | | | | | | | |
| K1204325 | SL0386 | K1204325-007 | ✓ | ✓ | | ✓ | ✓ | ✓ | | ✓ | |
| K1204325 | SL0387 | K1204325-008 | ✓ | ✓ | | ✓ | ✓ | ✓ | | ✓ | |
| K1204325 | SL0390 | K1204325-011 | ✓ | ✓ | | ✓ | ✓ | ✓ | | ✓ | |
| K1204325 | SL0391 | K1204325-012 | | | | | ✓ | ✓ | | ✓ | |
| K1204325 | SL0392 | K1204325-013 | ✓ | ✓ | | ✓ | ✓ | ✓ | | ✓ | |
| K1204325 | SL0393 | K1204325-014 | | | | | ✓ | | | | |
| K1204325 | SL0394 | K1204325-015 | ✓ | ✓ | | ✓ | ✓ | ✓ | | ✓ | |
| K1204325 | SL0395 | K1204325-016 | ✓ | | | | ✓ | | | | |

# Sample Index
## San Jacinto River Waste Pits - Southern Impoundments
## CAS Kelso

| SDG | Sample ID | Lab ID | VOC | SVOC | Aroclors | Metals | Grain Size | TOC | WB-TOC | Total Solids | TSS/TDS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| K1204325 | SL0398 | K1204325-018 | ✓ | ✓ | | ✓ | ✓ | ✓ | | ✓ | |
| K1204325 | SL0399 | K1204325-019 | ✓ | ✓ | | ✓ | ✓ | ✓ | | ✓ | |
| K1204325 | SL0400 | K1204325-020 | ✓ | ✓ | | ✓ | ✓ | ✓ | | ✓ | |
| K1204325 | SL0402 | K1204325-021 | ✓ | ✓ | | ✓ | ✓ | ✓ | | ✓ | |
| K1204325 | SL0404 | K1204325-022 | ✓ | ✓ | | ✓ | ✓ | ✓ | | ✓ | |
| K1204325 | SL0401 | K1204325-023 | | | | | ✓ | ✓ | | | |
| K1204325 | SL0403 | K1204325-024 | | | | | ✓ | ✓ | | | |
| K1204325 | SL0405 | K1204325-025 | | | | | ✓ | ✓ | | | |
| K1204325 | SL0406 | K1204325-026 | ✓ | | | | | | | | |
| K1204325 | TB5 | K1204325-027 | ✓ | | | | | | | | |
| K1204325 | TB6 | K1204325-028 | ✓ | | | | | | | | |
| K1204339 | SJMW002 | K1204339-001 | ✓ | ✓ | ✓ | ✓ | | | | | ✓ |
| K1204339 | SJMW002DUP1 | K1204339-002 | ✓ | ✓ | ✓ | ✓ | | | | | ✓ |
| K1204339 | ERB_20120505 | K1204339-003 | ✓ | ✓ | ✓ | ✓ | | | | ✓ | ✓ |
| K1204339 | TB_20120505 | K1204339-004 | ✓ | | | | | | | | |
| K1204342 | SL0343 | K1204342-001 | ✓ | | | | | | | | |
| K1204342 | SL0344 | K1204342-002 | ✓ | | | | | | | | |
| K1204342 | SL0345 | K1204342-003 | ✓ | ✓ | | ✓ | ✓ | | ✓ | ✓ | |
| K1204342 | SL0346 | K1204342-004 | | | | | ✓ | | ✓ | ✓ | |
| K1204342 | SL0349 | K1204342-005 | ✓ | ✓ | | ✓ | ✓ | | ✓ | ✓ | |
| K1204342 | SL0350 | K1204342-006 | | | | | ✓ | | ✓ | ✓ | |
| K1204342 | SL0351 | K1204342-007 | | ✓ | | ✓ | ✓ | | ✓ | ✓ | |
| K1204342 | SL0362 | K1204342-008 | | | | | ✓ | | ✓ | ✓ | |
| K1204356 | FW0002 | K1204356-001 | | ✓ | | ✓ | | | | | |
| K1204356 | SL0353 | K1204356-002 | ✓ | ✓ | | ✓ | ✓ | ✓ | | ✓ | |
| K1204356 | SL0354 | K1204356-003 | ✓ | ✓ | | ✓ | ✓ | ✓ | | ✓ | |
| K1204356 | SL0355 | K1204356-004 | | | | | ✓ | ✓ | | ✓ | |
| K1204356 | SL0352 | K1204356-005 | ✓ | | | | | | | ✓ | |
| K1204356 | SL0356 | K1204356-006 | ✓ | ✓ | | ✓ | ✓ | ✓ | | ✓ | |
| K1204356 | SL0357 | K1204356-007 | | | | | ✓ | ✓ | | ✓ | |
| K1204356 | SL0358 | K1204356-008 | ✓ | ✓ | | ✓ | ✓ | ✓ | | ✓ | |
| K1204356 | SL0359 | K1204356-009 | | | | | ✓ | ✓ | | ✓ | |

# Sample Index
## San Jacinto River Waste Pits - Southern Impoundments
## CAS Kelso

| SDG | Sample ID | Lab ID | VOC | SVOC | Aroclors | Metals | Grain Size | TOC | WB-TOC | Total Solids | TSS/TDS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| K1204356 | SL0360 | K1204356-010 | ✓ | ✓ | | ✓ | ✓ | ✓ | | ✓ | |
| K1204356 | SL0361 | K1204356-011 | | | | | ✓ | ✓ | | ✓ | |
| K1204356 | SL0300 | K1204356-012 | ✓ | ✓ | | ✓ | ✓ | ✓ | | ✓ | |
| K1204356 | SL0311 | K1204356-013 | | ✓ | | ✓ | ✓ | ✓ | | ✓ | |
| K1204356 | SL0363 | K1204356-014 | ✓ | ✓ | | ✓ | ✓ | ✓ | | ✓ | |
| K1204356 | SL0371 | K1204356-015 | ✓ | ✓ | | ✓ | ✓ | ✓ | | ✓ | |
| K1204356 | SL0370 | K1204356-016 | | | | | ✓ | ✓ | | ✓ | |
| K1204356 | SL0372 | K1204356-017 | | | | | ✓ | ✓ | | ✓ | |
| K1204356 | SL0321 | K1204356-018 | | ✓ | | ✓ | ✓ | ✓ | | ✓ | |
| K1204356 | SL0364 | K1204356-019 | ✓ | ✓ | | ✓ | ✓ | ✓ | | ✓ | |
| K1204356 | SL0365 | K1204356-020 | ✓ | ✓ | | ✓ | ✓ | ✓ | | ✓ | |
| K1204356 | SL0366 | K1204356-021 | | | | | ✓ | ✓ | | ✓ | |
| K1204356 | SL0368 | K1204356-022 | | ✓ | | ✓ | ✓ | ✓ | | ✓ | |
| K1204356 | SL0369 | K1204356-023 | ✓ | ✓ | | ✓ | ✓ | ✓ | | ✓ | |
| K1204356 | SL0332 | K1204356-024 | ✓ | ✓ | | ✓ | ✓ | ✓ | | ✓ | |
| K1204356 | SL0374 | K1204356-025 | | | | | ✓ | ✓ | | ✓ | |
| K1204356 | SL0375 | K1204356-026 | | | | | ✓ | ✓ | | ✓ | |
| K1204356 | SL0376 | K1204356-027 | | | | | ✓ | ✓ | | ✓ | |
| K1204356 | SL0377 | K1204356-028 | | | | | ✓ | ✓ | | ✓ | |
| K1204356 | SL0378 | K1204356-029 | | | | | ✓ | ✓ | | ✓ | |
| K1204356 | SL0379 | K1204356-030 | | | | | ✓ | ✓ | | ✓ | |
| K1204356 | SL0380 | K1204356-031 | | | | | ✓ | ✓ | | ✓ | |
| K1204356 | SL0381 | K1204356-032 | ✓ | | | | ✓ | ✓ | | ✓ | |
| K1204356 | SL0382 | K1204356-033 | | | | | ✓ | ✓ | | ✓ | |
| K1204356 | SL0383 | K1204356-034 | ✓ | | | | ✓ | ✓ | | ✓ | |
| K1204377 | SL0408 | K1204377-001 | | | | | ✓ | ✓ | | ✓ | |
| K1204377 | SL0409 | K1204377-002 | | | | | ✓ | ✓ | | ✓ | |
| K1204377 | SL0410 | K1204377-003 | | | | | ✓ | ✓ | | ✓ | |
| K1204377 | SL0411 | K1204377-004 | | | | | ✓ | ✓ | | ✓ | |
| K1204377 | SL0412 | K1204377-005 | | | | | ✓ | ✓ | | ✓ | |
| K1204377 | SL0414 | K1204377-006 | | | | | ✓ | ✓ | | ✓ | |
| K1204377 | SL0415 | K1204377-007 | | | | | ✓ | ✓ | | ✓ | |

# Sample Index
## San Jacinto River Waste Pits - Southern Impoundments
## CAS Kelso

| SDG | Sample ID | Lab ID | VOC | SVOC | Aroclors | Metals | Grain Size | TOC | WB-TOC | Total Solids | TSS/TDS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| K1204377 | SL0416 | K1204377-008 | | | | | ✓ | ✓ | | ✓ | |
| K1204377 | SL0417 | K1204377-009 | ✓ | | | | | | | | |
| K1204377 | SL0418 | K1204377-010 | ✓ | ✓ | | ✓ | ✓ | ✓ | | ✓ | |
| K1204377 | SL0419 | K1204377-011 | ✓ | ✓ | | ✓ | ✓ | ✓ | | ✓ | |
| K1204377 | SL0420 | K1204377-012 | | | | | ✓ | ✓ | | ✓ | |
| K1204377 | SL0421 | K1204377-013 | ✓ | ✓ | | ✓ | ✓ | ✓ | | ✓ | |
| K1204377 | SL0422 | K1204377-014 | | | | | ✓ | ✓ | | ✓ | |
| K1204377 | SL0423 | K1204377-015 | ✓ | ✓ | | ✓ | ✓ | ✓ | | ✓ | |
| K1204377 | SL0425 | K1204377-016 | ✓ | | | | ✓ | ✓ | | ✓ | |
| K1204377 | SL0426 | K1204377-017 | ✓ | ✓ | | ✓ | ✓ | ✓ | | ✓ | |
| K1204377 | SL0427 | K1204377-018 | ✓ | ✓ | | ✓ | ✓ | ✓ | | ✓ | |
| K1204377 | SL0428 | K1204377-019 | | | | | ✓ | ✓ | | ✓ | |
| K1204377 | SL0430 | K1204377-020 | | | | | ✓ | ✓ | | ✓ | |
| K1204377 | SL0431 | K1204377-021 | | | | | ✓ | ✓ | | ✓ | |
| K1204377 | SL0432 | K1204377-022 | | | | | ✓ | ✓ | | ✓ | |
| K1204377 | SL0433 | K1204377-023 | | | | | ✓ | ✓ | | ✓ | |
| K1204377 | SL0434 | K1204377-024 | ✓ | | | | ✓ | ✓ | | ✓ | |
| K1204377 | SL0436 | K1204377-025 | ✓ | | | | ✓ | ✓ | | ✓ | |
| K1204377 | SL0437 | K1204377-026 | ✓ | | | | ✓ | ✓ | | ✓ | |
| K1204377 | SL0438 | K1204377-027 | ✓ | | | | ✓ | ✓ | | ✓ | |
| K1204377 | SL0439 | K1204377-028 | | | | | ✓ | ✓ | | ✓ | |
| K1204377 | SL0440 | K1204377-029 | | | | | ✓ | ✓ | | ✓ | |
| K1204377 | SL0441 | K1204377-030 | ✓ | | | | | | | | |
| K1204377 | SL0442 | K1204377-031 | ✓ | ✓ | | ✓ | ✓ | ✓ | | ✓ | |
| K1204377 | SL0443 | K1204377-032 | ✓ | ✓ | | ✓ | ✓ | ✓ | | ✓ | |
| K1204377 | SL0444 | K1204377-033 | | | | | ✓ | ✓ | | ✓ | |
| K1204377 | SL0445 | K1204377-034 | ✓ | ✓ | | ✓ | ✓ | ✓ | | ✓ | |
| K1204377 | SL0446 | K1204377-035 | | | | | ✓ | ✓ | | ✓ | |
| K1204377 | SL0447 | K1204377-036 | ✓ | ✓ | | ✓ | ✓ | ✓ | | ✓ | |
| K1204377 | SL0448 | K1204377-037 | | | | | ✓ | ✓ | | ✓ | |
| K1204377 | SL0449 | K1204377-038 | ✓ | ✓ | | ✓ | ✓ | ✓ | | ✓ | |
| K1204377 | SL0450 | K1204377-039 | ✓ | | | | ✓ | ✓ | | ✓ | |

# Sample Index
## San Jacinto River Waste Pits - Southern Impoundments
## CAS Kelso

| SDG | Sample ID | Lab ID | VOC | SVOC | Aroclors | Metals | Grain Size | TOC | WB-TOC | Total Solids | TSS/TDS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| K1204377 | TB1 | K1204377-040 | ✓ | | | | | | | | |
| K1204377 | TB2 | K1204377-041 | | | | | | | | | |
| K1204377 | SL0462 | K1204449-001 | | | | | ✓ | ✓ | | ✓ | |
| K1204449 | SL0463 | K1204449-002 | | | | | ✓ | ✓ | | ✓ | |
| K1204449 | SL0464 | K1204449-003 | | | | | ✓ | ✓ | | ✓ | |
| K1204449 | SL0465 | K1204449-004 | | | | | ✓ | ✓ | | ✓ | |
| K1204449 | SL0466 | K1204449-005 | | | | | ✓ | ✓ | | ✓ | |
| K1204449 | SL0467 | K1204449-006 | | | | | ✓ | ✓ | | ✓ | |
| K1204449 | SL0468 | K1204449-007 | | | | | ✓ | ✓ | | ✓ | |
| K1204449 | SL0469 | K1204449-008 | | | | | ✓ | ✓ | | ✓ | |
| K1204449 | SL0470 | K1204449-009 | | | | | ✓ | ✓ | | ✓ | |
| K1204449 | FW0007 | K1204449-019 | | ✓ | | ✓ | | | | | |
| K1204449 | FW0008 | K1204449-020 | | ✓ | | ✓ | | | | | |
| K1204449 | SL0347 | K1204449-023 | ✓ | ✓ | | ✓ | ✓ | | ✓ | ✓ | |
| K1204449 | SL0348 | K1204449-024 | | | | | ✓ | | ✓ | ✓ | |
| K1204449 | SL0351 | K1204449-027 | ✓ | | | | | | | | |
| K1204449 | FW0009 | K1204449-029 | | ✓ | | ✓ | | | | | |
| K1204449 | FW0010 | K1204449-030 | | ✓ | | ✓ | | | | | |
| K1204452 | SL0333 | K1204452-001 | ✓ | ✓ | | ✓ | ✓ | ✓ | | ✓ | |
| K1204452 | SL0334 | K1204452-002 | ✓ | ✓ | | ✓ | ✓ | ✓ | | ✓ | |
| K1204452 | SL0335 | K1204452-003 | | | | | ✓ | ✓ | | ✓ | |
| K1204452 | SL0336 | K1204452-004 | ✓ | ✓ | | ✓ | ✓ | ✓ | | ✓ | |
| K1204452 | SL0337 | K1204452-005 | | | | | ✓ | ✓ | | ✓ | |
| K1204452 | SL0338 | K1204452-006 | ✓ | ✓ | | ✓ | ✓ | ✓ | | ✓ | |
| K1204452 | SL0339 | K1204452-007 | | | | | ✓ | ✓ | | ✓ | |
| K1204452 | SL0340 | K1204452-008 | ✓ | ✓ | | ✓ | ✓ | ✓ | | ✓ | |
| K1204452 | SL0341 | K1204452-009 | | | | | ✓ | ✓ | | ✓ | |
| K1204452 | FW0003 | K1204452-010 | | ✓ | | ✓ | | | | | |
| K1204452 | SL0441 | K1204452-011 | | ✓ | | ✓ | ✓ | | | ✓ | |
| K1204452 | SL0417 | K1204452-012 | | ✓ | | ✓ | ✓ | | | ✓ | |
| K1204452 | SL0429 | K1204452-013 | | | | ✓ | ✓ | | | ✓ | |
| K1204452 | SL0373 | K1204452-014 | | | | | ✓ | | | ✓ | |

**Sample Index**
**San Jacinto River Waste Pits - Southern Impoundments**
**CAS Kelso**

| SDG | Sample ID | Lab ID | VOC | SVOC | Aroclors | Metals | Grain Size | TOC | WB-TOC | Total Solids | TSS/TDS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| K1204452 | SL0385 | K1204452-015 | | ✓ | | ✓ | ✓ | | | ✓ | |
| K1204452 | SL0397 | K1204452-016 | | ✓ | | ✓ | ✓ | | | ✓ | |
| K1204452 | SL0407 | K1204452-018 | | | | ✓ | ✓ | | | ✓ | |
| K1204452 | FB0002 | K1204452-019 | | ✓ | | ✓ | | | | | |
| K1204452 | FW0004 | K1204452-020 | | ✓ | | ✓ | | | | | |
| K1204452 | FW0005 | K1204452-021 | | ✓ | | ✓ | | | | | |
| K1204452 | FW0006 | K1204452-022 | | ✓ | | ✓ | | | | | |
| K1204452 | SL0451 | K1204452-023 | | | | | ✓ | ✓ | | ✓ | |
| K1204452 | SL0461 | K1204452-024 | | | | | ✓ | ✓ | | ✓ | |
| K1204452 | SL0452 | K1204452-025 | | | | | ✓ | ✓ | | ✓ | |
| K1204452 | SL0453 | K1204452-026 | | | | | ✓ | ✓ | | ✓ | |
| K1204452 | SL0454 | K1204452-027 | | | | | ✓ | ✓ | | ✓ | |
| K1204452 | SL0455 | K1204452-028 | | | | | ✓ | ✓ | | ✓ | |
| K1204452 | SL0456 | K1204452-029 | | | | | ✓ | ✓ | | ✓ | |
| K1204452 | SL0457 | K1204452-030 | | | | | ✓ | ✓ | | ✓ | |
| K1204452 | SL0458 | K1204452-031 | | | | | ✓ | ✓ | | ✓ | |
| K1204452 | SL0459 | K1204452-032 | | | | | ✓ | ✓ | | ✓ | |
| K1204452 | SL0460 | K1204452-033 | | | | | ✓ | ✓ | | ✓ | |
| K1204452 | TB1 | K1204452-034 | ✓ | | | | | | | | |
| K1204452 | TB4 | K1204452-035 | ✓ | | | | | | | | |
| K1204452 | SL0461 | K1204452-036 | | | | | ✓ | ✓ | | ✓ | |

# Sample Index
## San Jacinto River Waste Pits - Southern Impoundments
## CAS - Houston

| SDG | Sample ID | Laboratory ID | Dioxin/Furans | PCB Congeners |
|---|---|---|---|---|
| E1200470 | SJMW003 | E1200470-001 | ✓ | |
| E1200470 | SJMW001 | E1200470-002 | ✓ | |
| E1200475 | SL0301 | E1200475-001 | ✓ | ✓ |
| E1200475 | SL0302 | E1200475-002 | ✓ | ✓ |
| E1200475 | SL0303 | E1200475-003 | ✓ | ✓ |
| E1200475 | SL0304 | E1200475-004 | ✓ | ✓ |
| E1200475 | SL0305 | E1200475-005 | ✓ | ✓ |
| E1200475 | SL0306 | E1200475-006 | ✓ | ✓ |
| E1200475 | SL0307 | E1200475-007 | ✓ | ✓ |
| E1200475 | SL0308 | E1200475-008 | ✓ | ✓ |
| E1200475 | SL0309 | E1200475-009 | ✓ | ✓ |
| E1200475 | SL0310 | E1200475-010 | ✓ | ✓ |
| E1200475 | SL0312 | E1200475-011 | ✓ | ✓ |
| E1200475 | SL0313 | E1200475-012 | ✓ | ✓ |
| E1200475 | SL0314 | E1200475-013 | ✓ | |
| E1200475 | SL0315 | E1200475-014 | ✓ | ✓ |
| E1200475 | SL0316 | E1200475-015 | ✓ | ✓ |
| E1200475 | SL0317 | E1200475-016 | ✓ | ✓ |
| E1200475 | SL0318 | E1200475-017 | ✓ | |
| E1200475 | SL0319 | E1200475-018 | ✓ | ✓ |
| E1200475 | SL0320 | E1200475-019 | ✓ | |
| E1200475 | SL0322 | E1200475-020 | ✓ | ✓ |
| E1200476 | SL0323 | E1200476-001 | ✓ | ✓ |
| E1200476 | SL0324 | E1200476-002 | ✓ | ✓ |
| E1200476 | SL0325 | E1200476-003 | ✓ | ✓ |
| E1200476 | SL0326 | E1200476-004 | ✓ | ✓ |
| E1200476 | SL0327 | E1200476-005 | ✓ | ✓ |
| E1200476 | SL0328 | E1200476-006 | ✓ | ✓ |
| E1200476 | SL0329 | E1200476-007 | ✓ | ✓ |
| E1200476 | SL0330 | E1200476-008 | ✓ | ✓ |
| E1200476 | SL0331 | E1200476-009 | ✓ | ✓ |
| E1200477 | SD0001 | E1200477-001 | ✓ | ✓ |
| E1200477 | SD0002 | E1200477-002 | ✓ | ✓ |
| E1200477 | SD0003 | E1200477-003 | ✓ | ✓ |
| E1200477 | SD0004 | E1200477-004 | ✓ | ✓ |
| E1200477 | SD0005 | E1200477-005 | ✓ | ✓ |
| E1200477 | SD0006 | E1200477-006 | ✓ | ✓ |
| E1200477 | SD0007 | E1200477-007 | ✓ | ✓ |
| E1200477 | SD0008 | E1200477-008 | ✓ | ✓ |
| E1200477 | SD0009 | E1200477-009 | ✓ | ✓ |
| E1200477 | SD0010 | E1200477-010 | ✓ | ✓ |
| E1200477 | SD0011 | E1200477-011 | ✓ | ✓ |
| E1200477 | SD0012 | E1200477-012 | ✓ | ✓ |

**Sample Index**
**San Jacinto River Waste Pits - Southern Impoundments**
**CAS - Houston**

| SDG | Sample ID | Laboratory ID | Dioxin/Furans | PCB Congeners |
|---|---|---|---|---|
| E1200477 | SD0013 | E1200477-013 | ✓ | ✓ |
| E1200477 | FW0001 | E1200477-014 | ✓ | ✓ |
| E1200477 | SD0014 | E1200477-015 | ✓ | ✓ |
| E1200477 | FB0001 | E1200477-016 | ✓ | ✓ |
| E1200480 | SJMW002 | E1200480-001 | ✓ | |
| E1200480 | SJMW002DUP1 | E1200480-002 | ✓ | |
| E1200480 | SJRM001 | E1200480-003 | ✓ | |
| E1200480 | ERBLANK | E1200480-004 | ✓ | |
| E1200485 | SL0345 | E1200485-001 | ✓ | ✓ |
| E1200485 | SL0346 | E1200485-002 | ✓ | |
| E1200485 | SL0349 | E1200485-003 | ✓ | ✓ |
| E1200485 | SL0350 | E1200485-004 | ✓ | |
| E1200485 | SL0351 | E1200485-005 | ✓ | ✓ |
| E1200485 | SL0362 | E1200485-006 | ✓ | |
| E1200485 | FW0002 | E1200485-007 | ✓ | ✓ |
| E1200485 | SL0353 | E1200485-008 | ✓ | ✓ |
| E1200485 | SL0354 | E1200485-009 | ✓ | ✓ |
| E1200485 | SL0355 | E1200485-010 | ✓ | |
| E1200485 | SL0356 | E1200485-011 | ✓ | ✓ |
| E1200485 | SL0357 | E1200485-012 | ✓ | |
| E1200485 | SL0358 | E1200485-013 | ✓ | ✓ |
| E1200485 | SL0359 | E1200485-014 | ✓ | |
| E1200485 | SL0360 | E1200485-015 | ✓ | ✓ |
| E1200485 | SL0361 | E1200485-016 | ✓ | |
| E1200485 | SL0300 | E1200485-017 | ✓ | ✓ |
| E1200485 | SL0311 | E1200485-018 | ✓ | ✓ |
| E1200485 | SL0364 | E1200485-019 | ✓ | |
| E1200485 | SL0365 | E1200485-020 | ✓ | ✓ |
| E1200486 | SL0366 | E1200486-001 | ✓ | |
| E1200486 | SL0368 | E1200486-002 | ✓ | ✓ |
| E1200486 | SL0369 | E1200486-003 | ✓ | ✓ |
| E1200486 | SL0370 | E1200486-004 | ✓ | |
| E1200486 | SL0371 | E1200486-005 | ✓ | ✓ |
| E1200486 | SL0372 | E1200486-006 | ✓ | |
| E1200486 | SL0321 | E1200486-007 | ✓ | ✓ |
| E1200486 | SL0332 | E1200486-008 | ✓ | ✓ |
| E1200486 | SL0374 | E1200486-009 | ✓ | |
| E1200486 | SL0375 | E1200486-010 | ✓ | |
| E1200486 | SL0376 | E1200486-011 | ✓ | |
| E1200486 | SL0377 | E1200486-012 | ✓ | |
| E1200486 | SL0378 | E1200486-013 | ✓ | |
| E1200486 | SL0379 | E1200486-014 | ✓ | |
| E1200486 | SL0380 | E1200486-015 | ✓ | |

**Sample Index**
**San Jacinto River Waste Pits - Southern Impoundments**
**CAS - Houston**

| SDG | Sample ID | Laboratory ID | Dioxin/Furans | PCB Congeners |
|---|---|---|---|---|
| E1200486 | SL0381 | E1200486-016 | ✓ | |
| E1200486 | SL0382 | E1200486-017 | ✓ | |
| E1200486 | SL0383 | E1200486-018 | ✓ | |
| E1200486 | SL0342 | E1200486-019 | ✓ | ✓ |
| E1200486 | SL0343 | E1200486-020 | ✓ | ✓ |
| E1200487 | SL0344 | E1200487-001 | ✓ | |
| E1200487 | SL0352 | E1200487-002 | ✓ | ✓ |
| E1200487 | SL0363 | E1200487-003 | ✓ | |
| E1200487 | SL0386 | E1200487-004 | ✓ | ✓ |
| E1200487 | SL0387 | E1200487-005 | ✓ | ✓ |
| E1200487 | SL0388 | E1200487-006 | ✓ | |
| E1200487 | SL0389 | E1200487-007 | ✓ | |
| E1200487 | SL0390 | E1200487-008 | ✓ | ✓ |
| E1200487 | SL0391 | E1200487-009 | ✓ | |
| E1200487 | SL0392 | E1200487-010 | ✓ | ✓ |
| E1200487 | SL0393 | E1200487-011 | ✓ | |
| E1200487 | SL0394 | E1200487-012 | ✓ | ✓ |
| E1200487 | SL0395 | E1200487-013 | ✓ | |
| E1200487 | SL0398 | E1200487-014 | ✓ | ✓ |
| E1200487 | SL0399 | E1200487-015 | ✓ | ✓ |
| E1200487 | SL0400 | E1200487-016 | ✓ | ✓ |
| E1200487 | SL0401 | E1200487-017 | ✓ | |
| E1200487 | SL0402 | E1200487-018 | ✓ | ✓ |
| E1200487 | SL0403 | E1200487-019 | ✓ | |
| E1200487 | SL0404 | E1200487-020 | ✓ | ✓ |
| E1200488 | SL0405 | E1200488-001 | ✓ | |
| E1200488 | SL0408 | E1200488-002 | ✓ | |
| E1200488 | SL0409 | E1200488-003 | ✓ | |
| E1200488 | SL0410 | E1200488-004 | ✓ | |
| E1200488 | SL0412 | E1200488-005 | ✓ | |
| E1200488 | SL0414 | E1200488-006 | ✓ | |
| E1200488 | SL0411 | E1200488-007 | ✓ | |
| E1200488 | SL0415 | E1200488-008 | ✓ | |
| E1200488 | SL0416 | E1200488-009 | ✓ | |
| E1200488 | SL0418 | E1200488-010 | ✓ | |
| E1200488 | SL0419 | E1200488-011 | ✓ | ✓ |
| E1200488 | SL0420 | E1200488-012 | ✓ | |
| E1200488 | SL0421 | E1200488-013 | ✓ | ✓ |
| E1200488 | SL0422 | E1200488-014 | ✓ | |
| E1200488 | SL0423 | E1200488-015 | ✓ | ✓ |
| E1200488 | SL0425 | E1200488-016 | ✓ | |
| E1200488 | SL0426 | E1200488-017 | ✓ | ✓ |
| E1200488 | SL0427 | E1200488-018 | ✓ | ✓ |

**Sample Index**
**San Jacinto River Waste Pits - Southern Impoundments**
**CAS - Houston**

| SDG | Sample ID | Laboratory ID | Dioxin/Furans | PCB Congeners |
|---|---|---|---|---|
| E1200488 | SL0428 | E1200488-019 | ✓ | |
| E1200488 | SL0430 | E1200488-020 | ✓ | |
| E1200493 | SL0431 | E1200493-001 | ✓ | |
| E1200493 | SL0432 | E1200493-002 | ✓ | |
| E1200493 | SL0433 | E1200493-003 | ✓ | |
| E1200493 | SL0434 | E1200493-004 | ✓ | |
| E1200493 | SL0436 | E1200493-005 | ✓ | |
| E1200493 | SL0437 | E1200493-006 | ✓ | |
| E1200493 | SL0438 | E1200493-007 | ✓ | |
| E1200493 | SL0439 | E1200493-008 | ✓ | |
| E1200493 | SL0440 | E1200493-009 | ✓ | |
| E1200493 | SL0442 | E1200493-010 | ✓ | ✓ |
| E1200493 | SL0443 | E1200493-011 | ✓ | ✓ |
| E1200493 | SL0444 | E1200493-012 | ✓ | |
| E1200493 | SL0445 | E1200493-013 | ✓ | ✓ |
| E1200493 | SL0446 | E1200493-014 | ✓ | |
| E1200493 | SL0447 | E1200493-015 | ✓ | ✓ |
| E1200493 | SL0448 | E1200493-016 | ✓ | |
| E1200493 | SL0449 | E1200493-017 | ✓ | ✓ |
| E1200493 | SL0450 | E1200493-018 | ✓ | |
| E1200505 | SL0333 | E1200505-001 | ✓ | ✓ |
| E1200505 | SL0334 | E1200505-002 | ✓ | ✓ |
| E1200505 | SL0335 | E1200505-003 | ✓ | |
| E1200505 | SL0336 | E1200505-004 | ✓ | ✓ |
| E1200505 | SL0337 | E1200505-005 | ✓ | |
| E1200505 | SL0338 | E1200505-006 | ✓ | ✓ |
| E1200505 | SL0339 | E1200505-007 | ✓ | ✓ |
| E1200505 | SL0340 | E1200505-008 | ✓ | ✓ |
| E1200505 | SL0341 | E1200505-009 | ✓ | |
| E1200505 | FW0003 | E1200505-010 | ✓ | ✓ |
| E1200505 | SL0441 | E1200505-011 | ✓ | |
| E1200505 | SL0417 | E1200505-012 | ✓ | ✓ |
| E1200505 | SL0429 | E1200505-013 | ✓ | |
| E1200505 | SL0373 | E1200505-014 | ✓ | |
| E1200505 | SL0385 | E1200505-015 | ✓ | |
| E1200505 | SL0397 | E1200505-016 | ✓ | ✓ |
| E1200505 | SL0407 | E1200505-018 | ✓ | |
| E1200505 | FB0002 | E1200505-019 | ✓ | ✓ |
| E1200505 | FW0004 | E1200505-020 | ✓ | ✓ |
| E1200507 | FW0005 | E1200507-001 | ✓ | ✓ |
| E1200507 | FW0006 | E1200507-002 | ✓ | ✓ |
| E1200507 | SL0451 | E1200507-003 | ✓ | ✓ |
| E1200507 | SL0452 | E1200507-004 | ✓ | ✓ |

**Sample Index**
**San Jacinto River Waste Pits - Southern Impoundments**
**CAS - Houston**

| SDG | Sample ID | Laboratory ID | Dioxin/Furans | PCB Congeners |
|---|---|---|---|---|
| E1200507 | SL0453 | E1200507-005 | ✓ | ✓ |
| E1200507 | SL0454 | E1200507-006 | ✓ | ✓ |
| E1200507 | SL0455 | E1200507-007 | ✓ | |
| E1200507 | SL0456 | E1200507-008 | ✓ | |
| E1200507 | SL0457 | E1200507-009 | ✓ | |
| E1200507 | SL0458 | E1200507-010 | ✓ | |
| E1200507 | SL0459 | E1200507-011 | ✓ | |
| E1200507 | SL0460 | E1200507-012 | ✓ | |
| E1200507 | SL0461 | E1200507-013 | ✓ | |
| E1200507 | SL0462 | E1200507-014 | ✓ | |
| E1200507 | SL0463 | E1200507-015 | ✓ | |
| E1200507 | SL0464 | E1200507-016 | ✓ | |
| E1200507 | SL0465 | E1200507-017 | ✓ | |
| E1200507 | SL0466 | E1200507-018 | ✓ | |
| E1200507 | SL0467 | E1200507-019 | ✓ | |
| E1200507 | SL0468 | E1200507-020 | ✓ | |
| E1200508 | SL0469 | E1200508-001 | ✓ | |
| E1200508 | SL0470 | E1200508-002 | ✓ | |
| E1200508 | FW0007 | E1200508-003 | ✓ | |
| E1200508 | FW0008 | E1200508-004 | ✓ | |
| E1200508 | FW0009 | E1200508-005 | ✓ | |
| E1200508 | FW0010 | E1200508-006 | ✓ | |
| E1200508 | SL0471 | E1200508-007 | ✓ | |
| E1200572 | SL0348 | E1200572-001 | ✓ | |
| E1200572 | SL0347 | E1200572-002 | ✓ | ✓ |

# DATA VALIDATION REPORT
# San Jacinto River Waste Pits
# Southern Impoundment Study II - Groundwater Samples
# Volatile Organic Compounds by Method SW8260C

This report documents the review of analytical data from the analyses of groundwater samples and the associated laboratory and field quality control (QC) samples. Samples were analyzed by Columbia Analytical Services, Inc., Kelso, Washington. Refer to the **Sample Index** for a complete list of samples.

| SDG | Number of Samples | Validation Level |
|---|---|---|
| K1204190 | 2 Groundwater &<br>1 Trip Blank | Stage 2B<br>Stage 2A |
| K1204339 | 2 Groundwater,<br>1 Trip Blank & 1 Equipment Blank | Stage 4<br>Stage 2A |

## I. DATA PACKAGE COMPLETENESS

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

## II. EDD TO HARDCOPY VERIFICATION

Ten percent (10%) of the results in the laboratory electronic data deliverable (EDD) were verified by comparison to the hardcopy laboratory data package. No errors were noted.

## III. TECHNICAL DATA VALIDATION

The quality control (QC) requirements that were reviewed are listed in the following table.

| | | | |
|---|---|---|---|
| 1 | Sample Receipt, Preservation, and Holding Times | 2 | Laboratory Control Samples (LCS) |
| | GC/MS Instrument Performance Check | | Field Replicates |
| | Initial Calibration (ICAL) | | Internal Standards |
| 2 | Continuing Calibration (CCAL) | | Reporting Limits |
| 2 | Laboratory Blanks | | Reported Results |
| 2 | Field (Trip) Blanks | 1 | Calculation Verification (Full validation only) |
| | Surrogate Compounds | | |
| | Matrix Spikes/Matrix Spike Duplicates (MS/MSD) | | |

[1] ***Quality control results are discussed below, but no data were qualified.***
[2] ***Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed below.***

### Sample Receipt, Preservation, and Holding Times

The validation guidance documents state that sample shipping coolers should arrive at the laboratory within the advisory temperature range of 2° to 6°C. The laboratory received all sample coolers with temperatures less than the lower limit, the lowest at -0.7°C. These outliers did not impact data quality; no qualifiers were assigned.

## Continuing Calibration

***SDG K1204190:*** In the continuing calibration (CCAL) analyzed on 5/10/12, the percent difference (%D) values for naphthalene and 1,2,3-trichlorobenzene were outside the control limit and indicated a potential low bias. The associated results were estimated (J/UJ-5B).

***SDG K1204339:*** In the CCAL analyzed on 5/14/12, the %D values for acetone, 4-methyl-2-pentanone and 2-hexanone were outside the control limit and indicated a potential high bias. All results for these analytes were not detected, except for acetone in Sample ER Blank; this result was estimated (J-5B).

## Laboratory Blanks

Laboratory (method) blanks were analyzed at the appropriate frequency. To assess the impact of each blank contaminant on the reported sample results, an action level was established at five times (5x; 10x for common lab contaminants) the concentration detected in the blank. If the concentration in the associated field samples were less than the action level, the results were qualified as not detected (U-7) at the reported concentration. No action was taken if the sample results were greater than the action level or for non-detected results.

***SDG K1204190***: methylene chloride (2 results), 1,2,4-trichlorobenzene (1 result), naphthalene (1 result).

***SDG K1204339***: methylene chloride (2 results).

## Field Blanks

To evaluate the effect on the sample data, action levels of 5x (10x for common lab contaminants) the blank concentrations were established. If a contaminant is detected in an associated field sample and the concentration is less than the action level, the result is qualified (U-6, U-18 for trip blanks) at the reported concentration to indicate an elevation of the reporting limit. No action is taken if the sample result is greater than the action level, or for non-detected results.

***SDG K1204190:*** One trip blank was submitted with this SDG. After qualification for method blank contamination, a positive result for toluene remained in the trip blank. Results for toluene were qualified as not detected (U-18) in Samples SJMW003 and SJMW001.

***SDG K1204339:*** One trip blank and one rinsate blank, ER Blank, were submitted with this SDG. After qualification for method blank contamination, a positive result for toluene remained in the trip blank. Results for toluene were qualified as not detected (U-18) in Samples SJMW002, SJMW002DUP1, and ER Blank.

After qualification for method blank and trip blank contamination, positive results for acetone, ethylbenzene, m,p-xylene, and o-xylene remained in ER Blank. The results for acetone and m,p-xylene were qualified as not detected (U-6) in Samples SJMW002 and SJMW002DUP1.

## Laboratory Control Samples

***SDG K1204190:*** The laboratory control sample (LCS) percent recovery (%R) value for acetone was greater than the upper control limit. The results for acetone in Samples SJMW001 and SJMW003 were estimated (J-10).

***SDG K1204339:*** The LCS %R value for acetone was greater than the upper control limit. The result for acetone in Sample ER Blank was estimated (J-10).

## Field Replicates

***SDG K1204339:*** One set of field replicates, SJMW002 & SJMW002DUP1, were submitted. For results greater than 5x the reporting limit (RL), all relative percent difference (RPD) values were less than the control limit of 50%. For results less than 5x the RL, the difference between the sample and replicate was less than 2x the RL. All field precision criteria were met.

## Calculation Verification

***SDG K1204339:*** Several results were verified by recalculation from the raw data. No calculation or transcription errors were noted.

## OVERALL ASSESSMENT

As determined by this evaluation, the laboratory followed the specified analytical method. Accuracy was acceptable, as demonstrated by the surrogate, LCS/LCSD and MS/MSD %R values. Precision was also acceptable as demonstrated by the MS/MSD RPD values.

Data were qualified as not detected based on method blank, trip blank, and equipment rinsate blank contamination. Data were estimated due to continuing calibration outliers, and LCS recovery outliers.

All data, as qualified, are acceptable for use.

# DATA VALIDATION REPORT
# San Jacinto River Waste Pits
# Southern Impoundment Study II- Soil Samples
# Volatile Organic Compounds by Method SW8260C

This report documents the review of analytical data from the analyses of soil samples and the associated laboratory and field quality control (QC) samples. Samples were analyzed by Columbia Analytical Services, Inc., Kelso, Washington. Refer to the **Sample Index** for a complete list of samples

| SDG | Number of Samples | Validation Level |
|---|---|---|
| K1204192 | 2 Soil &<br>1 Trip Blank | Stage 2B<br>Stage 2A |
| K1204226 | 16 Soils | Stage 4 |
| K1204325 | 14 Soil &<br>2 Trip Blanks | Stage 2B<br>Stage 2A |
| K1204342 | 4 Soil | Stage 2B |
| K1204356 | 15 Soil | Stage 2B |
| K1204377 | 18 Soil &<br>2 Trip Blanks | Stage 2B<br>Stage 2A |
| K1204449 | 2 Soil | Stage 2B |
| K1204452 | 5 Soil &<br>2 Trip Blanks | Stage 2B<br>Stage 2A |

## I. DATA PACKAGE COMPLETENESS

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

## II. EDD TO HARDCOPY VERIFICATION

Ten percent (10%) of the results in the laboratory electronic data deliverable (EDD) were verified by comparison to the hardcopy laboratory data package. No errors were noted.

***SDG K1204192:*** The sample matrix was listed as "soil" on the chain of custody (COC) but the data package listed the matrix as "sediment". The matrix from the COC was used.

## III. TECHNICAL DATA VALIDATION

The quality control (QC) requirements that were reviewed are listed in the following table.

| | | | |
|---|---|---|---|
| **1** | Sample Receipt, Preservation, and Holding Times | **1** | Laboratory Control Samples (LCS/LCSD) |
| | GC/MS Instrument Performance Check | **1** | Field Replicates |
| | Initial Calibration (ICAL) | **2** | Internal Standards |
| **2** | Continuing Calibration (CCAL) | **1** | Reporting Limits |
| **2** | Laboratory Blanks | | Reported Results |
| **2** | Field (Trip) Blanks | **1** | Calculation Verification (Full validation only) |
| **2** | Surrogate Compounds | | |
| **1** | Matrix Spikes/Matrix Spike Duplicates (MS/MSD) | | |

[1] ***Quality control results are discussed below, but no data were qualified.***
[2] ***Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed below.***

### Sample Receipt, Preservation, and Holding Times

The validation guidance documents state that sample shipping coolers should arrive at the laboratory within the advisory temperature range of 2° to 6°C. The laboratory received some sample coolers with temperatures less than the lower limit, the lowest at -0.8°C. These outliers did not impact data quality; no qualifiers were assigned.

### Continuing Calibration

***SDG K1204192***: In the continuing calibration (CCAL) analyzed on 5/11/12, the percent difference (%D) values for bromomethane and 1,1,2,2-tetrachloroethane were outside the control limit and indicated a potential low bias. The associated results for these analytes were estimated (J/UJ-5B).

In the CCAL analyzed on 5/10/12, the %D value for naphthalene was outside the control limit and indicated a potential low bias. The associated result for naphthalene was estimated (UJ-5B).

***SDG K1204226:*** In the CCAL analyzed on 5/10/12, the %D value for bromomethane was outside the control limit and indicated a potential low bias. In the CCAL analyzed on 5/11/12, the %D values for bromomethane and 1,1,2,2,-tetrachloroethane were outside the control limit and indicated a potential low bias. The associated results for these analytes were estimated (J/UJ-5B).

***SDG K1204325:*** In the CCAL analyzed on 5/13/12 and 5/16/12 the %D values for bromomethane and in the CCAL analyzed on 5/14/12 the %D value for hexachlorobutadiene, were outside the control limit and indicated a potential low bias. The associated results for these analytes were estimated (UJ-5B).

In the CCAL analyzed on 5/13/12, 5/16/12 and 5/17/12, the %D values for carbon disulfide were outside the control limit and indicated a potential high bias. The associated positive results for this analyte were estimated (J-5B).

***SDG K1204342:*** In the CCAL analyzed on 5/14/12, the %D value for bromomethane was outside the control limit and indicated a potential low bias. The four associated results for this analyte were estimated (UJ-5B).

***SDG K1204356***: In the CCAL analyzed on 5/10/12, 5/11/12, 5/13/12, 5/15/12, and 5/17/12 the %D values for bromomethane were outside the control limit and indicated a potential low bias. In the CCAL analyzed on 5/11/12, the %D value for 1,1,2,2-tetrachlorethane were outside the control limit and indicated a potential low bias. The associated results for these analytes were estimated (J/UJ-5B).

In the CCAL analyzed on 5/13/12, 5/15/12, and 5/17/12, the %D values for carbon disulfide were outside the control limit and indicated a potential high bias. The associated positive results for this analyte were estimated (J-5B).

***SDG K1204377:*** In the CCAL analyzed on 5/14/12 and 5/15/12, the %D values for bromomethane were outside the control limit and indicated a potential low bias. The associated results for these analytes were estimated (J/UJ-5B).

In the CCAL analyzed on 5/14/12, the %D value for hexachlorobutadiene was outside the control limit and indicated a potential low bias. The associated results for these analytes were estimated (UJ-5B).

In the CCAL analyzed on 5/15/12 and 5/17/12, the %D values for carbon disulfide were outside the control limit and indicated a potential high bias. The associated positive results for this analyte were estimated (J-5B).

***SDG K1204449:*** In the CCAL analyzed on 5/16/12, the %D value for bromomethane was outside the control limit and indicated a potential low bias. The associated results for this analyte were estimated (UJ-5B). The %D value for carbon disulfide in this CCAL was outside the control limit and indicated a potential high bias; this analyte was not detected in the associated samples, no data were qualified.

***SDG K1204452:*** In the CCAL analyzed on 5/15/12, the %D values for bromomethane and naphthalene were outside the control limit and indicated a potential low bias. The associated results for these analytes were estimated (J/UJ-5B).

In another CCAL analyzed on 5/15/12, the %D value for bromomethane was outside the control limit and indicated a potential low bias. The associated results for this analyte were estimated (J/UJ-5B). And the %D value for carbon disulfide was outside the control limit and indicated a potential high bias. The associated positive results for this analyte were estimated (J-5B).

In the CCAL analyzed on 5/17/12, the %D value for carbon disulfide was outside the control limit and indicated a potential high bias. The associated positive result for this analyte was estimated (J-5B).

## Laboratory Blanks

Laboratory (method) blanks were analyzed at the appropriate frequency. To assess the impact of each blank contaminant on the reported sample results, an action level was established at five times (5x; 10x for common lab contaminants) the concentration detected in the blank. If the

concentration in the associated field samples were less than the action level, the results were qualified as not detected (U-7) at the reported concentration. No action was taken if the sample results were greater than the action level or for non-detected results. The qualified results were for soil samples unless otherwise noted.

***SDG K1204192:*** methylene chloride (2 soil & 1 trip blank results), naphthalene (2 soil results).

***SDG K1204226:*** acetone (8 results), methylene chloride (16 results), naphthalene (4 results).

***SDG K1204325:*** acetone (7 results), carbon disulfide (2 results), methylene chloride (14 results), 2-butanone (9 results), naphthalene (8 results).

***SDG K1204342:*** acetone (1 result), carbon disulfide (2 results), methylene chloride (4 results), naphthalene (4 results).

***SDG K1204356:*** acetone (7 results), methylene chloride (15 results), 2-butanone (3 results), naphthalene (5 results).

***SDG K1204377:*** acetone (12 results), methylene chloride (18 results), 2-butanone (5 results), benzene (1 result), 1,4-dichlorobenzene (4 results), 1,2-dichlorobenzene (2 results), naphthalene (4 results).

***SDG K1204449:*** acetone (1 result), carbon disulfide (2 results), methylene chloride (2 results), 2-butanone (1 result).

***SDG K1204452:*** acetone (2 results), methylene chloride (5 results), naphthalene (2 results).

## Field Blanks

To evaluate the effect on the sample data, action levels of 5x (10x for common lab contaminants) the blank concentrations were established. If a contaminant is detected in an associated field sample and the concentration is less than the action level, the result is qualified (U-6, U-18 for trip blanks) at the reported concentration to indicate an elevation of the reporting limit. No action is taken if the sample result is greater than the action level, or for non-detected results.

***SDG K1204192:*** After qualification for method blank contamination, a positive result for toluene remained in Sample Trip Blank. Results for toluene were qualified as not detected (U-18) in Samples SL0311 and SL0321.

***SDGs K1204325, K1204377, K1204452:*** Two trip blanks were submitted with each of these SDG. No target analytes were detected in any of these trip blanks.

## Surrogate Compounds

***SDG K1204377:*** The percent recovery (%R) value for 4-bromofluorobenzene in Sample SL0437 was greater than the upper control limit. The associated positive results were estimated (J-13).

## Matrix Spike/Matrix Spike Duplicate

***SDGs K1204226 & K1204449:*** Matrix spike/matrix spike duplicate (MS/MSD) samples were not analyzed for soils. Accuracy and precision were evaluated using the laboratory control sample/laboratory control sample duplicate (LCS/LCSD).

***SDG K1204356:*** The MS/MSD analyses were performed using Batch QC samples. The outliers for the %R values did not result in qualifiers because the parent sample was from a different SDG.

## Laboratory Control Samples

***SDG K1204192:*** The LCS %R value for 1,1,2,2-tetrachloroethane was less than the lower control limit. The LCSD %R was acceptable; no data were qualified for this single outlier.

The LCS %R value for acetone was greater than the upper control limit. Acetone was not detected in the associated sample; no data were qualified.

***SDG K1204226:*** The LCS %R value for 1,1,2,2-tetrachloroethane was less than the lower control limit. The LCSD %R was acceptable; no data were qualified for this single outlier.

***SDG K1204356:*** In one LCS/LCSD pair the LCS %R value for 1,1,2,2-tetrachloroethane was less than the lower control limit. The LCSD %R was acceptable; no data were qualified for this single outlier.

In the LCS the %R value for 1,2-dichloroethane was greater than the upper control limit. The result for 1,2-dichloroethane was not detected in the associated sample; no data were qualified.

***SDG K2104452:*** In the LCS the %R values for acetone were greater than the upper control limit. Acetone was not detected in the associated samples; no data were qualified.

## Field Replicates

The following acceptance criteria were used to evaluate precision: the RPD control limit is 50% for results greater than 5x the reporting limit (RL). For results less than 5x the RL, the calculated difference between the sample and replicate must be less than 2x the RL. No data were qualified based on field replicate precision outliers. Data users should consider the impact of field precision outliers on the reported results. Field precision was acceptable in all cases.

***SDG K1204226:*** One set of field replicates, Samples SL0302 & SL0303, were submitted.

***SDG K1204325:*** One set of field replicates, Samples SL0399 & SL0400, were submitted.

***SDG K1204342:*** One set of field replicates, Samples SL0343 & SL0344, were submitted.

***SDG K1204377:*** One set of field replicates, Samples SL0426 &SL0427, were submitted.

## Internal Standards

***SDG K1204192:*** The recovery value for 1,4-dichlorobenzene-d4 was less than the lower control limit for Sample SL0321. The associated results in this sample were estimated (J/UJ-19).

***SDG K1204226:*** In Sample SL0312 the recovery value for 1,4-dichlorobenzene-d4 was less than the lower control limit; the associated results were estimated (J/UJ-19). The recovery values for the fluorobenzene, chlorobenzene-d5 and 1,2-dichlorobenzene-d4 were less than the lower control limit for Samples SL0313, SL0322 and SL0323; all results for these samples were estimated (J/UJ-19).

***SDG K1204325:*** The recovery value for 1,4-dichlorobenzene-d4 was less than the lower control limit for Sample SL0394. The associated results in this sample were estimated (J/UJ-19).

***SDG K1204342:*** The recovery value for 1,4-dichlorobenzene-d4 was less than the lower control limit for Sample SL0343. The associated results in this sample were estimated (J/UJ-19).

***SDG K1204356:*** The recovery values for 1,4-dichlorobenzene-d4 were less than the lower control limit for Samples SL0300, SL0353, and SL0356. In Sample SL0353 the recovery value for fluorobenzene was less than the control limit. The associated results in these samples were estimated (J/UJ-19).

***SDG K1204377:*** The recovery values for 1,4-dichlorobenzene-d4 were less than the lower control limit for Samples SL0417, SL0418 and SL0423. The associated results in these samples were estimated (J/UJ-19).

***SDG K1204452:*** The recovery values for 1,4-dichlorobenzene-d4 and chlorobenzene-d5 were less than the lower control limit for Samples SL0336; the associated results were estimated (J/UJ-19).

## Reporting Limits

***SDG K1204226:*** The reporting limits for 2-chlorotoluene were elevated in five samples due to non-target background components.

***SDGs K1204325, K1204356, K1204377, & K1204452:*** The reporting limits for one or more analytes in four or more samples per SDG were elevated due to non-target background components.

***SDG K1204342:*** The reporting limit for chloromethane was elevated in Sample SL0343 due to non-target background components.

## Calculation Verification

***SDG K1204226:*** Several results were verified by recalculation from the raw data. No calculation or transcription errors were noted.

## OVERALL ASSESSMENT

As determined by this evaluation, the laboratory followed the specified analytical method. With the exceptions noted above, accuracy was acceptable as demonstrated by the surrogate, LCS/LCSD and MS/MSD percent %R values. Precision was also acceptable as demonstrated by the LCS/LCSD and MS/MSD RPD values.

Data were qualified as not detected based on method blank and trip blank blank contamination. Data were estimated due to continuing calibration outliers, internal standard outliers, and a surrogate outlier.

All data, as qualified, are acceptable for use.

# DATA VALIDATION REPORT
# San Jacinto River Waste Pits
# Southern Impoundment Study II - Groundwater Samples
# Semivolatile Organic Compounds by Method SW8270D

This report documents the review of analytical data from the analyses of groundwater samples and the associated laboratory and field quality control (QC) samples. Samples were analyzed by Columbia Analytical Services, Inc., Kelso, Washington. Refer to the **Sample Index** for a complete list of samples.

| SDG | Number of Samples | Validation Level |
|---|---|---|
| K1204339 | 2 Groundwater &<br>1 Rinsate Blank | Stage 4<br>Stage 2A |
| K1204190 | 2 Groundwater | Stage 2B |

## I. DATA PACKAGE COMPLETENESS

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

## II. EDD TO HARDCOPY VERIFICATION

Ten percent (10%) of the results in the laboratory EDD were verified by comparison to the hardcopy laboratory data package. No errors were noted.

## III. TECHNICAL DATA VALIDATION

The QC requirements that were reviewed are listed below.

| | | | |
|---|---|---|---|
| 1 | Sample Receipt, Preservation, and Holding Times | | Laboratory Control Samples (LCS/LCSD) |
| | GC/MS Instrument Performance Check | 1 | Field Replicates |
| | Initial Calibration (ICAL) | | Internal Standards |
| 2 | Continuing Calibration (CCAL) | | Target Analyte List |
| 2 | Laboratory Blanks | | Reporting Limits (MDL and MRL) |
| 1 | Field Blanks | | Compound Identification |
| | Surrogate Compounds | | Reported Results |
| 1 | Matrix Spikes/Matrix Spike Duplicates (MS/MSD) | 1 | Calculation Verification (Full validation only) |

[1] ***Quality control results are discussed below, but no data were qualified.***
[2] ***Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed below.***

### Sample Receipt, Preservation, and Holding Times

The validation guidance documents state that sample shipping coolers should arrive at the laboratory within the advisory temperature range of 2° to 6°C. The laboratory received sample

coolers with temperatures less than the lower limit, the lowest at -0.7°C. These outliers did not impact data quality; therefore no data were qualified.

## Continuing Calibration

***SDG K1204190***: In the continuing calibration (CCAL) analyzed on 5/15/12 the percent difference (%D) values for benzoic acid and 4-nitrophenol were outside the control limit and indicated a potential high bias. The positive result for benzoic acid in Sample SJMW003 was estimated (J-5B) due to a potential high bias. There were no positive results for 4-nitrophenol; no data were qualified.

In the CCAL analyzed on 5/16/12 the %D values for hexachloroethane and 4-nitrophenol were outside the control limit and indicated a potential high bias; these analytes were not detected in the associated samples, no data were qualified. The %D values for 2,4-dinitrophenol and pentachlorophenol were outside the control limit and indicated a potential low bias; reporting limits for 2,4-dinitrophenol and pentachlorophenol were estimated (UJ-5B) in Sample SJMW001 due to a potential low bias.

***SDGs K1204339***: In the CCAL analyzed on 5/16/12 the %D values for hexachloroethane and 4-nitrophenol were outside the control limit and indicated a potential high bias; these analytes were not detected in the associated samples, no data were qualified. The %D values for 2,4-dinitrophenol and pentachlorophenol were outside the control limit and indicated a potential low bias; reporting limits for 2,4-dinitrophenol and pentachlorophenol were estimated (UJ-5B) in the three associated samples due to a potential low bias.

## Laboratory Blanks

Laboratory (method) blanks were analyzed at the appropriate frequency. To assess the impact of each blank contaminant on the reported sample results, an action level is established at five times (5x) the concentration detected in the blank (10x for phthalates). If a contaminant is detected in an associated field sample and the concentration is less than the action level, the result is qualified (U-7) at the reported concentration to indicate an elevation of the reporting limit. No action is taken if the sample result is greater than the action level, or for non-detected results. Various target analytes were detected in the method blanks, however only the following analytes required qualification:

***SDG K1204190***: diethyl phthalate (2 results), di-n-butyl phthalate (2 results), butyl benzyl phthalate (1 result)

***SDG K1204339***: diethyl phthalate (3 results), di-n-butyl phthalate (3 results), butyl benzyl phthalate (1 result)

## Field Blanks

To evaluate the effect on the sample data, action levels of 5x (10x for phthalates) the blank concentrations were established. If a contaminant is detected in an associated field sample and the concentration is less than the action level, the result is qualified (U-6) at the reported

concentration to indicate an elevation of the reporting limit. No action is taken if the sample result is greater than the action level, or for non-detected results.

***SDG K1204339***: One equipment rinsate, ER Blank, was submitted with this data package. After qualification due to method blank contamination no positive results remained in this sample.

## Matrix Spike/Matrix Spike Duplicates

Matrix spike/matrix spike duplicate (MS/MSD) analyses were not performed. Precision and accuracy were evaluated using the laboratory control sample/laboratory control sample duplicate (LCS/LCSD) analyses.

## Field Replicates

***SDG K1204339:*** One set of field replicates, SJMW002 & SJMW002DUP1, were submitted. For results greater than 5x the reporting limit (RL), all relative percent difference (RPD) values were less than the control limit of 50%. For results less than 5x the RL, the difference between the sample and replicate was less than 2x the RL. All field precision criteria were met.

## Calculation Verification

***SDG K1204339:*** Several results were verified by recalculation from the raw data. No calculation or transcription errors were noted.

## OVERALL ASSESSMENT

As determined by this evaluation, the laboratory followed the specified analytical method. Accuracy was acceptable, as demonstrated by the surrogate and LCS/LCSD recovery values. Precision was also acceptable as demonstrated by the LCS/LCSD and field replicate RPD values.

Data were qualified as not detected due to method blank contamination. Data were estimated based on continuing calibration outliers.

All data, as qualified, are acceptable for use.

# DATA VALIDATION REPORT
# San Jacinto River Waste Pits
# Southern Impoundment Study II - Sediment Samples
# Semivolatile Organic Compounds by Method SW8270D

This report documents the review of analytical data from the analyses of sediment samples and the associated laboratory and field quality control (QC) samples. Samples were analyzed by Columbia Analytical Services, Inc., Kelso, Washington. Refer to the **Sample Index** for a complete list of samples.

| SDG | Number of Samples | Validation Level |
|---|---|---|
| K1204265 | 13 Sediment,<br>1 Rinsate Blank & 1 Filter Wipe | Stage 4<br>Stage 2A |

## I. DATA PACKAGE COMPLETENESS

With the exception noted below, the laboratory submitted all required deliverables. The laboratory followed adequate corrective action processes and all anomalies were discussed in the case narrative**.**

Semivolatile organic analysis was cancelled for Sample SD0014.

## II. EDD TO HARDCOPY VERIFICATION

Ten percent (10%) of the results in the laboratory EDD were verified by comparison to the hardcopy laboratory data package. No errors were noted.

## III. Technical Data Validation

The QC requirements that were reviewed are listed below.

| | | | |
|---|---|---|---|
| 1 | Sample Receipt, Preservation, and Holding Times | | Laboratory Control Samples (LCS/LCSD) |
| | GC/MS Instrument Performance Check | 1 | Field Replicates |
| | Initial Calibration (ICAL) | | Internal Standards |
| | Continuing Calibration (CCAL) | | Target Analyte List |
| | Laboratory Blanks | 1 | Reporting Limits |
| 1 | Field Blanks | | Compound Identification |
| 1 | Surrogate Compounds | | Reported Results |
| | Matrix Spikes/Matrix Spike Duplicates (MS/MSD) | 1 | Calculation Verification (Full validation only) |

---

[1] ***Quality control results are discussed below, but no data were qualified.***
[2] ***Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed below.***

## Sample Receipt, Preservation, and Holding Times

The validation guidance documents state that sample shipping coolers should arrive at the laboratory within the advisory temperature range of 2° to 6°C. The laboratory received both sample coolers with temperatures less than the lower control limit, at -0.4°C and -0.8°C. These outliers did not impact data quality; no data were qualified.

## Field Blanks

To evaluate the effect on the sample data, action levels of 5x (10x for phthalates) the blank concentrations were established. If a contaminant is detected in an associated field sample and the concentration is less than the action level, the result is qualified (U-6) at the reported concentration to indicate an elevation of the reporting limit. No action is taken if the sample result is greater than the action level, or for non-detected results.

The field blanks for this project are filter wipe samples and equipment rinsate blanks. Laboratory blanks are used to evaluate all associated field blanks. The contamination in the filter wipe blank was further evaluated based on Sample FB0001 (the equipment rinsate blank). No target analytes were reported in Samples FB0001 or FW0001, the filter wipe sample.

## Surrogate Compounds

The percent recovery (%R) value for terphenyl-d14 in Sample SD0007 was greater than the upper control limit. This sample was analyzed at dilution (100x), this prevented accurate recovery of the surrogate; no data were qualified.

## Field Replicates

One set of field replicates, SL0006 & SL0007, were submitted. For results greater than 5x the reporting limit (RL), all relative percent difference (RPD) values were less than the control limit of 50%. For results less than 5x the RL, the difference between the sample and replicate was less than 2x the RL. All field precision criteria were met.

## Reporting Limits

Nine samples were analyzed at dilution (2x, 5x, 10x, 20x, or 100x) due to high levels of non-target background interferences. Reporting limits were elevated.

## Calculation Verification

Several results were verified by recalculation from the raw data. No calculation or transcription errors were noted.

## OVERALL ASSESSMENT

As determined by this evaluation, the laboratory followed the specified analytical method. Accuracy was acceptable as demonstrated by the surrogate, MS/MSD, and LCS/LCSD %R

values. Precision was also acceptable as demonstrated by the MS/MSD, LCS/LCSD, and field replicate RPD values.

All data, as reported, are acceptable for use.

# DATA VALIDATION REPORT
# San Jacinto River Waste Pits
# Southern Impoundment Study II - Soil Samples
# Semivolatile Organic Compounds by Method SW8270D

This report documents the review of analytical data from the analyses of soil samples and the associated laboratory and field quality control (QC) samples. Samples were analyzed by Columbia Analytical Services, Inc., Kelso, Washington. Refer to the **Sample Index** for a complete list of samples.

| SDG | Number of Samples | Validation Level |
|---|---|---|
| K1204226 | 16 Soil | Stage 4 |
| K1204325 | 14 Soil | Stage 2B |
| K1204342 | 3 Soil | Stage 2B |
| K1204356 | 15 Soil<br>1 Filter Wipe Blank | Stage 2B<br>Stage 2A |
| K1204377 | 11 Soil | Stage 2B |
| K1204449 | 1 Soil<br>4 Filter Wipe Blanks | Stage 2B<br>Stage 2A |
| K1204452 | 9 Soil,<br>1 Rinsate Blank & 4 Filter Wipe Blanks | Stage 2B<br>Stage 2A |

## I. DATA PACKAGE COMPLETENESS

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

## II. EDD TO HARDCOPY VERIFICATION

Ten percent (10%) of the results in the laboratory electronic data deliverable (EDD) were verified by comparison to the hardcopy laboratory data package. No errors were noted.

## III. Technical Data Validation

The QC requirements that were reviewed are listed below.

| | | | |
|---|---|---|---|
| **1** | Sample Receipt, Preservation, and Holding Times | **2** | Laboratory Control Samples (LCS/LCSD) |
| | GC/MS Instrument Performance Check | **1** | Field Replicates |
| | Initial Calibration (ICAL) | | Internal Standards |
| **2** | Continuing Calibration (CCAL) | | Target Analyte List |
| | Laboratory Blanks | **1** | Reporting Limits |
| **1** | Field Blanks | | Compound Identification |
| **2** | Surrogate Compounds | **2** | Reported Results |
| **2** | Matrix Spikes/Matrix Spike Duplicates (MS/MSD) | **1** | Calculation Verification (Full validation only) |

[1] ***Quality control results are discussed below, but no data were qualified.***
[2] ***Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed below.***

## Sample Receipt, Preservation, and Holding Times

The validation guidance documents state that sample shipping coolers should arrive at the laboratory within the advisory temperature range of 2° to 6°C. The laboratory received sample coolers with temperatures less than the lower limit, the lowest at -0.8°C. These outliers did not impact data quality; no data were qualified.

## Continuing Calibration

***SDG K1204226***: In the continuing calibration (CCAL) from 5/16/12 the percent difference (%D) values for hexachloroethane and 4-nitrophenol were outside the control limit, indicating a potential high bias; these analytes were not detected, no data were qualified. The %D values for 2,4-dinitrophenol, and pentachlorophenol were outside the control limit, indicating a potential low bias; reporting limits for these analytes were estimated (UJ-5B) in the three associated samples.

In the CCAL from 6/1/12 and 6/4/12 the %D values for bis(2-chloroisopropyl) ether were outside the control limit, indicating a potential low bias; reporting limits for these analytes were estimated (UJ-5B) in the eight associated samples.

***SDG K1204325***: In the CCAL from 5/14/12 the %D values for 2,4-dinitrophenol and pentachlorophenol were outside the control limit, indicating a potential low bias. Reporting limits for these analytes in the five associated samples were estimated (UJ-5B).

In the CCAL from 6/1/12 and 6/4/12 the %D values for bis(2-chloroisopropyl) ether were outside the control limit, indicating a potential low bias. The reporting limit for this analyte in the Sample SL0352 was estimated (UJ-5B).

***SDG K1204342***: In the CCAL from 5/14/12 the %D values for 2,4-dinitrophenol and pentachlorophenol were outside the control limit, indicating a potential low bias. Reporting limits for these analytes were estimated (UJ-5B) in Samples SL0345 and SL0351.

***SDG K1204356***: In the CCAL from 5/14/12 the %D values for 2,4-dinitrophenol and pentachlorophenol were outside the control limit, indicating a potential low bias. Reporting limits for these analytes in Samples SL0365 and SL0371 were estimated (UJ-5B).

In the CCAL from 5/16/12 the %D values for hexachloroethane and 4-nitrophenol were outside the control limit, indicating a potential high bias; these analytes were not detected, no data were qualified. The %D values for 2,4-dinitrophenol, and pentachlorophenol were outside the control limit, indicating a potential low bias; reporting limits for these analytes were estimated (UJ-5B) in Samples SL0353 and SL0354.

In the CCAL from 6/1/12 and 6/4/12 the %D values for bis(2-chloroisopropyl) ether were outside the control limit, indicating a potential low bias; reporting limits for these analytes were estimated (UJ-5B) in the eight associated samples.

***SDG K1204377***: In the CCAL from 5/16/12 the %D values for hexachloroethane and 4-nitrophenol were outside the control limit, indicating a potential high bias; these analytes were not detected, no data were qualified. The %D values for 2,4-dinitrophenol, and

pentachlorophenol were outside the control limit, indicating a potential low bias; reporting limits for these analytes were estimated (UJ-5B) in Sample SL0447.

## Field Blanks

To evaluate the effect on the sample data, action levels of 5x (10x for phthalates) the blank concentrations were established. If a contaminant is detected in an associated field sample and the concentration is less than the action level, the result is qualified (U-6) at the reported concentration to indicate an elevation of the reporting limit. No action is taken if the sample result is greater than the action level, or for non-detected results.

The field blanks for this project are rinsate blanks and filter wipe samples. Laboratory blanks are used to evaluate all associated field blanks. Laboratory blanks are used to evaluate all associated field blanks. No target analytes were detected in any field blanks, except as noted below. No data were qualified.

***SDG K1204356:*** One filter wipe blank, FW0002, was submitted with this SDG.

***SDG K1204449:*** Four filter wipe blanks, FW0007, FW0008, FW0009, and FW0010 were submitted with this SDG.

***SDG K1204452:*** An equipment rinsate blank, FB0002, and four filter wipe blanks, FW0003, FW0004, FW0005, and FW0006, were submitted with this SDG. A positive result remained for di-n-octyl phthalate in Sample FW0005. This analyte was not detected in the associated samples; no data were qualified.

## Surrogate Compounds

***SDG K1204226***: The surrogates 2-fluorophenol, phenol-d6, and 2,4,5-tribromophenol were either not recovered or recovered at less than 10% in Sample SL0305. The acid fraction analytes were rejected (R-13) in this sample.

***SDG K1204356***: The %R value for 2,4,6-tribromophenol in Sample SL0368 was less than 10%. The %R values for the two other acid fraction surrogates were acceptable. The results for the acid fraction analytes were estimated (J/UJ-13) in this sample.

The %R values for nitrobenzene-d5 in Samples SL0358 and SL0369 were greater than the upper control limits. These samples were analyzed at dilution (25x), this prevented accurate recovery of the surrogates; no data were qualified.

***SDG K1204377***: The %R value for phenol-d6 was less than the lower control limit and 2-fluorophenol and 2,4,6-tribromophenol were not recovered in Sample SL0421. The sample was analyzed at dilution (10x), this prevented accurate recovery of the surrogate; no data were qualified.

***SDG K1204452***: The %R values for nitrobenzene-d5 in Samples SL0336, SL0338, SL0340, for 2-fluorobiphenyl in Sample SL0338, and for terphenyl-14 in Sample SL0340 were outside of the

control limits. These samples were analyzed at dilution (20x or 25x), this prevented accurate recovery of the surrogate; no data were qualified.

## Matrix Spikes/Matrix Spike Duplicates

***SDG K1204226***: Sample SL0302 was used for the matrix spike/matrix spike duplicate (MS/MSD) analyses. Pentachlorophenol and 4-nitrophenol were not recovered. The reporting limits for these analytes in Sample SL0302 and its field duplicate, Sample SL0303, were rejected (R-8).

***SDG K1204325***: Sample SL0352 was used for the MS/MSD analyses. The MSD %R value for pyrene was greater than the control limit. The MS %R value was acceptable; no data were qualified for this single outlier.

A second set of MS/MSD analyses were performed using a Batch QC sample. The outliers for the %R values did not result in qualifiers because the parent sample was from a different SDG.

***SDGs K1204342 & K1204449***: The MS/MSD analyses were not performed due to insufficient sample volume. Precision and accuracy were evaluated using the laboratory control sample/laboratory control sample duplicate (LCS/LCSD) analyses.

***SDG K1204356***: Sample SL0322 was used for the MS/MSD analyses. The MS %R values for acenaphthene, pyrene, and benzo(a)pyrene were greater than the upper control limit. The MSD %R values were within control limits for these analytes; no data were qualified for these single outliers.

The RPD values for pyrene and benzo(a)pyrene were outside control limits. These analytes were estimated (J-9) in the parent sample. The RPD values for acenaphthalene and pentachlorophenol were outside control limits. These analytes were not detected in the parent sample; no data were qualified.

***SDG K1204377***: Sample SL0499 was used for the MS/MSD analyses. The RPD value for 2,4-dinitrotoluene was greater than the control limit. This analyte was not detected in the parent sample; no data were qualified.

***SDG K1204452***: Sample SL0441 was used for the MS/MSD analyses. The %R values for pentachlorophenol were greater than the control limit. This analyte was not detected in the parent sample; no data were qualified.

## Laboratory Control Samples

***SDG K1204342***: In the LCS/LCSD the LCS %R value for benzoic acid was less than 10% and the LCSD %R value was within control limits. The reporting limits in the associated samples were estimated (UJ-10). The RPD value for benzoic acid was greater than the control limit; this analyte was not detected in the associated samples, no data were qualified.

The LCS %R value for 4-nitrophenol was greater than the upper control limit. The LCSD %R value was within the control limit; no data were qualified for this single outlier.

***SDG K1204356***: The LCS %R value for benzoic acid was less than 10%, the LCSD %R value was within control limits. The reporting limits in the 14 associated samples were estimated (UJ-10). The RPD value for benzoic acid was greater than the control limit. This analyte was not detected in the associated samples; no data were qualified.

The LCS %R value for 4-nitrophenol was greater than the upper control limit. The LCSD %R value was within the control limit; no data were qualified for this single outlier.

***SDGs K1204449 & K1204452***: The RPD values for 18 analytes were greater than the control limit. These analytes were not detected in the associated samples; no data were qualified.

## Field Replicates

The following acceptance criteria were used to evaluate precision: the relative percent difference (RPD) control limit is 50% for results greater than 5x the reporting limit (RL). For results less than 5x the RL, the absolute difference between the sample and replicate must be less than 2x the RL. No data were qualified based on field replicate precision outliers. Data users should consider the impact of field precision outliers on the reported results. With the exceptions noted below, field precision was acceptable

***SDG K1204226:*** One set of field replicates, Samples SL0302 & SL0303, were submitted.

***SDG K1204325:*** Two sets of field replicates, Samples SL0343 & SL0344 and Samples SL0399 & SL0400, were submitted. The difference for benzo(b)fluoranthene between Samples SL0399 & SL0400 was greater than the control limit.

***SDG K1204377:*** One set of field replicates, Samples SL0426 & SL0427, were submitted.

## Reporting Limits

***SDG K1204226:*** Four samples were analyzed at dilution (2x or 5x) due to high levels of not target background components. Reporting levels were elevated accordingly.

***SDG K1204325:*** Nine samples were analyzed at dilution (5x, 10x, 20x, or 25x) due to high levels of not target background components. Reporting levels were elevated accordingly.

***SDG K1204342:*** Sample SL0347 was analyzed at dilution (2x) due to high levels of not target background components. Reporting levels were elevated accordingly.

***SDG K1204342:*** Sample SL0349 was analyzed at dilution (10x) due to high levels of not target background components. Reporting levels were elevated accordingly.

***SDG K1204452:*** Eleven samples were analyzed at dilution (2x, 5x, 10x, or 25x) due to high levels of not target background components. Reporting levels were elevated accordingly.

***SDG K1204377:*** Ten samples were analyzed at dilution (2x, 5x, 10x, or 20x) due to high levels of not target background components. Reporting levels were elevated accordingly.

***SDG K1204452:*** Eight samples were analyzed at dilution (2x, 5x, 10x, 20x, or 25x) due to high levels of not target background components. Reporting levels were elevated accordingly.

### Reported Results

***SDG K1204226:*** As noted in the case narrative, benzo(b)fluoranthene and benzo(k)fluoranthene could not be resolved in Sample SL0301. The laboratory flagged both results with an "X" to indicate that these analytes were integrated together and reported as benzo(b)fluoranthene. Because of this resolution issue, the benzo(b)fluoranthene result was estimated (J-14) and the benzo(k)fluoranthene result was rejected (R-14).

***SDG K1204452:*** For sample SL0338, the laboratory flagged the acenaphthylene result with an "X" to indicate a potential high bias because of matrix interference. This result was estimated (J-14).

### Calculation Verification

***SDG K1204226:*** Several results were verified by recalculation from the raw data. No calculation or transcription errors were noted.

## OVERALL ASSESSMENT

As determined by this evaluation, the laboratory followed the specified analytical methods. With the exceptions noted above, accuracy was acceptable as demonstrated by the surrogate, LCS/LCSD, and MS/MSD %R values. With the exceptions noted above, precision was also acceptable as demonstrated by the LCS/LCSD, MS/MSD, and field replicate RPD values.

Data were estimated based on calibration %D outliers, surrogate and LCS recovery outliers, MS/MSD RPD outliers, a compound resolution issue, and matrix interference.

Results were rejected based on very low surrogate and MS/MSD recovery values, and a compound resolution issue. Data that has been rejected should not be used for any purpose.

All other data, as qualified, are acceptable for use.

# DATA VALIDATION REPORT
# San Jacinto River Waste Pits
# Southern Impoundment Study II - Groundwater Samples
# PCB Aroclors by Method SW8082A

This report documents the review of analytical data from the analyses of groundwater samples and the associated laboratory quality control (QC) samples. Samples were analyzed by Columbia Analytical Services, Inc. of Kelso, Washington. Refer to the **Sample Index** for a complete list of samples.

| SDG | Number of Samples | Validation Level |
|---|---|---|
| K1204190 | 2 Groundwater | Stage 2B |
| K1204339 | 2 Groundwater &<br>1 Rinsate Blank | Stage 4<br>Stage 2A |

## I. DATA PACKAGE COMPLETENESS

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

## II. EDD TO HARDCOPY VERIFICATION

Ten percent (10%) of the results in the laboratory EDD were verified by comparison to the hardcopy laboratory data package. No errors were noted.

## III. TECHNICAL DATA VALIDATION

The QC requirements that were reviewed are listed in the following table

| | | | |
|---|---|---|---|
| 1 | Sample Receipt, Preservation, and Holding Times | | Laboratory Control Samples (LCS/LCSD) |
| | Initial Calibration (ICAL) | 1 | Field Replicates |
| | Continuing Calibration (CCAL) | | Target Analyte List |
| | Laboratory Blanks | 1 | Reporting Limits |
| 1 | Field Blanks | 2 | Compound Identification |
| 2 | Surrogate Compounds | | Reported Results |
| 1 | Matrix Spikes/Matrix Spike Duplicates (MS/MSD) | 1 | Calculation Verification (Full validation only) |

[1] ***Quality control results are discussed below, but no data were qualified.***
[2] ***Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed below.***

### Sample Receipt, Preservation, and Holding Times

The validation guidance documents state that sample shipping coolers should arrive at the laboratory within the advisory temperature range of 2° to 6°C. The laboratory received sample coolers with temperatures less than the lower limit, the lowest at -0.7°C. These outliers did not impact data quality; no qualifiers were assigned.

## Field Blanks

***SDG K1204339:*** One equipment rinsate, ER Blank, was submitted with this data package. No target analytes were detected in this sample.

## Surrogate Compounds

***SDG K1204190:*** The percent recovery (%R) value for decachlorobiphenyl in Sample SJMW001 was greater than the upper control limit. The associated results for Aroclor 1254 and 1260 were estimated (J-13) in this sample.

## Matrix Spike/Matrix Spike Duplicates

***SDG K1204190:*** The matrix spike/matrix spike duplicate (MS/MSD) analyses were performed using Batch QC samples. No data were qualified due to the %R or RPD outlier values because the parent sample was from a different SDG.

***SDG K1204339:*** The MS/MSD analyses were not performed due to insufficient sample volume. Precision and accuracy were evaluated using the laboratory control sample/laboratory control sample duplicate (LCS/LCSD) analyses.

## Field Replicates

One set of field replicates, SJMW002 & SJMW002DUP1, were submitted. For results greater than 5x the reporting limit (RL), all relative percent difference (RPD) values were less than the control limit of 50%. For results less than 5x the RL, the difference between the sample and replicate was less than 2x the RL. All field precision criteria were met.

## Reporting Limits

***SDGs K1204339 & K1204190:*** The reporting limits for several Aroclors in a several samples were elevated due to matrix interference.

## Compound Identification

The results from the two analytical columns were compared for agreement. In cases where the RPD value between the two columns was greater than 40%, the reported result was "P" flagged by the laboratory. The elevated RPD value may indicate the presence of an interferent resulting in a high bias. When the RPD value was greater than 40% but less than 60% the reported value was estimated (J-3). If the RPD value was greater than 60%, the result was qualified as a tentative identification (NJ-3).

***SDG K1204339***: The results for Aroclor 1260 in Samples SJMW002 and SJMW002DUP1 were estimated (J-3).

### Calculation Verification

***SDG K1204339:*** Calculation verifications were performed for this SDG. No calculation or transcription errors were found.

## IV. OVERALL ASSESSMENT

As determined by this evaluation, the laboratory followed the specified analytical method. With the exceptions noted above, accuracy was acceptable as demonstrated by the surrogate and LCS/LCSD %R values. Precision was also acceptable as demonstrated by the LCS/LCSD, and field replicate RPD values.

Data were estimated due to surrogate recovery and column confirmation outliers.

All data, as qualified, are acceptable for use.

# DATA VALIDATION REPORT
# San Jacinto River Waste Pits
# Southern Impoundment Study II - Sediment Samples
# PCB Congeners by EPA 1668A

This report documents the review of analytical data from the analyses of sediment samples and the associated laboratory quality control (QC) samples. Columbia Analytical Services, Houston, Texas, analyzed the samples. Refer to the **Sample Index** for a complete list of samples.

| SDG | Number of Samples | Validation Level |
|---|---|---|
| E1200477 | 14 Sediment,<br>1 Equipment Blank & 1 Wipe | Stage 4<br>Stage 2A |

## I. DATA PAAGE COMPLETENESS

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

In the data package an initial calibration (ICAL) was noted as being analyzed on 5/21/11, but all the corresponding documentation noted the analysis was 5/21/12. The laboratory was contacted and they confirmed the ICAL analysis date was 5/21/12. No further action was taken beyond noting this discrepancy.

## II. EDD TO HARDCOPY VERIFICATION

Ten percent (10%) of the results in the laboratory EDD were verified by comparison to the hardcopy laboratory data package. No errors were noted.

## III. TECHNICAL DATA VALIDATION

The QC requirements that were reviewed are listed in the following table.

| | | | |
|---|---|---|---|
| | Sample Receipt, Preservation, and Holding Times | **1** | Matrix Spike/Matrix Spike Duplicate (MS/MSD) |
| | GC/MS Instrument Performance Check | | Laboratory Control Samples (LCS/LCSD) |
| | Initial Calibration (ICAL) | **1** | Reference Material (RM) |
| | Calibration Verification (CVER) | **1** | Field Replicates |
| | Isomer Specificity | | Target Analyte List |
| **2** | Laboratory Blanks | | Reported Results |
| **1** | Field Blanks | **2** | Compound Identification |
| | Labeled Compound Recovery | **1** | Calculation Verification (EPA Stage 4 only) |

[1] ***Quality control results are discussed below, but no data were qualified.***
[2] ***Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed below.***

## Laboratory Blanks

To assess the impact of any blank contaminant on the reported sample results, an action level is established at five times (5x) the concentration reported in the blank. If a contaminant is reported in an associated field sample and the concentration is less than the action level, the result is qualified as not detected (U-7). No action is taken if the sample result is greater than the action level, or for non-detected results. The laboratory assigned K-flags to values when a peak was detected but did not meet identification criteria. These values cannot be considered as positive identifications, but are "estimated maximum possible concentrations". When these occurred in the method blank the results were considered as false positives. No action levels were established for these analytes.

Method blanks were analyzed at the appropriate frequency. Various target analytes were detected in the method blanks, however only the following analytes required qualification:

PCB 1, PCB 11, PCB 17, & PCB 52 (1 result each).

## Field Blanks

To evaluate the effect on the sample data, action levels of 5x the blank concentrations were established. If a contaminant is detected in an associated field sample and the concentration is less than the action level, the result is qualified (U-6) at the reported concentration to indicate an elevation of the reporting limit. No action is taken if the sample result is greater than the action level, or for non-detected results.

The field blanks for this project are filter wipe samples and equipment rinsate blanks. Laboratory blanks are used to evaluate all associated field blanks. The contamination in the filter wipe blank was further evaluated based on Sample FB0001 (the equipment rinsate blank). After qualification due to method blank contamination there were no positive results remaining in Sample FB0001. There were no positive results reported in filter wipe Sample FW0001.

## Matrix Spike/Matrix Spike Duplicate

Matrix spike/matrix spike duplicate (MS/MSD) samples were not analyzed. Accuracy and precision were evaluated using the laboratory control sample/laboratory control sample duplicate (LCS/LCSD).

## Field Replicates

One set of field replicates, SL0006 & SL0007, were submitted. For results greater than 5x the reporting limit (RL), all relative percent difference (RPD) values were less than the control limit of 50%. For results less than 5x the RL, the difference between the sample and replicate was less than 2x the RL. The RPD values for PCB002, PCB 209, total monochlorobiphenyls, and total trichlorobiphenyls were greater than the control limit.

## Compound Identification

The laboratory assigned K-flags to results where a peak was detected but did not meet ion ratio quantitation criteria. The reported values cannot be considered as positive identifications for these analytes. These results were considered potential false positives or estimated maximum possible concentrations (EMPC) and were qualified as not detected (U-22) at the reported values. Laboratory blank values flagged "K" were considered as non-detects.

The laboratory reported peak shifting caused by matrix interference and stated that some peaks may not have fully resolved resulting in incomplete integration. As a result these congeners may be biased low. The following results were estimated (J-14) based on this potential low bias.

Sample SD0007: PCB 61/70/74/76, PCB 84, PCB 183, and PCB 187.
Sample SD0009: PCB 207
Sample SD0014: PCB 144

## Calculation Verification

Several results were verified by recalculation from the raw data. No calculation or transcription errors were noted.

# IV. OVERALL ASSESSMENT

As determined by this evaluation, the laboratory followed the specified analytical method. Accuracy was acceptable, as demonstrated by labeled compound and LCS/LCSD %R values. With the exceptions noted above, precision was also acceptable as demonstrated by the LCS/LCSD and field replicate RPD values.

Data were qualified as not detected due to method blank contamination and ion ratio criteria outliers. Data were estimated due to matrix interferences.

All data, as qualified, are acceptable for use.

# DATA VALIDATION REPORT
# San Jacinto River Waste Pits
# Southern Impoundment Study II - Soil Samples
# PCB Congeners by EPA 1668A

This report documents the review of analytical data from the analyses of soil samples and the associated laboratory quality control (QC) samples. Columbia Analytical Services, Houston, Texas, analyzed the samples. Refer to the **Sample Index** for a complete list of samples.

| SDG | Number of Samples | Validation Level |
|---|---|---|
| E1200475 | 17 Soil | Stage 2B |
| E1200476 | 9 Soil | Stage 4 |
| E1200485 | 12 Soil &<br>1 Filter Wipe Blank | Stage 4<br>Stage 2A |
| E1200486 | 7 Soil | Stage 2B |
| E1200487 | 13 Soil | Stage 2B |
| E1200488 | 6 Soil | Stage 2B |
| E1200493 | 5 Soil | Stage 2B |
| E1200505 | 10 Soil,<br>1 Rinsate & 2 Filter Wipe Blanks | Stage 2B<br>Stage 2A |
| E1200507 | 2 Filter Wipe Blanks | Stage 2A |
| E1200508 | 4 Filter Wipe Blanks | Stage 2A |
| E1200572 | 1 Soil | Stage 2B |

## I. DATA PACKAGE COMPLETENESS

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

***SDGs E1200476, E1200485, E1200486, E1200487, E1200488, E1200493, E1200505, & E1200508:*** In these data packages an initial calibration (ICAL) was noted as being analyzed on 5/21/11, but all the corresponding documentation noted the analysis was 5/21/12. The laboratory was contacted and they confirmed the ICAL analysis date was 5/21/12. No further action was taken beyond noting this discrepancy.

## II. EDD TO HARDCOPY VERIFICATION

Ten percent (10%) of the results in the laboratory EDD were verified by comparison to the hardcopy laboratory data package. No errors were noted.

## III. TECHNICAL DATA VALIDATION

The QC requirements that were reviewed are listed in the following table.

| | | | |
|---|---|---|---|
| **1** | Sample Receipt, Preservation, and Holding Times | **1** | Matrix Spike/Matrix Spike Duplicate (MS/MSD) |
| | GC/MS Instrument Performance Check | | Laboratory Control Samples (LCS/LCSD) |
| | Initial Calibration (ICAL) | **1** | Reference Material (RM) |
| | Calibration Verification (CVER) | **1** | Field Replicates |
| | Isomer Specificity | | Target Analyte List |
| **2** | Laboratory Blanks | | Reported Results |
| **1** | Field Blanks | **2** | Compound Identification |
| | Labeled Compound Recovery | **1** | Calculation Verification (EPA Stage 4 only) |

*[1] Quality control results are discussed below, but no data were qualified.*
*[2] Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed below.*

### Sample Receipt, Preservation, and Holding Times

The validation guidance documents state that sample shipping coolers should arrive at the laboratory within the advisory temperature range of 2° to 6°C. The laboratory received several sample coolers with temperatures less than the lower limit, the lowest at 1.0°C. These outliers did not impact data quality; therefore, no data were qualified.

### Laboratory Blanks

To assess the impact of any blank contaminant on the reported sample results, an action level is established at five times (5x) the concentration reported in the blank. If a contaminant is reported in an associated field sample and the concentration is less than the action level, the result is qualified as not detected (U-7). No action is taken if the sample result is greater than the action level, or for non-detected results. The laboratory assigned K-flags to values when a peak was detected but did not meet identification criteria. These values cannot be considered as positive identifications, but are "estimated maximum possible concentrations". When these occurred in the method blank the results were considered as false positives. No action levels were established for these analytes.

Method blanks were analyzed at the appropriate frequency. Various target analytes were detected in the method blanks, however only the following analytes required qualification:

***SDG E1200475:*** PCB 1 (2 results), PCB 16 (2 results), PCB 17 (3 results), PCB 18/30 (4 results), PCB 20/28 (2 results), PCB 21/33 (2 results), PCB 22 (1 result), PCB 44/47/65 (5 results), PCB 52 (4 results), PCB 64 (2 results), PCB 61/70/74/76 (1 result), PCB 95 (1 result).

***SDG E1200476:*** PCB 16 (2 results), PCB 17 (1 result), PCB 18/30 (2 results), PCB 44/47/65 (2 results), PCB 52 (3 results), PCB 95 (1 result).

***SDG E1200485:*** PCB 31 (2 soil results), PCB 54 (2 soil results), PCB 61/70/74/76 (1 soil result), PCB 156/157 (1 soil result).

***SDG E1200486:*** PCB 52 (1 result), PCB 54 (2 results), and PCB 61/70/74/76 (2 results).

***SDG E1200487:*** PCB 31 (1 result), PCB 52 (2 results), and PCB 95 (1 result).

***SDG E1200505:*** PCB 137 (2 soil results), PCB 139/140 (2 soil results), PCB 154 (1 soil result), PCB 175 (2 soil results), and PCB 181 (2 soil results).

***SDG E1200507:*** PCB 52 (1 filter wipe result), PCB 95 (1 filter wipe result), PCB 110/115 (1 filter wipe result).

***SDG E1200508:*** PCB 52 (1 filter wipe result), and PCB 90/101/113 (1 filter wipe result).

## Field Blanks

To evaluate the effect on the sample data, action levels of 5x the blank concentrations were established. If a contaminant is detected in an associated field sample and the concentration is less than the action level, the result is qualified (U-6) at the reported concentration to indicate an elevation of the reporting limit. No action is taken if the sample result is greater than the action level, or for non-detected results.

The field blanks for this project are filter wipe samples. Laboratory blanks are used to evaluate all associated field blanks. The contamination in the filter wipe blanks was further evaluated based on Sample FB0002 (an equipment rinsate blank). After qualifiers were issued based on method and equipment rinsate blanks, several positive results for target analytes remained in several filter wipe samples. All field sample results were greater than action levels; no data were qualified due to filter wipe contamination.

***SDG E1200485:*** One filter wipe blank, FW0002, was submitted with this SDG. After qualification due to method blank contamination and ion ratio outliers, positive results for PCB 44/47/65 and PCB 61/70/74/76 remained in Sample FW0002.

***SDG E1200505:*** An equipment rinsate blank, FB0002, and two filter wipe blanks, FW0003 and FW0004, were submitted with this SDG. After qualification due to method blank contamination and ion ratio outliers, no positive results remained in Sample FB0002. After qualification due to ion ratio outliers, a positive result for PCB 118 remained in Sample FW0003. After qualification due to ion ratio outliers, a positive result for PCB 18/30 remained in Sample FW0004.

***SDG E1200507:*** Two filter wipe blanks, FW0005 and FW0006, were submitted with this SDG. After qualification due to method blank contamination and ion ratio outliers, positive results for PCB 18/30 and PCB 209 remained in Sample FW0005. After qualification due to method blank contamination and ion ratio outliers, positive results for PCB 11, PCB 20/28, PCB 49/69, and PCB 153/168 remained in Sample FW0006.

***SDG E1200508:*** Four filter wipe blanks, FW0007, FW0008, FW0009 and FW0010, were submitted with this SDG. Sample FW0009 was not associated with any field samples and was not reviewed any further. After qualification due to method blank contamination and ion ratio outliers, positive results for PCB 20/28, PCB 31, PCB 61/70/74/76 and PCB 129/138/163 remained in Sample FW0007. After qualification due to method blank contamination and ion

ratio outliers, positive results for PCB 20/28, PCB 44/47/65, PCB 49/69, PCB 66, PCB 118, PCB 153/168, and PCB 180/193 remained in Sample FW0008. After qualification due to method blank contamination and ion ratio outliers, no positive results remained in Sample FW0010.

## Matrix Spike/Matrix Spike Duplicate

Matrix spike/matrix spike duplicate (MS/MSD) samples were not analyzed. Accuracy and precision were evaluated using the laboratory control sample/laboratory control sample duplicate (LCS/LCSD).

## Field Replicates

The following acceptance criteria were used to evaluate precision: the relative percent difference (RPD) value control limit is 50% for results greater than 5x the reporting limit (RL). The absolute difference between the sample and replicate must be less than the RL for results less than 5x the RL. No data were qualified based on field replicate precision outliers. Data users should consider the impact of field precision outliers on the reported results. With the exceptions noted below, field precision was acceptable.

***SDG E1200475:*** One set of field replicates were submitted, SL0302 & SL0303.

***SDG E1200476:*** One set of field replicates were submitted, SL0324 & SL0325.

***SDG E1200486 & E1200487:*** One set of field replicates were submitted, SL0343 & SL0344, one sample was submitted with each SDG.

***SDG E1200488:*** One set of field replicates were submitted, SL0426 & SL0427. The RPD values for 14 analytes or homolog groups were outside control limits.

## Compound Identification

The laboratory assigned K-flags to results where a peak was detected but did not meet ion ratio quantitation criteria. The reported values cannot be considered as positive identifications for these analytes. These results were considered potential false positives or estimated maximum possible concentrations (EMPC) and were qualified as not detected (U-22) at the reported values. Laboratory blank values flagged "K" were considered as non-detects.

***SDG E1200487:*** The results for PCB 15, PCB 129/138/163, PCB 147/149, PCB 153/168, and PCB 180/193 in Sample SL0394 exceeded the calibration range. This sample was diluted (10x) and re-analyzed. Only the dilution results for these analytes were reported in the EDD.

***SDG E1200488:*** The result for PCB 15 in Sample SL0423 exceeded the calibration range. This sample was diluted (10x) and re-analyzed. Only the dilution result for this analyte was reported in the EDD.

The laboratory reported peak shifting caused by matrix interference and stated that some peaks may not have fully resolved resulting in incomplete integration. As a result these congeners may be biased low. The following results were estimated (J-14) based on this potential low bias.

| SDG | Analyte | Sample ID |
|---|---|---|
| E1200475 | PCB 147/149 | SL0301, SL0302, SL0303, SL0305, SL0307, SL0309, SL0312, SL0313 |
| | PCB 203 | SL0306 |
| E1200476 | PCB 56 | SL0323, SL0324 |
| | PCB 147/149 | SL0324, SL0325, SL0326, SL0327 |
| E1200485 | PCB 89 | SL0349 |
| | PCB 147/149 | SL0300, SL0345, SL0353, SL0358, SL0360, SL0364 |
| E1200486 | PCB 56 | SL0321, SL0332, SL0342 |
| | PCB 144 | SL0369 |
| E1200487 | PCB 55 | SL0349 |
| | PCB 56 | SL0349, SL0386, SL0387 |
| | PCB 144 | SL0390, SL0392 |
| | PCB 147/149 | SL0363, SL0386 |
| E1200488 | PCB 144 | SL0423 |
| E1200505 | PCB 89 | SL0336 |
| | PCB 147/149 | SL0333, SL0339, SL0397 |
| E1200572 | PCB 56 | SL0347 |

### Calculation Verification

***SDGs E1200476, & E1200485:*** Several results were verified by recalculation from the raw data. No calculation or transcription errors were noted.

## IV. OVERALL ASSESSMENT

As determined by this evaluation, the laboratory followed the specified analytical method. Accuracy was acceptable, as demonstrated by labeled compound and LCS/LCSD %R values. Precision was also acceptable as demonstrated by the LCS/LCSD and field replicate RPD values.

Data were qualified as not detected due to method blank contamination and ion ratio criteria outliers. Data were estimated due to matrix interferences.

All other data, as qualified, are acceptable for use.

# DATA VALIDATION REPORT
# San Jacinto River Waste Pits
# Southern Impoundment Study II - Groundwater Samples
# Dioxin/Furan Compounds by EPA 1613B

This report documents the review of analytical data from the analyses of groundwater samples and the associated laboratory quality control (QC) samples. Columbia Analytical Services, Houston, Texas, analyzed the samples. Refer to the **Sample Index** for a complete list of samples.

| SDG | Number of Samples | Validation Level |
|---|---|---|
| E1200470 | 2 Groundwater | Stage 4 |
| E1200480 | 2 Groundwater &<br>1 Equipment Blank | Stage 2B<br>Stage 2A |

## I. DATA PACKAGE COMPLETENESS

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

***SDGs E1200470 & E1200480:*** In these data packages the initial calibration (ICAL) and continuing calibration (CCAL) instruments were incorrectly noted on the summary sheets. The laboratory was contacted and they confirmed that associated CCAL were analyzed on the same instruments as their ICAL. A complete list of ICAL and CCAL associations was provided by the laboratory as documentation. No further action was taken beyond noting this discrepancy.

## II. EDD TO HARDCOPY VERIFICATION

Ten percent (10%) of the results in the laboratory EDD were verified by comparison to the hardcopy laboratory data package. No errors were noted.

## III. TECHNICAL DATA VALIDATION

The QC requirements that were reviewed are listed in the following table.

| | | | |
|---|---|---|---|
| | Sample Receipt, Preservation, and Holding Times | 1 | Matrix Spike/Matrix Spike Duplicate (MS/MSD) |
| | GC/MS Instrument Performance Check | | Laboratory Control Samples (LCS/LCSD) |
| | Initial Calibration (ICAL) | 1 | Reference Material (RM) |
| | Calibration Verification (CVER) | 1 | Field Replicates |
| | Isomer Specificity | | Target Analyte List |
| 2 | Laboratory Blanks | | Reported Results |
| 1 | Field Blanks | 2 | Compound Identification |
| | Labeled Compound Recovery | 1 | Calculation Verification (EPA Stage 4 only) |

[1] ***Quality control results are discussed below, but no data were qualified.***
[2] ***Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed below.***

## Laboratory Blanks

To assess the impact of any blank contaminant on the reported sample results, an action level is established at five times (5x) the concentration reported in the blank. If a contaminant is reported in an associated field sample and the concentration is less than the action level, the result is qualified as not detected (U-7). No action is taken if the sample result is greater than the action level, or for non-detected results. The laboratory assigned K-flags to values when a peak was detected but did not meet identification criteria. These values cannot be considered as positive identifications, but are "estimated maximum possible concentrations". When these occurred in the method blank the results were considered as false positives. No action levels were established for these analytes.

Method blanks were analyzed at the appropriate frequency. Various target analytes were detected in the method blanks, however only the following analytes required qualification:

***SDG E1200470:*** 1,2,3,4,6,7,8-HpCDD was qualified as not detected (U-7) in Sample SJMW003.

## Field Blanks

To evaluate the effect on the sample data, action levels of 5x the blank concentrations were established. If a contaminant is detected in an associated field sample and the concentration is less than the action level, the result is qualified (U-6) at the reported concentration to indicate an elevation of the reporting limit. No action is taken if the sample result is greater than the action level, or for non-detected results.

***SDG E1200480:*** One equipment rinsate, ER Blank, was submitted with this data package. There was a positive result for OCDD and a K-flagged result for 1,2,3,4,6,7,8-HpCDD. All associated sample results were either not detected or detected at concentrations greater than the action level. No data were qualified.

## Matrix Spike/Matrix Spike Duplicate

Matrix spike/matrix spike duplicate (MS/MSD) samples were not analyzed. Accuracy and precision were evaluated using the laboratory control sample/laboratory control sample duplicate (LCS/LCSD).

## Reference Material

***SDG E1200480:*** The laboratory extracted and analyzed RTC reference material (SRM-904). EcoChem evaluated the results using ±20% of the reference value as evaluation criteria. Based on this evaluation, the result for 2,3,7,8-TCDD, was acceptable.

## Field Replicates

***SDG E1200480:*** One set of field replicates, SJMW002 & SJMW002DUP1, were submitted. For results greater than 5x the reporting limit (RL), all relative percent difference (RPD) values were less than the control limit of 50%. For results less than 5x the RL, the difference between

the sample and replicate was less than 2x the RL. All field precision criteria were met.

### Compound Identification

The laboratory assigned K-flags to results where a peak was detected but did not meet ion ratio quantitation criteria. The reported values cannot be considered as positive identifications for these analytes. These results were considered potential false positives or estimated maximum possible concentrations (EMPC) and were qualified as not detected (U-22) at the reported values. Laboratory blank values flagged "K" were considered as non-detects.

All positive results for 2,3,7,8-TCDF were confirmed on a DB-225 column as required by the method. The 2,3,7,8-TCDF results from the DB-5 column were qualified do-not-report (DNR-11) in favor of the results from the DB-225 column.

### Calculation Verification

***SDG E1200470:*** Several results were verified by recalculation from the raw data. No calculation or transcription errors were noted.

## IV. OVERALL ASSESSMENT

As determined by this evaluation, the laboratory followed the specified analytical method. Accuracy was acceptable, as demonstrated by labeled compound and LCS/LCSD %R values. Precision was also acceptable as demonstrated by the LCS/LCSD and field replicate RPD values.

Data were qualified as not detected due to method blank contamination and ion ratio criteria outliers.

Data were flagged as do-not-report (DNR) to indicate which result (from multiple reported analyses) should not be used. Data that has been flagged DNR should not be used for any purpose.

All other data, as qualified, are acceptable for use.

# DATA VALIDATION REPORT
# San Jacinto River Waste Pits
# Southern Impoundment Study II - Sediment Samples
# Dioxin/Furan Compounds by EPA 1613B

This report documents the review of analytical data from the analyses of sediment samples and the associated laboratory quality control (QC) samples. Columbia Analytical Services, Houston, Texas, analyzed the samples. Refer to the **Sample Index** for a complete list of samples.

| SDG | Number of Samples | Validation Level |
|---|---|---|
| E1200477 | 14 Sediment,<br>1 Equipment Blank & 1 Wipe | Stage 4<br>Stage 2A |

## I. DATA PACKAGE COMPLETENESS

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

In the data package the initial calibration (ICAL) and continuing calibration (CCAL) instruments were incorrectly noted on the summary sheets. The laboratory was contacted and they confirmed that associated CCAL were analyzed on the same instruments as their ICAL. A complete list of ICAL and CCAL associations was provided by the laboratory as documentation. No further action was taken beyond noting this discrepancy.

## II. EDD TO HARDCOPY VERIFICATION

Ten percent (10%) of the results in the laboratory EDD were verified by comparison to the hardcopy laboratory data package. No errors were noted.

## III. TECHNICAL DATA VALIDATION

The QC requirements that were reviewed are listed in the following table.

| | | | |
|---|---|---|---|
| | Sample Receipt, Preservation, and Holding Times | 1 | Matrix Spike/Matrix Spike Duplicate (MS/MSD) |
| | GC/MS Instrument Performance Check | 2 | Laboratory Control Samples (LCS/LCSD) |
| | Initial Calibration (ICAL) | | Reference Material (RM) |
| | Calibration Verification (CVER) | 1 | Field Replicates |
| | Isomer Specificity | | Target Analyte List |
| 2 | Laboratory Blanks | | Reported Results |
| 1 | Field Blanks | 2 | Compound Identification |
| 2 | Labeled Compound Recovery | 1 | Calculation Verification (EPA Stage 4 only) |

[1] ***Quality control results are discussed below, but no data were qualified.***
[2] ***Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed below.***

## Laboratory Blanks

To assess the impact of any blank contaminant on the reported sample results, an action level is established at five times (5x) the concentration reported in the blank. If a contaminant is reported in an associated field sample and the concentration is less than the action level, the result is qualified as not detected (U-7). No action is taken if the sample result is greater than the action level, or for non-detected results. The laboratory assigned K-flags to values when a peak was detected but did not meet identification criteria. These values cannot be considered as positive identifications, but are "estimated maximum possible concentrations". When these occurred in the method blank the results were considered as false positives. No action levels were established for these analytes.

Method blanks were analyzed at the appropriate frequency. Various target analytes were detected in the method blanks, however only the following analytes required qualification:

1,2,3,4,7,8,9-HpCDF (1 sediment result), OCDD (2 field blank results).

## Field Blanks

To evaluate the effect on the sample data, action levels of 5x the blank concentrations were established. If a contaminant is detected in an associated field sample and the concentration is less than the action level, the result is qualified (U-6) at the reported concentration to indicate an elevation of the reporting limit. No action is taken if the sample result is greater than the action level, or for non-detected results.

The field blanks for this project are filter wipe samples and equipment rinsate blanks. Laboratory blanks are used to evaluate all associated field blanks. The contamination in the filter wipe blank was further evaluated based on Sample FB0001 (the equipment rinsate blank). After qualification due to method blank contamination there were no positive results remaining in Sample FB0001.

Positive results for 1,2,3,4,6,7,8-HpCDD and 1,2,3,7,8,9-HxCDF remained in Sample FW0001 after qualification due to method blanks. All associated results were either not detected for these analytes or detected at concentrations greater than the action levels. No data were qualified.

## Labeled Compound Recovery

Labeled compounds were added to all samples. The labeled compound percent recovery (%R) values were evaluated using the laboratory control limits. If the labeled compound recovery outlier value indicates high bias, positive results for the associated compounds are estimated (J-13); whereas outlier values indicating low bias, positive results and reporting limits for the associated compounds are estimated (J/UJ-13).

The %R values for five labeled compounds (ranging from 144% to 169%) were greater than the upper control limit in Sample SD0014. The associated target analytes were estimated (J-13). The %R value for 37Cl4-2,3,7,8-TCDD was less than the lower control limit in Sample FW0001. This compound is a clean-up standard; no data were qualified for this QC result.

### Matrix Spike/Matrix Spike Duplicate

Matrix spike/matrix spike duplicate (MS/MSD) samples were not analyzed. Accuracy and precision were evaluated using the laboratory control sample/laboratory control sample duplicate (LCS/LCSD).

### Laboratory Control Sample

Three sets of LCS/LCSD were analyzed. In one set the LCS/LCSD %R values for 1,2,3,4,7,8-HxCDF were less than the lower control limit. The results for this analyte were estimated (UJ-10) in Samples FW0001 and FB0001.

### Field Replicates

One set of field replicates, SL0006 & SL0007, was submitted. For results greater than 5x the reporting limit (RL), all relative percent difference (RPD) values were less than the control limit of 50%. For results less than 5x the RL, the difference between the sample and replicate was less than 2x the RL. All field precision criteria were met.

### Compound Identification

The laboratory assigned K-flags to results where a peak was detected but did not meet ion ratio quantitation criteria. The reported values cannot be considered as positive identifications for these analytes. These results were considered potential false positives or estimated maximum possible concentrations (EMPC) and were qualified as not detected (U-22) at the reported values. Laboratory blank values flagged "K" were considered as non-detects.

All positive results for 2,3,7,8-TCDF were confirmed on a DB-225 column as required by the method. The 2,3,7,8-TCDF results from the DB-5 column were qualified do-not-report (DNR-11) in favor of the results from the DB-225 column.

The laboratory reported peak shifting caused by matrix interference and stated that some peaks may not have fully resolved resulting in incomplete integration. As a result these congeners may be biased low. The result for 1,2,3,7,8,9-HxCDD in Sample SD0014 was estimated (J-14) based on this potential low bias.

### Calculation Verification

Several results were verified by recalculation from the raw data. No calculation or transcription errors were noted.

## IV. OVERALL ASSESSMENT

As determined by this evaluation, the laboratory followed the specified analytical method. With the exceptions noted above, accuracy was acceptable as demonstrated by labeled compound and LCS/LCSD %R values. Precision was also acceptable as demonstrated by the LCS/LCSD and field replicate RPD values.

Data were qualified as not detected due to method blank contamination and ion ratio criteria outliers. Data were estimated due to labeled compound and LCS/LCSD recovery outliers, and matrix interferences.

Data were flagged as do-not-report (DNR) to indicate which result (from multiple reported analyses) should not be used. Data that has been flagged DNR should not be used for any purpose.

All other data, as qualified, are acceptable for use.

# DATA VALIDATION REPORT
# San Jacinto River Waste Pits
# Southern Impoundment Study II - Soil Samples
# Dioxin/Furan Compounds by EPA 1613B

This report documents the review of analytical data from the analyses of soil samples and the associated laboratory quality control (QC) samples. Columbia Analytical Services, Houston, Texas, analyzed the samples. Refer to the **Sample Index** for a complete list of samples.

| SDG | Number of Samples | Validation Level |
|---|---|---|
| E1200475 | 20 Soil | Stage 4 |
| E1200476 | 9 Soil | Stage 2B |
| E1200485 | 19 Soil &<br>1 Filter Wipe Blank | Stage 4<br>Stage 2A |
| E1200486 | 20 Soil | Stage 2B |
| E1200487 | 20 Soil | Stage 2B |
| E1200488 | 20 Soil | Stage 2B |
| E1200493 | 18 Soil | Stage 2B |
| E1200505 | 16 Soil &<br>1 Rinsate & 2 Filter Wipe Blanks | Stage 2B<br>Stage 2A |
| E1200507 | 18 Soil &<br>2 Filter Wipe Blanks | Stage 2B<br>Stage 2A |
| E1200508 | 3 Soil &<br>4 Filter Wipe Blanks | Stage 2B<br>Stage 2A |
| E1200572 | 2 Soil | Stage 2B |

## I. DATA PACKAGE COMPLETENESS

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

***SDGs E1200475, E1200476, E1200485, E1200486, E1200487, E1200488, E1200493, E1200505, E1200507, E1200508, & E1200572:*** In these data packages the initial calibration (ICAL) and continuing calibration (CCAL) instruments were incorrectly noted on the summary sheets. The laboratory was contacted and they confirmed that associated CCAL were analyzed on the same instruments as their ICAL. A complete list of ICAL and CCAL associations was provided by the laboratory as documentation. No further action was taken beyond noting this discrepancy.

## II. EDD TO HARDCOPY VERIFICATION

Ten percent (10%) of the results in the laboratory EDD were verified by comparison to the hardcopy laboratory data package. With the exception noted below, no additional errors were noted.

***SDG E1200507:*** In this EDD the 18 soil results were reported as wipes in units of pg when the samples were soils in units of ng/kg. The data package reported the matrix and units correctly. The result values were correct and matched between the EDD and the data package.

## III. TECHNICAL DATA VALIDATION

The QC requirements that were reviewed are listed in the following table.

| | | | |
|---|---|---|---|
| 1 | Sample Receipt, Preservation, and Holding Times | 1 | Matrix Spike/Matrix Spike Duplicate (MS/MSD) |
| | GC/MS Instrument Performance Check | 2 | Laboratory Control Samples (LCS/LCSD) |
| | Initial Calibration (ICAL) | | Reference Material (RM) |
| | Calibration Verification (CVER) | 1 | Field Replicates |
| | Isomer Specificity | | Target Analyte List |
| 2 | Laboratory Blanks | | Reported Results |
| 1 | Field Blanks | 2 | Compound Identification |
| | Labeled Compound Recovery | 1 | Calculation Verification (EPA Stage 4 only) |

[1] ***Quality control results are discussed below, but no data were qualified.***
[2] ***Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed below.***

### Sample Receipt, Preservation, and Holding Times

The validation guidance documents state that sample shipping coolers should arrive at the laboratory within the advisory temperature range of 2° to 6°C. The laboratory received a sample cooler with a temperature less than the lower limit, the lowest at 1.0°C. This outlier did not impact data quality; therefore, no data were qualified.

### Laboratory Blanks

To assess the impact of any blank contaminant on the reported sample results, an action level is established at five times (5x) the concentration reported in the blank. If a contaminant is reported in an associated field sample and the concentration is less than the action level, the result is qualified as not detected (U-7). No action is taken if the sample result is greater than the action level, or for non-detected results. The laboratory assigned K-flags to values when a peak was detected but did not meet identification criteria. These values cannot be considered as positive identifications, but are "estimated maximum possible concentrations". When these occurred in the method blank the results were considered as false positives. No action levels were established for these analytes.

Method blanks were analyzed at the appropriate frequency. Various target analytes were detected in the method blanks, however only the following analytes required qualification:

***SDG E1200475:*** 1,2,3,7,8,9-HxCDF (3 soil results).

***SDG E1200476:*** 1,2,3,4,6,7,8-HpCDD (1 soil result) and 1,2,3,4,7,8,9-HpCDF (1 soil result).

***SDG E1200485:*** OCDD (1 filter wipe result).

***SDG E1200486:*** 2,3,4,6,7,8-HxCDF (1 soil result) and 1,2,3,4,6,7,8-HpCDF (3 soil results).

***SDG E1200487:*** 2,3,4,6,7,8-HxCDF (1 soil result) and 1,2,3,4,7,8-HxCDF (1 soil result).

***SDG E1200488:*** 1,2,3,4,7,8-HxCDF (3 soil results).

***SDG E1200505:*** OCDD (1 filter wipe result and 1 rinsate blank result).

***SDG E1200507:*** OCDD (1 filter wipe result).

***SDG E1200508:*** OCDD (3 filter wipe results), OCDF (1 soil result).

## Field Blanks

To evaluate the effect on the sample data, action levels of 5x the blank concentrations were established. If a contaminant is detected in an associated field sample and the concentration is less than the action level, the result is qualified (U-6) at the reported concentration to indicate an elevation of the reporting limit. No action is taken if the sample result is greater than the action level, or for non-detected results.

The field blanks for this project are filter wipe samples. Laboratory blanks are used to evaluate all associated field blanks. The contamination in the filter wipe blanks was further evaluated based on Sample FB0002 (an equipment rinsate blank). After qualifiers were issued based on method and/or equipment rinsate blanks, several positive results for target analytes remained in several filter wipe samples. All field sample results were greater than action levels; no data were qualified due to filter wipe contamination.

***SDG E1200485:*** One filter wipe blank, FW0002, was submitted with this SDG. After qualification due to method blank contamination and ion ratio outliers, positive results for 1,2,3,4,6,7,8-HpCDD and OCDD remained in Sample FW0002.

***SDG E1200505:*** An equipment rinsate blank, FB0002, and two filter wipe blanks, FW0003 and FW0004, were submitted with this SDG. After qualification due to method blank contamination and ion ratio outliers, no positive results remained in these samples.

***SDG E1200507:*** Two filter wipe blanks, FW0005 and FW0006, were submitted with this SDG. After qualification due to method blank contamination, a positive result for 1,2,3,4,6,7,8-HpCDD remained in Sample FW0005. After qualification due to ion abundance ratio outliers no positive results remained in Sample FW0006.

***SDG E1200508:*** Four filter wipe blanks, FW0007, FW0008, FW0009 and FW0010, were submitted with this SDG. Sample FW0009 was not associated with any field samples and was not reviewed any further. After qualification due to method blank contamination and ion ratio outliers, no positive results remained in Samples FW0007, FW0008, or FW0010. After qualification due to method blank contamination and ion ratio outliers, positive results for 2,3,7,8-TCDD and 2,3,7,8-TCDF remained in Sample FW0010.

## Labeled Compound Recovery

Labeled compounds were added to all samples. The labeled compound percent recovery (%R)

values were evaluated using the laboratory control limits. If the labeled compound recovery outlier value indicates high bias, positive results for the associated compounds are estimated (J-13); whereas outlier values indicating low bias, positive results and reporting limits for the associated compounds are estimated (J/UJ-13).

***SDG E1200488:*** The %R values for 13 labeled compounds (ranging from 15% to 26%) were less than the low control limit in Sample SL0411. The associated target analytes were estimated (J/UJ-13). The %R value for 37Cl4-2,3,7,8-TCDD was less than the lower control limit in this sample. This compound is a clean-up standard; no data were qualified for this QC result.

## Matrix Spike/Matrix Spike Duplicate

Matrix spike/matrix spike duplicate (MS/MSD) samples were not analyzed. Accuracy and precision were evaluated using the laboratory control sample/laboratory control sample duplicate (LCS/LCSD).

## Laboratory Control Sample

***SDGs E1200486, E1200487, & E1200488:*** Two sets of LCS/LCSD were analyzed with each of these SDG. In one set the LCS %R value for 1,2,3,4,7,8-HxCDF was less than the lower control limit. The LCSD %R value was within control limits. No data were qualified for these single outliers.

***SDG E1200485:*** Three sets of LCS/LCSD were analyzed. In one set the LCS/LCSD %R values for 1,2,3,4,7,8-HxCDF were less than the lower control limit. The result for this analyte was estimated (UJ-10) in Sample FW0002.

***SDG E1200505:*** Two sets of LCS/LCSD were analyzed. In one set the LCS/LCSD %R values for 1,2,3,4,7,8-HxCDF were less than the lower control limit. The results for this analyte were estimated (UJ-10) in Samples FB0002, FW0003, and FW0004. In the second LCS/LCSD set the LCS %R value for 1,2,3,4,7,8-HxCDF was less than the lower control limit. The LCSD %R value was within control limits. No data were qualified for this single outlier

***SDG E1200507:*** Four sets of LCS/LCSD were analyzed. In one set the LCS/LCSD %R values for 1,2,3,4,7,8-HxCDF were less than the lower control limit. The results for this analyte were estimated (UJ-10) in Samples FW0005 and FW0006.

***SDG E1200508:*** Two sets of LCS/LCSD were analyzed. In one set the LCS/LCSD %R values for 1,2,3,4,7,8-HxCDF were less than the lower control limit. The results for this analyte were estimated (UJ-10) in Samples FW0007, FW0008, FW0009, and FW0010.

## Field Replicates

The following acceptance criteria were used to evaluate precision: the relative percent difference (RPD) value control limit is 50% for results greater than 5x the reporting limit (RL). The absolute difference between the sample and replicate must be less than the RL for results less than 5x the RL. No data were qualified based on field replicate precision outliers. Data users should consider the impact of field precision outliers on the reported results. With the exceptions

noted below, field precision was acceptable.

***SDG E1200475:*** One set of field replicates were submitted, SL0302 & SL0303.

***SDG E1200476:*** One set of field replicates were submitted, SL0324 & SL0325.

***SDG E1200486:*** One set of field replicates were submitted, SL0377 & SL0378. The RPD values for 15 analytes or homolog groups were outside control limits.

***SDGs E1200486 & E1200487:*** One set of field replicates were submitted, SL0343 & SL0344, one sample was submitted with each SDG.

***SDG E1200487:*** Two sets of field replicates were submitted, SL0388 & SL0389 and SL0399 & SL0400. For the pair SL0388 & SL0389 the RPD values for 11 analytes or homolog groups were outside control limits. For the pair SL0399 & SL0400 the RPD values for 14 analytes or homolog groups were outside control limits.

***SDG E1200488:*** One set of field replicates were submitted, SL0426 & SL0427. The RPD values for 9 analytes or homolog groups were outside control limits.

***SDG E1200493:*** One set of field replicates were submitted, SL0436 & SL0440. The RPD values for OCDD, total HxCDD, and total HpCDD were outside control limits.

## Compound Identification

The laboratory assigned K-flags to results where a peak was detected but did not meet ion ratio quantitation criteria. The reported values cannot be considered as positive identifications for these analytes. These results were considered potential false positives or estimated maximum possible concentrations (EMPC) and were qualified as not detected (U-22) at the reported values. Laboratory blank values flagged "K" were considered as non-detects.

All positive results for 2,3,7,8-TCDF were confirmed on a DB-225 column as required by the method. The 2,3,7,8-TCDF results from the DB-5 column were qualified do-not-report (DNR-11) in favor of the results from the DB-225 column, except for the SDG noted below where only the result from the DB-225 column was reported in the EDD.

In several samples the reported concentrations for 2,3,7,8-TCDD, 2,3,7,8-TCDF, and/or OCDD were greater than the calibrated linear range of the instrument; the laboratory qualified these results with an "E" flag. Affected sample extracts were diluted and re-analyzed; both sets of data were reported and reviewed. The results which were greater than the calibration range were qualified as do-not-report (DNR-20). The results for all other analytes in the dilutions were qualified (DNR-11); the results from the original analyses should be used; except for the SDG noted below where only the dilution result was reported in the EDD. Affected samples are listed below.

***SDG E1200475:*** The result for 2,3,7,8-TCDF in Sample SL0308 exceeded the calibration range. This sample was diluted (10x) and re-analyzed.

***SDG E1200476:*** The result for 2,3,7,8-TCDF in Sample SL0326 exceeded the calibration range. This sample was diluted (10x) and re-analyzed.

***SDG E1200485:*** The results for 2,3,7,8-TCDD in Samples SL0356 and SL0357, OCDD in Samples SL0349, SL0356, and SL0357, and 2,3,7,8-TCDF in Samples SL0350, SL0356, and SL0357 exceeded the calibration range. These samples were diluted (10x) and re-analyzed.

The laboratory reported peak shifting caused by matrix interference and stated that some peaks may not have fully resolved resulting in incomplete integration. As a result the total PeCDF results in Samples SL0353 and SL0355 may be biased low. These results were estimated (J-14) based on this potential low bias.

***SDG E1200486:*** The results for OCDD in Samples SL0342, SL0343, and SL0368 exceeded the calibration range. These samples were diluted (10x) and re-analyzed.

***SDG E1200487:*** The results for OCDD in Samples SL0344, SL0390, SL0391, SL0392, SL0393, and SL0394 exceeded the calibration range. These samples were diluted (10x) and re-analyzed. Only the dilution result for OCDD was reported in the EDD for these samples. Only the 2,3,7,8-TCDF results from the DB-225 column were reported in the EDD.

***SDG E1200488:*** Only the 2,3,7,8-TCDF results from the DB-225 column were reported in the EDD.

***SDG E1200493:*** The result for 2,3,7,8-TCDF in Sample SL0448 exceeded the calibration range. This sample was diluted (5x) and re-analyzed. Only the 2,3,7,8-TCDF results from the DB-225 column were reported in the EDD.

***SDG E1200572:*** The result for OCDD in Sample SL0348 exceeded the calibration range. This sample was diluted (10x) and re-analyzed.

***SDG E1200505:*** The results for 2,3,7,8-TCDD & 2,3,7,8-TCDF in Samples SL0335 and SL0336 and OCDD in Sample SL0336 exceeded the calibration range. Samples SL0335 and SL0336 were diluted (5x & 50x, respectively) and re-analyzed. Only the dilution results for these analytes were reported in the EDD for these samples. Only the 2,3,7,8-TCDF result from the DB-225 column was reported in the EDD, dilution or otherwise.

Results were assigned "P" by the laboratory to indicate the presence of diphenyl ether interference. The following results were estimated (J-14) to indicate a potential high bias. Affected samples are listed below:

| SDG | Sample ID | Analyte |
|---|---|---|
| E1200475 | SL0302 | 1,2,3,4,7,8-HxCDF |
| | SL0303 | 2,3,4,6,7,8-HxCDF |
| | SL0306 | 2,3,4,7,8-PeCDF |
| E1200485 | SL0300 | 1,2,3,7,8-PeCDF |
| | SL0355 | 1,2,3,7,8-PeCDF<br>1,2,3,4,7,8-HxCDF |

| | | |
|---|---|---|
| E1200486 | SL0377 | 1,2,3,7,8-PeCDF<br>1,2,3,4,7,8-HxCDF |
| | SL0378 | 2,3,4,6,7,8-HxCDF |
| | SL0379 | 1,2,3,4,7,8-HxCDF<br>2,3,4,6,7,8-HxCDF |
| | SL0380 | 1,2,3,7,8-PeCDF<br>1,2,3,4,7,8-HxCDF |
| E1200487 | SL0390 | 1,2,3,4,7,8-HxCDF |
| | SL0391 | 1,2,3,7,8-PeCDF<br>2,3,4,7,8-PeCDF |
| | SL0392 | 2,3,4,7,8-PeCDF<br>1,2,3,4,7,8-HxCDF |
| | SL0393 | 1,2,3,7,8-PeCDF<br>2,3,4,7,8-PeCDF<br>1,2,3,4,7,8-HxCDF |
| | SL0394 | 1,2,3,7,8-PeCDF<br>2,3,4,7,8-PeCDF<br>1,2,3,7,8,9-HxCDF |
| | SL0399 | 1,2,3,7,8-PeCDF |
| E1200487 | SL0390 | 1,2,3,4,7,8-HxCDF |
| | SL0391 | 1,2,3,7,8-PeCDF<br>2,3,4,7,8-PeCDF |
| | SL0392 | 2,3,4,7,8-PeCDF<br>1,2,3,4,7,8-HxCDF |
| | SL0393 | 1,2,3,7,8-PeCDF<br>2,3,4,7,8-PeCDF<br>1,2,3,4,7,8-HxCDF |
| | SL0394 | 1,2,3,7,8-PeCDF<br>2,3,4,7,8-PeCDF<br>1,2,3,7,8,9-HxCDF |
| | SL0399 | 1,2,3,7,8-PeCDF |
| E1200493 | SL0444 | 1,2,3,4,7,8-HxCDF |
| E1200505 | SL0337 | 1,2,3,6,7,8-HxCDF |
| | SL0407 | 2,3,4,7,8-PeCDF |
| | SL0417 | 2,3,4,7,8-PeCDF<br>1,2,3,4,7,8-HxCDF |
| E1200508 | SL0471 | 1,2,3,7,8-PeCDF<br>2,3,4,7,8-PeCDF<br>1,2,3,4,7,8-HxCDF<br>2,3,4,6,7,8-HxCDF<br>OCDF |

## Calculation Verification

***SDGs E1200475 & E1200485:*** Several results were verified by recalculation from the raw data. No calculation or transcription errors were noted.

## IV. OVERALL ASSESSMENT

As determined by this evaluation, the laboratory followed the specified analytical method. With the exceptions noted above, accuracy was acceptable as demonstrated by labeled compound and LCS/LCSD %R values. With the exceptions noted above, precision was also acceptable as demonstrated by the LCS/LCSD and field replicate RPD values.

Data were qualified as not detected due to method blank contamination and ion ratio criteria outliers. Data were estimated based on labeled compound and LCS/LCSD recovery outliers, and due to diphenyl ether interference and other matrix interferences.

Data were flagged as do-not-report (DNR) to indicate which result (from multiple reported analyses) should not be used. Data that has been flagged DNR should not be used for any purpose.

All other data, as qualified, are acceptable for use.

# DATA VALIDATION REPORT
# San Jacinto River Waste Pits
# Southern Impoundment Study II - Groundwater Samples
# Metals by Methods SW6010C, SW6020A, and SW7470A

This report documents the review of analytical data from the analyses of groundwater samples and the associated laboratory quality control (QC) samples. Columbia Analytical Services, Kelso, Washington, analyzed the samples. Refer to the Sample Index for a complete list of samples.

| SDG | Number of Samples | Validation Level |
|---|---|---|
| K1204190 | 2 Groundwater | Stage 2B |
| K1204339 | 2 Groundwater<br>1 Field Blank | Stage 3<br>Stage 3 |

## I. DATA PACKAGE COMPLETENESS

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

## II. EDD TO HARDCOPY VERIFICATION

Ten percent (10%) of the results in the laboratory electronic data deliverable (EDD) were verified by comparison to the hardcopy laboratory data package.

***SDG K1204339:*** It was noted during EDD verification that the sample duplicate analysis for mercury was not performed. Duplicate precision for mercury was evaluated using the relative percent difference (RPD) between the matrix spike/matrix spike duplicate (MS/MSD) performed on Sample SJMW002. The MS/MSD QC data are not included in the EDD; no action was taken.

## III. TECHNICAL DATA VALIDATION

The QC requirements that were reviewed are listed below.

| | | | |
|---|---|---|---|
| 1 | Sample Receipt, Preservation, and Holding Times | | Matrix Spike Samples |
| | Initial Calibration | | Laboratory Duplicates |
| | Continuing Calibration Verification | 1 | Field Replicates |
| | ICP-MS Tune | 2 | Interference Check Samples |
| | CRDL Standards | 2 | ICP Serial Dilutions |
| 2 | Laboratory Blanks | | ICP-MS Internal Standards |
| 1 | Field Blanks | | Reporting Limits (MDL and MRL) |
| | Laboratory Control Samples (LCS/LCSD) | 2 | Reported Results |
| | Reference Materials | 1 | Calculation Verification (Stage 3 only) |

[1] ***Quality control results are discussed below, but no data were qualified.***
[2] ***Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed below.***

### Sample Receipt, Preservation, and Holding Times

As stated in validation guidance documents, sample shipping coolers should arrive at the laboratory within the advisory temperature range of 2° to 6°C. The laboratory received two sample coolers with temperatures less than the lower limit, the lowest at 0.9°C. These outliers did not impact data quality; no data were qualified.

### Laboratory Blanks

To assess the impact of any blank contaminant on the reported sample results, an action level is established at five times (5x) the concentration reported in the blank. If a contaminant is reported in an associated field sample and the concentration is less than the action level, the result is qualified as not detected (U-7). No action is taken if the sample result is greater than the action level, or for non-detected results.

In addition, some analytes were found at levels less than the MDL in some instrument blanks. For negative blanks, action levels of 5x the absolute value of the blank concentrations were established. Results less than the action levels in the associated samples were estimated (J/UJ-7) to indicate a potential low bias.

Laboratory blanks were analyzed at the appropriate frequency. Contaminant levels, associated samples, and action levels are documented in the data validation worksheets. Various target analytes were detected in the method blanks, however only the following analytes required qualification in one or more samples:

***SDG K1204190:*** copper, thallium, mercury – not detected (U-7), chromium – low bias (J/UJ-7)

***SDG K1204339:*** cobalt – not detected (U-7), aluminum – low bias (J/UJ-7)

## Field Blanks

To evaluate the effect on the sample data, action levels of 5x the blank concentrations were established. If a contaminant is detected in an associated field sample and the concentration is less than the action level, the result is qualified (U-6) at the reported concentration to indicate an elevation of the reporting limit. No action is taken if the sample result is greater than the action level, or for non-detected results.

***SDG K1204339:*** One equipment rinsate, ER Blank, was submitted with this data package. After qualification due to method blank contamination, positive results for aluminum and magnesium remained in ER Blank (Total) and no positive results remained in ER Blank (Dissolved). All associated sample results were detected at concentrations greater than the action level. No data were qualified.

## Field Replicates

***SDG K1204339:*** One set of field replicates, SJMW002 & SJMW002DUP1, were submitted. For results greater than 5x the reporting limit (RL), all relative percent difference (RPD) values were less than the control limit of 50%. For results less than 5x the RL, the difference between the sample and replicate was less than 2x the RL. All field precision criteria were met.

## Interference Check Samples

Interference check standard samples (ICSA/ICSAB) were analyzed as required by the method. To assess the potential impact of interferences on the reported sample results, the results for the ICSA were carefully evaluated. For cases where the concentration of unspiked analytes in the ICSA was greater than +/- the QL, an action level is established at 2x the absolute value of the ICSA result. The ICSAB control limit is 80% – 120% for all spiked elements.

***SDG K1204190:*** ICSA: cobalt – high bias (J-17); ICSAB: magnesium – low bias (J-17)

***SDG K1204339:*** ICSAB: magnesium – low bias (J-17)

## ICP Serial Dilution

Serial dilutions were analyzed at the proper frequency of one per 20 samples or one per batch; whichever was more frequent. The percent difference (%D) values were less than the control limit of 10% for results greater than 50 times the MDL, except as noted below. The sample used for the serial dilution analysis and the analyte with a %D outlier is noted below:

***SDG K204190:*** SJMW003: aluminum – high bias (J-16)

## Reported Results

The following acceptance criteria were used to evaluate results for analytes that were greater in the dissolved sample fraction than in the total sample fraction: the RPD control limit is 35% for results greater than 5x the reporting limit (RL). For results less than 5x the RL, the absolute

difference between the sample and replicate must be less than the RL. Only the following analytes required qualification in both the total and dissolved fractions:

***SDG K1204190:*** SJMW003: aluminum, barium (J-14); SJMW001: barium (J-14)

### Calculation Verification

***SDG K1204339:*** Several results were verified by recalculation from the raw data. No calculation or transcription errors were noted.

## IV. OVERALL ASSESSMENT

As determined by this evaluation, the laboratory followed the specified analytical methods. Accuracy was acceptable as demonstrated by the laboratory control sample and matrix spike percent recovery values. Precision was also acceptable as demonstrated by the laboratory duplicate, and field replicate RPD values.

Data were estimated and/or qualified as not detected based on laboratory blank outliers. Data were estimated based on ICSA/ICSAB outliers, where dissolved results were significantly greater than total results, and serial dilution %D outliers.

All data, as qualified, are acceptable for use.

# DATA VALIDATION REPORT
# San Jacinto River Waste Pits
# Southern Impoundment Study II - Sediment Samples
# Metals by Methods SW6010C, SW6020A, SW7470A, and SW7471B

This report documents the review of analytical data from the analyses of sediment samples and the associated laboratory quality control (QC) samples. Columbia Analytical Services, Kelso, Washington, analyzed the samples. Refer to the Sample Index for a complete list of samples.

| SDG | Number of Samples | Validation Level |
|---|---|---|
| K1204265 | 14 Sediment<br>2 Filter Wipe | Stage 3<br>Stage 2A |

## I. DATA PACKAGE COMPLETENESS

With the exception noted below, the laboratory submitted all required deliverables. The laboratory followed adequate corrective action processes and all anomalies were discussed in the case narrative**.**

One page of mercury raw data was not included in the laboratory report. The laboratory was contacted and provided the missing documentation.

## I. EDD TO HARDCOPY VERIFICATION

Ten percent (10%) of the results in the laboratory EDD were verified by comparison to the hardcopy laboratory data package.

## III. TECHNICAL DATA VALIDATION

The QC requirements that were reviewed are listed below.

| | | | |
|---|---|---|---|
| 1 | Sample Receipt, Preservation, and Holding Times | | Matrix Spike Samples |
| | Initial Calibration | | Laboratory Duplicates |
| | Continuing Calibration Verification | 1 | Field Replicates |
| | ICP-MS Tune | | Interference Check Samples |
| | CRDL Standards | 2 | Serial Dilutions |
| 2 | Laboratory Blanks | | ICP-MS Internal Standards |
| 2 | Field Blanks | | Reporting Limits (MDL and MRL) |
| | Laboratory Control Samples (LCS) | | Reported Results |
| | Reference Materials | 1 | Calculation Verification (Stage 3 only) |

***[1] Quality control results are discussed below, but no data were qualified.***
***[2] Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed below.***

## Sample Receipt, Preservation, and Holding Times

As stated in validation guidance documents, sample shipping coolers should arrive at the laboratory within the advisory temperature range of 2° to 6°C. The laboratory received one sample cooler with a temperature less than the lower limit, at 1.5°C. This outlier did not impact data quality; no data were qualified.

## Laboratory Blanks

To assess the impact of any blank contaminant on the reported sample results, an action level is established at five times (5x) the concentration reported in the blank. If a contaminant is reported in an associated field sample and the concentration is less than the action level, the result is qualified as not detected (U-7). No action is taken if the sample result is greater than the action level, or for non-detected results.

In addition, some analytes were found at levels less than the MDL in some instrument blanks. For negative blanks, action levels of 5x the absolute value of the blank concentrations were established. Results less than the action levels in the associated samples were estimated (J/UJ-7) to indicate a potential low bias.

Laboratory blanks were analyzed at the appropriate frequency. Contaminant levels, associated samples, and action levels are documented in the data validation worksheets. Various target analytes were detected in the laboratory blanks, however only the following analytes required qualification in one or more samples:

Field Blanks: Cadmium, chromium, nickel - not detected (U-7),

Sediments: Thallium, mercury - low bias (J/UJ-7)

## Field Blanks

To evaluate the effect on the sample data, action levels of 5x the blank concentrations were established. If a contaminant is detected in an associated field sample and the concentration is less than the action level, the result is qualified (U-6) at the reported concentration to indicate an elevation of the reporting limit. No action is taken if the sample result is greater than the action level, or for non-detected results.

The field blanks for this project are filter wipe samples and equipment rinsate blanks. Laboratory blanks are used to evaluate all associated field blanks. The contamination in the filter wipe blank was further evaluated based on Sample FB0001 (the equipment rinsate blank). One filter wipe blank sample, FW0001, was submitted with this SDG. Based on contamination reported in the Sample FB0001, aluminum, arsenic, copper, magnesium, manganese and zinc were qualified as not detected (U-6) in this sample.

After qualifiers were issued based on laboratory blanks and the equipment rinsate blank, a positive result for chromium remained in filter wipe Sample FW0001. All field sample results were greater than action levels; no data were qualified due to filter wipe contamination.

## Field Replicates

One set of field replicates, SL0006 & SL0007, was submitted. For results greater than 5x the reporting limit (RL), all relative percent difference (RPD) values were less than the control limit of 50%. For results less than 5x the RL, the difference between the sample and replicate was less than 2x the RL. The RPD or difference values for barium, cadmium, and chromium were greater than the control limits.

## ICP Serial Dilution

Serial dilutions were analyzed at the proper frequency of one per 20 samples or one per batch; whichever was more frequent. The percent difference (%D) values were less than the control limit of 10% for results greater than 50 times the MDL, except as noted below. For %D outliers, all associated results were estimated (J-16). The sample used for the serial dilution analysis and the analytes with %D outliers are noted below:

SD0001 (sediment): cobalt, nickel

## Calculation Verification

Calculation verifications were performed for this SDG. No calculation or transcription errors were found.

# IV. OVERALL ASSESSMENT

As determined by this evaluation, the laboratory followed the specified analytical methods. Accuracy was acceptable as demonstrated by the laboratory control sample and matrix spike recovery values. Precision was acceptable as demonstrated by the laboratory duplicate, and field replicate RPD values.

Data were estimated and/or qualified as not detected based on laboratory and field blank outliers. Data were estimated based on serial dilution %D outliers.

All data, as qualified, are acceptable for use.

# DATA VALIDATION REPORT
# San Jacinto River Waste Pits
# Southern Impoundment Study II - Soil Samples
# Metals by Methods SW6010C, SW6020A, and SW7471B

This report documents the review of analytical data from the analyses of soil samples and the associated laboratory quality control (QC) samples. Columbia Analytical Services, Kelso, Washington, analyzed the samples. Refer to the Sample Index for a complete list of samples.

| SDG | Number of Samples | Validation Level |
|---|---|---|
| K1204226 | 16 Soil | Stage 3 |
| K1204325 | 14 Soil | Stage 2B |
| K1204342 | 3 Soil | Stage 2B |
| K1204356 | 15 Soil<br>1 Filter Wipe | Stage 2B<br>Stage 2A |
| K1204377 | 11 Soil | Stage 2B |
| K1204449 | 1 Soil<br>4 Filter Wipes | Stage 2B<br>Stage 2A |
| K1204452 | 10 Soil<br>5 Filter Wipes | Stage 2B<br>Stage 2A |

## I. DATA PACKAGE COMPLETENESS

With the exceptions noted below, the laboratory submitted all required deliverables. The laboratory followed adequate corrective action processes and all anomalies were discussed in the case narrative**.**

***SDG K1204226:*** The closing CCV7 and CCB7 were not included in the laboratory report summary forms. The laboratory was contacted and provided the missing documentation.

***SDG K1204325:*** The closing CCV12 and CCB12 were not included in the laboratory report summary forms. The laboratory was contacted and provided the missing documentation.

***SDG K1204356:*** The serial dilution summary form for Sample SL0332 contained an error. The laboratory was contacted and resubmitted the corrected form.

***SDG K1204449:*** The solid LCS for mercury analysis on 5/20/12 was not included in the laboratory report summary forms. The laboratory was contacted and resubmitted the corrected form.

The results for the laboratory duplicate Sample SL0312 were flagged do-not-report (DNR-11) as the sample was cancelled for analysis.

## II. EDD TO HARDCOPY VERIFICATION

Ten percent (10%) of the results in the laboratory EDD were verified by comparison to the hardcopy laboratory data package.

## III. TECHNICAL DATA VALIDATION

The QC requirements that were reviewed are listed below.

| | | | |
|---|---|---|---|
| **1** | Sample Receipt, Preservation, and Holding Times | **2** | Matrix Spike Samples |
| | Initial Calibration | **2** | Laboratory Duplicates |
| | Continuing Calibration Verification | **1** | Field Replicates |
| | ICP-MS Tune | **2** | Interference Check Samples |
| | CRDL Standards | **2** | Serial Dilutions |
| **2** | Laboratory Blanks | | ICP-MS Internal Standards |
| **2** | Field Blanks | | Reporting Limits (MDL and MRL) |
| | Laboratory Control Samples (LCS) | | Reported Results |
| | Reference Materials | **1** | Calculation Verification (Stage 3 only) |

[1] ***Quality control results are discussed below, but no data were qualified.***
[2] ***Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed below.***

### Sample Receipt, Preservation, and Holding Times

As stated in validation guidance documents, sample shipping coolers should arrive at the laboratory within the advisory temperature range of 2° to 6°C. The laboratory received several sample coolers with temperatures less than the lower control limit, the lowest being -0.6°C. This outlier did not impact data quality; no data were qualified.

***SDG K1204356:*** Sample SL0368 was not listed for metals analysis on the chain of custody (COC) record and was reported by the laboratory.

### Laboratory Blanks

To assess the impact of any blank contaminant on the reported sample results, an action level is established at five times (5x) the concentration reported in the blank. If a contaminant is reported in an associated field sample and the concentration is less than the action level, the result is qualified as not detected (U-7). No action is taken if the sample result is greater than the action level, or for non-detected results.

In addition, some analytes were found at levels less than the MDL in some instrument blanks. For negative blanks, action levels of 5x the absolute value of the blank concentrations were established. Results less than the action levels in the associated samples were estimated (J/UJ-7) to indicate a potential low bias.

Laboratory blanks were analyzed at the appropriate frequency. Contaminant levels, associated samples, and action levels are documented in the data validation worksheets. Various target

analytes were detected in the laboratory blanks, however only the following analytes required qualification in one or more samples:

***SDGs K1204226 & K1204342:*** Soil: cadmium, not detected (U-7)

***SDG K1204325:*** Soil: cadmium, not detected (U-7); thallium, low bias (UJ-7)

***SDG K1204356:*** Filter wipe: cadmium, not detected (U-7)

Soil: cadmium, not detected (U-7); mercury, low bias (J/UJ-7); thallium, low bias (J/UJ-7)

***SDG K1204377:*** Soil: thallium, low bias (UJ-7)

***SDG K1204449:*** Filter wipe: cadmium, nickel, not detected (U-7)

Soil: thallium, low bias (UJ-7)

***SDG K1204452:*** Filter wipe: cadmium, chromium, nickel, not detected (U-7)

Soil: thallium, low bias (J/UJ-7)

## Field Blanks

To evaluate the effect on the sample data, action levels of 5x the blank concentrations were established. If a contaminant is detected in an associated field sample and the concentration is less than the action level, the result is qualified (U-6) at the reported concentration to indicate an elevation of the reporting limit. No action is taken if the sample result is greater than the action level, or for non-detected results.

The field blanks for this project are filter wipe samples. Laboratory blanks are used to evaluate all associated field blanks. The contamination in the filter wipe blanks was further evaluated based on Sample FB0002 (an equipment rinsate blank). After qualifiers were issued based on method and/or equipment rinsate blanks, several positive results for target analytes remained in several filter wipe samples. All field sample results were greater than action levels; no data were qualified due to filter wipe contamination.

***SDG K1204356:*** One filter wipe blank, FW0002, was submitted with this SDG. After qualification due to rinsate blank contamination positive results remained for aluminum, barium, chromium, and nickel in this sample.

***SDG K1204449:*** Four filter wipe blanks, FW0007, FW0008, FW0009, and FW0010 were submitted with this SDG. Sample FW0009 was not associated with any field samples and was not reviewed any further. After qualification due to method and rinsate blank contamination positive results remained for aluminum, barium, chromium, manganese, and nickel in Samples FW0007, FW0008, and FW0010.

***SDG K1204452:*** An equipment rinsate blank, FB0002, and four filter wipe blanks, FW0003, FW0004, FW0005, and FW0006, were submitted with this SDG.

After qualification due to method blank contamination positive results remained for aluminum, arsenic, copper, magnesium, manganese, and zinc in Sample FB0002. Filter wipe results for these analytes at less than the action level were qualified as not detected (U-6); aluminum (1 result), arsenic, copper, magnesium, zinc (10 results each), manganese (2 results).

After qualification due to method and rinsate blank contamination positive results remained for aluminum, barium, chromium, and manganese in Samples FW0003, FW0004, and FW0005. After qualification due to method and rinsate blank contamination positive results remained for aluminum, barium, chromium, manganese, and nickel in Sample FW0006.

## Matrix Spikes

Matrix spike samples (MS) were analyzed at the proper frequency of one per 20 samples or one per batch for soil samples. If the MS percent recovery (%R) value indicates a potential low bias, associated results are estimated (J/UJ-8). If the %R value indicates a potential high bias, only the associated positive results are estimated (J-8). For %R values less than 30%, indicating an extreme low bias, the results for the post digestion spike were also evaluated. If the post spike %R values were acceptable, then associated results were estimated (J/UJ-8). If the post spike %R value was also outside of the control limits of 75%-125%, then positive results were estimated (J-8) and non-detects were rejected (R-8).

The following analytes were qualified in one or more samples based on %R value outliers.

***SDG K1104226:*** SL0301: barium, chromium (high bias)

***SDG K1104342:*** SL0345: magnesium, manganese (high bias)

***SDG K1204356:*** SL0332: arsenic, barium (low bias); chromium (high bias)

***SDG K1104377:*** Batch QC SL0345: magnesium, manganese (high bias)

***SDGs K1104449 & K1204452:*** Batch QC SL0312: barium, chromium (low bias); lead, magnesium (high bias)

## Laboratory Duplicates

Laboratory duplicates were analyzed at the proper frequency of one per 20 samples or one per batch for the soil samples. The following acceptance criteria were used to evaluate precision. The RPD control limit is 20% for all analytes except mercury, which is 30%. The RPD control limits apply to results greater than 5x the reporting limit (RL). The absolute difference between the sample and replicate must be less than 2x the RL for results less than 5x the RL.

For RPD or difference values greater than the control limits, associated positive results and non-detects were estimated (J/UJ-9). The following outliers were noted:

***SDG K1104226:*** SL0301: chromium (125%)

***SDG K1104325:*** SL0342: arsenic (20.4%)

***SDG K1104342:*** SL0345: aluminum (29%), magnesium (25%)

***SDG K1204356:*** SL0332: barium (99%), chromium (40%) and nickel (28%)

***SDG K1104377:*** Batch QC SL0345: aluminum (29%), magnesium (25%)

***SDGs K1104449 & K1104452:*** Batch QC SL0312: barium (53%), chromium (98%), manganese (71%) and vanadium (68%)

## Field Replicates

The following acceptance criteria were used to evaluate precision: the RPD control limit is 50% for results greater than 5x the RL. For results less than 5x the RL, the absolute difference between the sample and replicate must be less than 2x the RL. No data were qualified based on field replicate precision outliers. Data users should consider the impact of field precision outliers on the reported results.

***SDG K1204226:*** One set of field replicates was submitted: SL0302 & SL0303: barium (102%)

***SDG K1204325:*** Two sets of field replicates were submitted: SL0343 & SL0344: All field precision criteria were met; SL0399 & SL0400: manganese (125%)

***SDG K1204377:*** One set of field replicates was submitted: SL0302 & SL0303: arsenic (64%), cadmium (70%), copper (64%), lead (99%), mercury (98%), zinc (94%)

## Interference Check Samples

Interference check standard samples (ICSA/ICSAB) were analyzed as required by the method. To assess the potential impact of interferences on the reported sample results, the results for the ICSA were carefully evaluated. For cases where the concentration of an unspiked analytes in the ICSA was greater than +/- the QL, an action level is established at 2x the absolute value of the ICSA result. The ICSAB control limit is 80% – 120% for all spiked elements.

***SDGs K1204226, K1204325, K1204342, K1204356, K1204377, K1204449 & K1204452:*** ICSAB: magnesium – low bias (J-17)

## ICP Serial Dilution

Serial dilutions were analyzed at the proper frequency of one per 20 samples or one per batch; whichever was more frequent. The percent difference (%D) values were less than the control limit of 10% for results greater than 50 times the MDL, except as noted below. For %D outliers, all associated results were estimated (J-16). The sample used for the serial dilution analysis and the analytes with %D outliers are noted below:

***SDG K1204342:*** SL0345: cadmium, cobalt

***SDG K1204377:*** Batch QC SL0345: chromium, cobalt

### Calculation Verification

***SDG K1204226:*** Several results were verified by recalculation from the raw data. No calculation or transcription errors were noted.

## IV. OVERALL ASSESSMENT

As determined by this evaluation, the laboratory followed the specified analytical methods. Accuracy was acceptable as demonstrated by the laboratory control sample and matrix spike recovery values. Precision was acceptable as demonstrated by the laboratory duplicate, and field replicate RPD values.

Data were estimated and/or qualified as not detected based on laboratory blank and field blank outliers. Data were estimated based on MS and ICSAB %R outliers, laboratory duplicate RPD outliers, and serial dilution %D outliers.

Data were flagged as do-not-report (DNR) to indicate results (from a cancelled analysis) should not be used. Data that has been flagged DNR should not be used for any purpose.

All other data, as qualified, are acceptable for use.

# DATA VALIDATION REPORT
# San Jacinto River Waste Pits
# Southern Impoundment Study II - Groundwater Samples
# Conventional Parameters

This report documents the review of analytical data from the analyses of groundwater samples and the associated laboratory quality control (QC) samples. Columbia Analytical Services, Kelso, Washington, analyzed the samples. Refer to the Sample Index for a complete list of samples.

| SDG | Number of Samples | Validation Level |
|---|---|---|
| K1204190 | 2 Groundwater | Stage 2B |
| K1204339 | 2 Groundwater<br>1 Rinsate Blank | Stage 3<br>Stage 2A |

The analytical tests that were performed are summarized below.

| Parameter | Method |
|---|---|
| Total Suspended Solids (TSS) | SM2540D |
| Total Dissolved Solids (TDS) | SM2540C |

## I. DATA PACKAGE COMPLETENESS

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

## II. EDD TO HARDCOPY VERIFICATION

Ten percent (10%) of the results in the laboratory EDD were verified by comparison to the hardcopy laboratory data package. No errors were noted.

## III. TECHNICAL DATA VALIDATION

The QC requirements that were reviewed are listed in the following table.

| | | | |
|---|---|---|---|
| 1 | Sample Receipt, Preservation, and Holding Times | 1 | Field Replicates |
| | Laboratory Blanks | | Reported Results |
| 1 | Field Blanks | | Reporting Limits |
| | Laboratory Control Samples (LCS) | 1 | Calculation Verification |
| | Laboratory Duplicates | | |

[1] ***Quality control results are discussed below, but no data were qualified.***
[2] ***Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed below.***

## Sample Receipt, Preservation, and Holding Times

As stated in validation guidance documents, sample shipping coolers should arrive at the laboratory within the advisory temperature range of 2° to 6°C. The laboratory received two sample coolers with temperatures less than the lower limit, the lowest at 0.9°C. These outliers did not impact data quality; no data were qualified.

## Field Blanks

To evaluate the effect on the sample data, action levels of 5x the blank concentrations were established. If a contaminant is detected in an associated field sample and the concentration is less than the action level, the result is qualified (U-6) at the reported concentration to indicate an elevation of the reporting limit. No action is taken if the sample result is greater than the action level, or for non-detected results.

***SDG K1204339:*** One equipment rinsate, ER Blank, was submitted with this data package. A positive result for total dissolved solids was reported. All associated sample results were detected at concentrations greater than the action level. No data were qualified.

## Field Replicates

***SDG K1204339:*** One set of field replicates, SJMW002 & SJMW002DUP1, were submitted. For results greater than 5x the reporting limit (RL), all relative percent difference (RPD) values were less than the control limit of 50%. For results less than 5x the RL, the difference between the sample and replicate was less than 2x the RL. All field precision criteria were met.

## Calculation Verification

Several results were verified by recalculation from the raw data. No calculation or transcription errors were noted.

# IV. OVERALL ASSESSMENT

As determined by this evaluation, the laboratory followed the specified analytical methods. Accuracy was acceptable as demonstrated by the laboratory control sample percent recovery values. Precision was acceptable as demonstrated by the laboratory duplicate, and field replicate RPD values.

No data were qualified for any reason.

All data, as reported, are acceptable for use.

# DATA VALIDATION REPORT
# San Jacinto River Waste Pits
# Southern Impoundment Study II – Sediment Samples
# Conventional Parameters

This report documents the review of analytical data from the analyses of sediment samples and the associated laboratory quality control (QC) samples. Columbia Analytical Services, Kelso, Washington, analyzed the samples. Refer to the Sample Index for a complete list of samples.

| SDG | Number of Samples | Validation Level |
|---|---|---|
| K1204265 | 14 Sediment | Stage 3 |

The analytical tests that were performed are summarized below.

| Parameter | Method |
|---|---|
| Grain Size | PSEP |
| Total Organic Carbon | ASTM D4129-05M |
| | Walkley-Black |
| Total Solids | 160.3M |

## I. DATA PACKAGE COMPLETENESS

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

## II. EDD TO HARDCOPY VERIFICATION

Ten percent (10%) of the results in the laboratory EDD were verified by comparison to the hardcopy laboratory data package. No errors were noted.

## III. TECHNICAL DATA VALIDATION

The QC requirements that were reviewed are listed in the following table.

| | | | |
|---|---|---|---|
| 1 | Sample Receipt, Preservation, and Holding Times | 1 | Field Replicates |
| | Laboratory Blanks | | Reported Results |
| | Laboratory Control Samples (LCS) | | Reporting Limits |
| | Laboratory Replicates | 1 | Calculation Verification |

[1] ***Quality control results are discussed below, but no data were qualified.***
[2] ***Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed below.***

### Sample Receipt, Preservation, and Holding Times

As stated in validation guidance documents, sample shipping coolers should arrive at the laboratory within the advisory temperature range of 2° to 6°C. The laboratory received one sample cooler with a temperature less than the lower limit at 1.5°C. This outlier did not impact data quality; no data were qualified.

### Field Replicates

One set of field replicates, SL0006 & SL0007, were submitted. For results greater than 5x the reporting limit (RL), all relative percent difference (RPD) values were less than the control limit of 50%. For results less than 5x the RL, the difference between the sample and replicate was less than 2x the RL. The RPD values for both total organic carbon (TOC) methods and gravel were greater than the control limit.

### Calculation Verification

Several results were verified by recalculation from the raw data. No calculation or transcription errors were noted.

## IV. OVERALL ASSESSMENT

As determined by this evaluation, the laboratory followed the specified analytical methods. Accuracy was acceptable as demonstrated by the laboratory control sample percent recovery values. With the exception noted above, precision was acceptable as demonstrated by the laboratory duplicate, and field replicate RPD values.

No data were qualified for any reason.

All data, as reported, are acceptable for use.

# DATA VALIDATION REPORT
# San Jacinto River Waste Pits
# Southern Impoundment Study II – Soil Samples
# Conventional Parameters

This report documents the review of analytical data from the analyses of soil samples and the associated laboratory quality control (QC) samples. Columbia Analytical Services, Kelso, Washington, analyzed the samples. Refer to the Sample Index for a complete list of samples.

| SDG | Number of Samples | Validation Level |
|---|---|---|
| K1204226 | 29 Soil | Stage 3 |
| K1204325 | 22 Soil | Stage 2B |
| K1204342 | 6 Soil | Stage 2B |
| K1204356 | 32 Soil | Stage 2B |
| K1204377 | 37 Soil | Stage 2B |
| K1204449 | 11 Soil | Stage 2B |
| K1204452 | 28 Soil | Stage 2B |

The analytical tests that were performed are summarized below.

| Parameter | Method |
|---|---|
| Grain Size | PSEP |
| Total Organic Carbon | ASTM D4129-05M |
| | Walkley-Black |
| Total Solids | 160.3M |

## I. DATA PACKAGE COMPLETENESS

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

## II. EDD TO HARDCOPY VERIFICATION

Ten percent (10%) of the results in the laboratory EDD were verified by comparison to the hardcopy laboratory data package. No errors were noted.

## III. TECHNICAL DATA VALIDATION

The QC requirements that were reviewed are listed in the following table.

| | | | |
|---|---|---|---|
| 1 | Sample Receipt, Preservation, and Holding Times | 1 | Field Replicates |
| | Laboratory Blanks | | Reported Results |
| | Laboratory Control Samples (LCS) | | Reporting Limits |
| | Matrix Spikes | 1 | Calculation Verification |
| 2 | Laboratory Replicates | | |

[1] ***Quality control results are discussed below, but no data were qualified.***
[2] ***Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed below.***

### Sample Receipt, Preservation, and Holding Times

As stated in validation guidance documents, sample shipping coolers should arrive at the laboratory within the advisory temperature range of 2° to 6°C. The laboratory received several sample coolers with temperatures less than the lower control limit, the lowest being -0.6°C. This outlier did not impact data quality; no data were qualified.

### Laboratory Replicates

Laboratory replicate analyses were performed at the frequency of one per batch. The relative percent difference (RPD) or percent relative standard deviation (%RSD) values were within the control limit of 20%, with the exceptions noted below. The laboratory performed triplicate analyses for grain size. For grain size a %RSD limit of 20% was used for all fractions with results of at least 5%. The laboratory performed quadruplicate analyses for total organic carbon (TOC). All associated samples, including duplicate, triplicate, and quadruplicate results (parent sample only for grain size) were estimated (J/UJ-9) for RPD or %RSD value outliers. The following outliers were noted:

***SDG K1204226:*** SL0331: fine sand (26%) – (J-9)

***SDG K1204325:*** SL0403: TOC (23%) – (J-9)

***SDG K1204356:*** SL0354 (25%), SL0364 (22%), SL0376 (67%): all for TOC – (J-9)

***SDG K1204377:*** SL0430: gravel (25%) – (J-9)

### Field Replicates

The following acceptance criteria were used to evaluate precision: the RPD control limit is 50% for results greater than 5x the reporting limit (RL). For results less than 5x the RL, the absolute difference between the sample and replicate must be less than 2x the RL. No data were qualified based on field replicate precision outliers. Data users should consider the impact of field precision outliers on the reported results. With the exceptions noted below, field precision was acceptable.

***SDG K1204226:*** Two sets of field replicates were submitted: SL0302 & SL0303 and SL0324 & SL0325.

***SDG K1204325:*** Three sets of field replicates were submitted: SL0343 & SL0344, SL0388 & SL0389, and SL0399 & SL0400. The RPD values for gravel in the pair SL0388 & SL0389 and TOC in the pair SL0399 & SL0400 were outside control limits.

***SDG K1204356:*** One set of field replicates was submitted: SL0377 & SL0378.

***SDG K1204377:*** Two sets of field replicates were submitted: SL0426 & SL0427 and SL0436 & SL0440.

### Calculation Verification

***SDG K1204226:*** Several results were verified by recalculation from the raw data. No calculation or transcription errors were noted.

## IV. OVERALL ASSESSMENT

As determined by this evaluation, the laboratory followed the specified analytical methods. Accuracy was acceptable as demonstrated by the laboratory control sample and matrix spike percent recovery values. With the exceptions noted above, precision was acceptable as demonstrated by the laboratory duplicate, and field replicate RPD values.

Data were estimated based on laboratory replicate RPD outliers.

All data, as qualified, are acceptable for use.

EcoChem, INC.
Environmental Data Quality

# APPENDIX A

# DATA QUALIFIER DEFINITIONS, REASON CODES, AND CRITERIA TABLES

# DATA VALIDATION QUALIFIER CODES
# Based on National Functional Guidelines

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

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

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

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

# DATA QUALIFIER REASON CODES

| | |
|---|---|
| 1 | Holding Time/Sample Preservation |
| 2 | Chromatographic pattern in sample does not match pattern of calibration standard. |
| 3 | Compound Confirmation |
| 4 | Tentatively Identified Compound (TIC) (associated with NJ only) |
| 5A | Calibration (initial) |
| 5B | Calibration (continuing) |
| 6 | Field Blank Contamination |
| 7 | Lab Blank Contamination (e.g., method blank, instrument, etc.) |
| 8 | Matrix Spike(MS & MSD) Recoveries |
| 9 | Precision (all replicates) |
| 10 | Laboratory Control Sample Recoveries |
| 11 | A more appropriate result is reported (associated with “R” and “DNR” only) |
| 12 | Reference Material |
| 13 | Surrogate Spike Recoveries (a.k.a., labeled compounds & recovery standards) |
| 14 | Other (define in validation report) |
| 15 | GFAA Post Digestion Spike Recoveries |
| 16 | ICP Serial Dilution % Difference |
| 17 | ICP Interference Check Standard Recovery |
| 18 | Trip Blank Contamination |
| 19 | Internal Standard Performance (e.g., area, retention time, recovery) |
| 20 | Linear Range Exceeded |
| 21 | Potential False Positives |
| 22 | Elevated Detection Limit Due to Interference (i.e., laboratory, chemical and/or matrix) |

# EcoChem Validation Guidelines for Volatile Analysis by GC/MS (Based on Organic NFG 1999)

| VALIDATION QC ELEMENT | ACCEPTANCE CRITERIA | ACTION | REASON CODE |
|---|---|---|---|
| Cooler Temperature | 4°C±2°C<br>Water: HCl to pH < 2 | J(+)/UJ(-) if greater than 6 deg. C (EcoChem PJ) | 1 |
| Hold Time | Waters: 14 days preserved<br>7 Days: unpreserved (for aromatics)<br><br>Solids: 14 Days | J(+)/UJ(-) if hold times exceeded<br>If exceeded by > 3X HT: J(+)/R(-) (EcoChem PJ) | 1 |
| Tuning | BFB<br>Beginning of each 12 hour period<br>Method acceptance criteria | R(+/-) all analytes in all samples associated with the tune | 5A |
| Initial Calibration (Minimum 5 stds.) | RRF > 0.05 | (EcoChem PJ, see TM-06)<br>If MDL= reporting limit:<br>J(+)/R(-) if RRF < 0.05<br><br>If reporting limit > MDL:<br>note in worksheet if RRF <0.05 | 5A |
| | %RSD < 30% | (EcoChem PJ, see TM-06)<br>J(+) if %RSD > 30% | 5A |
| Continuing Calibration (Prior to each 12 hr. shift) | RRF > 0.05 | (EcoChem PJ, see TM-06)<br>If MDL= reporting limit:<br>J(+)/R(-) if RRF < 0.05<br><br>If reporting limit > MDL:<br>note in worksheet if RRF <0.05 | 5B |
| | %D <25% | (EcoChem PJ, see TM-06)<br>If > +/-90%: J+/R-<br>If -90% to -26%: J+ (high bias)<br>If 26% to 90%: J+/UJ- (low bias) | 5B |
| Method Blank | One per matrix per batch<br>No results > CRQL | U(+) if sample (+) result is less than CRQL and less than appropriate 5X or 10X rule (raise sample value to CRQL) | 7 |
| | | U(+) if sample (+) result is greater than or equal to CRQL and less than appropriate 5X and 10X rule (at reported sample value) | 7 |
| | No TICs present | R(+) TICs using 10X rule | 7 |
| Storage Blank | One per SDG<br><CRQL | U(+) the specific analyte(s) results in all assoc.samples using the 5x or 10x rule | 7 |
| Trip Blank | Frequency as per project QAPP | Same as method blank for positive results remaining in trip blank after method blank qualifiers are assigned | 18 |
| Field Blanks (if required in QAPP) | No results > CRQL | Apply 5X/10X rule; U(+) < action level | 6 |



Copyright 2005 EcoChem, Inc.

# EcoChem Validation Guidelines for Volatile Analysis by GC/MS (Based on Organic NFG 1999)

| VALIDATION QC ELEMENT | ACCEPTANCE CRITERIA | ACTION | REASON CODE |
|---|---|---|---|
| MS/MSD (recovery) | One per matrix per batch<br>Use method acceptance criteria | Qualify parent only unless other QC indicates systematic problems:<br>J(+) if both %R > UCL<br>J(+)/UJ(-) if both %R < LCL<br>J(+)/R(-) if both %R < 10%<br>PJ if only one %R outlier | 8 |
| MS/MSD (RPD) | One per matrix per batch<br>Use method acceptance criteria | J(+) in parent sample if RPD > CL | 9 |
| LCS<br>*low conc. H2O VOA* | One per lab batch<br>Within method control limits | J(+) assoc. cmpd if > UCL<br>J(+)/R(-) assoc. cmpd if < LCL<br>J(+)/R(-) all cmpds if half are < LCL | 10 |
| LCS<br>*regular VOA (H2O & solid)* | One per lab batch<br>Lab or method control limits | J(+) if %R > UCL J(+)/UJ(-) if %R <LCL<br>J(+)/R(-) if %R < 10% (EcoChem PJ) | 10 |
| LCS/LCSD<br>*(if required)* | One set per matrix and batch of 20 samples<br>RPD < 35% | J(+)/UJ(-) assoc. cmpd. in all samples | 9 |
| Surrogates | Added to all samples<br>Within method control limits | J(+) if %R >UCL<br>J(+)/UJ(-) if %R <LCL but >10% (see PJ[1])<br>J(+)/R(-) if <10% | 13 |
| Internal Standard (IS) | Added to all samples<br>Acceptable Range: IS area 50% to 200% of CCAL area<br>RT within 30 seconds of CC RT | J(+) if > 200%<br>J(+)/UJ(-) if < 50%<br>J(+)/R(-) if < 25%<br>RT>30 seconds, narrate and Notify PM | 19 |
| Field Duplicates | Use QAPP limits. If no QAPP:<br>Solids: RPD <50%<br>OR absolute diff. < 2X RL (for results < 5X RL)<br><br>Aqueous: RPD <35%<br>OR absolute diff. < 1X RL (for results < 5X RL) | Narrate and qualify if required by project<br>(EcoChem PJ) | 9 |
| TICs | Major ions (>10%) in reference must be present in sample; intensities agree within 20%; check identification | NJ the TIC unless:<br>R(+) common laboratory contaminants<br>See Technical Director for ID issues | 4 |
| Quantitation/ Identification | RRT within 0.06 of standard RRT<br>Ion relative intensity within 20% of standard<br>All ions in std. at > 10% intensity must be present in sample | See Technical Director if outliers | 14<br>21 (false +) |

**PJ[1]** No action if there are 4+ surrogates and only 1 outlier.



Copyright 2005 EcoChem, Inc.

# EcoChem Validation Guidelines for Semivolatile Analysis by GC/MS (Based on Organic NFG 1999)

| VALIDATION QC ELEMENT | ACCEPTANCE CRITERIA | ACTION | REASON CODE |
|---|---|---|---|
| Cooler Temperature | 4°C ±2° | J(+)/UJ(-) if greater than 6 deg. C (EcoChem PJ) | 1 |
| Holding Time | Water: 7 days from collection<br>Soil: 14 days from collection<br>Analysis: 40 days from extraction | Water:<br>J(+)/UJ(-) if ext. > 7 and < 21 days<br>J(+)/R(-) if ext > 21 days (EcoChem PJ)<br>Solids/Wastes:<br>J(+)/UJ(-) if ext. > 14 and < 42 days<br>J(+)/R(-) if ext. > 42 days (EcoChem PJ)<br><br>J(+)/UJ(-) if analysis >40 days | 1 |
| Tuning | DFTPP<br>Beginning of each 12 hour period<br>Method acceptance criteria | R(+/-) all analytes in all samples associated with the tune | 5A |
| Initial Calibration (Minimum 5 stds.) | RRF > 0.05 | (EcoChem PJ, see TM-06)<br>If MDL= reporting limit:<br>J(+)/R(-) if RRF < 0.05<br><br>If reporting limit > MDL:<br>note in worksheet if RRF <0.05 | 5A |
| | %RSD < 30% | (EcoChem PJ, see TM-06)<br>J(+) if %RSD > 30% | 5A |
| Continuing Calibration (Prior to each 12 hr. shift) | RRF > 0.05 | (EcoChem PJ, see TM-06)<br>If MDL= reporting limit:<br>J(+)/R(-) if RRF < 0.05<br><br>If reporting limit > MDL:<br>note in worksheet if RRF <0.05 | 5B |
| | %D <25% | (EcoChem PJ, see TM-06)<br>If > +/-90%: J+/R-<br>If -90% to -26%: J+ (high bias)<br>If 26% to 90%: J+/UJ- (low bias) | 5B |
| Method Blank | One per matrix per batch<br>No results > CRQL | U(+) if sample (+) result is less than CRQL and less than appropriate 5X or 10X rule (raise sample value to CRQL) | 7 |
| | | U(+) if sample (+) result is greater than or equal to CRQL and less than appropriate 5X and 10X rule (at reported sample value) | 7 |
| | No TICs present | R(+) TICs using 10X rule | 7 |
| Field Blanks (Not Required) | No results > CRQL | Apply 5X/10X rule; U(+) < action level | 6 |



Copyright 2005 EcoChem, Inc.

# EcoChem Validation Guidelines for Semivolatile Analysis by GC/MS (Based on Organic NFG 1999)

| VALIDATION QC ELEMENT | ACCEPTANCE CRITERIA | ACTION | REASON CODE |
|---|---|---|---|
| MS/MSD (recovery) | One per matrix per batch<br>Use method acceptance criteria | Qualify parent only unless other QC indicates systematic problems:<br>J(+) if both %R > UCL<br>J(+)/UJ(-) if both %R < LCL<br>J(+)/R(-) if both %R < 10%<br>PJ if only one %R outlier | 8 |
| MS/MSD (RPD) | One per matrix per batch<br>Use method acceptance criteria | J(+) in parent sample if RPD > CL | 9 |
| LCS<br>low conc. H2O SVOA | One per lab batch<br>Within method control limits | J(+) assoc. cmpd if > UCL<br>J(+)/R(-) assoc. cmpd if < LCL<br>J(+)/R(-) all cmpds if half are < LCL | 10 |
| LCS<br>regular SVOA (H2O & solid) | One per lab batch<br>Lab or method control limits | J(+) if %R > UCL J(+)/UJ(-) if %R <LCL<br>J(+)/R(-) if %R < 10% (EcoChem PJ) | 10 |
| LCS/LCSD<br>*(if required)* | One set per matrix and batch of 20 samples<br>RPD < 35% | J(+)/UJ(-) assoc. cmpd. in all samples | 9 |
| Surrogates | Minimum of 3 acid and 3 base/neutral compounds<br>Use method acceptance criteria | Do not qualify if only 1 acid and/or 1 B/N surrogate is out unless <10%<br>J(+) if %R > UCL J(+)/UJ(-) if %R < LCL<br>J(+)/R(-) if %R < 10% | 13 |
| Internal Standards | Added to all samples<br>Acceptable Range: IS area 50% to 200% of CCAL area<br>RT within 30 seconds of CC RT | J(+) if > 200%<br>J(+)/UJ(-) if < 50%<br>J(+)/R(-) if < 25%<br>RT>30 seconds, narrate and Notify PM | 19 |
| Field Duplicates | Use QAPP limits. If no QAPP:<br>Solids: RPD <50%<br>OR absolute diff. < 2X RL (for results < 5X RL)<br><br>Aqueous: RPD <35%<br>OR absolute diff. < 1X RL (for results < 5X RL) | Narrate and qualify if required by project<br>(EcoChem PJ) | 9 |
| TICs | Major ions (>10%) in reference must be present in sample; intensities agree within 20%; check identification | NJ the TIC unless:<br>R(+) common laboratory contaminants<br>See Technical Director for ID issues | 4 |
| Quantitation/ Identification | RRT within 0.06 of standard RRT<br>Ion relative intensity within 20% of standard<br>All ions in std. at > 10% intensity must be present in sample | See Technical Director if outliers | 14<br>21 (false +) |



Copyright 2005 EcoChem, Inc.

# EcoChem Validation Guidelines for Pesticides, PCBs, Herbicides, and Phenol by GC/ECD (Based on Organic NFG 1999 & EPA SW-846 Methods 8081/8082/8041/8151)

| VALIDATION QC ELEMENT | ACCEPTANCE CRITERIA | ACTION | REASON CODE |
|---|---|---|---|
| Cooler Temperature | 4°C ±2° | J(+)/UJ(-) if greater than 6 deg. C (EcoChem PJ) | 1 |
| Holding Time | Water: 7 days from collection<br>Soil: 14 days from collection<br>Analysis: 40 days from extraction | J(+)/UJ(-) if ext/analyzed > HT<br>J(+)/R(-) if ext/analyzed > 3X HT (EcoChem PJ) | 1 |
| Resolution Check | Beginning of ICAL Sequence<br>Within RTW Resolution >90% | Narrate (Use Professional Judgement to qualify) | 14 |
| Instrument Performance (Breakdown) | DDT Breakdown: < 20%<br>Endrin Breakdown: <20%<br>Combined Breakdown: <30%<br>Compounds within RTW | J(+) DDT NJ(+) DDD and/or DDE<br>R(-) DDT - If (+) for either DDE or DDD<br><br>J(+) Endrin NJ(+) EK and/or EA<br>R(-) Endrin - If (+) for either EK or EA | 5A |
| Retention Times | Surrogates:<br>TCX (+/- 0.05); DCB (+/- 0.10)<br>Target compounds:<br>elute before heptachlor epoxide (+/- 0.05)<br>elute after heptachlor epoxide (+/- 0.07) | NJ(+)/R(-) results for analytes with RT shifts<br>For full DV, use PJ based on examination of raw data | 5B |
| Initial Calibration | Pesticides: Low=CRQL, Mid=4X, High=16X<br>Multiresponse - one point Calibration<br>%RSD<20%<br>%RSD<30% for surr; two comp. may exceed if <30%<br>Resolution in Mix A and Mix B >90% | J(+)/UJ(-) | 5A |
| Continuing Calibration | Alternating PEM standard and INDA/INDB standards every 12 hours (each preceeded by an inst. Blank)<br>%D < 25%<br><br>Resolution >90% in IND mixes; 100% for PEM | J(+)/UJ(-) J(+)R(-) if %D > 90%<br><br>PJ for resolution | 5B |
| Method Blank | One per matrix per batch<br>No results > CRQL | U(+) if sample result is < CRQL and < 5X rule (raise sample value to CRQL)<br>U(+) if sample result is > or equal to CRQL and < 5X rule (at reported sample value) | 7 |
| Instrument Blanks | Analyzed at the beginning of every 12 hour sequence<br>No analyte > 1/2 CRQL | Same as Method Blank | 7 |
| Field Blanks | Not addressed by NFG<br>No results > CRQL | Apply 5X rule; U(+) < action level | 6 |



Copyright 2005 EcoChem, Inc.

# EcoChem Validation Guidelines for Pesticides, PCBs, Herbicides, and Phenol by GC/ECD (Based on Organic NFG 1999 & EPA SW-846 Methods 8081/8082/8041/8151)

| VALIDATION QC ELEMENT | ACCEPTANCE CRITERIA | ACTION | REASON CODE |
|---|---|---|---|
| MS/MSD (recovery) | One set per matrix per batch<br>Method Acceptance Criteria | Qualify parent only unless other QC indicates systematic problems:<br>J(+) if both %R > UCL<br>J(+)/UJ(-) if both %R < LCL<br>J(+)/R(-) if both %R < 10%<br>PJ if only one %R outlier | 8 |
| MS/MSD (RPD) | One set per matrix per batch<br>Method Acceptance Criteria | J(+) in parent sample if RPD > CL | 9 |
| LCS | One per SDG<br>Method Acceptance Criteria | J(+) if %R > UCL J(+)/UJ(-) if %R < LCL<br>J(+)/R(-) using PJ if %R <<LCL (< 10%) | 10 |
| LCS/LCSD<br>*(if required)* | One set per matrix and batch of 20 samples<br>RPD < 35% | J(+)/UJ(-) assoc. cmpd. in all samples | 9 |
| Surrogates | TCX and DCB added to every sample<br>%R = 30-150% | J(+)/UJ(-) if both %R = 10 - 60%<br>J(+) if both >150%<br>J(+)/R(-) if any %R <10% | 13 |
| Quantitation/ Identification | Quantitated using ICAL calibration factor (CF)<br><br>RPD between columns <40% | J(+) if RPD = 40 - 60%<br>NJ(+) if RPD >60%<br>EcoChem PJ - See TM-08 | 3 |
| Two analyses for one sample | Report only one result per analyte | "DNR" results that should not be used to avoid reporting two results for one sample | 11 |
| Sample Clean-up | GPC required for soil samples<br>Florisil required for all samples<br>Sulfur is optional<br><br>Clean-up standard check %R within CLP limits | J(+)/UJ(-) if %R < LCL<br>J(+) if %R > UCL | 14 |
| Field Duplicates | Use QAPP limits. If no QAPP:<br>Solids: RPD <50%<br>OR absolute diff. < 2X RL (for results < 5X RL)<br><br>Aqueous: RPD <35%<br>OR absolute diff. < 1X RL (for results < 5X RL) | Narrate<br>(Qualifiy if required by project QAPP) | 9 |



Copyright 2005 EcoChem, Inc.

# EcoChem Validation Guidelines for PCB Congener Analysis by HRMS (Based on EPA Reg. 10 SOP, Rev. 1, 12/1995 & EPA SW-846, Method 1668)

| VALIDATION QC ELEMENT | ACCEPTANCE CRITERIA | ACTION | REASON CODE |
|---|---|---|---|
| Cooler/Storage Temperature | Waters/Solids <4°C<br>Tissues <-10°C | EcoChem PJ, see TM-05 | 1 |
| Holding Time | Samples: Up to one year if stored in the dark & temp as above.<br><br>Extracts: Up to 1 year if stored at <-10°C and in the dark | J(+)/UJ(-) if HT > 1 year<br>EcoChem PJ, see TM-05 | 1 |
| Mass Resolution | >=10,000 resolving power at m/z 330.9792<br><5 ppm deviation from each m/z listed in Table 7 of method.<br>Analyzed prior to ICAL and at the beginning<br>and end of each 12 hr. shift | R(+/-) if not met | 14 |
| Column Resolution 209 Congener Solution | Mix of all 209 PCBs run prior to each ICAL<br>and each 12 hour shift<br>RT of PCB209 must be > 55 min<br>PCB 156 & 157 must coelute w/in 2 sec<br>PCB34 & 23 and PCB187 & 182 must be resolved<br>where ( (x/y)*100%) < 40%<br>x = ht. of valley and y = ht of shortest peak | J(+) if valley >40% | 5A (ICAL)<br>5B (CCAL) |
| Initial Calibration | Minimum of five standards<br>%RSD < 20% for native compounds<br>%RSD < 35% for labeled compounds | J(+) natives if %RSD > 20% | 5A |
| | Ion Abundance ratios within QC limits<br>(Method 1668, Table 8) in CS1 std. | EcoChem PJ, see TM-05 | |
| | S/N ratio > 10 for all native and labeled compounds in CS1 std. | If <10, elevate Det. Limit or R(-) | |
| Continuing Calibration | Every 12 hours: Concentrations must meet criteria specified in Method 1668, Table 6 | J(+)/(UJ(-) natives if %D = 30% - 50%<br>J(+)/R(-) natives if %D > 75% | 5B |
| | Absolute RT of all Labelled Compounds and Window Defining Congeners must be +/- 15 sec of RT in ICAL<br>RRT of all compounds must meet Table 2 of method. | EcoChem PJ, see ICAL section of TM-05 | |
| | S/N ratio > 10 | If <10, elevate Det. Limit or R(-) | |
| | Ion Abundance ratios must meet criteria specified in Method 1668, Table 8 | EcoChem PJ, see TM-05 | |
| Method Blank | One per matrix per batch<br>No positive results | If sample result <5X action level,<br>qualify U at reported value. | 7 |



Copyright 2006 EcoChem, Inc.

# EcoChem Validation Guidelines for PCB Congener Analysis by HRMS (Based on EPA Reg. 10 SOP, Rev. 1, 12/1995 & EPA SW-846, Method 1668)

| VALIDATION QC ELEMENT | ACCEPTANCE CRITERIA | ACTION | REASON CODE |
|---|---|---|---|
| Rinse/Field Blank (if required) | One per matrix per batch<br>No positive results | If sample result <5X action level, qualify U at reported value. | 6 |
| LCS / OPR | One per matrix per batch<br>%R Values w/in limits specified in Method 1668, Table 6 | J(+) if %R > UCL<br>J(+)/UJ(-) if %R < LCL<br>J(+)/R(-) using PJ if %R <<LCL (< 10%) | 10 |
| MS/MSD (if required) | Accuracy: %R values within laboratory limits | Qualify parent sample only unless other QC indicates systematic problems:<br>J(+) if both %R > UCL<br>J(+)/UJ(-) if both %R < LCL<br>J(+)/R(-) if both %R < 10%<br>PJ if only one %R outlier | 8 |
| | Precision: RPD < 20% | J(+) in parent sample if RPD > 20% | 9 |
| Duplicate (if required) | RPD <25% | J(+)/UJ(-) if outside limts | 9 |
| Labeled Compounds / Internal Standards | %R must meet limits specified in Method 1668, Table 6. | J(+)/UJ(-) if %R = 10% to LCL<br>J(+) if %R > UCL<br>J(+)/R(-) if %R < 10% | 13 |
| Quantitation/ Identification | Ions for analyte, IS, and rec. std. must max w/in 2 sec.<br>S/N >2.5<br>Ion abundance (IA ratios) must meet limits stated in Table 8 of Method 1668<br>Relative retention times (RRT) must be w/in limits stated in Table 2 of Method 1668 | If RT criteria not met, use PJ (see TM-05)<br>J(+) if S/N criteria not met<br>if unlabelled ion abundance not met, change to EMPC<br>J(+) if labelled ion abundance not met. | 21 |
| Interferences | Lock masses must not deviate +/- 20% | Change result to EMPC | 14 |
| Field Duplicates | Use QAPP limits. If no QAPP:<br>Solids: RPD <50%<br>OR absolute diff. < 2X RL (for results < 5X RL)<br><br>Aqueous: RPD <35%<br>OR absolute diff. < 1X RL (for results < 5X RL) | Narrate and qualify if required by project (EcoChem PJ) | 9 |
| Two analyses for one sample | Report only one result per analyte | "DNR" results that should not be used to avoid reporting two results for one sample | 11 |



Copyright 2006 EcoChem, Inc.

# EcoChem Validation Guidelines for Dioxin/Furan Analysis by HRMS
## (Based on EPA Reg. 10 SOP, Rev. 2, 1996 & EPA SW-846, Methods 1613b and 8290)

| VALIDATION QC ELEMENT | ACCEPTANCE CRITERIA | ACTION | REASON CODE |
|---|---|---|---|
| Cooler/Storage Temperature | Waters/Solids < 4°C<br>Tissues <-10°C | EcoChem PJ, see TM-05 | 1 |
| Holding Time | Extraction - Water: 30 days from collection<br>*Note:* Under CWA, SDWA, and RCRA the HT for H2O is 7 days*<br>Extraction - Soil: 30 days from collection<br>Analysis: 40 days from extraction | J(+)/UJ(-) if ext > 30 days<br>J(+)/UJ(-) if analysis > 40 Days<br>EcoChem PJ, see TM-05 | 1 |
| Mass Resolution | >=10,000 resolving power at m/z 304.9824<br>Exact mass of m/z 380.9760 w/in 5 ppm of theoretical value (380.97410 to 380.97790) .<br>Analyzed prior to ICAL and at the start and end of each 12 hr. shift | R(+/-) if not met | 14 |
| Window Defining Mix and Column Performance Mix | Window defining mixture/Isomer specificity std run before ICAL and CCAL<br>Valley < 25% (valley = (x/y)*100%)<br>x = ht. of TCDD<br>y = baseline to bottom of valley<br>For all isomers eluting near 2378-TCDD/TCDF isomers (TCDD only for 8290) | J(+) if valley > 25% | 5A (ICAL)<br>5B (CCAL |
| Initial Calibration | Minimum of five standards<br>%RSD < 20% for native compounds<br>%RSD <30% for labeled compounds<br>(%RSD <35% for labeled compounds under 1613b) | J(+) natives if %RSD > 20% | 5A |
| | Abs. RT of $^{13}C_{12}$-1234-TCDD<br>>25 min on DB5<br>>15 min on DB-225 | EcoChem PJ, see TM-05 | |
| | Ion Abundance ratios within QC limits<br>(Table 8 of method 8290)<br>(Table 9 of method 1613B) | EcoChem PJ, see TM-05 | |
| | S/N ratio > 10 for all native and labeled compounds in CS1 std. | If <10, elevate Det. Limit or R(-) | |



Copyright 2007 EcoChem, Inc.

# EcoChem Validation Guidelines for Dioxin/Furan Analysis by HRMS
## (Based on EPA Reg. 10 SOP, Rev. 2, 1996 & EPA SW-846, Methods 1613b and 8290)

| VALIDATION QC ELEMENT | ACCEPTANCE CRITERIA | ACTION | REASON CODE |
|---|---|---|---|
| Continuing Calibration | Analyzed at the start and end of each 12 hour shift.<br>%D+/-20% for native compounds<br>%D +/-30% for labeled compounds<br>(Must meet limits in Table 6, Method 1613B)<br>(If %Ds in the closing CCAL are w/in 25%/35% the avg RF from the two CCAL may be used to calculate samples per Method 8290, Section 8.3.2.4) | Do not qualify labeled compounds. Narrate in report for labeled compound %D outliers.<br>For native compound %D outliers:<br>8290: J(+)/UJ(-) if %D = 20% - 75%<br>J(+)/R(-) if %D > 75%<br>1613: J(+)/UJ(-) if %D is outside Table 6 limits<br>J(+)/R(-) if %D is +/- 75% of Table 6 limit | 5B |
| | Abs. RT of $^{13}C_{12}$-1234-TCDD and $^{13}C12$-123789-HxCDD +/- 15 sec of ICAL. | EcoChem PJ, see ICAL section of TM-05 | |
| | RRT of all other compounds must meet Table 2 of 1613B. | EcoChem PJ, see TM-05 | |
| | Ion Abundance ratios within QC limits<br>(Table 8 of method 8290)<br>(Table 9 of method 1613B) | EcoChem PJ, see TM-05 | |
| | S/N ratio > 10 | If <10, elevate Det. Limit or R(-) | |
| Method Blank | One per matrix per batch<br>No positive results | If sample result <5X action level, qualify U at reported value. | 7 |
| Field Blanks (Not Required) | No positive results | If sample result <5X action level, qualify U at reported value. | 6 |
| LCS / OPR | Concentrations must meet limits in Table 6, Method 1613B or lab limits. | J(+) if %R > UCL<br>J(+)/UJ(-) if %R < LCL<br>J(+)/R(-) using PJ if %R <<LCL (< 10%) | 10 |
| MS/MSD (recovery) | May not analyze MS/MSD<br>%R should meet lab limits. | Qualify parent only unless other QC indicates systematic problems:<br>J(+) if both %R > UCL<br>J(+)/UJ(-) if both %R < LCL<br>J(+)/R(-) if both %R < 10%<br>PJ if only one %R outlier | 8 |
| MS/MSD (RPD) | May not analyze MS/MSD<br>RPD < 20% | J(+) in parent sample if RPD > CL | 9 |



Copyright 2007 EcoChem, Inc.

# EcoChem Validation Guidelines for Dioxin/Furan Analysis by HRMS
## (Based on EPA Reg. 10 SOP, Rev. 2, 1996 & EPA SW-846, Methods 1613b and 8290)

| VALIDATION QC ELEMENT | ACCEPTANCE CRITERIA | ACTION | REASON CODE |
|---|---|---|---|
| Lab Duplicate | RPD <25% if present. | J(+)/UJ(-) if outside limts | 9 |
| Labeled Compounds / Internal Standards | *Method 8290:* %R = 40% - 135% in all samples<br>*Method 1613B:* %R must meet limits specified in Table 7, Method 1613 | J(+)/UJ(-) if %R = 10% to LCL<br>J(+) if %R > UCL<br>J(+)/R(-) if %R < 10% | 13 |
| Quantitation/ Identification | Ions for analyte, IS, and rec. std. must max w/in 2 sec.<br>S/N >2.5<br>IA ratios meet limits in Table 9 of 1613B or Table 8 of 8290<br>RRTs w/in limits in Table 2 of 1613B | If RT criteria not met, use PJ (see TM-05)<br>If S/N criteria not met, J(+).<br>if unlabelled ion abundance not met, change to EMPC<br>If labelled ion abundance not met, J(+). | 21 |
| EMPC (estimated maximum possible concentration) | If quantitation idenfication criteria are not met, laboratory should report an EMPC value. | If laboratory correctly reported an EMPC value, qualify with U to indicate that the value is a detection limit. | 14 |
| Interferences | PCDF interferences from PCDPE | If both detected, change PCDF result to EMPC | 14 |
| Second Column Confirmation | All 2378-TCDF hits must be confirmed on a DB-225 (or equiv) column. All QC specs in this table must be met for the confirmation analysis. | Report lower of the two values.<br>If not performed use PJ (see TM-05). | 3 |
| Field Duplicates | Use QAPP limits. If no QAPP:<br>Solids: RPD <50%<br>OR absolute diff. < 2X RL (for results < 5X RL)<br>Aqueous: RPD <35%<br>OR absolute diff. < 1X RL (for results < 5X RL) | Narrate and qualify if required by project (EcoChem PJ) | 9 |
| Two analyses for one sample | Report only one result per analyte | "DNR" results that should not be used | 11 |



Copyright 2007 EcoChem, Inc.

# EcoChem Validation Guidelines for Metals Analysis by ICP (Based on Inorganic NFG 1994 & 2004)

| VALIDATION QC ELEMENT | ACCEPTANCE CRITERIA | ACTION | REASON CODE |
|---|---|---|---|
| Cooler Temperature and Preservation | Cooler temperature: 4°C ±2°<br>Waters: Nitric Acid to pH < 2<br>For Dissolved Metals: 0.45um filter & preserve after filtration<br>Tissues: Frozen | EcoChem Professional Judgment - no qualification based on cooler temperature outliers<br>J(+)/UJ(-) if pH preservation requirements are not met | 1 |
| Holding Time | 180 days from date sampled<br>Frozen tissues - HT extended to 2 years | J(+)/UJ(-) if holding time exceeded | 1 |
| Initial Calibration | Blank + minimum 1 standard<br>If more than 1 standard, r > 0.995 | J(+)/UJ(-) if r < 0.995 (multi point cal) | 5A |
| Initial Calibration Verification (ICV) | Independent source analyzed immediately after calibration<br>%R within ±10% of true value | J(+)/UJ(-) if %R 75-89%<br>J(+) if %R = 111-125%<br>R(+) if %R > 125%<br>R(+/-) if %R < 75% | 5A |
| Continuing Calibration Verification (CCV) | Every ten samples, immediately following ICV/ICB and at end of run<br>%R within ±10% of true value | J(+)/UJ(-) if %R = 75-89%<br>J(+) if %R 111-125%<br>R(+) if %R > 125%<br>R(+/-) if %R < 75% | 5B |
| Initial and Continuing Calibration Blank (ICB/CCB) | After each ICV and CCV<br>every ten samples and end of run<br>\| blank \| < IDL (MDL) | Action level is 5x absolute value of blank conc.<br>For (+) blanks, U(+) results < action level<br>For (-) blanks, J(+)/UJ(-) results < action level<br>(Refer to TM-02 for additional information) | 7 |
| Reporting Limit Standard | 2x RL analyzed beginning of run<br>Not required for Al, Ba, Ca, Fe, Mg, Na, K<br>%R = 70%-130% (50%-150% Sb, Pb, Tl) | R(-)/J(+) < 2x RL if %R <50% (< 30% Sb, Pb, Tl)<br>J(+) < 2x RL, UJ(-) if %R 50-69% (30-49% Sb, Pb,Tl)<br>J(+) < 2x RL if %R 130-180% (150-200% Sb, Pb, Tl)<br>R(+) < 2x RL if %R > 180% (200% Sb, Pb, Tl) | 14 |
| Interference Check Samples (ICSA/ICSAB) | ICSAB %R 80 - 120% for all spiked elements<br>\| ICSA \| < MDL for all unspiked elements except: K, Na | For samples with Al, Ca, Fe, or Mg > ICS levels<br>R(+/-) if %R < 50%<br>J(+) if %R >120%<br>J(+)/UJ(-) if %R= 50 to 79%<br>Use Professional Judgment for ICSA to determine if bias is present<br>see TM-09 for additional details | 17 |
| Method Blank | One per matrix per batch<br>(batch not to exceed 20 samples)<br>blank < MDL | Action level is 5x blank concentration<br>U(+) results < action level | 7 |
| Laboratory Control Sample (LCS) | One per matrix per batch<br>Blank Spike: %R within 80-120% | R(+/-) if %R < 50%<br>J(+)/UJ(-) if %R = 50-79%<br>J(+) if %R >120% | 10 |
| | CRM: Result within manufacturer's certified acceptance range or project guidelines | J(+)/UJ(-) if < LCL,<br>J(+) if > UCL | |



Copyright 2006 EcoChem, Inc.

# EcoChem Validation Guidelines for Metals Analysis by ICP
# (Based on Inorganic NFG 1994 & 2004)

| VALIDATION QC ELEMENT | ACCEPTANCE CRITERIA | ACTION | REASON CODE |
|---|---|---|---|
| Matrix Spikes | One per matrix per batch<br>75-125% for samples less than 4x spike level | J(+) if %R > 125%<br>J(+)/UJ(-) if %R < 75%<br>J(+)/R(-) if %R < 30% or<br>J(+)/UJ(-) if Post Spike %R 75-125%<br>Qualify all samples in batch | 8 |
| Post-digestion Spike | If Matrix Spike is outside 75-125%,<br>spike at twice the sample conc. | No qualifiers assigned based on this element | |
| Laboratory Duplicate (or MS/MSD) | One per matrix per batch<br>RPD < 20% for samples > 5x RL<br>Diff < RL for samples >RL and < 5x RL<br>(Diff < 2x RL for solids) | J(+)/UJ(-) if RPD > 20% or diff > RL (2x RL for solids)<br>qualify all samples in batch | 9 |
| Serial Dilution | 5x dilution one per matrix<br>%D < 10% for original sample conc. > 50x MDL | J(+)/UJ(-) if %D >10%<br>qualify all samples in batch | 16 |
| Field Blank | Blank < MDL | Action level is 5x blank conc.<br>U(+) sample values < action level<br>in associated field samples only | 6 |
| Field Duplicate | For results > 5x RL:<br>Water: RPD < 35% Solid: RPD < 50%<br>For results < 5 x RL:<br>Water: Diff < RL Solid: Diff < 2x RL | J(+)/UJ(-) in parent samples only | 9 |
| Linear Range | Sample concentrations must fall within range | J values over range | 20 |



Copyright 2006 EcoChem, Inc.

# EcoChem Validation Guidelines for Metals Analysis by ICP-MS (Based on Inorganic NFG 1994 & 2004)

| VALIDATION QC ELEMENT | ACCEPTANCE CRITERIA | ACTION | REASON CODE |
|---|---|---|---|
| Cooler Temperature and Preservation | Cooler temperature: 4°C ±2°<br>Waters: Nitric Acid to pH < 2<br>For Dissolved Metals: 0.45um filter & preserve after filtration | EcoChem Professional Judgment - no qualification based on cooler temperature outliers<br>J(+)/UJ(-) if pH preservation requirements are not met | 1 |
| Holding Time | 180 days from date sampled<br>Frozen tissues - HT extended to 2 years | J(+)/UJ(-) if holding time exceeded | 1 |
| Tune | Prior to ICAL<br>monitoring compounds analyzed 5 times wih Std Dev. ≤ 5%<br>mass calibration <0.1 amu from True Value<br>Resolution < 0.9 AMU @ 10% peak height or <0.75 amu @ 5% peak height | Use Professional Judgment to evaluate tune<br>J(+)/UJ(-) if tune criteria not met | 5A |
| Initial Calibration | Blank + minimum 1 standard<br>If more than 1 standard, r>0.995 | J(+)/UJ(-) if r<0.995 (for multi point cal) | 5A |
| Initial Calibration Verification (ICV) | Independent source analyzed immediately after calibration<br>%R within ±10% of true value | J(+)/UJ(-) if %R 75-89%<br>J(+) if %R = 111-125%<br>R(+) if %R > 125%<br>R(+/-) if %R < 75% | 5A |
| Continuing Calibration Verification (CCV) | Every ten samples, immediately following ICV/ICB and at end of run<br>±10% of true value | J(+)/UJ(-) if %R = 75-89%<br>J(+) if %R 111-125%<br>R(+) if %R > 125%<br>R(+/-) if %R < 75% | 5B |
| Initial and Continuing Calibration Blanks (ICB/CCB) | After each ICV and CCV<br>every ten samples and end of run<br>\| blank \| < IDL (MDL) | Action level is 5x absolute value of blank conc.<br>For (+) blanks, U(+) results < action level<br>For (-) blanks, J(+)/UJ(-) results < action level<br>refer to TM-02 for additional details | 7 |
| Reporting Limit Standard (CRI) | 2x RL analyzed beginning of run<br>Not required for Al, Ba, Ca, Fe, Mg, Na, K<br>%R = 70%-130% (50%-150% Co,Mn, Zn) | R(-),(+) < 2x RL if %R < 50% (< 30% Co,Mn, Zn)<br>J(+) < 2x RL, UJ(-) if %R 50-69% (30%-49% Co,Mn, Zn)<br>J(+) < 2x RL if %R 130%-180% (150%-200% Co,Mn, Zn)<br>R(+) < 2x RL if %R > 180% (200% Co, Mn, Zn) | 14 |
| Interference Check Samples (ICSA/ICSAB) | Required by SW 6020, but not 200.8<br>ICSAB %R 80% - 120% for all spiked elements<br>\| ICSA \| < IDL (MDL) for all unspiked elements | For samples with Al, Ca, Fe, or Mg > ICS levels<br>R(+/-) if %R < 50%<br>J(+) if %R >120%<br>J(+)/UJ(-) if %R = 50% to 79%<br>Use Professional Judgment for ICSA to determine if bias is present<br>see TM-09 for additional details | 17 |
| Method Blank | One per matrix per batch<br>(batch not to exceed 20 samples)<br>blank < MDL | Action level is 5x blank concentration<br>U(+) results < action level | 7 |



Copyright 2006 EcoChem, Inc.

# EcoChem Validation Guidelines for Metals Analysis by ICP-MS
# (Based on Inorganic NFG 1994 & 2004)

| VALIDATION QC ELEMENT | ACCEPTANCE CRITERIA | ACTION | REASON CODE |
|---|---|---|---|
| Laboratory Control Sample (LCS) | One per matrix per batch<br>Blank Spike: %R within 80%-120% | R(+/-) if %R < 50%<br>J(+)/UJ(-) if %R = 50-79%<br>J(+) if %R >120% | 10 |
| | CRM: Result within manufacturer's certified acceptance range or project guidelines | J(+)/UJ(-) if < LCL,<br>J(+) if > UCL | |
| Matrix Spike/ Matrix Spike Duplicate (MS/MSD) | One per matrix per batch<br>75-125% for samples where results do not exceed 4x spike level | J(+) if %R>125%<br>J(+)/UJ(-) if %R <75%<br>J(+)/R(-) if %R<30% or<br>J(+)/UJ(-) if Post Spike %R 75%-125%<br>Qualify all samples in batch | 8 |
| Post-digestion Spike | If Matrix Spike is outside 75-125%,<br>Spike parent sample at 2x the sample conc. | No qualifiers assigned based on this element | |
| Laboratory Duplicate (or MS/MSD) | One per matrix per batch<br>RPD < 20% for samples > 5x RL<br>Diff < RL for samples > RL and < 5 x RL<br>(Diff < 2x RL for solids) | J(+)/UJ(-) if RPD > 20% or diff > RL<br>all samples in batch | 9 |
| Serial Dilution | 5x dilution one per matrix<br>%D < 10% for original sample values > 50x MDL | J(+)/UJ(-) if %D >10%<br>All samples in batch | 16 |
| Internal Standards | Every sample<br>SW6020: 60%-125% of cal blank IS<br>200.8: 30%-120% of cal blank IS | J (+)/UJ (-) all analytes associated with IS outlier | 19 |
| Field Blank | Blank < MDL | Action level is 5x blank conc.<br>U(+) sample values < AL<br>in associated field samples only | 6 |
| Field Duplicate | For results > 5x RL:<br>Water: RPD < 35% Solid: RPD < 50%<br>For results < 5 x RL:<br>Water: Diff < RL Solid: Diff < 2x RL | J(+)/UJ(-) in parent samples only | 9 |
| Linear Range | Sample concentrations must fall within range | J values over range | 20 |



Copyright 2006 EcoChem, Inc.

# EcoChem Validation Guidelines for Mercury Analysis by CVAA (Based on Inorganic NFG 1994 & 2004)

| VALIDATION QC ELEMENT | ACCEPTANCE CRITERIA | ACTION | REASON CODE |
|---|---|---|---|
| Cooler Temperature and Preservation | Cooler temperature: 4°C ±2°<br>Waters: Nitric Acid to pH < 2<br>For Dissolved Metals: 0.45um filter & preserve after filtration | EcoChem Professional Judgment - no qualification based on cooler temperature outliers<br>J(+)/UJ(-) if pH preservation requirements are not met | 1 |
| Holding Time | 28 days from date sampled<br>Frozen tissues: HT extended to 6 months | J(+)/UJ(-) if holding time exceeded | 1 |
| Initial Calibration | Blank + 4 standards, one at RL<br>r > 0.995 | J(+)/UJ(-) if r<0.995 | 5A |
| Initial Calibration Verification (ICV) | Independent source analyzed immediately after calibration<br>%R within ±20% of true value | J(+)/UJ(-) if %R = 65%-79%<br>J(+) if %R = 121-135%<br>R(+/-) if %R < 65% R(+) if %R > 135% | 5A |
| Continuing Calibration Verification (CCV) | Every ten samples, immediately following ICV/ICB and at end of run<br>%R within ±20% of true value | J(+)/UJ(-) if %R = 65%-79%<br>J(+) if %R = 121-135%<br>R(+/-) if %R < 65% R(+) if %R > 135% | 5B |
| Initial and Continuing Calibration Blanks (ICB/CCB) | after each ICV and CCV<br>every ten samples and end of run<br>\| blank \| < IDL (MDL) | Action level is 5x absolute value of blank conc.<br>For (+) blanks, U(+) results < action level<br>For (-) blanks, J(+)/UJ(-) results < action level<br>refer to TM-02 for additional details | 7 |
| Reporting Limit Standard (CRA) | conc at RL - analyzed beginning of run<br>%R = 70-130% | R(-),(+)<2xRL if %R <50%<br>J(+)<2x RL, UJ(-) if %R 50-69%<br>J(+) <2x RL if %R 130-180%<br>R(+)<2x RL if %R>180% | 14 |
| Method Blank | One per matrix per batch<br>(batch not to exceed 20 samples)<br>blank < MDL | Action level is 5x blank concentration<br>U(+) results < action level | 7 |
| Laboratory Control Sample (LCS) | One per matrix per batch | | 10 |
| | Blank Spike: %R within 80-120% | R(+/-) if %R < 50%<br>J(+)/UJ(-) if %R = 50-79%<br>J(+) if %R >120% | |
| | CRM: Result within manufacturer's certified acceptance range or project guidelines | J(+)/UJ(-) if < LCL,<br>J(+) if > UCL | |
| Matrix Spike/Matrix Spike Duplicate (MS/MSD) | One per matrix per batch<br>5% frequency<br>75-125% for samples less than 4x spike level | J(+) if %R>125%<br>J(+)/UJ(-) if %R <75%<br>J(+)/R(-) if %R<30%<br>all samples in batch | 8 |
| Laboratory Duplicate (or MS/MSD) | One per matrix per batch<br>RPD < 20% for samples > 5x RL<br>Diff < RL for samples > RL and < 5x RL<br>(Diff < 2x RL for solids) | J(+)/UJ(-) if RPD > 20% or diff > RL<br>all samples in batch | 9 |



Copyright 2006 EcoChem, Inc.

# EcoChem Validation Guidelines for Mercury Analysis by CVAA (Based on Inorganic NFG 1994 & 2004)

| VALIDATION QC ELEMENT | ACCEPTANCE CRITERIA | ACTION | REASON CODE |
|---|---|---|---|
| Field Blank | Blank < MDL | Action level is 5x blank conc.<br>U(+) sample values < action level<br>in associated field samples only | 6 |
| Field Duplicate | For results > 5x RL:<br>Water: RPD < 35% Solid: RPD < 50%<br>For results < 5x RL:<br>Water: Diff<RL Solid: Diff < 2x RL | J(+)/UJ(-) in parent samples only | 9 |
| Linear Range | Sample concentrations must be less than 110% of high standard | J values over range | 20 |



Copyright 2006 EcoChem, Inc.

# EcoChem Validation Guidelines for Conventional Chemistry Analysis (Based on EPA Standard Methods)

| VALIDATION QC ELEMENT | ACCEPTANCE CRITERIA | ACTION | REASON CODE |
|---|---|---|---|
| Cooler Temperature and Preservation | Cooler Temperature 4°C ±2°C<br>Preservation: Method Specific | Use Professional Judgment to qualify based to qualify for coole temp outliers<br>J(+)/UJ(-) if preservation requirements not met | 1 |
| Holding Time | Method Specific | Professional Judgment<br>J(+)/UJ(-) if holding time exceeded<br>J(+)/R(-) if HT exceeded by > 3X | 1 |
| Initial Calibration | Method specific<br>r>0.995 | Use professional judgment<br>J(+)/UJ(-) for r < 0.995 | 5A |
| Initial Calibration Verification (ICV) | Where applicable to method<br>Independent source analyzed immediately after calibration<br>%R method specific, usually 90% - 110% | R(+/-) if %R significantly < LCL<br>J(+)/UJ(-) if %R < LCL<br>J(+) if %R > UCL<br>R(+) if %R significantly > UCL | 5A |
| Continuing Cal Verification (CCV) | Where applicable to method<br>Every ten samples, immed. following ICV/ICB and end of run<br>%R method specific, usually 90% - 110% | R(+/-) if %R significantly < LCL<br>J(+)/UJ(-) if %R < LCL<br>J(+) if %R > UCL<br>R(+) if %R significantly > UCL | 5B |
| Initial and Continuing Cal Blanks (ICB/CCB) | Where applicable to method<br>After each ICV and CCV every ten samples and end of run<br>\| blank\| < MDL | Action level is 5x absolute value of blank conc.<br>For (+) blanks, U(+) results < action level<br>For (-) blanks, J(+)/UJ(-) results < action level<br>refer to TM-02 for additional details | 7 |
| Method Blank | One per matrix per batch<br>(not to exceed 20 samples)<br>blank < MDL | Action level is 5x absolute value of blank conc.<br>For (+) blk value, U(+) results < action level<br>For (-) blk value, J(+)/UJ(-) results < action level | 7 |
| Laboratory Control Sample | Waters:<br>One per matrix per batch<br>%R (80-120%) | R(+/-) if %R < 50%<br>J(+)/UJ(-) if %R = 50-79%<br>J(+) if %R >120% | 10 |
| | Soils:<br>One per matrix per batch<br>Result within manufacturer's certified acceptance range | J(+)/UJ(-) if < LCL,<br>J(+) if > UCL | 10 |
| Matrix Spike | One per matrix per batch; 5% frequency<br>75-125% for samples less than 4 x spike level | J(+) if %R > 125% or < 75%<br>UJ(-) if %R = 30-74%<br>R(+/-) results < IDL if %R < 30% | 8 |
| Laboratory Duplicate | One per matrix per batch<br>RPD <20% for samples > 5x RL<br>Diff <RL for samples >RL and <5 x RL<br>(may use RPD < 35%, Diff < 2X RL for solids) | J(+)/UJ(-) if RPD > 20% or diff > RL<br>all samples in batch | 9 |



Copyright 2006 EcoChem, Inc.

# EcoChem Validation Guidelines for Conventional Chemistry Analysis (Based on EPA Standard Methods)

| VALIDATION QC ELEMENT | ACCEPTANCE CRITERIA | ACTION | REASON CODE |
|---|---|---|---|
| Field Blank | blank < MDL | Action level is 5x blank conc.<br>U(+) sample values < action level<br>in associated field samples only | 6 |
| Field Duplicate | For results > 5X RL:<br>Water: RPD < 35% Solid: RPD < 50%<br>For results < 5 x RL:<br>Water: Diff<RL Solid: Diff < 2X RL | J(+)/UJ(-) in parent samples only | 9 |



Copyright 2006 EcoChem, Inc.

EcoChem, INC.
Environmental Data Quality

# APPENDIX B
# QUALIFIED DATA SUMMARY TABLE

## Qualified Data Summary Table
## San Jacinto River Waste Pits - Southern Impoundments

| SDG | Sample ID | Laboratory ID | Method | Analyte | Result | Units | Lab Qualifier | Validation Qualifier | Validation Reason |
|---|---|---|---|---|---|---|---|---|---|
| K1204325 | SL0403 | K1204325-024 | D412905M_CASSOP | Organic carbon | 0.314 | percent | | J | 9 |
| K1204325 | SL0403 | K1204325-024DUP | D412905M_CASSOP | Organic carbon | 0.229 | percent | | J | 9 |
| K1204325 | SL0403 | K1204325-024QUAD | D412905M_CASSOP | Organic carbon | 0.209 | percent | * | J | 9 |
| K1204325 | SL0403 | K1204325-024TPL | D412905M_CASSOP | Organic carbon | 0.192 | percent | | J | 9 |
| K1204356 | SL0354 | K1204356-003 | D412905M_CASSOP | Organic carbon | 0.192 | percent | | J | 9 |
| K1204356 | SL0354 | K1204356-003DUP | D412905M_CASSOP | Organic carbon | 0.136 | percent | | J | 9 |
| K1204356 | SL0354 | K1204356-003QUAD | D412905M_CASSOP | Organic carbon | 0.255 | percent | * | J | 9 |
| K1204356 | SL0354 | K1204356-003TPL | D412905M_CASSOP | Organic carbon | 0.136 | percent | | J | 9 |
| K1204356 | SL0364 | K1204356-019 | D412905M_CASSOP | Organic carbon | 0.595 | percent | | J | 9 |
| K1204356 | SL0364 | K1204356-019DUP | D412905M_CASSOP | Organic carbon | 0.728 | percent | | J | 9 |
| K1204356 | SL0364 | K1204356-019QUAD | D412905M_CASSOP | Organic carbon | 0.963 | percent | * | J | 9 |
| K1204356 | SL0364 | K1204356-019TPL | D412905M_CASSOP | Organic carbon | 0.728 | percent | | J | 9 |
| K1204356 | SL0376 | K1204356-027 | D412905M_CASSOP | Organic carbon | 0.028 | percent | J | J | 9 |
| K1204356 | SL0376 | K1204356-027DUP | D412905M_CASSOP | Organic carbon | 0.051 | percent | | J | 9 |
| K1204356 | SL0376 | K1204356-027QUAD | D412905M_CASSOP | Organic carbon | 0.118 | percent | * | J | 9 |
| K1204356 | SL0376 | K1204356-027TPL | D412905M_CASSOP | Organic carbon | 0.051 | percent | | J | 9 |
| K1204452 | SL0429 | K1204452-013 | D412905M_CASSOP | Organic carbon | 50.5 | percent | | J | 9 |
| K1204452 | SL0429 | K1204452-013DUP | D412905M_CASSOP | Organic carbon | 55.3 | percent | | J | 9 |
| K1204452 | SL0429 | K1204452-013QUAD | D412905M_CASSOP | Organic carbon | 54.8 | percent | | J | 9 |
| K1204452 | SL0429 | K1204452-013TPL | D412905M_CASSOP | Organic carbon | 56.1 | percent | | J | 9 |
| K1204226 | SL0331 | K1204226-029 | PSEP | Fine Sand | 28.17 | percent | | J | 9 |
| K1204226 | SL0331 | K1204226-029DUP | PSEP | Fine Sand | 22.54 | percent | | J | 9 |
| K1204226 | SL0331 | K1204226-029TPL | PSEP | Fine Sand | 16.69 | percent | | J | 9 |
| K1204377 | SL0430 | K1204377-020 | PSEP | Gravel | 27.07 | percent | | J | 9 |
| K1204377 | SL0430 | K1204377-020DUP | PSEP | Gravel | 32.95 | percent | | J | 9 |
| K1204377 | SL0430 | K1204377-020TPL | PSEP | Gravel | 44.35 | percent | | J | 9 |
| E1200470 | SJMW003 | E1200470-001 | EPA1613B | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin | 9.19 | pg/L | BJ | U | 7 |
| E1200470 | SJMW003 | E1200470-001 | EPA1613B | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-furan | 2.42 | pg/L | JK | U | 22 |
| E1200470 | SJMW003 | E1200470-001 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-furan | 0.951 | pg/L | JK | U | 22 |
| E1200470 | SJMW003 | E1200470-001 | EPA1613B | 2,3,4,7,8-Pentachlorodibenzo-p-furan | 1.53 | pg/L | JK | U | 22 |
| E1200470 | SJMW003 | E1200470-001 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 19.8 | pg/L | K | U | 22 |
| E1200470 | SJMW003 | E1200470-001 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 56 | pg/L | C | DNR | 11 |
| E1200470 | SJMW001 | E1200470-002 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-furan | 1.66 | pg/L | JK | U | 22 |
| E1200470 | SJMW001 | E1200470-002 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin | 2.22 | pg/L | JK | U | 22 |
| E1200470 | SJMW001 | E1200470-002 | EPA1613B | 2,3,4,6,7,8-Hexachlorodibenzo-p-furan | 1.3 | pg/L | JK | U | 22 |
| E1200470 | SJMW001 | E1200470-002 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 103 | pg/L | C | DNR | 11 |
| E1200475 | SL0301 | E1200475-001 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 7.84 | ng/kg | C | DNR | 11 |
| E1200475 | SL0302 | E1200475-002 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-furan | 1.05 | ng/kg | BJP | J | 14 |
| E1200475 | SL0302 | E1200475-002 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin | 0.253 | ng/kg | JK | U | 22 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| E1200475 | SL0302 | E1200475-002 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 2.24 | ng/kg | C | DNR | 11 |
| E1200475 | SL0303 | E1200475-003 | EPA1613B | 1,2,3,4,7,8,9-Heptachlorodibenzo-p-furan | 0.67 | ng/kg | JK | U | 22 |
| E1200475 | SL0303 | E1200475-003 | EPA1613B | 2,3,4,6,7,8-Hexachlorodibenzo-p-furan | 0.776 | ng/kg | JP | J | 14 |
| E1200475 | SL0303 | E1200475-003 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 0.588 | ng/kg | JK | U | 22 |
| E1200475 | SL0303 | E1200475-003 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 3.24 | ng/kg | C | DNR | 11 |
| E1200475 | SL0304 | E1200475-004 | EPA1613B | 1,2,3,4,7,8,9-Heptachlorodibenzo-p-furan | 0.145 | ng/kg | JK | U | 22 |
| E1200475 | SL0304 | E1200475-004 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin | 0.273 | ng/kg | JK | U | 22 |
| E1200475 | SL0304 | E1200475-004 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-furan | 0.326 | ng/kg | JK | U | 22 |
| E1200475 | SL0304 | E1200475-004 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 0.247 | ng/kg | JK | U | 22 |
| E1200475 | SL0304 | E1200475-004 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 1.12 | ng/kg | CJ | DNR | 11 |
| E1200475 | SL0305 | E1200475-005 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin | 1.22 | ng/kg | JK | U | 22 |
| E1200475 | SL0305 | E1200475-005 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin | 0.209 | ng/kg | JK | U | 22 |
| E1200475 | SL0305 | E1200475-005 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-furan | 0.452 | ng/kg | JK | U | 22 |
| E1200475 | SL0305 | E1200475-005 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 4.7 | ng/kg | C | DNR | 11 |
| E1200475 | SL0306 | E1200475-006 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin | 0.386 | ng/kg | JK | U | 22 |
| E1200475 | SL0306 | E1200475-006 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-furan | 0.158 | ng/kg | BJK | U | 22 |
| E1200475 | SL0306 | E1200475-006 | EPA1613B | 2,3,4,7,8-Pentachlorodibenzo-p-furan | 0.721 | ng/kg | JP | J | 14 |
| E1200475 | SL0306 | E1200475-006 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 15.6 | ng/kg | C | DNR | 11 |
| E1200475 | SL0307 | E1200475-007 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin | 0.121 | ng/kg | JK | U | 22 |
| E1200475 | SL0307 | E1200475-007 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin | 0.232 | ng/kg | JK | U | 22 |
| E1200475 | SL0307 | E1200475-007 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-furan | 0.0535 | ng/kg | BJK | U | 22 |
| E1200475 | SL0307 | E1200475-007 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin | 0.231 | ng/kg | JK | U | 22 |
| E1200475 | SL0307 | E1200475-007 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 53.6 | ng/kg | C | DNR | 11 |
| E1200475 | SL0308 | E1200475-008 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 6100 | ng/kg | E | DNR | 20 |
| E1200475 | SL0308 | E1200475-008 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 6610 | ng/kg | CE | DNR | 11 |
| E1200475 | SL0309 | E1200475-009 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin | 1.04 | ng/kg | JK | U | 22 |
| E1200475 | SL0309 | E1200475-009 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-furan | 0.0599 | ng/kg | BJ | U | 7 |
| E1200475 | SL0309 | E1200475-009 | EPA1613B | 2,3,4,6,7,8-Hexachlorodibenzo-p-furan | 0.183 | ng/kg | JK | U | 22 |
| E1200475 | SL0309 | E1200475-009 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 52.6 | ng/kg | C | DNR | 11 |
| E1200475 | SL0310 | E1200475-010 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-furan | 0.112 | ng/kg | BJ | U | 7 |
| E1200475 | SL0310 | E1200475-010 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 128 | ng/kg | C | DNR | 11 |
| E1200475 | SL0312 | E1200475-011 | EPA1613B | 1,2,3,4,7,8,9-Heptachlorodibenzo-p-furan | 0.642 | ng/kg | JK | U | 22 |
| E1200475 | SL0312 | E1200475-011 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin | 0.478 | ng/kg | JK | U | 22 |
| E1200475 | SL0312 | E1200475-011 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-furan | 0.698 | ng/kg | BJK | U | 22 |
| E1200475 | SL0312 | E1200475-011 | EPA1613B | 2,3,4,6,7,8-Hexachlorodibenzo-p-furan | 0.606 | ng/kg | JK | U | 22 |
| E1200475 | SL0312 | E1200475-011 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 25.1 | ng/kg | C | DNR | 11 |
| E1200475 | SL0313 | E1200475-012 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin | 0.549 | ng/kg | JK | U | 22 |
| E1200475 | SL0313 | E1200475-012 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-furan | 0.0679 | ng/kg | BJK | U | 22 |
| E1200475 | SL0313 | E1200475-012 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin | 0.13 | ng/kg | JK | U | 22 |
| E1200475 | SL0313 | E1200475-012 | EPA1613B | 2,3,4,6,7,8-Hexachlorodibenzo-p-furan | 0.295 | ng/kg | JK | U | 22 |
| E1200475 | SL0313 | E1200475-012 | EPA1613B | 2,3,4,7,8-Pentachlorodibenzo-p-furan | 0.268 | ng/kg | JK | U | 22 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| E1200475 | SL0313 | E1200475-012 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 5.19 | ng/kg | C | DNR | 11 |
| E1200475 | SL0314 | E1200475-013 | EPA1613B | 1,2,3,4,7,8,9-Heptachlorodibenzo-p-furan | 1.09 | ng/kg | JK | U | 22 |
| E1200475 | SL0314 | E1200475-013 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin | 0.205 | ng/kg | JK | U | 22 |
| E1200475 | SL0314 | E1200475-013 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin | 0.819 | ng/kg | JK | U | 22 |
| E1200475 | SL0314 | E1200475-013 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-furan | 0.188 | ng/kg | BJ | U | 7 |
| E1200475 | SL0314 | E1200475-013 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 170 | ng/kg | C | DNR | 11 |
| E1200475 | SL0315 | E1200475-014 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin | 0.133 | ng/kg | JK | U | 22 |
| E1200475 | SL0315 | E1200475-014 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 576 | ng/kg | CP | DNR | 11 |
| E1200475 | SL0316 | E1200475-015 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 139 | ng/kg | C | DNR | 11 |
| E1200475 | SL0317 | E1200475-016 | EPA1613B | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-furan | 0.163 | ng/kg | BJK | U | 22 |
| E1200475 | SL0317 | E1200475-016 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin | 0.135 | ng/kg | JK | U | 22 |
| E1200475 | SL0317 | E1200475-016 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 3.86 | ng/kg | C | DNR | 11 |
| E1200475 | SL0318 | E1200475-017 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin | 0.113 | ng/kg | JK | U | 22 |
| E1200475 | SL0318 | E1200475-017 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 0.532 | ng/kg | JK | U | 22 |
| E1200475 | SL0318 | E1200475-017 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 1.82 | ng/kg | C | DNR | 11 |
| E1200475 | SL0319 | E1200475-018 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 0.978 | ng/kg | CJ | DNR | 11 |
| E1200475 | SL0320 | E1200475-019 | EPA1613B | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin | 0.389 | ng/kg | BJK | U | 22 |
| E1200475 | SL0322 | E1200475-020 | EPA1613B | 1,2,3,4,7,8,9-Heptachlorodibenzo-p-furan | 0.309 | ng/kg | JK | U | 22 |
| E1200475 | SL0322 | E1200475-020 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin | 0.154 | ng/kg | JK | U | 22 |
| E1200475 | SL0322 | E1200475-020 | EPA1613B | 2,3,4,7,8-Pentachlorodibenzo-p-furan | 0.642 | ng/kg | JK | U | 22 |
| E1200475 | SL0322 | E1200475-020 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 14 | ng/kg | C | DNR | 11 |
| E1200476 | SL0323 | E1200476-001 | EPA1613B | 1,2,3,4,7,8,9-Heptachlorodibenzo-p-furan | 0.106 | ng/kg | BJ | U | 7 |
| E1200476 | SL0323 | E1200476-001 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin | 0.0862 | ng/kg | JK | U | 22 |
| E1200476 | SL0323 | E1200476-001 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin | 0.222 | ng/kg | JK | U | 22 |
| E1200476 | SL0323 | E1200476-001 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-furan | 0.13 | ng/kg | BJK | U | 22 |
| E1200476 | SL0323 | E1200476-001 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin | 0.086 | ng/kg | JK | U | 22 |
| E1200476 | SL0323 | E1200476-001 | EPA1613B | 2,3,4,6,7,8-Hexachlorodibenzo-p-furan | 0.106 | ng/kg | JK | U | 22 |
| E1200476 | SL0323 | E1200476-001 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 3.87 | ng/kg | C | DNR | 11 |
| E1200476 | SL0324 | E1200476-002 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 1190 | ng/kg | C | DNR | 11 |
| E1200476 | SL0325 | E1200476-003 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin | 0.196 | ng/kg | JK | U | 22 |
| E1200476 | SL0325 | E1200476-003 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 1510 | ng/kg | C | DNR | 11 |
| E1200476 | SL0326 | E1200476-004 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin | 0.755 | ng/kg | JK | U | 22 |
| E1200476 | SL0326 | E1200476-004 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 3690 | ng/kg | E | DNR | 20 |
| E1200476 | SL0326 | E1200476-004 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 4270 | ng/kg | CE | DNR | 11 |
| E1200476 | SL0327 | E1200476-005 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin | 0.039 | ng/kg | JK | U | 22 |
| E1200476 | SL0327 | E1200476-005 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin | 0.18 | ng/kg | JK | U | 22 |
| E1200476 | SL0327 | E1200476-005 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-furan | 0.141 | ng/kg | BJK | U | 22 |
| E1200476 | SL0327 | E1200476-005 | EPA1613B | 2,3,4,6,7,8-Hexachlorodibenzo-p-furan | 0.24 | ng/kg | JK | U | 22 |
| E1200476 | SL0327 | E1200476-005 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 127 | ng/kg | C | DNR | 11 |
| E1200476 | SL0328 | E1200476-006 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-furan | 0.112 | ng/kg | JK | U | 22 |
| E1200476 | SL0328 | E1200476-006 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin | 0.087 | ng/kg | JK | U | 22 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| E1200476 | SL0328 | E1200476-006 | EPA1613B | 2,3,4,7,8-Pentachlorodibenzo-p-furan | 0.0445 | ng/kg | JK | U | 22 |
| E1200476 | SL0328 | E1200476-006 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 0.554 | ng/kg | JK | U | 22 |
| E1200476 | SL0328 | E1200476-006 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 1.48 | ng/kg | C | DNR | 11 |
| E1200476 | SL0329 | E1200476-007 | EPA1613B | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin | 0.27 | ng/kg | BJ | U | 7 |
| E1200476 | SL0329 | E1200476-007 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 0.119 | ng/kg | JK | U | 22 |
| E1200476 | SL0329 | E1200476-007 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 0.309 | ng/kg | CJ | DNR | 11 |
| E1200476 | SL0330 | E1200476-008 | EPA1613B | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-furan | 0.151 | ng/kg | BJK | U | 22 |
| E1200476 | SL0330 | E1200476-008 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin | 0.166 | ng/kg | JK | U | 22 |
| E1200476 | SL0330 | E1200476-008 | EPA1613B | 2,3,4,7,8-Pentachlorodibenzo-p-furan | 0.168 | ng/kg | JKP | U | 22 |
| E1200476 | SL0330 | E1200476-008 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 5.18 | ng/kg | C | DNR | 11 |
| E1200476 | SL0330 | E1200476-008 | EPA1613B | Octachlorodibenzo-p-furan | 0.103 | ng/kg | JK | U | 22 |
| E1200476 | SL0331 | E1200476-009 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin | 0.033 | ng/kg | JK | U | 22 |
| E1200476 | SL0331 | E1200476-009 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin | 0.0369 | ng/kg | JK | U | 22 |
| E1200476 | SL0331 | E1200476-009 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 27.2 | ng/kg | C | DNR | 11 |
| E1200477 | SD0001 | E1200477-001 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-furan | 0.106 | ng/kg | BJK | U | 22 |
| E1200477 | SD0001 | E1200477-001 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin | 0.347 | ng/kg | JK | U | 22 |
| E1200477 | SD0001 | E1200477-001 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 37.5 | ng/kg | C | DNR | 11 |
| E1200477 | SD0002 | E1200477-002 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin | 0.275 | ng/kg | JK | U | 22 |
| E1200477 | SD0002 | E1200477-002 | EPA1613B | 2,3,4,6,7,8-Hexachlorodibenzo-p-furan | 0.127 | ng/kg | JK | U | 22 |
| E1200477 | SD0002 | E1200477-002 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 9.72 | ng/kg | C | DNR | 11 |
| E1200477 | SD0003 | E1200477-003 | EPA1613B | 1,2,3,4,7,8,9-Heptachlorodibenzo-p-furan | 0.165 | ng/kg | BJK | U | 22 |
| E1200477 | SD0003 | E1200477-003 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-furan | 0.228 | ng/kg | JK | U | 22 |
| E1200477 | SD0003 | E1200477-003 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-furan | 0.115 | ng/kg | BJK | U | 22 |
| E1200477 | SD0003 | E1200477-003 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin | 0.172 | ng/kg | JK | U | 22 |
| E1200477 | SD0003 | E1200477-003 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-furan | 0.125 | ng/kg | JK | U | 22 |
| E1200477 | SD0003 | E1200477-003 | EPA1613B | 2,3,4,6,7,8-Hexachlorodibenzo-p-furan | 0.0579 | ng/kg | JK | U | 22 |
| E1200477 | SD0003 | E1200477-003 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 2.91 | ng/kg | C | DNR | 11 |
| E1200477 | SD0004 | E1200477-004 | EPA1613B | 1,2,3,4,7,8,9-Heptachlorodibenzo-p-furan | 0.205 | ng/kg | BJ | U | 7 |
| E1200477 | SD0004 | E1200477-004 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin | 0.147 | ng/kg | JK | U | 22 |
| E1200477 | SD0004 | E1200477-004 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-furan | 0.187 | ng/kg | BJK | U | 22 |
| E1200477 | SD0004 | E1200477-004 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin | 0.394 | ng/kg | JK | U | 22 |
| E1200477 | SD0004 | E1200477-004 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin | 0.0803 | ng/kg | JK | U | 22 |
| E1200477 | SD0004 | E1200477-004 | EPA1613B | 2,3,4,6,7,8-Hexachlorodibenzo-p-furan | 0.106 | ng/kg | JK | U | 22 |
| E1200477 | SD0004 | E1200477-004 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 8.89 | ng/kg | C | DNR | 11 |
| E1200477 | SD0005 | E1200477-005 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-furan | 0.0607 | ng/kg | BJK | U | 22 |
| E1200477 | SD0005 | E1200477-005 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin | 0.184 | ng/kg | JK | U | 22 |
| E1200477 | SD0005 | E1200477-005 | EPA1613B | 2,3,4,6,7,8-Hexachlorodibenzo-p-furan | 0.173 | ng/kg | JK | U | 22 |
| E1200477 | SD0005 | E1200477-005 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 17.1 | ng/kg | C | DNR | 11 |
| E1200477 | SD0006 | E1200477-006 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin | 0.361 | ng/kg | JK | U | 22 |
| E1200477 | SD0006 | E1200477-006 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin | 0.703 | ng/kg | JK | U | 22 |
| E1200477 | SD0006 | E1200477-006 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin | 0.18 | ng/kg | JK | U | 22 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| E1200477 | SD0006 | E1200477-006 | EPA1613B | 2,3,4,6,7,8-Hexachlorodibenzo-p-furan | 0.21 | ng/kg | JK | U | 22 |
| E1200477 | SD0006 | E1200477-006 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 19.9 | ng/kg | C | DNR | 11 |
| E1200477 | SD0007 | E1200477-007 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin | 1.3 | ng/kg | JK | U | 22 |
| E1200477 | SD0007 | E1200477-007 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 16.8 | ng/kg | C | DNR | 11 |
| E1200477 | SD0008 | E1200477-008 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 24.7 | ng/kg | C | DNR | 11 |
| E1200477 | SD0009 | E1200477-009 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin | 0.388 | ng/kg | JK | U | 22 |
| E1200477 | SD0009 | E1200477-009 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin | 0.934 | ng/kg | JK | U | 22 |
| E1200477 | SD0009 | E1200477-009 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 23.6 | ng/kg | C | DNR | 11 |
| E1200477 | SD0010 | E1200477-010 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin | 0.781 | ng/kg | JK | U | 22 |
| E1200477 | SD0010 | E1200477-010 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin | 0.166 | ng/kg | JK | U | 22 |
| E1200477 | SD0010 | E1200477-010 | EPA1613B | 2,3,4,6,7,8-Hexachlorodibenzo-p-furan | 0.361 | ng/kg | JK | U | 22 |
| E1200477 | SD0010 | E1200477-010 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 9.47 | ng/kg | C | DNR | 11 |
| E1200477 | SD0011 | E1200477-011 | EPA1613B | 2,3,4,6,7,8-Hexachlorodibenzo-p-furan | 0.261 | ng/kg | JK | U | 22 |
| E1200477 | SD0011 | E1200477-011 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 16.2 | ng/kg | C | DNR | 11 |
| E1200477 | SD0012 | E1200477-012 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 41.5 | ng/kg | C | DNR | 11 |
| E1200477 | SD0013 | E1200477-013 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-furan | 0.0942 | ng/kg | JK | U | 22 |
| E1200477 | SD0013 | E1200477-013 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 33.1 | ng/kg | C | DNR | 11 |
| E1200477 | FW0001 | E1200477-014 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-furan | 0.251 | pg | BJK | UJ | 10,22 |
| E1200477 | FW0001 | E1200477-014 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin | 0.479 | pg | JK | U | 22 |
| E1200477 | FW0001 | E1200477-014 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 1.25 | pg | CJK | DNR | 11 |
| E1200477 | FW0001 | E1200477-014 | EPA1613B | Octachlorodibenzo-p-dioxin | 30 | pg | BJ | U | 7 |
| E1200477 | SD0014 | E1200477-015 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-furan | 249 | ng/kg | | J | 13 |
| E1200477 | SD0014 | E1200477-015 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin | 64.1 | ng/kg | | J | 13 |
| E1200477 | SD0014 | E1200477-015 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-furan | 100 | ng/kg | | J | 13 |
| E1200477 | SD0014 | E1200477-015 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin | 30.2 | ng/kg | | J | 14 |
| E1200477 | SD0014 | E1200477-015 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-furan | 2.21 | ng/kg | J | J | 13 |
| E1200477 | SD0014 | E1200477-015 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-furan | 44.3 | ng/kg | P | J | 14 |
| E1200477 | SD0014 | E1200477-015 | EPA1613B | 2,3,4,6,7,8-Hexachlorodibenzo-p-furan | 52.5 | ng/kg | P | J | 13,14 |
| E1200477 | SD0014 | E1200477-015 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 194 | ng/kg | C | DNR | 11 |
| E1200477 | FB0001 | E1200477-016 | EPA1613B | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin | 0.941 | pg | BJK | U | 22 |
| E1200477 | FB0001 | E1200477-016 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-furan | 0.075 | pg | U | UJ | 10 |
| E1200477 | FB0001 | E1200477-016 | EPA1613B | Octachlorodibenzo-p-dioxin | 10.7 | pg | BJ | U | 7 |
| E1200480 | SJMW002 | E1200480-001 | EPA1613B | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-furan | 3.42 | pg/L | JK | U | 22 |
| E1200480 | SJMW002 | E1200480-001 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 25.8 | pg/L | C | DNR | 11 |
| E1200480 | SJMW002DUP1 | E1200480-002 | EPA1613B | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-furan | 4.2 | pg/L | JK | U | 22 |
| E1200480 | SJMW002DUP1 | E1200480-002 | EPA1613B | 2,3,4,6,7,8-Hexachlorodibenzo-p-furan | 1.06 | pg/L | JK | U | 22 |
| E1200480 | SJMW002DUP1 | E1200480-002 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 24.9 | pg/L | C | DNR | 11 |
| E1200480 | SJRM001 | E1200480-003 | EPA1613B | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin | 2.01 | pg/L | BJK | U | 22 |
| E1200480 | ERBLANK | E1200480-004 | EPA1613B | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin | 1.55 | pg/L | BJK | U | 22 |
| E1200485 | SL0345 | E1200485-001 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-furan | 0.29 | ng/kg | JK | U | 22 |
| E1200485 | SL0345 | E1200485-001 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-furan | 0.142 | ng/kg | JK | U | 22 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| E1200485 | SL0345 | E1200485-001 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-furan | 0.0585 | ng/kg | JK | U | 22 |
| E1200485 | SL0345 | E1200485-001 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin | 0.172 | ng/kg | JK | U | 22 |
| E1200485 | SL0345 | E1200485-001 | EPA1613B | 2,3,4,7,8-Pentachlorodibenzo-p-furan | 0.119 | ng/kg | JK | U | 22 |
| E1200485 | SL0345 | E1200485-001 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 0.561 | ng/kg | JK | U | 22 |
| E1200485 | SL0345 | E1200485-001 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 1.89 | ng/kg | CK | DNR | 11 |
| E1200485 | SL0346 | E1200485-002 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin | 0.757 | ng/kg | JK | U | 22 |
| E1200485 | SL0346 | E1200485-002 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-furan | 0.115 | ng/kg | JK | U | 22 |
| E1200485 | SL0346 | E1200485-002 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 1.36 | ng/kg | C | DNR | 11 |
| E1200485 | SL0349 | E1200485-003 | EPA1613B | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin | 759 | ng/kg | B,D | DNR | 11 |
| E1200485 | SL0349 | E1200485-003 | EPA1613B | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-furan | 31.1 | ng/kg | J,D | DNR | 11 |
| E1200485 | SL0349 | E1200485-003 | EPA1613B | 1,2,3,4,7,8,9-Heptachlorodibenzo-p-furan | 4.46 | ng/kg | J,D | DNR | 11 |
| E1200485 | SL0349 | E1200485-003 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin | 5.55 | ng/kg | JK,D | DNR | 11 |
| E1200485 | SL0349 | E1200485-003 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-furan | 5.44 | ng/kg | JK,D | DNR | 11 |
| E1200485 | SL0349 | E1200485-003 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin | 15.1 | ng/kg | J,D | DNR | 11 |
| E1200485 | SL0349 | E1200485-003 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-furan | 1.52 | ng/kg | JK,D | DNR | 11 |
| E1200485 | SL0349 | E1200485-003 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin | 15.8 | ng/kg | J,D | DNR | 11 |
| E1200485 | SL0349 | E1200485-003 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-furan | 1.1 | ng/kg | U,D | DNR | 11 |
| E1200485 | SL0349 | E1200485-003 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin | 5.72 | ng/kg | J,D | DNR | 11 |
| E1200485 | SL0349 | E1200485-003 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-furan | 3.2 | ng/kg | J,D | DNR | 11 |
| E1200485 | SL0349 | E1200485-003 | EPA1613B | 2,3,4,6,7,8-Hexachlorodibenzo-p-furan | 1.59 | ng/kg | JK | U | 22 |
| E1200485 | SL0349 | E1200485-003 | EPA1613B | 2,3,4,6,7,8-Hexachlorodibenzo-p-furan | 2.13 | ng/kg | J,D | DNR | 11 |
| E1200485 | SL0349 | E1200485-003 | EPA1613B | 2,3,4,7,8-Pentachlorodibenzo-p-furan | 1.71 | ng/kg | J,D | DNR | 11 |
| E1200485 | SL0349 | E1200485-003 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 9.58 | ng/kg | J,D | DNR | 11 |
| E1200485 | SL0349 | E1200485-003 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 11.3 | ng/kg | C | DNR | 11 |
| E1200485 | SL0349 | E1200485-003 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 31.2 | ng/kg | C,D | DNR | 11 |
| E1200485 | SL0349 | E1200485-003 | EPA1613B | Octachlorodibenzo-p-dioxin | 79400 | ng/kg | BE | DNR | 20 |
| E1200485 | SL0349 | E1200485-003 | EPA1613B | Octachlorodibenzo-p-furan | 121 | ng/kg | J,D | DNR | 11 |
| E1200485 | SL0350 | E1200485-004 | EPA1613B | 2,3,4,6,7,8-Hexachlorodibenzo-p-furan | 10.6 | ng/kg | K | U | 22 |
| E1200485 | SL0350 | E1200485-004 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 4580 | ng/kg | CE | DNR | 11 |
| E1200485 | SL0350 | E1200485-004 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 5010 | ng/kg | E | DNR | 20 |
| E1200485 | SL0351 | E1200485-005 | EPA1613B | 1,2,3,4,7,8,9-Heptachlorodibenzo-p-furan | 0.147 | ng/kg | JK | U | 22 |
| E1200485 | SL0351 | E1200485-005 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin | 0.151 | ng/kg | JK | U | 22 |
| E1200485 | SL0351 | E1200485-005 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-furan | 0.153 | ng/kg | JK | U | 22 |
| E1200485 | SL0351 | E1200485-005 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin | 0.13 | ng/kg | JK | U | 22 |
| E1200485 | SL0351 | E1200485-005 | EPA1613B | 2,3,4,6,7,8-Hexachlorodibenzo-p-furan | 0.0671 | ng/kg | JK | U | 22 |
| E1200485 | SL0351 | E1200485-005 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 8.76 | ng/kg | C | DNR | 11 |
| E1200485 | SL0362 | E1200485-006 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-furan | 0.0615 | ng/kg | JK | U | 22 |
| E1200485 | SL0362 | E1200485-006 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin | 0.126 | ng/kg | JK | U | 22 |
| E1200485 | SL0362 | E1200485-006 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 2.79 | ng/kg | C | DNR | 11 |
| E1200485 | SL0362 | E1200485-006 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 2.9 | ng/kg | K | U | 22 |
| E1200485 | FW0002 | E1200485-007 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-furan | 0.079 | pg | U | UJ | 10 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| E1200485 | FW0002 | E1200485-007 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 1.07 | pg | CJ | DNR | 11 |
| E1200485 | FW0002 | E1200485-007 | EPA1613B | Octachlorodibenzo-p-dioxin | 9.15 | pg | BJ | U | 7 |
| E1200485 | SL0353 | E1200485-008 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-furan | 0.114 | ng/kg | JK | U | 22 |
| E1200485 | SL0353 | E1200485-008 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 3.91 | ng/kg | C | DNR | 11 |
| E1200485 | SL0353 | E1200485-008 | EPA1613B | Pentachlorodibenzo-p-furan (Total) | 6.27 | ng/kg | J | J | 14 |
| E1200485 | SL0354 | E1200485-009 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin | 0.058 | ng/kg | JK | U | 22 |
| E1200485 | SL0354 | E1200485-009 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin | 0.121 | ng/kg | JK | U | 22 |
| E1200485 | SL0354 | E1200485-009 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin | 0.0443 | ng/kg | JK | U | 22 |
| E1200485 | SL0354 | E1200485-009 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 0.142 | ng/kg | CJK | DNR | 11 |
| E1200485 | SL0355 | E1200485-010 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-furan | 0.0798 | ng/kg | JK | U | 22 |
| E1200485 | SL0355 | E1200485-010 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-furan | 0.713 | ng/kg | JP | J | 14 |
| E1200485 | SL0355 | E1200485-010 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 4.81 | ng/kg | C | DNR | 11 |
| E1200485 | SL0355 | E1200485-010 | EPA1613B | Pentachlorodibenzo-p-furan (Total) | 17.3 | ng/kg | | J | 14 |
| E1200485 | SL0356 | E1200485-011 | EPA1613B | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin | 1140 | ng/kg | B,D | DNR | 11 |
| E1200485 | SL0356 | E1200485-011 | EPA1613B | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-furan | 268 | ng/kg | D | DNR | 11 |
| E1200485 | SL0356 | E1200485-011 | EPA1613B | 1,2,3,4,7,8,9-Heptachlorodibenzo-p-furan | 76.9 | ng/kg | D | DNR | 11 |
| E1200485 | SL0356 | E1200485-011 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin | 10.2 | ng/kg | JK,D | DNR | 11 |
| E1200485 | SL0356 | E1200485-011 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-furan | 476 | ng/kg | D | DNR | 11 |
| E1200485 | SL0356 | E1200485-011 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin | 42.6 | ng/kg | J,D | DNR | 11 |
| E1200485 | SL0356 | E1200485-011 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-furan | 129 | ng/kg | D | DNR | 11 |
| E1200485 | SL0356 | E1200485-011 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin | 43.5 | ng/kg | J,D | DNR | 11 |
| E1200485 | SL0356 | E1200485-011 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-furan | 9.44 | ng/kg | J,D | DNR | 11 |
| E1200485 | SL0356 | E1200485-011 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin | 50.4 | ng/kg | J,D | DNR | 11 |
| E1200485 | SL0356 | E1200485-011 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-furan | 361 | ng/kg | D | DNR | 11 |
| E1200485 | SL0356 | E1200485-011 | EPA1613B | 2,3,4,6,7,8-Hexachlorodibenzo-p-furan | 34 | ng/kg | J,D | DNR | 11 |
| E1200485 | SL0356 | E1200485-011 | EPA1613B | 2,3,4,7,8-Pentachlorodibenzo-p-furan | 281 | ng/kg | D | DNR | 11 |
| E1200485 | SL0356 | E1200485-011 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 3750 | ng/kg | E | DNR | 20 |
| E1200485 | SL0356 | E1200485-011 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 13000 | ng/kg | C,D | DNR | 11 |
| E1200485 | SL0356 | E1200485-011 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 10700 | ng/kg | E,D | DNR | 20 |
| E1200485 | SL0356 | E1200485-011 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 10100 | ng/kg | CEP | DNR | 11 |
| E1200485 | SL0356 | E1200485-011 | EPA1613B | Octachlorodibenzo-p-dioxin | 13600 | ng/kg | B,D | DNR | 11 |
| E1200485 | SL0356 | E1200485-011 | EPA1613B | Octachlorodibenzo-p-furan | 1520 | ng/kg | D | DNR | 11 |
| E1200485 | SL0357 | E1200485-012 | EPA1613B | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin | 626 | ng/kg | B,D | DNR | 11 |
| E1200485 | SL0357 | E1200485-012 | EPA1613B | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-furan | 381 | ng/kg | D | DNR | 11 |
| E1200485 | SL0357 | E1200485-012 | EPA1613B | 1,2,3,4,7,8,9-Heptachlorodibenzo-p-furan | 77.2 | ng/kg | J,D | DNR | 11 |
| E1200485 | SL0357 | E1200485-012 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin | 6.63 | ng/kg | J,D | DNR | 11 |
| E1200485 | SL0357 | E1200485-012 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-furan | 312 | ng/kg | D | DNR | 11 |
| E1200485 | SL0357 | E1200485-012 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin | 27 | ng/kg | J,D | DNR | 11 |
| E1200485 | SL0357 | E1200485-012 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-furan | 87 | ng/kg | D | DNR | 11 |
| E1200485 | SL0357 | E1200485-012 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin | 17.2 | ng/kg | J,D | DNR | 11 |
| E1200485 | SL0357 | E1200485-012 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-furan | 6.4 | ng/kg | J,D | DNR | 11 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| E1200485 | SL0357 | E1200485-012 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin | 34 | ng/kg | J,D | DNR | 11 |
| E1200485 | SL0357 | E1200485-012 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-furan | 241 | ng/kg | D | DNR | 11 |
| E1200485 | SL0357 | E1200485-012 | EPA1613B | 2,3,4,6,7,8-Hexachlorodibenzo-p-furan | 27.4 | ng/kg | J,D | DNR | 11 |
| E1200485 | SL0357 | E1200485-012 | EPA1613B | 2,3,4,7,8-Pentachlorodibenzo-p-furan | 195 | ng/kg | D | DNR | 11 |
| E1200485 | SL0357 | E1200485-012 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 3590 | ng/kg | E | DNR | 20 |
| E1200485 | SL0357 | E1200485-012 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 11000 | ng/kg | E,D | DNR | 20 |
| E1200485 | SL0357 | E1200485-012 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 9300 | ng/kg | C,D | DNR | 11 |
| E1200485 | SL0357 | E1200485-012 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 10300 | ng/kg | CE | DNR | 11 |
| E1200485 | SL0357 | E1200485-012 | EPA1613B | Octachlorodibenzo-p-dioxin | 12400 | ng/kg | B,D | DNR | 11 |
| E1200485 | SL0357 | E1200485-012 | EPA1613B | Octachlorodibenzo-p-furan | 14800 | ng/kg | D | DNR | 11 |
| E1200485 | SL0358 | E1200485-013 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 1030 | ng/kg | C | DNR | 11 |
| E1200485 | SL0359 | E1200485-014 | EPA1613B | 1,2,3,4,7,8,9-Heptachlorodibenzo-p-furan | 0.199 | ng/kg | JK | U | 22 |
| E1200485 | SL0359 | E1200485-014 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin | 0.28 | ng/kg | JK | U | 22 |
| E1200485 | SL0359 | E1200485-014 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 21.4 | ng/kg | K | U | 22 |
| E1200485 | SL0359 | E1200485-014 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 18.7 | ng/kg | C | DNR | 11 |
| E1200485 | SL0360 | E1200485-015 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-furan | 0.119 | ng/kg | JK | U | 22 |
| E1200485 | SL0360 | E1200485-015 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin | 0.253 | ng/kg | JK | U | 22 |
| E1200485 | SL0360 | E1200485-015 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 8.16 | ng/kg | C | DNR | 11 |
| E1200485 | SL0361 | E1200485-016 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin | 0.372 | ng/kg | JK | U | 22 |
| E1200485 | SL0361 | E1200485-016 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin | 0.155 | ng/kg | JK | U | 22 |
| E1200485 | SL0361 | E1200485-016 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 13.9 | ng/kg | C | DNR | 11 |
| E1200485 | SL0300 | E1200485-017 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-furan | 3.14 | ng/kg | JP | J | 14 |
| E1200485 | SL0300 | E1200485-017 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-furan | 0.872 | ng/kg | JP | J | 14 |
| E1200485 | SL0300 | E1200485-017 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 4.93 | ng/kg | C | DNR | 11 |
| E1200485 | SL0311 | E1200485-018 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-furan | 0.106 | ng/kg | JK | U | 22 |
| E1200485 | SL0311 | E1200485-018 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 69 | ng/kg | C | DNR | 11 |
| E1200485 | SL0364 | E1200485-019 | EPA1613B | 2,3,4,6,7,8-Hexachlorodibenzo-p-furan | 1.1 | ng/kg | JK | U | 22 |
| E1200485 | SL0364 | E1200485-019 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 10.2 | ng/kg | C | DNR | 11 |
| E1200485 | SL0365 | E1200485-020 | EPA1613B | 1,2,3,4,7,8,9-Heptachlorodibenzo-p-furan | 0.0715 | ng/kg | JK | U | 22 |
| E1200485 | SL0365 | E1200485-020 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin | 0.112 | ng/kg | JK | U | 22 |
| E1200485 | SL0365 | E1200485-020 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin | 0.393 | ng/kg | JK | U | 22 |
| E1200485 | SL0365 | E1200485-020 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-furan | 0.106 | ng/kg | JK | U | 22 |
| E1200485 | SL0365 | E1200485-020 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin | 0.321 | ng/kg | JK | U | 22 |
| E1200485 | SL0365 | E1200485-020 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 0.386 | ng/kg | JK | U | 22 |
| E1200485 | SL0365 | E1200485-020 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 1.16 | ng/kg | CJ | DNR | 11 |
| E1200486 | SL0366 | E1200486-001 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-furan | 0.128 | ng/kg | | U | 22 |
| E1200486 | SL0366 | E1200486-001 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 13 | ng/kg | CP | DNR | 11 |
| E1200486 | SL0368 | E1200486-002 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 7.31 | ng/kg | C | DNR | 11 |
| E1200486 | SL0368 | E1200486-002 | EPA1613B | Octachlorodibenzo-p-dioxin | 34000 | ng/kg | BE | DNR | 20 |
| E1200486 | SL0368 | E1200486-002DL | EPA1613B | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin | 2010 | ng/kg | B,D | DNR | 11 |
| E1200486 | SL0368 | E1200486-002DL | EPA1613B | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-furan | 119 | ng/kg | B,D | DNR | 11 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| E1200486 | SL0368 | E1200486-002DL | EPA1613B | 1,2,3,4,7,8,9-Heptachlorodibenzo-p-furan | 6.13 | ng/kg | J,D | DNR | 11 |
| E1200486 | SL0368 | E1200486-002DL | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin | 24.1 | ng/kg | J,D | DNR | 11 |
| E1200486 | SL0368 | E1200486-002DL | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-furan | 3.95 | ng/kg | JK,D | DNR | 11 |
| E1200486 | SL0368 | E1200486-002DL | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin | 79.2 | ng/kg | D | DNR | 11 |
| E1200486 | SL0368 | E1200486-002DL | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-furan | 2.21 | ng/kg | JK,D | DNR | 11 |
| E1200486 | SL0368 | E1200486-002DL | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin | 33.4 | ng/kg | J,D | DNR | 11 |
| E1200486 | SL0368 | E1200486-002DL | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-furan | 0.721 | ng/kg | JK,D | DNR | 11 |
| E1200486 | SL0368 | E1200486-002DL | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin | 6.7 | ng/kg | J,D | DNR | 11 |
| E1200486 | SL0368 | E1200486-002DL | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-furan | 1.05 | ng/kg | JK,D | DNR | 11 |
| E1200486 | SL0368 | E1200486-002DL | EPA1613B | 2,3,4,6,7,8-Hexachlorodibenzo-p-furan | 5.44 | ng/kg | J,D | DNR | 11 |
| E1200486 | SL0368 | E1200486-002DL | EPA1613B | 2,3,4,7,8-Pentachlorodibenzo-p-furan | 1 | ng/kg | J,D | DNR | 11 |
| E1200486 | SL0368 | E1200486-002DL | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 5.2 | ng/kg | JK,D | DNR | 11 |
| E1200486 | SL0368 | E1200486-002DL | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 13 | ng/kg | C,D | DNR | 11 |
| E1200486 | SL0368 | E1200486-002DL | EPA1613B | Octachlorodibenzo-p-furan | 375 | ng/kg | B,D | DNR | 11 |
| E1200486 | SL0369 | E1200486-003 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 448 | ng/kg | C | DNR | 11 |
| E1200486 | SL0370 | E1200486-004 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-furan | 0.068 | ng/kg | JK | U | 22 |
| E1200486 | SL0370 | E1200486-004 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 36.2 | ng/kg | C | DNR | 11 |
| E1200486 | SL0371 | E1200486-005 | EPA1613B | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-furan | 0.285 | ng/kg | BJ | U | 7 |
| E1200486 | SL0371 | E1200486-005 | EPA1613B | 1,2,3,4,7,8,9-Heptachlorodibenzo-p-furan | 0.0684 | ng/kg | JK | U | 22 |
| E1200486 | SL0371 | E1200486-005 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin | 0.212 | ng/kg | JK | U | 22 |
| E1200486 | SL0371 | E1200486-005 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-furan | 0.194 | ng/kg | JK | U | 22 |
| E1200486 | SL0371 | E1200486-005 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-furan | 0.135 | ng/kg | JK | U | 22 |
| E1200486 | SL0371 | E1200486-005 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 3.9 | ng/kg | C | DNR | 11 |
| E1200486 | SL0372 | E1200486-006 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 348 | ng/kg | C | DNR | 11 |
| E1200486 | SL0321 | E1200486-007 | EPA1613B | 1,2,3,4,7,8,9-Heptachlorodibenzo-p-furan | 0.324 | ng/kg | JK | U | 22 |
| E1200486 | SL0321 | E1200486-007 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-furan | 0.104 | ng/kg | JK | U | 22 |
| E1200486 | SL0321 | E1200486-007 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 5.59 | ng/kg | C | DNR | 11 |
| E1200486 | SL0332 | E1200486-008 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 73 | ng/kg | C | DNR | 11 |
| E1200486 | SL0374 | E1200486-009 | EPA1613B | 1,2,3,4,7,8,9-Heptachlorodibenzo-p-furan | 0.21 | ng/kg | JK | U | 22 |
| E1200486 | SL0374 | E1200486-009 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin | 0.115 | ng/kg | JK | U | 22 |
| E1200486 | SL0374 | E1200486-009 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 8.73 | ng/kg | C | DNR | 11 |
| E1200486 | SL0375 | E1200486-010 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin | 0.324 | ng/kg | JK | U | 22 |
| E1200486 | SL0375 | E1200486-010 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 24.4 | ng/kg | C | DNR | 11 |
| E1200486 | SL0376 | E1200486-011 | EPA1613B | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-furan | 0.945 | ng/kg | BJ | U | 7 |
| E1200486 | SL0376 | E1200486-011 | EPA1613B | 1,2,3,4,7,8,9-Heptachlorodibenzo-p-furan | 0.125 | ng/kg | JK | U | 22 |
| E1200486 | SL0376 | E1200486-011 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-furan | 0.0724 | ng/kg | JK | U | 22 |
| E1200486 | SL0376 | E1200486-011 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-furan | 0.0891 | ng/kg | JK | U | 22 |
| E1200486 | SL0376 | E1200486-011 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 1.84 | ng/kg | C | DNR | 11 |
| E1200486 | SL0377 | E1200486-012 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-furan | 12.5 | ng/kg | P | J | 14 |
| E1200486 | SL0377 | E1200486-012 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-furan | 5.31 | ng/kg | JP | J | 14 |
| E1200486 | SL0377 | E1200486-012 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 156 | ng/kg | C | DNR | 11 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| E1200486 | SL0378 | E1200486-013 | EPA1613B | 2,3,4,6,7,8-Hexachlorodibenzo-p-furan | 8.35 | ng/kg | P | J | 14 |
| E1200486 | SL0378 | E1200486-013 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 524 | ng/kg | C | DNR | 11 |
| E1200486 | SL0379 | E1200486-014 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-furan | 46.9 | ng/kg | P | J | 14 |
| E1200486 | SL0379 | E1200486-014 | EPA1613B | 2,3,4,6,7,8-Hexachlorodibenzo-p-furan | 11.2 | ng/kg | P | J | 14 |
| E1200486 | SL0379 | E1200486-014 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 870 | ng/kg | C | DNR | 11 |
| E1200486 | SL0380 | E1200486-015 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-furan | 31 | ng/kg | P | J | 14 |
| E1200486 | SL0380 | E1200486-015 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-furan | 16.8 | ng/kg | P | J | 14 |
| E1200486 | SL0380 | E1200486-015 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 479 | ng/kg | C | DNR | 11 |
| E1200486 | SL0381 | E1200486-016 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin | 0.275 | ng/kg | JK | U | 22 |
| E1200486 | SL0381 | E1200486-016 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-furan | 0.0289 | ng/kg | JK | U | 22 |
| E1200486 | SL0381 | E1200486-016 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 17.7 | ng/kg | C | DNR | 11 |
| E1200486 | SL0382 | E1200486-017 | EPA1613B | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-furan | 0.136 | ng/kg | BJ | U | 7 |
| E1200486 | SL0382 | E1200486-017 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 0.117 | ng/kg | JK | U | 22 |
| E1200486 | SL0382 | E1200486-017 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 0.293 | ng/kg | CJ | DNR | 11 |
| E1200486 | SL0382 | E1200486-017 | EPA1613B | Octachlorodibenzo-p-furan | 0.576 | ng/kg | BJK | U | 22 |
| E1200486 | SL0383 | E1200486-018 | EPA1613B | 1,2,3,4,7,8,9-Heptachlorodibenzo-p-furan | 0.108 | ng/kg | JK | U | 22 |
| E1200486 | SL0383 | E1200486-018 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin | 0.156 | ng/kg | JK | U | 22 |
| E1200486 | SL0383 | E1200486-018 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-furan | 0.114 | ng/kg | JK | U | 22 |
| E1200486 | SL0383 | E1200486-018 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-furan | 0.174 | ng/kg | JK | U | 22 |
| E1200486 | SL0383 | E1200486-018 | EPA1613B | 2,3,4,7,8-Pentachlorodibenzo-p-furan | 0.122 | ng/kg | JK | U | 22 |
| E1200486 | SL0383 | E1200486-018 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 4.51 | ng/kg | C | DNR | 11 |
| E1200486 | SL0342 | E1200486-019 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-furan | 0.234 | ng/kg | BJK | U | 22 |
| E1200486 | SL0342 | E1200486-019 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 1.86 | ng/kg | C | DNR | 11 |
| E1200486 | SL0342 | E1200486-019 | EPA1613B | Octachlorodibenzo-p-dioxin | 46500 | ng/kg | BE | DNR | 20 |
| E1200486 | SL0342 | E1200486-019DL | EPA1613B | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin | 302 | ng/kg | B,D | DNR | 11 |
| E1200486 | SL0342 | E1200486-019DL | EPA1613B | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-furan | 4.63 | ng/kg | J,D | DNR | 11 |
| E1200486 | SL0342 | E1200486-019DL | EPA1613B | 1,2,3,4,7,8,9-Heptachlorodibenzo-p-furan | 4.41 | ng/kg | U,D | DNR | 11 |
| E1200486 | SL0342 | E1200486-019DL | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin | 3.93 | ng/kg | U,D | DNR | 11 |
| E1200486 | SL0342 | E1200486-019DL | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-furan | 1.4 | ng/kg | U,D | DNR | 11 |
| E1200486 | SL0342 | E1200486-019DL | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin | 4.31 | ng/kg | U,D | DNR | 11 |
| E1200486 | SL0342 | E1200486-019DL | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-furan | 1.93 | ng/kg | U,D | DNR | 11 |
| E1200486 | SL0342 | E1200486-019DL | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin | 3.91 | ng/kg | U,D | DNR | 11 |
| E1200486 | SL0342 | E1200486-019DL | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-furan | 2.93 | ng/kg | U,D | DNR | 11 |
| E1200486 | SL0342 | E1200486-019DL | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin | 3.8 | ng/kg | U,D | DNR | 11 |
| E1200486 | SL0342 | E1200486-019DL | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-furan | 2.6 | ng/kg | U,D | DNR | 11 |
| E1200486 | SL0342 | E1200486-019DL | EPA1613B | 2,3,4,6,7,8-Hexachlorodibenzo-p-furan | 2.31 | ng/kg | U,D | DNR | 11 |
| E1200486 | SL0342 | E1200486-019DL | EPA1613B | 2,3,4,7,8-Pentachlorodibenzo-p-furan | 2.85 | ng/kg | U,D | DNR | 11 |
| E1200486 | SL0342 | E1200486-019DL | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 5.84 | ng/kg | U,D | DNR | 11 |
| E1200486 | SL0342 | E1200486-019DL | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 5.06 | ng/kg | U,D | DNR | 11 |
| E1200486 | SL0342 | E1200486-019DL | EPA1613B | Octachlorodibenzo-p-furan | 21.3 | ng/kg | U,D | DNR | 11 |
| E1200486 | SL0343 | E1200486-020 | EPA1613B | 1,2,3,4,7,8,9-Heptachlorodibenzo-p-furan | 0.0963 | ng/kg | JK | U | 22 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| E1200486 | SL0343 | E1200486-020 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-furan | 0.0732 | ng/kg | BJK | U | 22 |
| E1200486 | SL0343 | E1200486-020 | EPA1613B | 2,3,4,6,7,8-Hexachlorodibenzo-p-furan | 0.128 | ng/kg | BJ | U | 7 |
| E1200486 | SL0343 | E1200486-020 | EPA1613B | 2,3,4,7,8-Pentachlorodibenzo-p-furan | 0.071 | ng/kg | JK | U | 22 |
| E1200486 | SL0343 | E1200486-020 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 0.362 | ng/kg | JK | U | 22 |
| E1200486 | SL0343 | E1200486-020 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 0.176 | ng/kg | CJK | DNR | 11 |
| E1200486 | SL0343 | E1200486-020 | EPA1613B | Octachlorodibenzo-p-dioxin | 41400 | ng/kg | BE | DNR | 20 |
| E1200486 | SL0343 | E1200486-020DL | EPA1613B | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin | 229 | ng/kg | B,D | DNR | 11 |
| E1200486 | SL0343 | E1200486-020DL | EPA1613B | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-furan | 3 | ng/kg | U,D | DNR | 11 |
| E1200486 | SL0343 | E1200486-020DL | EPA1613B | 1,2,3,4,7,8,9-Heptachlorodibenzo-p-furan | 4.33 | ng/kg | U,D | DNR | 11 |
| E1200486 | SL0343 | E1200486-020DL | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin | 3.01 | ng/kg | U,D | DNR | 11 |
| E1200486 | SL0343 | E1200486-020DL | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-furan | 2.03 | ng/kg | U,D | DNR | 11 |
| E1200486 | SL0343 | E1200486-020DL | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin | 3.06 | ng/kg | U,D | DNR | 11 |
| E1200486 | SL0343 | E1200486-020DL | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-furan | 2.97 | ng/kg | U,D | DNR | 11 |
| E1200486 | SL0343 | E1200486-020DL | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin | 2.89 | ng/kg | U,D | DNR | 11 |
| E1200486 | SL0343 | E1200486-020DL | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-furan | 4.58 | ng/kg | U,D | DNR | 11 |
| E1200486 | SL0343 | E1200486-020DL | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin | 4.13 | ng/kg | U,D | DNR | 11 |
| E1200486 | SL0343 | E1200486-020DL | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-furan | 1.97 | ng/kg | U,D | DNR | 11 |
| E1200486 | SL0343 | E1200486-020DL | EPA1613B | 2,3,4,6,7,8-Hexachlorodibenzo-p-furan | 3.56 | ng/kg | U,D | DNR | 11 |
| E1200486 | SL0343 | E1200486-020DL | EPA1613B | 2,3,4,7,8-Pentachlorodibenzo-p-furan | 2.28 | ng/kg | U,D | DNR | 11 |
| E1200486 | SL0343 | E1200486-020DL | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 4.64 | ng/kg | U,D | DNR | 11 |
| E1200486 | SL0343 | E1200486-020DL | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 4.49 | ng/kg | U,D | DNR | 11 |
| E1200486 | SL0343 | E1200486-020DL | EPA1613B | Octachlorodibenzo-p-furan | 14.1 | ng/kg | U,D | DNR | 11 |
| E1200487 | SL0344 | E1200487-001 | EPA1613B | 1,2,3,4,7,8,9-Heptachlorodibenzo-p-furan | 0.0944 | ng/kg | JK | U | 22 |
| E1200487 | SL0344 | E1200487-001 | EPA1613B | 2,3,4,6,7,8-Hexachlorodibenzo-p-furan | 0.0659 | ng/kg | BJK | U | 22 |
| E1200487 | SL0344 | E1200487-001 | EPA1613B | 2,3,4,7,8-Pentachlorodibenzo-p-furan | 0.0692 | ng/kg | JK | U | 22 |
| E1200487 | SL0344 | E1200487-001 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 0.398 | ng/kg | JK | U | 22 |
| E1200487 | SL0352 | E1200487-002 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-furan | 0.155 | ng/kg | JK | U | 22 |
| E1200487 | SL0386 | E1200487-004 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin | 0.38 | ng/kg | JK | U | 22 |
| E1200487 | SL0386 | E1200487-004 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-furan | 0.069 | ng/kg | JK | U | 22 |
| E1200487 | SL0387 | E1200487-005 | EPA1613B | 1,2,3,4,7,8,9-Heptachlorodibenzo-p-furan | 0.28 | ng/kg | JK | U | 22 |
| E1200487 | SL0387 | E1200487-005 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin | 0.28 | ng/kg | JK | U | 22 |
| E1200487 | SL0387 | E1200487-005 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-furan | 0.251 | ng/kg | BJK | U | 22 |
| E1200487 | SL0387 | E1200487-005 | EPA1613B | 2,3,4,6,7,8-Hexachlorodibenzo-p-furan | 0.174 | ng/kg | BJ | U | 7 |
| E1200487 | SL0388 | E1200487-006 | EPA1613B | 1,2,3,4,7,8,9-Heptachlorodibenzo-p-furan | 0.242 | ng/kg | JK | U | 22 |
| E1200487 | SL0388 | E1200487-006 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 0.28 | ng/kg | JK | U | 22 |
| E1200487 | SL0388 | E1200487-006 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 0.773 | ng/kg | JK | U | 22 |
| E1200487 | SL0390 | E1200487-008 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-furan | 17 | ng/kg | BP | J | 14 |
| E1200487 | SL0391 | E1200487-009 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-furan | 2.87 | ng/kg | JP | J | 14 |
| E1200487 | SL0391 | E1200487-009 | EPA1613B | 2,3,4,7,8-Pentachlorodibenzo-p-furan | 4.48 | ng/kg | JP | J | 14 |
| E1200487 | SL0392 | E1200487-010 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-furan | 8.97 | ng/kg | BP | J | 14 |
| E1200487 | SL0392 | E1200487-010 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-furan | 2.76 | ng/kg | JK | U | 22 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| E1200487 | SL0392 | E1200487-010 | EPA1613B | 2,3,4,7,8-Pentachlorodibenzo-p-furan | 4.34 | ng/kg | JP | J | 14 |
| E1200487 | SL0393 | E1200487-011 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-furan | 32.3 | ng/kg | BP | J | 14 |
| E1200487 | SL0393 | E1200487-011 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-furan | 16.1 | ng/kg | P | J | 14 |
| E1200487 | SL0393 | E1200487-011 | EPA1613B | 2,3,4,7,8-Pentachlorodibenzo-p-furan | 16.8 | ng/kg | P | J | 14 |
| E1200487 | SL0394 | E1200487-012 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-furan | 9.96 | ng/kg | P | J | 14 |
| E1200487 | SL0394 | E1200487-012 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-furan | 308 | ng/kg | P | J | 14 |
| E1200487 | SL0394 | E1200487-012 | EPA1613B | 2,3,4,7,8-Pentachlorodibenzo-p-furan | 175 | ng/kg | P | J | 14 |
| E1200487 | SL0398 | E1200487-014 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-furan | 0.228 | ng/kg | JK | U | 22 |
| E1200487 | SL0399 | E1200487-015 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-furan | 2.32 | ng/kg | JP | J | 14 |
| E1200487 | SL0400 | E1200487-016 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-furan | 0.568 | ng/kg | JK | U | 22 |
| E1200487 | SL0402 | E1200487-018 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin | 1.13 | ng/kg | JK | U | 22 |
| E1200487 | SL0403 | E1200487-019 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-furan | 0.184 | ng/kg | BJK | U | 22 |
| E1200487 | SL0403 | E1200487-019 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-furan | 0.13 | ng/kg | JK | U | 22 |
| E1200487 | SL0403 | E1200487-019 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin | 0.755 | ng/kg | JK | U | 22 |
| E1200487 | SL0403 | E1200487-019 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin | 0.101 | ng/kg | JK | U | 22 |
| E1200487 | SL0404 | E1200487-020 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin | 0.159 | ng/kg | JK | U | 22 |
| E1200487 | SL0404 | E1200487-020 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-furan | 0.103 | ng/kg | BJ | U | 7 |
| E1200487 | SL0404 | E1200487-020 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin | 0.296 | ng/kg | JK | U | 22 |
| E1200487 | SL0404 | E1200487-020 | EPA1613B | 2,3,4,7,8-Pentachlorodibenzo-p-furan | 0.0596 | ng/kg | JK | U | 22 |
| E1200487 | SL0404 | E1200487-020 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 0.417 | ng/kg | JK | U | 22 |
| E1200487 | SL0404 | E1200487-020 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 1.37 | ng/kg | K | U | 22 |
| E1200488 | SL0405 | E1200488-001 | EPA1613B | 1,2,3,4,7,8,9-Heptachlorodibenzo-p-furan | 0.109 | ng/kg | JK | U | 22 |
| E1200488 | SL0405 | E1200488-001 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-furan | 0.146 | ng/kg | BJ | U | 7 |
| E1200488 | SL0405 | E1200488-001 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-furan | 0.0928 | ng/kg | JK | U | 22 |
| E1200488 | SL0405 | E1200488-001 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin | 0.31 | ng/kg | JK | U | 22 |
| E1200488 | SL0405 | E1200488-001 | EPA1613B | 2,3,4,6,7,8-Hexachlorodibenzo-p-furan | 0.0986 | ng/kg | JK | U | 22 |
| E1200488 | SL0405 | E1200488-001 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 0.391 | ng/kg | JK | U | 22 |
| E1200488 | SL0408 | E1200488-002 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-furan | 0.184 | ng/kg | JK | U | 22 |
| E1200488 | SL0408 | E1200488-002 | EPA1613B | 2,3,4,7,8-Pentachlorodibenzo-p-furan | 2.54 | ng/kg | JP | J | 14 |
| E1200488 | SL0410 | E1200488-004 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin | 3.31 | ng/kg | JK | U | 22 |
| E1200488 | SL0412 | E1200488-005 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-furan | 0.149 | ng/kg | JK | U | 22 |
| E1200488 | SL0414 | E1200488-006 | EPA1613B | 1,2,3,4,7,8,9-Heptachlorodibenzo-p-furan | 0.199 | ng/kg | JK | U | 22 |
| E1200488 | SL0414 | E1200488-006 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-furan | 0.328 | ng/kg | BJ | U | 7 |
| E1200488 | SL0414 | E1200488-006 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin | 0.282 | ng/kg | JK | U | 22 |
| E1200488 | SL0414 | E1200488-006 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 1.08 | ng/kg | JK | U | 22 |
| E1200488 | SL0411 | E1200488-007 | EPA1613B | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin | 559 | ng/kg | | J | 13 |
| E1200488 | SL0411 | E1200488-007 | EPA1613B | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-furan | 56.2 | ng/kg | | J | 13 |
| E1200488 | SL0411 | E1200488-007 | EPA1613B | 1,2,3,4,7,8,9-Heptachlorodibenzo-p-furan | 4.37 | ng/kg | J | J | 13 |
| E1200488 | SL0411 | E1200488-007 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin | 2.39 | ng/kg | J | J | 13 |
| E1200488 | SL0411 | E1200488-007 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin | 12.9 | ng/kg | | J | 13 |
| E1200488 | SL0411 | E1200488-007 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-furan | 0.425 | ng/kg | U | UJ | 13 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| E1200488 | SL0411 | E1200488-007 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin | 1.12 | ng/kg | JK | UJ | 13,22 |
| E1200488 | SL0411 | E1200488-007 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-furan | 2.16 | ng/kg | J | J | 13 |
| E1200488 | SL0411 | E1200488-007 | EPA1613B | 2,3,4,6,7,8-Hexachlorodibenzo-p-furan | 1.98 | ng/kg | JK | UJ | 13,22 |
| E1200488 | SL0411 | E1200488-007 | EPA1613B | 2,3,4,7,8-Pentachlorodibenzo-p-furan | 2.73 | ng/kg | J | J | 13 |
| E1200488 | SL0411 | E1200488-007 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 5.39 | ng/kg | | J | 13 |
| E1200488 | SL0411 | E1200488-007 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 19.3 | ng/kg | | J | 13 |
| E1200488 | SL0411 | E1200488-007 | EPA1613B | Octachlorodibenzo-p-dioxin | 7340 | ng/kg | B | J | 13 |
| E1200488 | SL0415 | E1200488-008 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-furan | 0.161 | ng/kg | BJ | U | 7 |
| E1200488 | SL0416 | E1200488-009 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin | 0.637 | ng/kg | JK | U | 22 |
| E1200488 | SL0416 | E1200488-009 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-furan | 0.285 | ng/kg | BJK | U | 22 |
| E1200488 | SL0416 | E1200488-009 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin | 1.17 | ng/kg | JK | U | 22 |
| E1200488 | SL0416 | E1200488-009 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-furan | 0.273 | ng/kg | JK | U | 22 |
| E1200488 | SL0416 | E1200488-009 | EPA1613B | 2,3,4,7,8-Pentachlorodibenzo-p-furan | 0.182 | ng/kg | JK | U | 22 |
| E1200488 | SL0418 | E1200488-010 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin | 1.94 | ng/kg | JK | U | 22 |
| E1200488 | SL0418 | E1200488-010 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-furan | 3.86 | ng/kg | BJP | J | 14 |
| E1200488 | SL0418 | E1200488-010 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin | 5.86 | ng/kg | K | U | 22 |
| E1200488 | SL0420 | E1200488-012 | EPA1613B | 2,3,4,7,8-Pentachlorodibenzo-p-furan | 1.89 | ng/kg | JP | J | 14 |
| E1200488 | SL0421 | E1200488-013 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-furan | 2.54 | ng/kg | BJP | J | 14 |
| E1200488 | SL0421 | E1200488-013 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin | 0.768 | ng/kg | JK | U | 22 |
| E1200488 | SL0421 | E1200488-013 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-furan | 0.921 | ng/kg | JP | J | 14 |
| E1200488 | SL0421 | E1200488-013 | EPA1613B | 2,3,4,7,8-Pentachlorodibenzo-p-furan | 1.51 | ng/kg | JP | J | 14 |
| E1200488 | SL0421 | E1200488-013 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 1.09 | ng/kg | JK | U | 22 |
| E1200488 | SL0422 | E1200488-014 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin | 1.12 | ng/kg | JK | U | 22 |
| E1200488 | SL0422 | E1200488-014 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-furan | 2.98 | ng/kg | JP | J | 14 |
| E1200488 | SL0422 | E1200488-014 | EPA1613B | 2,3,4,7,8-Pentachlorodibenzo-p-furan | 2.9 | ng/kg | JP | J | 14 |
| E1200488 | SL0425 | E1200488-016 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-furan | 0.615 | ng/kg | JK | U | 22 |
| E1200488 | SL0426 | E1200488-017 | EPA1613B | 1,2,3,4,7,8,9-Heptachlorodibenzo-p-furan | 1.7 | ng/kg | JK | U | 22 |
| E1200488 | SL0426 | E1200488-017 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin | 1.1 | ng/kg | JK | U | 22 |
| E1200488 | SL0426 | E1200488-017 | EPA1613B | 2,3,4,6,7,8-Hexachlorodibenzo-p-furan | 0.631 | ng/kg | JK | U | 22 |
| E1200488 | SL0427 | E1200488-018 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-furan | 3.76 | ng/kg | JP | J | 14 |
| E1200488 | SL0428 | E1200488-019 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin | 0.459 | ng/kg | JK | U | 22 |
| E1200488 | SL0428 | E1200488-019 | EPA1613B | 2,3,4,6,7,8-Hexachlorodibenzo-p-furan | 0.736 | ng/kg | JK | U | 22 |
| E1200488 | SL0430 | E1200488-020 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-furan | 0.321 | ng/kg | JK | U | 22 |
| E1200493 | SL0432 | E1200493-002 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-furan | 0.221 | ng/kg | JK | U | 22 |
| E1200493 | SL0432 | E1200493-002 | EPA1613B | 2,3,4,7,8-Pentachlorodibenzo-p-furan | 0.152 | ng/kg | JK | U | 22 |
| E1200493 | SL0433 | E1200493-003 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin | 0.563 | ng/kg | JK | U | 22 |
| E1200493 | SL0434 | E1200493-004 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin | 2.28 | ng/kg | JK | U | 22 |
| E1200493 | SL0434 | E1200493-004 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-furan | 0.11 | ng/kg | JK | U | 22 |
| E1200493 | SL0434 | E1200493-004 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin | 0.493 | ng/kg | JK | U | 22 |
| E1200493 | SL0434 | E1200493-004 | EPA1613B | 2,3,4,7,8-Pentachlorodibenzo-p-furan | 0.469 | ng/kg | JK | U | 22 |
| E1200493 | SL0436 | E1200493-005 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-furan | 0.699 | ng/kg | JK | U | 22 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| E1200493 | SL0436 | E1200493-005 | EPA1613B | 2,3,4,6,7,8-Hexachlorodibenzo-p-furan | 0.328 | ng/kg | JK | U | 22 |
| E1200493 | SL0437 | E1200493-006 | EPA1613B | 1,2,3,4,7,8,9-Heptachlorodibenzo-p-furan | 0.6 | ng/kg | JK | U | 22 |
| E1200493 | SL0437 | E1200493-006 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-furan | 0.0701 | ng/kg | JK | U | 22 |
| E1200493 | SL0438 | E1200493-007 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-furan | 0.255 | ng/kg | JK | U | 22 |
| E1200493 | SL0438 | E1200493-007 | EPA1613B | 2,3,4,6,7,8-Hexachlorodibenzo-p-furan | 0.229 | ng/kg | JK | U | 22 |
| E1200493 | SL0438 | E1200493-007 | EPA1613B | 2,3,4,7,8-Pentachlorodibenzo-p-furan | 0.174 | ng/kg | JK | U | 22 |
| E1200493 | SL0439 | E1200493-008 | EPA1613B | 1,2,3,4,7,8,9-Heptachlorodibenzo-p-furan | 0.121 | ng/kg | JK | U | 22 |
| E1200493 | SL0439 | E1200493-008 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin | 0.238 | ng/kg | JK | U | 22 |
| E1200493 | SL0439 | E1200493-008 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin | 0.706 | ng/kg | JK | U | 22 |
| E1200493 | SL0439 | E1200493-008 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-furan | 0.108 | ng/kg | JK | U | 22 |
| E1200493 | SL0439 | E1200493-008 | EPA1613B | 2,3,4,6,7,8-Hexachlorodibenzo-p-furan | 0.111 | ng/kg | JK | U | 22 |
| E1200493 | SL0439 | E1200493-008 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 0.489 | ng/kg | BJK | U | 22 |
| E1200493 | SL0440 | E1200493-009 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-furan | 0.323 | ng/kg | JK | U | 22 |
| E1200493 | SL0442 | E1200493-010 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-furan | 0.695 | ng/kg | JK | U | 22 |
| E1200493 | SL0444 | E1200493-012 | EPA1613B | 1,2,3,4,7,8,9-Heptachlorodibenzo-p-furan | 2.15 | ng/kg | JK | U | 22 |
| E1200493 | SL0444 | E1200493-012 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-furan | 3.32 | ng/kg | BJP | J | 14 |
| E1200493 | SL0444 | E1200493-012 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin | 1.22 | ng/kg | JK | U | 22 |
| E1200493 | SL0444 | E1200493-012 | EPA1613B | 2,3,4,6,7,8-Hexachlorodibenzo-p-furan | 2.5 | ng/kg | JK | U | 22 |
| E1200493 | SL0445 | E1200493-013 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin | 0.195 | ng/kg | JK | U | 22 |
| E1200493 | SL0445 | E1200493-013 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-furan | 0.253 | ng/kg | JK | U | 22 |
| E1200493 | SL0445 | E1200493-013 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin | 0.798 | ng/kg | JK | U | 22 |
| E1200493 | SL0445 | E1200493-013 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-furan | 0.51 | ng/kg | JK | U | 22 |
| E1200493 | SL0445 | E1200493-013 | EPA1613B | 2,3,4,6,7,8-Hexachlorodibenzo-p-furan | 0.152 | ng/kg | JK | U | 22 |
| E1200493 | SL0446 | E1200493-014 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin | 0.185 | ng/kg | JK | U | 22 |
| E1200493 | SL0446 | E1200493-014 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin | 0.0819 | ng/kg | JK | U | 22 |
| E1200493 | SL0446 | E1200493-014 | EPA1613B | 2,3,4,7,8-Pentachlorodibenzo-p-furan | 0.119 | ng/kg | JK | U | 22 |
| E1200493 | SL0447 | E1200493-015 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-furan | 0.119 | ng/kg | BJK | U | 22 |
| E1200493 | SL0447 | E1200493-015 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-furan | 0.0491 | ng/kg | JK | U | 22 |
| E1200493 | SL0448 | E1200493-016 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin | 4.42 | ng/kg | JK | U | 22 |
| E1200493 | SL0449 | E1200493-017 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-furan | 0.0813 | ng/kg | BJK | U | 22 |
| E1200493 | SL0449 | E1200493-017 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-furan | 0.0834 | ng/kg | JK | U | 22 |
| E1200493 | SL0450 | E1200493-018 | EPA1613B | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-furan | 0.704 | ng/kg | JK | U | 22 |
| E1200493 | SL0450 | E1200493-018 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-furan | 0.404 | ng/kg | BJK | U | 22 |
| E1200493 | SL0450 | E1200493-018 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin | 0.279 | ng/kg | JK | U | 22 |
| E1200493 | SL0450 | E1200493-018 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-furan | 0.286 | ng/kg | JK | U | 22 |
| E1200493 | SL0450 | E1200493-018 | EPA1613B | 2,3,4,7,8-Pentachlorodibenzo-p-furan | 0.212 | ng/kg | JK | U | 22 |
| E1200505 | SL0333 | E1200505-001 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-furan | 0.167 | ng/kg | JK | U | 22 |
| E1200505 | SL0334 | E1200505-002 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-furan | 0.553 | ng/kg | JK | U | 22 |
| E1200505 | SL0335 | E1200505-003 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-furan | 3.51 | ng/kg | JK | U | 22 |
| E1200505 | SL0337 | E1200505-005 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-furan | 6.31 | ng/kg | JP | J | 14 |
| E1200505 | FW0003 | E1200505-010 | EPA1613B | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin | 0.814 | pg | BJK | U | 22 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| E1200505 | FW0003 | E1200505-010 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-furan | 0.211 | pg | U | UJ | 10 |
| E1200505 | FW0003 | E1200505-010 | EPA1613B | Octachlorodibenzo-p-dioxin | 5.46 | pg | BJK | U | 22 |
| E1200505 | SL0441 | E1200505-011 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin | 1.3 | ng/kg | JK | U | 22 |
| E1200505 | SL0417 | E1200505-012 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-furan | 3.43 | ng/kg | JP | J | 14 |
| E1200505 | SL0417 | E1200505-012 | EPA1613B | 2,3,4,7,8-Pentachlorodibenzo-p-furan | 1.88 | ng/kg | JP | J | 14 |
| E1200505 | SL0429 | E1200505-013 | EPA1613B | 1,2,3,4,7,8,9-Heptachlorodibenzo-p-furan | 0.773 | ng/kg | JK | U | 22 |
| E1200505 | SL0429 | E1200505-013 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin | 0.416 | ng/kg | JK | U | 22 |
| E1200505 | SL0429 | E1200505-013 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-furan | 0.461 | ng/kg | JK | U | 22 |
| E1200505 | SL0429 | E1200505-013 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 2.78 | ng/kg | K | U | 22 |
| E1200505 | SL0385 | E1200505-015 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-furan | 0.222 | ng/kg | JK | U | 22 |
| E1200505 | SL0407 | E1200505-018 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-furan | 2.18 | ng/kg | JK | U | 22 |
| E1200505 | SL0407 | E1200505-018 | EPA1613B | 2,3,4,7,8-Pentachlorodibenzo-p-furan | 2.31 | ng/kg | JP | J | 14 |
| E1200505 | FB0002 | E1200505-019 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-furan | 0.219 | pg | U | UJ | 10 |
| E1200505 | FB0002 | E1200505-019 | EPA1613B | Octachlorodibenzo-p-dioxin | 14.2 | pg | BJ | U | 7 |
| E1200505 | FW0004 | E1200505-020 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-furan | 0.17 | pg | U | UJ | 10 |
| E1200505 | FW0004 | E1200505-020 | EPA1613B | Octachlorodibenzo-p-dioxin | 10.2 | pg | BJ | U | 7 |
| E1200507 | FW0005 | E1200507-001 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-furan | 0.285 | pg | U | UJ | 10 |
| E1200507 | FW0005 | E1200507-001 | EPA1613B | Octachlorodibenzo-p-dioxin | 8.39 | pg | BJ | U | 7 |
| E1200507 | FW0006 | E1200507-002 | EPA1613B | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin | 0.662 | pg | BJK | U | 22 |
| E1200507 | FW0006 | E1200507-002 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-furan | 0.159 | pg | U | UJ | 10 |
| E1200507 | FW0006 | E1200507-002 | EPA1613B | Octachlorodibenzo-p-dioxin | 6.78 | pg | BJK | U | 22 |
| E1200507 | SL0451 | E1200507-003 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-furan | 0.539 | pg | JK | U | 22 |
| E1200507 | SL0451 | E1200507-003 | EPA1613B | 2,3,4,6,7,8-Hexachlorodibenzo-p-furan | 0.439 | pg | JKP | U | 22 |
| E1200507 | SL0451 | E1200507-003 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 20.4 | pg | C | DNR | 11 |
| E1200507 | SL0452 | E1200507-004 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-furan | 0.549 | pg | JK | U | 22 |
| E1200507 | SL0452 | E1200507-004 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 44 | pg | C | DNR | 11 |
| E1200507 | SL0453 | E1200507-005 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin | 0.343 | pg | JK | U | 22 |
| E1200507 | SL0453 | E1200507-005 | EPA1613B | 2,3,4,6,7,8-Hexachlorodibenzo-p-furan | 0.334 | pg | JK | U | 22 |
| E1200507 | SL0453 | E1200507-005 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 47.2 | pg | C | DNR | 11 |
| E1200507 | SL0454 | E1200507-006 | EPA1613B | 1,2,3,4,7,8,9-Heptachlorodibenzo-p-furan | 1.52 | pg | JK | U | 22 |
| E1200507 | SL0454 | E1200507-006 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin | 0.461 | pg | JK | U | 22 |
| E1200507 | SL0454 | E1200507-006 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 42 | pg | C | DNR | 11 |
| E1200507 | SL0455 | E1200507-007 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin | 0.663 | pg | JK | U | 22 |
| E1200507 | SL0455 | E1200507-007 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin | 2.24 | pg | JK | U | 22 |
| E1200507 | SL0455 | E1200507-007 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin | 1.72 | pg | JK | U | 22 |
| E1200507 | SL0455 | E1200507-007 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 464 | pg | C | DNR | 11 |
| E1200507 | SL0456 | E1200507-008 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 774 | pg | C | DNR | 11 |
| E1200507 | SL0457 | E1200507-009 | EPA1613B | 1,2,3,4,7,8,9-Heptachlorodibenzo-p-furan | 0.947 | pg | JK | U | 22 |
| E1200507 | SL0457 | E1200507-009 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin | 0.204 | pg | JK | U | 22 |
| E1200507 | SL0457 | E1200507-009 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-furan | 0.886 | pg | JK | U | 22 |
| E1200507 | SL0457 | E1200507-009 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 51.4 | pg | C | DNR | 11 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| E1200507 | SL0458 | E1200507-010 | EPA1613B | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-furan | 0.509 | pg | JK | U | 22 |
| E1200507 | SL0458 | E1200507-010 | EPA1613B | 1,2,3,4,7,8,9-Heptachlorodibenzo-p-furan | 0.096 | pg | JK | U | 22 |
| E1200507 | SL0458 | E1200507-010 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-furan | 0.221 | pg | JK | U | 22 |
| E1200507 | SL0458 | E1200507-010 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-furan | 0.131 | pg | JK | U | 22 |
| E1200507 | SL0458 | E1200507-010 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-furan | 0.201 | pg | JK | U | 22 |
| E1200507 | SL0458 | E1200507-010 | EPA1613B | 2,3,4,7,8-Pentachlorodibenzo-p-furan | 0.154 | pg | JK | U | 22 |
| E1200507 | SL0458 | E1200507-010 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 5.19 | pg | C | DNR | 11 |
| E1200507 | SL0459 | E1200507-011 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-furan | 0.322 | pg | JK | U | 22 |
| E1200507 | SL0459 | E1200507-011 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-furan | 0.493 | pg | JK | U | 22 |
| E1200507 | SL0459 | E1200507-011 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 13 | pg | C | DNR | 11 |
| E1200507 | SL0460 | E1200507-012 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-furan | 0.183 | pg | JK | U | 22 |
| E1200507 | SL0460 | E1200507-012 | EPA1613B | 2,3,4,7,8-Pentachlorodibenzo-p-furan | 0.157 | pg | JK | U | 22 |
| E1200507 | SL0460 | E1200507-012 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 4 | pg | C | DNR | 11 |
| E1200507 | SL0461 | E1200507-013 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin | 1.16 | pg | JK | U | 22 |
| E1200507 | SL0461 | E1200507-013 | EPA1613B | 2,3,4,6,7,8-Hexachlorodibenzo-p-furan | 0.454 | pg | JK | U | 22 |
| E1200507 | SL0461 | E1200507-013 | EPA1613B | 2,3,4,7,8-Pentachlorodibenzo-p-furan | 0.832 | pg | JK | U | 22 |
| E1200507 | SL0461 | E1200507-013 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 36.5 | pg | C | DNR | 11 |
| E1200507 | SL0462 | E1200507-014 | EPA1613B | 1,2,3,4,7,8,9-Heptachlorodibenzo-p-furan | 0.256 | pg | JK | U | 22 |
| E1200507 | SL0462 | E1200507-014 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin | 0.651 | pg | JK | U | 22 |
| E1200507 | SL0462 | E1200507-014 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin | 1.13 | pg | JK | U | 22 |
| E1200507 | SL0462 | E1200507-014 | EPA1613B | 2,3,4,6,7,8-Hexachlorodibenzo-p-furan | 0.251 | pg | JK | U | 22 |
| E1200507 | SL0462 | E1200507-014 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 22.5 | pg | C | DNR | 11 |
| E1200507 | SL0463 | E1200507-015 | EPA1613B | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-furan | 2.57 | pg | JK | U | 22 |
| E1200507 | SL0463 | E1200507-015 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-furan | 0.445 | pg | JK | U | 22 |
| E1200507 | SL0463 | E1200507-015 | EPA1613B | 2,3,4,7,8-Pentachlorodibenzo-p-furan | 0.29 | pg | JK | U | 22 |
| E1200507 | SL0463 | E1200507-015 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 13.2 | pg | C | DNR | 11 |
| E1200507 | SL0463 | E1200507-015 | EPA1613B | Octachlorodibenzo-p-furan | 21.9 | pg | BK | U | 22 |
| E1200507 | SL0464 | E1200507-016 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin | 0.452 | pg | JK | U | 22 |
| E1200507 | SL0464 | E1200507-016 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin | 0.736 | pg | JK | U | 22 |
| E1200507 | SL0464 | E1200507-016 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 7.83 | pg | C | DNR | 11 |
| E1200507 | SL0465 | E1200507-017 | EPA1613B | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin | 11.5 | pg | BK | U | 22 |
| E1200507 | SL0465 | E1200507-017 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin | 0.173 | pg | JK | U | 22 |
| E1200507 | SL0465 | E1200507-017 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin | 0.934 | pg | JK | U | 22 |
| E1200507 | SL0465 | E1200507-017 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 0.308 | pg | JK | U | 22 |
| E1200507 | SL0465 | E1200507-017 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 0.954 | pg | JK | U | 22 |
| E1200507 | SL0465 | E1200507-017 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 0.915 | pg | CJ | DNR | 11 |
| E1200507 | SL0466 | E1200507-018 | EPA1613B | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-furan | 0.717 | pg | JK | U | 22 |
| E1200507 | SL0466 | E1200507-018 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-furan | 0.209 | pg | JK | U | 22 |
| E1200507 | SL0466 | E1200507-018 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin | 0.695 | pg | JK | U | 22 |
| E1200507 | SL0466 | E1200507-018 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 8.38 | pg | C | DNR | 11 |
| E1200507 | SL0467 | E1200507-019 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 0.292 | pg | CJK | DNR | 11 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| E1200507 | SL0467 | E1200507-019 | EPA1613B | Octachlorodibenzo-p-furan | 1.18 | pg | BJK | U | 22 |
| E1200507 | SL0468 | E1200507-020 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-furan | 0.293 | pg | JK | U | 22 |
| E1200507 | SL0468 | E1200507-020 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin | 0.516 | pg | JK | U | 22 |
| E1200507 | SL0468 | E1200507-020 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 4.67 | pg | C | DNR | 11 |
| E1200507 | SL0468 | E1200507-020 | EPA1613B | Octachlorodibenzo-p-furan | 2.78 | pg | BJK | U | 22 |
| E1200508 | SL0469 | E1200508-001 | EPA1613B | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-furan | 0.066 | ng/kg | JK | U | 22 |
| E1200508 | SL0469 | E1200508-001 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 0.171 | ng/kg | JK | U | 22 |
| E1200508 | SL0469 | E1200508-001 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 0.436 | ng/kg | CJ | DNR | 11 |
| E1200508 | SL0469 | E1200508-001 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 0.313 | ng/kg | JK | U | 22 |
| E1200508 | SL0469 | E1200508-001 | EPA1613B | Octachlorodibenzo-p-furan | 0.486 | ng/kg | BJ | U | 7 |
| E1200508 | SL0470 | E1200508-002 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 0.101 | ng/kg | CJK | DNR | 11 |
| E1200508 | SL0470 | E1200508-002 | EPA1613B | Octachlorodibenzo-p-furan | 0.243 | ng/kg | BJK | U | 22 |
| E1200508 | FW0007 | E1200508-003 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-furan | 0.192 | pg | U | UJ | 10 |
| E1200508 | FW0007 | E1200508-003 | EPA1613B | Octachlorodibenzo-p-dioxin | 6.98 | pg | BJK | U | 22 |
| E1200508 | FW0008 | E1200508-004 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-furan | 0.244 | pg | U | UJ | 10 |
| E1200508 | FW0008 | E1200508-004 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 1.19 | pg | JK | U | 22 |
| E1200508 | FW0008 | E1200508-004 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 1.9 | pg | CJK | DNR | 11 |
| E1200508 | FW0008 | E1200508-004 | EPA1613B | Octachlorodibenzo-p-dioxin | 9.04 | pg | BJ | U | 7 |
| E1200508 | FW0009 | E1200508-005 | EPA1613B | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin | 1.5 | pg | BJK | U | 22 |
| E1200508 | FW0009 | E1200508-005 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-furan | 0.156 | pg | U | UJ | 10 |
| E1200508 | FW0009 | E1200508-005 | EPA1613B | Octachlorodibenzo-p-dioxin | 8.66 | pg | BJ | U | 7 |
| E1200508 | FW0010 | E1200508-006 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-furan | 0.13 | pg | U | UJ | 10 |
| E1200508 | FW0010 | E1200508-006 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 7.81 | pg | CJ | DNR | 11 |
| E1200508 | FW0010 | E1200508-006 | EPA1613B | Octachlorodibenzo-p-dioxin | 7.54 | pg | BJ | U | 7 |
| E1200508 | SL0471 | E1200508-007 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-furan | 208 | ng/kg | P | J | 14 |
| E1200508 | SL0471 | E1200508-007 | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-furan | 1.61 | ng/kg | JK | U | 22 |
| E1200508 | SL0471 | E1200508-007 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-furan | 47.8 | ng/kg | P | J | 14 |
| E1200508 | SL0471 | E1200508-007 | EPA1613B | 2,3,4,6,7,8-Hexachlorodibenzo-p-furan | 60.3 | ng/kg | P | J | 14 |
| E1200508 | SL0471 | E1200508-007 | EPA1613B | 2,3,4,7,8-Pentachlorodibenzo-p-furan | 48.4 | ng/kg | P | J | 14 |
| E1200508 | SL0471 | E1200508-007 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 202 | ng/kg | C | DNR | 11 |
| E1200508 | SL0471 | E1200508-007 | EPA1613B | Octachlorodibenzo-p-furan | 1520 | ng/kg | BP | J | 14 |
| E1200572 | SL0348 | E1200572-001 | EPA1613B | 1,2,3,4,7,8,9-Heptachlorodibenzo-p-furan | 0.624 | ng/kg | JK | U | 22 |
| E1200572 | SL0348 | E1200572-001 | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin | 1.18 | ng/kg | JK | U | 22 |
| E1200572 | SL0348 | E1200572-001 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin | 2.95 | ng/kg | JK | U | 22 |
| E1200572 | SL0348 | E1200572-001 | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-furan | 0.696 | ng/kg | JK | U | 22 |
| E1200572 | SL0348 | E1200572-001 | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-furan | 0.587 | ng/kg | JK | U | 22 |
| E1200572 | SL0348 | E1200572-001 | EPA1613B | 2,3,4,6,7,8-Hexachlorodibenzo-p-furan | 0.983 | ng/kg | JK | U | 22 |
| E1200572 | SL0348 | E1200572-001 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 5.19 | ng/kg | C | DNR | 11 |
| E1200572 | SL0348 | E1200572-001 | EPA1613B | Octachlorodibenzo-p-dioxin | 54100 | ng/kg | E | DNR | 20 |
| E1200572 | SL0348 | E1200572-001DL | EPA1613B | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin | 441 | ng/kg | D | DNR | 11 |
| E1200572 | SL0348 | E1200572-001DL | EPA1613B | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-furan | 13.6 | ng/kg | JK,D | DNR | 11 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| E1200572 | SL0348 | E1200572-001DL | EPA1613B | 1,2,3,4,7,8,9-Heptachlorodibenzo-p-furan | 7 | ng/kg | U,D | DNR | 11 |
| E1200572 | SL0348 | E1200572-001DL | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin | 7.44 | ng/kg | U,D | DNR | 11 |
| E1200572 | SL0348 | E1200572-001DL | EPA1613B | 1,2,3,4,7,8-Hexachlorodibenzo-p-furan | 3.48 | ng/kg | U,D | DNR | 11 |
| E1200572 | SL0348 | E1200572-001DL | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin | 7.6 | ng/kg | U,D | DNR | 11 |
| E1200572 | SL0348 | E1200572-001DL | EPA1613B | 1,2,3,6,7,8-Hexachlorodibenzo-p-furan | 3.56 | ng/kg | U,D | DNR | 11 |
| E1200572 | SL0348 | E1200572-001DL | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin | 7.15 | ng/kg | U,D | DNR | 11 |
| E1200572 | SL0348 | E1200572-001DL | EPA1613B | 1,2,3,7,8,9-Hexachlorodibenzo-p-furan | 4.17 | ng/kg | U,D | DNR | 11 |
| E1200572 | SL0348 | E1200572-001DL | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin | 5.61 | ng/kg | U,D | DNR | 11 |
| E1200572 | SL0348 | E1200572-001DL | EPA1613B | 1,2,3,7,8-Pentachlorodibenzo-p-furan | 3.51 | ng/kg | U,D | DNR | 11 |
| E1200572 | SL0348 | E1200572-001DL | EPA1613B | 2,3,4,6,7,8-Hexachlorodibenzo-p-furan | 3.63 | ng/kg | U,D | DNR | 11 |
| E1200572 | SL0348 | E1200572-001DL | EPA1613B | 2,3,4,7,8-Pentachlorodibenzo-p-furan | 3.84 | ng/kg | U,D | DNR | 11 |
| E1200572 | SL0348 | E1200572-001DL | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 5.68 | ng/kg | U,D | DNR | 11 |
| E1200572 | SL0348 | E1200572-001DL | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 7.23 | ng/kg | CJK,D | DNR | 11 |
| E1200572 | SL0348 | E1200572-001DL | EPA1613B | Octachlorodibenzo-p-furan | 55 | ng/kg | J,D | DNR | 11 |
| E1200572 | SL0347 | E1200572-002 | EPA1613B | 1,2,3,4,7,8,9-Heptachlorodibenzo-p-furan | 1.35 | ng/kg | JK | U | 22 |
| E1200572 | SL0347 | E1200572-002 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 15.6 | ng/kg | C | DNR | 11 |
| K1204190 | SJMW003 | K1204190-001 | 6010 | Aluminum | 192 | ug/L | | J | 14,16 |
| K1204190 | SJMW003 | K1204190-001 | 6010 | Barium | 257 | ug/L | | J | 14 |
| K1204190 | SJMW003 | K1204190-001 | 6010 | Chromium | 2.4 | ug/L | J | J | 7 |
| K1204190 | SJMW003 | K1204190-001 | 6010 | Magnesium | 185000 | ug/L | | J | 17 |
| K1204190 | SJMW003 | K1204190-001DISS | 6010 | Aluminum | 609 | ug/L | | J | 14,16 |
| K1204190 | SJMW003 | K1204190-001DISS | 6010 | Barium | 776 | ug/L | | J | 14 |
| K1204190 | SJMW003 | K1204190-001DISS | 6010 | Chromium | 0.7 | ug/L | J | J | 7 |
| K1204190 | SJMW003 | K1204190-001DISS | 6010 | Copper | 4 | ug/L | J | U | 7 |
| K1204190 | SJMW003 | K1204190-001DISS | 6010 | Magnesium | 82700 | ug/L | | J | 17 |
| K1204190 | SJMW003 | K1204190-001DUP | 6010 | Aluminum | 189 | ug/L | | J | 16 |
| K1204190 | SJMW003 | K1204190-001DUP | 6010 | Chromium | 2.2 | ug/L | J | J | 7 |
| K1204190 | SJMW003 | K1204190-001DUP | 6010 | Magnesium | 182000 | ug/L | | J | 17 |
| K1204190 | SJMW001 | K1204190-003 | 6010 | Aluminum | 24.5 | ug/L | J | J | 16 |
| K1204190 | SJMW001 | K1204190-003 | 6010 | Barium | 245 | ug/L | | J | 14 |
| K1204190 | SJMW001 | K1204190-003 | 6010 | Chromium | 1.5 | ug/L | J | J | 7 |
| K1204190 | SJMW001 | K1204190-003 | 6010 | Copper | 6.3 | ug/L | J | U | 7 |
| K1204190 | SJMW001 | K1204190-003 | 6010 | Magnesium | 176000 | ug/L | | J | 17 |
| K1204190 | SJMW001 | K1204190-003DISS | 6010 | Aluminum | 21.2 | ug/L | J | J | 16 |
| K1204190 | SJMW001 | K1204190-003DISS | 6010 | Barium | 782 | ug/L | | J | 14 |
| K1204190 | SJMW001 | K1204190-003DISS | 6010 | Chromium | 0.6 | ug/L | U | UJ | 7 |
| K1204190 | SJMW001 | K1204190-003DISS | 6010 | Copper | 2.8 | ug/L | J | U | 7 |
| K1204190 | SJMW001 | K1204190-003DISS | 6010 | Magnesium | 85300 | ug/L | | J | 17 |
| K1204226 | SL0301 | K1204226-001 | 6010 | Barium | 449 | mg/kg | N | J | 8 |
| K1204226 | SL0301 | K1204226-001 | 6010 | Magnesium | 3950 | mg/kg | | J | 17 |
| K1204226 | SL0301 | K1204226-001DUP | 6010 | Barium | 524 | mg/kg | | J | 8 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| K1204226 | SL0301 | K1204226-001DUP | 6010 | Magnesium | 4250 | mg/kg | | J | 17 |
| K1204226 | SL0302 | K1204226-002 | 6010 | Barium | 212 | mg/kg | N | J | 8 |
| K1204226 | SL0302 | K1204226-002 | 6010 | Magnesium | 4490 | mg/kg | | J | 17 |
| K1204226 | SL0303 | K1204226-003 | 6010 | Barium | 654 | mg/kg | N | J | 8 |
| K1204226 | SL0303 | K1204226-003 | 6010 | Magnesium | 6510 | mg/kg | | J | 17 |
| K1204226 | SL0305 | K1204226-005 | 6010 | Barium | 169 | mg/kg | N | J | 8 |
| K1204226 | SL0305 | K1204226-005 | 6010 | Magnesium | 3700 | mg/kg | | J | 17 |
| K1204226 | SL0307 | K1204226-007 | 6010 | Barium | 56 | mg/kg | N | J | 8 |
| K1204226 | SL0307 | K1204226-007 | 6010 | Magnesium | 1560 | mg/kg | | J | 17 |
| K1204226 | SL0309 | K1204226-009 | 6010 | Barium | 39.4 | mg/kg | N | J | 8 |
| K1204226 | SL0309 | K1204226-009 | 6010 | Magnesium | 1790 | mg/kg | | J | 17 |
| K1204226 | SL0312 | K1204226-011 | 6010 | Barium | 311 | mg/kg | N | J | 8 |
| K1204226 | SL0312 | K1204226-011 | 6010 | Magnesium | 3700 | mg/kg | | J | 17 |
| K1204226 | SL0313 | K1204226-012 | 6010 | Barium | 184 | mg/kg | N | J | 8 |
| K1204226 | SL0313 | K1204226-012 | 6010 | Magnesium | 4130 | mg/kg | | J | 17 |
| K1204226 | SL0315 | K1204226-014 | 6010 | Barium | 35.7 | mg/kg | N | J | 8 |
| K1204226 | SL0315 | K1204226-014 | 6010 | Magnesium | 988 | mg/kg | | J | 17 |
| K1204226 | SL0317 | K1204226-016 | 6010 | Barium | 19.5 | mg/kg | N | J | 8 |
| K1204226 | SL0317 | K1204226-016 | 6010 | Magnesium | 476 | mg/kg | | J | 17 |
| K1204226 | SL0319 | K1204226-018 | 6010 | Barium | 113 | mg/kg | N | J | 8 |
| K1204226 | SL0319 | K1204226-018 | 6010 | Magnesium | 2770 | mg/kg | | J | 17 |
| K1204226 | SL0322 | K1204226-020 | 6010 | Barium | 193 | mg/kg | N | J | 8 |
| K1204226 | SL0322 | K1204226-020 | 6010 | Magnesium | 2540 | mg/kg | | J | 17 |
| K1204226 | SL0323 | K1204226-021 | 6010 | Barium | 144 | mg/kg | N | J | 8 |
| K1204226 | SL0323 | K1204226-021 | 6010 | Magnesium | 2390 | mg/kg | | J | 17 |
| K1204226 | SL0326 | K1204226-024 | 6010 | Barium | 2280 | mg/kg | N | J | 8 |
| K1204226 | SL0326 | K1204226-024 | 6010 | Magnesium | 2410 | mg/kg | | J | 17 |
| K1204226 | SL0328 | K1204226-026 | 6010 | Barium | 85 | mg/kg | N | J | 8 |
| K1204226 | SL0328 | K1204226-026 | 6010 | Magnesium | 873 | mg/kg | | J | 17 |
| K1204226 | SL0330 | K1204226-028 | 6010 | Barium | 48.4 | mg/kg | N | J | 8 |
| K1204226 | SL0330 | K1204226-028 | 6010 | Magnesium | 1740 | mg/kg | | J | 17 |
| K1204265 | SD0001 | K1204265-001 | 6010 | Cobalt | 4.19 | mg/kg | | J | 16 |
| K1204265 | SD0001 | K1204265-001 | 6010 | Nickel | 7.32 | mg/kg | | J | 16 |
| K1204265 | SD0001 | K1204265-001DUP | 6010 | Cobalt | 4.02 | mg/kg | | J | 16 |
| K1204265 | SD0001 | K1204265-001DUP | 6010 | Nickel | 7.07 | mg/kg | | J | 16 |
| K1204265 | SD0001 | K1204265-001DUP | 6010 | Thallium | 0.3 | mg/kg | U | UJ | 7 |
| K1204265 | SD0002 | K1204265-002 | 6010 | Cobalt | 4.39 | mg/kg | | J | 16 |
| K1204265 | SD0002 | K1204265-002 | 6010 | Nickel | 6.21 | mg/kg | | J | 16 |
| K1204265 | SD0002 | K1204265-002 | 6010 | Thallium | 0.3 | mg/kg | U | UJ | 7 |
| K1204265 | SD0003 | K1204265-003 | 6010 | Cobalt | 4.56 | mg/kg | | J | 16 |
| K1204265 | SD0003 | K1204265-003 | 6010 | Nickel | 6.34 | mg/kg | | J | 16 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| K1204265 | SD0003 | K1204265-003 | 6010 | Thallium | 0.3 | mg/kg | U | UJ | 7 |
| K1204265 | SD0004 | K1204265-004 | 6010 | Cobalt | 3.46 | mg/kg | | J | 16 |
| K1204265 | SD0004 | K1204265-004 | 6010 | Nickel | 5.74 | mg/kg | | J | 16 |
| K1204265 | SD0004 | K1204265-004 | 6010 | Thallium | 0.3 | mg/kg | U | UJ | 7 |
| K1204265 | SD0005 | K1204265-005 | 6010 | Cobalt | 3.68 | mg/kg | | J | 16 |
| K1204265 | SD0005 | K1204265-005 | 6010 | Nickel | 6.32 | mg/kg | | J | 16 |
| K1204265 | SD0005 | K1204265-005 | 6010 | Thallium | 0.3 | mg/kg | U | UJ | 7 |
| K1204265 | SD0006 | K1204265-006 | 6010 | Cobalt | 3.9 | mg/kg | | J | 16 |
| K1204265 | SD0006 | K1204265-006 | 6010 | Nickel | 6.73 | mg/kg | | J | 16 |
| K1204265 | SD0006 | K1204265-006 | 6010 | Thallium | 0.3 | mg/kg | U | UJ | 7 |
| K1204265 | SD0007 | K1204265-007 | 6010 | Cobalt | 3.91 | mg/kg | | J | 16 |
| K1204265 | SD0007 | K1204265-007 | 6010 | Nickel | 13.6 | mg/kg | | J | 16 |
| K1204265 | SD0008 | K1204265-008 | 6010 | Cobalt | 3.43 | mg/kg | | J | 16 |
| K1204265 | SD0008 | K1204265-008 | 6010 | Nickel | 6.29 | mg/kg | | J | 16 |
| K1204265 | SD0008 | K1204265-008 | 6010 | Thallium | 0.3 | mg/kg | U | UJ | 7 |
| K1204265 | SD0009 | K1204265-009 | 6010 | Cobalt | 3.49 | mg/kg | | J | 16 |
| K1204265 | SD0009 | K1204265-009 | 6010 | Nickel | 6.13 | mg/kg | | J | 16 |
| K1204265 | SD0009 | K1204265-009 | 6010 | Thallium | 0.3 | mg/kg | U | UJ | 7 |
| K1204265 | SD0010 | K1204265-010 | 6010 | Cobalt | 4.08 | mg/kg | | J | 16 |
| K1204265 | SD0010 | K1204265-010 | 6010 | Nickel | 7.58 | mg/kg | | J | 16 |
| K1204265 | SD0010 | K1204265-010 | 6010 | Thallium | 0.4 | mg/kg | U | UJ | 7 |
| K1204265 | SD0011 | K1204265-011 | 6010 | Cobalt | 3.06 | mg/kg | | J | 16 |
| K1204265 | SD0011 | K1204265-011 | 6010 | Nickel | 5.32 | mg/kg | | J | 16 |
| K1204265 | SD0011 | K1204265-011 | 6010 | Thallium | 0.2 | mg/kg | U | UJ | 7 |
| K1204265 | SD0012 | K1204265-012 | 6010 | Cobalt | 3.18 | mg/kg | | J | 16 |
| K1204265 | SD0012 | K1204265-012 | 6010 | Nickel | 5.7 | mg/kg | | J | 16 |
| K1204265 | SD0012 | K1204265-012 | 6010 | Thallium | 0.3 | mg/kg | U | UJ | 7 |
| K1204265 | SD0013 | K1204265-013 | 6010 | Cobalt | 3.59 | mg/kg | | J | 16 |
| K1204265 | SD0013 | K1204265-013 | 6010 | Nickel | 6.03 | mg/kg | | J | 16 |
| K1204265 | SD0013 | K1204265-013 | 6010 | Thallium | 0.2 | mg/kg | U | UJ | 7 |
| K1204265 | FW0001 | K1204265-014 | 6010 | Aluminum | 9.7 | ug | J | U | 6 |
| K1204265 | FW0001 | K1204265-014 | 6010 | Copper | 0.7 | ug | J | U | 6 |
| K1204265 | FW0001 | K1204265-014 | 6010 | Magnesium | 128 | ug | | U | 6 |
| K1204265 | FW0001 | K1204265-014 | 6010 | Manganese | 0.3 | ug | J | U | 6 |
| K1204265 | FW0001 | K1204265-014 | 6010 | Nickel | 0.36 | ug | J | U | 7 |
| K1204265 | FW0001 | K1204265-014 | 6010 | Zinc | 39.3 | ug | | U | 6 |
| K1204265 | SD0014 | K1204265-015 | 6010 | Cobalt | 8.62 | mg/kg | | J | 16 |
| K1204265 | SD0014 | K1204265-015 | 6010 | Nickel | 58.5 | mg/kg | | J | 16 |
| K1204265 | SD0014 | K1204265-015 | 6010 | Thallium | 0.4 | mg/kg | U | UJ | 7 |
| K1204265 | FB0001 | K1204265-016 | 6010 | Nickel | 0.22 | ug | J | U | 7 |
| K1204325 | SL0342 | K1204325-002 | 6010 | Magnesium | 1220 | mg/kg | | J | 17 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| K1204325 | SL0342 | K1204325-002 | 6010 | Thallium | 0.4 | mg/kg | U | UJ | 7 |
| K1204325 | SL0342 | K1204325-002DUP | 6010 | Magnesium | 1140 | mg/kg | | J | 17 |
| K1204325 | SL0342 | K1204325-002DUP | 6010 | Thallium | 0.4 | mg/kg | U | UJ | 7 |
| K1204325 | SL0343 | K1204325-003 | 6010 | Magnesium | 665 | mg/kg | | J | 17 |
| K1204325 | SL0343 | K1204325-003 | 6010 | Thallium | 0.5 | mg/kg | U | UJ | 7 |
| K1204325 | SL0344 | K1204325-004 | 6010 | Magnesium | 571 | mg/kg | | J | 17 |
| K1204325 | SL0344 | K1204325-004 | 6010 | Thallium | 0.4 | mg/kg | U | UJ | 7 |
| K1204325 | SL0352 | K1204325-005 | 6010 | Magnesium | 2620 | mg/kg | | J | 17 |
| K1204325 | SL0352 | K1204325-005 | 6010 | Thallium | 0.5 | mg/kg | U | UJ | 7 |
| K1204325 | SL0386 | K1204325-007 | 6010 | Magnesium | 3600 | mg/kg | | J | 17 |
| K1204325 | SL0386 | K1204325-007 | 6010 | Thallium | 0.4 | mg/kg | U | UJ | 7 |
| K1204325 | SL0387 | K1204325-008 | 6010 | Magnesium | 3760 | mg/kg | | J | 17 |
| K1204325 | SL0387 | K1204325-008 | 6010 | Thallium | 0.4 | mg/kg | U | UJ | 7 |
| K1204325 | SL0390 | K1204325-011 | 6010 | Magnesium | 2020 | mg/kg | | J | 17 |
| K1204325 | SL0390 | K1204325-011 | 6010 | Thallium | 0.4 | mg/kg | U | UJ | 7 |
| K1204325 | SL0392 | K1204325-013 | 6010 | Magnesium | 2100 | mg/kg | | J | 17 |
| K1204325 | SL0392 | K1204325-013 | 6010 | Thallium | 0.4 | mg/kg | U | UJ | 7 |
| K1204325 | SL0394 | K1204325-015 | 6010 | Magnesium | 2630 | mg/kg | | J | 17 |
| K1204325 | SL0394 | K1204325-015 | 6010 | Thallium | 0.5 | mg/kg | U | UJ | 7 |
| K1204325 | SL0398 | K1204325-018 | 6010 | Magnesium | 3320 | mg/kg | | J | 17 |
| K1204325 | SL0398 | K1204325-018 | 6010 | Thallium | 0.4 | mg/kg | U | UJ | 7 |
| K1204325 | SL0399 | K1204325-019 | 6010 | Magnesium | 3380 | mg/kg | | J | 17 |
| K1204325 | SL0399 | K1204325-019 | 6010 | Thallium | 0.4 | mg/kg | U | UJ | 7 |
| K1204325 | SL0400 | K1204325-020 | 6010 | Magnesium | 2850 | mg/kg | | J | 17 |
| K1204325 | SL0400 | K1204325-020 | 6010 | Thallium | 0.4 | mg/kg | U | UJ | 7 |
| K1204325 | SL0402 | K1204325-021 | 6010 | Magnesium | 1420 | mg/kg | | J | 17 |
| K1204325 | SL0402 | K1204325-021 | 6010 | Thallium | 0.4 | mg/kg | U | UJ | 7 |
| K1204325 | SL0404 | K1204325-022 | 6010 | Magnesium | 754 | mg/kg | | J | 17 |
| K1204325 | SL0404 | K1204325-022 | 6010 | Thallium | 0.2 | mg/kg | U | UJ | 7 |
| K1204339 | SJMW002 | K1204339-001 | 6010 | Magnesium | 41400 | ug/L | | J | 17 |
| K1204339 | SJMW002 | K1204339-001DISS | 6010 | Aluminum | 9.1 | ug/L | J | J | 7 |
| K1204339 | SJMW002 | K1204339-001DISS | 6010 | Magnesium | 42100 | ug/L | | J | 17 |
| K1204339 | SJMW002 | K1204339-001DUP | 6010 | Magnesium | 41400 | ug/L | | J | 17 |
| K1204339 | SJMW002DUP1 | K1204339-002 | 6010 | Magnesium | 41400 | ug/L | | J | 17 |
| K1204339 | SJMW002DUP1 | K1204339-002DISS | 6010 | Magnesium | 41800 | ug/L | | J | 17 |
| K1204339 | ERB_20120505 | K1204339-003 | 6010 | Aluminum | 4.2 | ug/L | J | J | 7 |
| K1204339 | ERB_20120505 | K1204339-003 | 6010 | Magnesium | 2.4 | ug/L | J | J | 17 |
| K1204339 | ERB_20120505 | K1204339-003DISS | 6010 | Aluminum | 2 | ug/L | U | UJ | 7 |
| K1204342 | SL0345 | K1204342-003 | 6010 | Aluminum | 5400 | mg/kg | * | J | 9 |
| K1204342 | SL0345 | K1204342-003 | 6010 | Cobalt | 4.4 | mg/kg | | J | 16 |
| K1204342 | SL0345 | K1204342-003 | 6010 | Magnesium | 3660 | mg/kg | N* | J | 8,9,17 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| K1204342 | SL0345 | K1204342-003 | 6010 | Manganese | 136 | mg/kg | N | J | 8 |
| K1204342 | SL0345 | K1204342-003DUP | 6010 | Aluminum | 4030 | mg/kg | | J | 9 |
| K1204342 | SL0345 | K1204342-003DUP | 6010 | Cobalt | 3.41 | mg/kg | | J | 16 |
| K1204342 | SL0345 | K1204342-003DUP | 6010 | Magnesium | 4660 | mg/kg | | J | 8,9,17 |
| K1204342 | SL0345 | K1204342-003DUP | 6010 | Manganese | 144 | mg/kg | | J | 8 |
| K1204342 | SL0349 | K1204342-005 | 6010 | Aluminum | 15300 | mg/kg | * | J | 9 |
| K1204342 | SL0349 | K1204342-005 | 6010 | Cobalt | 3.94 | mg/kg | | J | 16 |
| K1204342 | SL0349 | K1204342-005 | 6010 | Magnesium | 1420 | mg/kg | N* | J | 8,9,17 |
| K1204342 | SL0349 | K1204342-005 | 6010 | Manganese | 141 | mg/kg | N | J | 8 |
| K1204342 | SL0351 | K1204342-007 | 6010 | Aluminum | 5270 | mg/kg | * | J | 9 |
| K1204342 | SL0351 | K1204342-007 | 6010 | Cobalt | 3.47 | mg/kg | | J | 16 |
| K1204342 | SL0351 | K1204342-007 | 6010 | Magnesium | 1760 | mg/kg | N* | J | 8,9,17 |
| K1204342 | SL0351 | K1204342-007 | 6010 | Manganese | 54.6 | mg/kg | N | J | 8 |
| K1204356 | FW0002 | K1204356-001 | 6010 | Copper | 1.2 | ug | J | U | 6 |
| K1204356 | FW0002 | K1204356-001 | 6010 | Magnesium | 101 | ug | | U | 6 |
| K1204356 | FW0002 | K1204356-001 | 6010 | Manganese | 0.82 | ug | J | U | 6 |
| K1204356 | FW0002 | K1204356-001 | 6010 | Zinc | 48.7 | ug | | U | 6 |
| K1204356 | SL0353 | K1204356-002 | 6010 | Barium | 174 | mg/kg | N* | J | 8,9 |
| K1204356 | SL0353 | K1204356-002 | 6010 | Magnesium | 2780 | mg/kg | | J | 17 |
| K1204356 | SL0353 | K1204356-002 | 6010 | Nickel | 11.5 | mg/kg | * | J | 9 |
| K1204356 | SL0354 | K1204356-003 | 6010 | Barium | 78.5 | mg/kg | N* | J | 8,9 |
| K1204356 | SL0354 | K1204356-003 | 6010 | Magnesium | 3230 | mg/kg | | J | 17 |
| K1204356 | SL0354 | K1204356-003 | 6010 | Nickel | 10 | mg/kg | * | J | 9 |
| K1204356 | SL0356 | K1204356-006 | 6010 | Barium | 183 | mg/kg | N* | J | 8,9 |
| K1204356 | SL0356 | K1204356-006 | 6010 | Magnesium | 2580 | mg/kg | | J | 17 |
| K1204356 | SL0356 | K1204356-006 | 6010 | Nickel | 18.2 | mg/kg | * | J | 9 |
| K1204356 | SL0358 | K1204356-008 | 6010 | Barium | 106 | mg/kg | N* | J | 8,9 |
| K1204356 | SL0358 | K1204356-008 | 6010 | Magnesium | 4160 | mg/kg | | J | 17 |
| K1204356 | SL0358 | K1204356-008 | 6010 | Nickel | 15.5 | mg/kg | * | J | 9 |
| K1204356 | SL0360 | K1204356-010 | 6010 | Barium | 85.9 | mg/kg | N* | J | 8,9 |
| K1204356 | SL0360 | K1204356-010 | 6010 | Magnesium | 1530 | mg/kg | | J | 17 |
| K1204356 | SL0360 | K1204356-010 | 6010 | Nickel | 6.49 | mg/kg | * | J | 9 |
| K1204356 | SL0300 | K1204356-012 | 6010 | Barium | 688 | mg/kg | N* | J | 8,9 |
| K1204356 | SL0300 | K1204356-012 | 6010 | Magnesium | 2780 | mg/kg | | J | 17 |
| K1204356 | SL0300 | K1204356-012 | 6010 | Nickel | 29.7 | mg/kg | * | J | 9 |
| K1204356 | SL0311 | K1204356-013 | 6010 | Barium | 127 | mg/kg | N* | J | 8,9 |
| K1204356 | SL0311 | K1204356-013 | 6010 | Magnesium | 1880 | mg/kg | | J | 17 |
| K1204356 | SL0311 | K1204356-013 | 6010 | Nickel | 10.6 | mg/kg | * | J | 9 |
| K1204356 | SL0363 | K1204356-014 | 6010 | Barium | 84.1 | mg/kg | N* | J | 8,9 |
| K1204356 | SL0363 | K1204356-014 | 6010 | Magnesium | 1830 | mg/kg | | J | 17 |
| K1204356 | SL0363 | K1204356-014 | 6010 | Nickel | 7.75 | mg/kg | * | J | 9 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| K1204356 | SL0371 | K1204356-015 | 6010 | Barium | 111 | mg/kg | N* | J | 8,9 |
| K1204356 | SL0371 | K1204356-015 | 6010 | Magnesium | 2270 | mg/kg | | J | 17 |
| K1204356 | SL0371 | K1204356-015 | 6010 | Nickel | 4.77 | mg/kg | * | J | 9 |
| K1204356 | SL0321 | K1204356-018 | 6010 | Barium | 98.2 | mg/kg | N* | J | 8,9 |
| K1204356 | SL0321 | K1204356-018 | 6010 | Magnesium | 1360 | mg/kg | | J | 17 |
| K1204356 | SL0321 | K1204356-018 | 6010 | Nickel | 6.38 | mg/kg | * | J | 9 |
| K1204356 | SL0364 | K1204356-019 | 6010 | Barium | 53.7 | mg/kg | N* | J | 8,9 |
| K1204356 | SL0364 | K1204356-019 | 6010 | Magnesium | 2150 | mg/kg | | J | 17 |
| K1204356 | SL0364 | K1204356-019 | 6010 | Nickel | 4.92 | mg/kg | * | J | 9 |
| K1204356 | SL0364 | K1204356-019 | 6010 | Thallium | 0.4 | mg/kg | U | UJ | 7 |
| K1204356 | SL0365 | K1204356-020 | 6010 | Barium | 41.3 | mg/kg | N* | J | 8,9 |
| K1204356 | SL0365 | K1204356-020 | 6010 | Magnesium | 3530 | mg/kg | | J | 17 |
| K1204356 | SL0365 | K1204356-020 | 6010 | Nickel | 4.27 | mg/kg | * | J | 9 |
| K1204356 | SL0365 | K1204356-020 | 6010 | Thallium | 0.4 | mg/kg | U | UJ | 7 |
| K1204356 | SL0368 | K1204356-022 | 6010 | Barium | 93.1 | mg/kg | N* | J | 8,9 |
| K1204356 | SL0368 | K1204356-022 | 6010 | Magnesium | 1340 | mg/kg | | J | 17 |
| K1204356 | SL0368 | K1204356-022 | 6010 | Nickel | 7.2 | mg/kg | * | J | 9 |
| K1204356 | SL0368 | K1204356-022 | 6010 | Thallium | 0.2 | mg/kg | U | UJ | 7 |
| K1204356 | SL0369 | K1204356-023 | 6010 | Barium | 95.9 | mg/kg | N* | J | 8,9 |
| K1204356 | SL0369 | K1204356-023 | 6010 | Magnesium | 2300 | mg/kg | | J | 17 |
| K1204356 | SL0369 | K1204356-023 | 6010 | Nickel | 12.3 | mg/kg | * | J | 9 |
| K1204356 | SL0369 | K1204356-023 | 6010 | Thallium | 0.4 | mg/kg | U | UJ | 7 |
| K1204356 | SL0332 | K1204356-024 | 6010 | Barium | 1280 | mg/kg | N* | J | 8,9 |
| K1204356 | SL0332 | K1204356-024 | 6010 | Magnesium | 4610 | mg/kg | | J | 17 |
| K1204356 | SL0332 | K1204356-024 | 6010 | Nickel | 37.5 | mg/kg | * | J | 9 |
| K1204356 | SL0332 | K1204356-024DUP | 6010 | Barium | 403 | mg/kg | | J | 8,9 |
| K1204356 | SL0332 | K1204356-024DUP | 6010 | Magnesium | 3920 | mg/kg | | J | 17 |
| K1204356 | SL0332 | K1204356-024DUP | 6010 | Nickel | 50.4 | mg/kg | | J | 9 |
| K1204356 | SL0332 | K1204356-024DUP | 6010 | Thallium | 1.2 | mg/kg | J | J | 7 |
| K1204377 | SL0418 | K1204377-010 | 6010 | Aluminum | 8470 | mg/kg | * | J | 9 |
| K1204377 | SL0418 | K1204377-010 | 6010 | Cobalt | 11.43 | mg/kg | | J | 16 |
| K1204377 | SL0418 | K1204377-010 | 6010 | Magnesium | 2680 | mg/kg | N* | J | 8,9,17 |
| K1204377 | SL0418 | K1204377-010 | 6010 | Manganese | 1970 | mg/kg | N | J | 8 |
| K1204377 | SL0419 | K1204377-011 | 6010 | Aluminum | 7620 | mg/kg | * | J | 9 |
| K1204377 | SL0419 | K1204377-011 | 6010 | Cobalt | 8.25 | mg/kg | | J | 16 |
| K1204377 | SL0419 | K1204377-011 | 6010 | Magnesium | 3020 | mg/kg | N* | J | 8,9,17 |
| K1204377 | SL0419 | K1204377-011 | 6010 | Manganese | 3440 | mg/kg | N | J | 8 |
| K1204377 | SL0421 | K1204377-013 | 6010 | Aluminum | 12100 | mg/kg | * | J | 9 |
| K1204377 | SL0421 | K1204377-013 | 6010 | Cobalt | 4 | mg/kg | | J | 16 |
| K1204377 | SL0421 | K1204377-013 | 6010 | Magnesium | 3390 | mg/kg | N* | J | 8,9,17 |
| K1204377 | SL0421 | K1204377-013 | 6010 | Manganese | 1070 | mg/kg | N | J | 8 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| K1204377 | SL0423 | K1204377-015 | 6010 | Aluminum | 9340 | mg/kg | * | J | 9 |
| K1204377 | SL0423 | K1204377-015 | 6010 | Cobalt | 4.87 | mg/kg | | J | 16 |
| K1204377 | SL0423 | K1204377-015 | 6010 | Magnesium | 2790 | mg/kg | N* | J | 8,9,17 |
| K1204377 | SL0423 | K1204377-015 | 6010 | Manganese | 1020 | mg/kg | N | J | 8 |
| K1204377 | SL0423 | K1204377-015 | 6010 | Thallium | 0.5 | mg/kg | U | UJ | 7 |
| K1204377 | SL0426 | K1204377-017 | 6010 | Aluminum | 13100 | mg/kg | * | J | 9 |
| K1204377 | SL0426 | K1204377-017 | 6010 | Cobalt | 5.62 | mg/kg | | J | 16 |
| K1204377 | SL0426 | K1204377-017 | 6010 | Magnesium | 4340 | mg/kg | N* | J | 8,9,17 |
| K1204377 | SL0426 | K1204377-017 | 6010 | Manganese | 116 | mg/kg | N | J | 8 |
| K1204377 | SL0426 | K1204377-017 | 6010 | Thallium | 0.5 | mg/kg | U | UJ | 7 |
| K1204377 | SL0427 | K1204377-018 | 6010 | Aluminum | 9980 | mg/kg | * | J | 9 |
| K1204377 | SL0427 | K1204377-018 | 6010 | Cobalt | 3.62 | mg/kg | | J | 16 |
| K1204377 | SL0427 | K1204377-018 | 6010 | Magnesium | 3100 | mg/kg | N* | J | 8,9,17 |
| K1204377 | SL0427 | K1204377-018 | 6010 | Manganese | 72.9 | mg/kg | N | J | 8 |
| K1204377 | SL0427 | K1204377-018 | 6010 | Thallium | 0.4 | mg/kg | U | UJ | 7 |
| K1204377 | SL0442 | K1204377-031 | 6010 | Aluminum | 6170 | mg/kg | * | J | 9 |
| K1204377 | SL0442 | K1204377-031 | 6010 | Cobalt | 52.42 | mg/kg | | J | 16 |
| K1204377 | SL0442 | K1204377-031 | 6010 | Magnesium | 13400 | mg/kg | N* | J | 8,9,17 |
| K1204377 | SL0442 | K1204377-031 | 6010 | Manganese | 6350 | mg/kg | N | J | 8 |
| K1204377 | SL0443 | K1204377-032 | 6010 | Aluminum | 8720 | mg/kg | * | J | 9 |
| K1204377 | SL0443 | K1204377-032 | 6010 | Cobalt | 44.68 | mg/kg | | J | 16 |
| K1204377 | SL0443 | K1204377-032 | 6010 | Magnesium | 12500 | mg/kg | N* | J | 8,9,17 |
| K1204377 | SL0443 | K1204377-032 | 6010 | Manganese | 8120 | mg/kg | N | J | 8 |
| K1204377 | SL0445 | K1204377-034 | 6010 | Aluminum | 9290 | mg/kg | * | J | 9 |
| K1204377 | SL0445 | K1204377-034 | 6010 | Cobalt | 3.69 | mg/kg | | J | 16 |
| K1204377 | SL0445 | K1204377-034 | 6010 | Magnesium | 2690 | mg/kg | N* | J | 8,9,17 |
| K1204377 | SL0445 | K1204377-034 | 6010 | Manganese | 270 | mg/kg | N | J | 8 |
| K1204377 | SL0445 | K1204377-034 | 6010 | Thallium | 0.4 | mg/kg | U | UJ | 7 |
| K1204377 | SL0447 | K1204377-036 | 6010 | Aluminum | 7350 | mg/kg | * | J | 9 |
| K1204377 | SL0447 | K1204377-036 | 6010 | Cobalt | 7.35 | mg/kg | | J | 16 |
| K1204377 | SL0447 | K1204377-036 | 6010 | Magnesium | 2380 | mg/kg | N* | J | 8,9,17 |
| K1204377 | SL0447 | K1204377-036 | 6010 | Manganese | 92.2 | mg/kg | N | J | 8 |
| K1204377 | SL0447 | K1204377-036 | 6010 | Thallium | 0.4 | mg/kg | U | UJ | 7 |
| K1204377 | SL0449 | K1204377-038 | 6010 | Aluminum | 3500 | mg/kg | * | J | 9 |
| K1204377 | SL0449 | K1204377-038 | 6010 | Cobalt | 4 | mg/kg | | J | 16 |
| K1204377 | SL0449 | K1204377-038 | 6010 | Magnesium | 1360 | mg/kg | N* | J | 8,9,17 |
| K1204377 | SL0449 | K1204377-038 | 6010 | Manganese | 346 | mg/kg | N | J | 8 |
| K1204377 | SL0449 | K1204377-038 | 6010 | Thallium | 0.4 | mg/kg | U | UJ | 7 |
| K1204449 | SL0312 | K1204449-010DUP | 6010 | Aluminum | 7020 | mg/kg | | DNR | 11 |
| K1204449 | SL0312 | K1204449-010DUP | 6010 | Barium | 369 | mg/kg | | DNR | 11 |
| K1204449 | SL0312 | K1204449-010DUP | 6010 | Cobalt | 15.08 | mg/kg | | DNR | 11 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| K1204449 | SL0312 | K1204449-010DUP | 6010 | Copper | 380 | mg/kg | | DNR | 11 |
| K1204449 | SL0312 | K1204449-010DUP | 6010 | Lead | 233 | mg/kg | | DNR | 11 |
| K1204449 | SL0312 | K1204449-010DUP | 6010 | Magnesium | 3790 | mg/kg | | DNR | 11 |
| K1204449 | SL0312 | K1204449-010DUP | 6010 | Manganese | 2040 | mg/kg | | DNR | 11 |
| K1204449 | SL0312 | K1204449-010DUP | 6010 | Nickel | 22.4 | mg/kg | | DNR | 11 |
| K1204449 | SL0312 | K1204449-010DUP | 6010 | Thallium | 0.4 | mg/kg | U | DNR | 11 |
| K1204449 | SL0312 | K1204449-010DUP | 6010 | Vanadium | 47.6 | mg/kg | | DNR | 11 |
| K1204449 | SL0312 | K1204449-010DUP | 6010 | Zinc | 1760 | mg/kg | | DNR | 11 |
| K1204449 | FW0007 | K1204449-019 | 6010 | Copper | 1.3 | ug | J | U | 6 |
| K1204449 | FW0007 | K1204449-019 | 6010 | Magnesium | 133 | ug | | U | 6 |
| K1204449 | FW0007 | K1204449-019 | 6010 | Zinc | 41.9 | ug | | U | 6 |
| K1204449 | FW0008 | K1204449-020 | 6010 | Copper | 1.2 | ug | J | U | 6 |
| K1204449 | FW0008 | K1204449-020 | 6010 | Magnesium | 182 | ug | | U | 6 |
| K1204449 | FW0008 | K1204449-020 | 6010 | Zinc | 44.4 | ug | | U | 6 |
| K1204449 | SL0347 | K1204449-023 | 6010 | Barium | 85.7 | mg/kg | N* | J | 8,9 |
| K1204449 | SL0347 | K1204449-023 | 6010 | Lead | 47.2 | mg/kg | N | J | 8 |
| K1204449 | SL0347 | K1204449-023 | 6010 | Magnesium | 1090 | mg/kg | N | J | 8,17 |
| K1204449 | SL0347 | K1204449-023 | 6010 | Manganese | 238 | mg/kg | * | J | 9 |
| K1204449 | SL0347 | K1204449-023 | 6010 | Thallium | 0.5 | mg/kg | U | UJ | 7 |
| K1204449 | SL0347 | K1204449-023 | 6010 | Vanadium | 18 | mg/kg | * | J | 9 |
| K1204449 | FW0009 | K1204449-029 | 6010 | Copper | 1 | ug | J | U | 6 |
| K1204449 | FW0009 | K1204449-029 | 6010 | Magnesium | 138 | ug | | U | 6 |
| K1204449 | FW0009 | K1204449-029 | 6010 | Nickel | 0.3 | ug | J | U | 7 |
| K1204449 | FW0009 | K1204449-029 | 6010 | Zinc | 44.2 | ug | | U | 6 |
| K1204449 | FW0010 | K1204449-030 | 6010 | Copper | 1.4 | ug | J | U | 6 |
| K1204449 | FW0010 | K1204449-030 | 6010 | Magnesium | 140 | ug | | U | 6 |
| K1204449 | FW0010 | K1204449-030 | 6010 | Zinc | 44.7 | ug | | U | 6 |
| K1204452 | SL0333 | K1204452-001 | 6010 | Barium | 534 | mg/kg | N* | J | 8,9 |
| K1204452 | SL0333 | K1204452-001 | 6010 | Lead | 597 | mg/kg | N | J | 8 |
| K1204452 | SL0333 | K1204452-001 | 6010 | Magnesium | 5360 | mg/kg | N | J | 8,17 |
| K1204452 | SL0333 | K1204452-001 | 6010 | Manganese | 7250 | mg/kg | * | J | 9 |
| K1204452 | SL0333 | K1204452-001 | 6010 | Vanadium | 25.4 | mg/kg | * | J | 9 |
| K1204452 | SL0334 | K1204452-002 | 6010 | Barium | 778 | mg/kg | N* | J | 8,9 |
| K1204452 | SL0334 | K1204452-002 | 6010 | Lead | 37.2 | mg/kg | N | J | 8 |
| K1204452 | SL0334 | K1204452-002 | 6010 | Magnesium | 6030 | mg/kg | N | J | 8,17 |
| K1204452 | SL0334 | K1204452-002 | 6010 | Manganese | 33500 | mg/kg | * | J | 9 |
| K1204452 | SL0334 | K1204452-002 | 6010 | Thallium | 0.1 | mg/kg | U | UJ | 7 |
| K1204452 | SL0334 | K1204452-002 | 6010 | Vanadium | 8.7 | mg/kg | * | J | 9 |
| K1204452 | SL0336 | K1204452-004 | 6010 | Barium | 217 | mg/kg | N* | J | 8,9 |
| K1204452 | SL0336 | K1204452-004 | 6010 | Lead | 42.3 | mg/kg | N | J | 8 |
| K1204452 | SL0336 | K1204452-004 | 6010 | Magnesium | 1720 | mg/kg | N | J | 8,17 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| K1204452 | SL0336 | K1204452-004 | 6010 | Manganese | 695 | mg/kg | * | J | 9 |
| K1204452 | SL0336 | K1204452-004 | 6010 | Thallium | 0.6 | mg/kg | U | UJ | 7 |
| K1204452 | SL0336 | K1204452-004 | 6010 | Vanadium | 11.1 | mg/kg | * | J | 9 |
| K1204452 | SL0338 | K1204452-006 | 6010 | Barium | 108 | mg/kg | N* | J | 8,9 |
| K1204452 | SL0338 | K1204452-006 | 6010 | Lead | 204 | mg/kg | N | J | 8 |
| K1204452 | SL0338 | K1204452-006 | 6010 | Magnesium | 3810 | mg/kg | N | J | 8,17 |
| K1204452 | SL0338 | K1204452-006 | 6010 | Manganese | 143 | mg/kg | * | J | 9 |
| K1204452 | SL0338 | K1204452-006 | 6010 | Thallium | 0.5 | mg/kg | U | UJ | 7 |
| K1204452 | SL0338 | K1204452-006 | 6010 | Vanadium | 25.2 | mg/kg | * | J | 9 |
| K1204452 | SL0340 | K1204452-008 | 6010 | Barium | 192 | mg/kg | N* | J | 8,9 |
| K1204452 | SL0340 | K1204452-008 | 6010 | Lead | 99.3 | mg/kg | N | J | 8 |
| K1204452 | SL0340 | K1204452-008 | 6010 | Magnesium | 2200 | mg/kg | N | J | 8,17 |
| K1204452 | SL0340 | K1204452-008 | 6010 | Manganese | 752 | mg/kg | * | J | 9 |
| K1204452 | SL0340 | K1204452-008 | 6010 | Thallium | 0.3 | mg/kg | U | UJ | 7 |
| K1204452 | SL0340 | K1204452-008 | 6010 | Vanadium | 14.2 | mg/kg | * | J | 9 |
| K1204452 | FW0003 | K1204452-010 | 6010 | Copper | 1.3 | ug | J | U | 6 |
| K1204452 | FW0003 | K1204452-010 | 6010 | Magnesium | 139 | ug | | U | 6 |
| K1204452 | FW0003 | K1204452-010 | 6010 | Nickel | 0.7 | ug | J | U | 7 |
| K1204452 | FW0003 | K1204452-010 | 6010 | Zinc | 44.6 | ug | | U | 6 |
| K1204452 | SL0441 | K1204452-011 | 6010 | Barium | 657 | mg/kg | N* | J | 8,9 |
| K1204452 | SL0441 | K1204452-011 | 6010 | Lead | 896 | mg/kg | N | J | 8 |
| K1204452 | SL0441 | K1204452-011 | 6010 | Magnesium | 14900 | mg/kg | N | J | 8,17 |
| K1204452 | SL0441 | K1204452-011 | 6010 | Manganese | 10500 | mg/kg | * | J | 9 |
| K1204452 | SL0441 | K1204452-011 | 6010 | Vanadium | 21.7 | mg/kg | * | J | 9 |
| K1204452 | SL0417 | K1204452-012 | 6010 | Barium | 264 | mg/kg | N* | J | 8,9 |
| K1204452 | SL0417 | K1204452-012 | 6010 | Lead | 111 | mg/kg | N | J | 8 |
| K1204452 | SL0417 | K1204452-012 | 6010 | Magnesium | 1730 | mg/kg | N | J | 8,17 |
| K1204452 | SL0417 | K1204452-012 | 6010 | Manganese | 635 | mg/kg | * | J | 9 |
| K1204452 | SL0417 | K1204452-012 | 6010 | Thallium | 0.4 | mg/kg | U | UJ | 7 |
| K1204452 | SL0417 | K1204452-012 | 6010 | Vanadium | 19.5 | mg/kg | * | J | 9 |
| K1204452 | SL0429 | K1204452-013 | 6010 | Barium | 107 | mg/kg | N* | J | 8,9 |
| K1204452 | SL0429 | K1204452-013 | 6010 | Lead | 26.1 | mg/kg | N | J | 8 |
| K1204452 | SL0429 | K1204452-013 | 6010 | Magnesium | 1390 | mg/kg | N | J | 8,17 |
| K1204452 | SL0429 | K1204452-013 | 6010 | Manganese | 1210 | mg/kg | * | J | 9 |
| K1204452 | SL0429 | K1204452-013 | 6010 | Thallium | 0.5 | mg/kg | J | J | 7 |
| K1204452 | SL0429 | K1204452-013 | 6010 | Vanadium | 110 | mg/kg | * | J | 9 |
| K1204452 | SL0385 | K1204452-015 | 6010 | Barium | 235 | mg/kg | N* | J | 8,9 |
| K1204452 | SL0385 | K1204452-015 | 6010 | Lead | 76.1 | mg/kg | N | J | 8 |
| K1204452 | SL0385 | K1204452-015 | 6010 | Magnesium | 3080 | mg/kg | N | J | 8,17 |
| K1204452 | SL0385 | K1204452-015 | 6010 | Manganese | 402 | mg/kg | * | J | 9 |
| K1204452 | SL0385 | K1204452-015 | 6010 | Thallium | 0.4 | mg/kg | U | UJ | 7 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| K1204452 | SL0385 | K1204452-015 | 6010 | Vanadium | 25.6 | mg/kg | * | J | 9 |
| K1204452 | SL0397 | K1204452-016 | 6010 | Barium | 254 | mg/kg | N* | J | 8,9 |
| K1204452 | SL0397 | K1204452-016 | 6010 | Lead | 116 | mg/kg | N | J | 8 |
| K1204452 | SL0397 | K1204452-016 | 6010 | Magnesium | 3520 | mg/kg | N | J | 8,17 |
| K1204452 | SL0397 | K1204452-016 | 6010 | Manganese | 441 | mg/kg | * | J | 9 |
| K1204452 | SL0397 | K1204452-016 | 6010 | Thallium | 0.4 | mg/kg | U | UJ | 7 |
| K1204452 | SL0397 | K1204452-016 | 6010 | Vanadium | 22.1 | mg/kg | * | J | 9 |
| K1204452 | FB0002 | K1204452-019 | 6010 | Nickel | 0.28 | ug | J | U | 7 |
| K1204452 | FW0004 | K1204452-020 | 6010 | Copper | 1.5 | ug | J | U | 6 |
| K1204452 | FW0004 | K1204452-020 | 6010 | Magnesium | 145 | ug | | U | 6 |
| K1204452 | FW0004 | K1204452-020 | 6010 | Nickel | 0.46 | ug | J | U | 7 |
| K1204452 | FW0004 | K1204452-020 | 6010 | Zinc | 44.2 | ug | | U | 6 |
| K1204452 | FW0005 | K1204452-021 | 6010 | Copper | 1.4 | ug | J | U | 6 |
| K1204452 | FW0005 | K1204452-021 | 6010 | Magnesium | 142 | ug | | U | 6 |
| K1204452 | FW0005 | K1204452-021 | 6010 | Nickel | 0.44 | ug | J | U | 7 |
| K1204452 | FW0005 | K1204452-021 | 6010 | Zinc | 42.2 | ug | | U | 6 |
| K1204452 | FW0006 | K1204452-022 | 6010 | Copper | 1.2 | ug | J | U | 6 |
| K1204452 | FW0006 | K1204452-022 | 6010 | Magnesium | 146 | ug | | U | 6 |
| K1204452 | FW0006 | K1204452-022 | 6010 | Zinc | 40.5 | ug | | U | 6 |
| K1204226 | SL0301 | K1204226-001 | SW6020A_3050B | Chromium | 80.4 | mg/kg | N* | J | 8,9 |
| K1204226 | SL0301 | K1204226-001DUP | SW6020A_3050B | Chromium | 349.18 | mg/kg | | J | 8,9 |
| K1204226 | SL0302 | K1204226-002 | SW6020A_3050B | Chromium | 41.7 | mg/kg | N* | J | 8,9 |
| K1204226 | SL0303 | K1204226-003 | SW6020A_3050B | Chromium | 34.3 | mg/kg | N* | J | 8,9 |
| K1204226 | SL0305 | K1204226-005 | SW6020A_3050B | Chromium | 21.7 | mg/kg | N* | J | 8,9 |
| K1204226 | SL0307 | K1204226-007 | SW6020A_3050B | Cadmium | 0.083 | mg/kg | | U | 7 |
| K1204226 | SL0307 | K1204226-007 | SW6020A_3050B | Chromium | 7.66 | mg/kg | N* | J | 8,9 |
| K1204226 | SL0309 | K1204226-009 | SW6020A_3050B | Cadmium | 0.075 | mg/kg | | U | 7 |
| K1204226 | SL0309 | K1204226-009 | SW6020A_3050B | Chromium | 5.32 | mg/kg | N* | J | 8,9 |
| K1204226 | SL0312 | K1204226-011 | SW6020A_3050B | Chromium | 16.8 | mg/kg | N* | J | 8,9 |
| K1204226 | SL0313 | K1204226-012 | SW6020A_3050B | Cadmium | 0.104 | mg/kg | | U | 7 |
| K1204226 | SL0313 | K1204226-012 | SW6020A_3050B | Chromium | 17 | mg/kg | N* | J | 8,9 |
| K1204226 | SL0315 | K1204226-014 | SW6020A_3050B | Cadmium | 0.103 | mg/kg | | U | 7 |
| K1204226 | SL0315 | K1204226-014 | SW6020A_3050B | Chromium | 3.53 | mg/kg | N* | J | 8,9 |
| K1204226 | SL0317 | K1204226-016 | SW6020A_3050B | Cadmium | 0.029 | mg/kg | J | U | 7 |
| K1204226 | SL0317 | K1204226-016 | SW6020A_3050B | Chromium | 1.46 | mg/kg | N* | J | 8,9 |
| K1204226 | SL0319 | K1204226-018 | SW6020A_3050B | Cadmium | 0.053 | mg/kg | J | U | 7 |
| K1204226 | SL0319 | K1204226-018 | SW6020A_3050B | Chromium | 5.7 | mg/kg | N* | J | 8,9 |
| K1204226 | SL0322 | K1204226-020 | SW6020A_3050B | Chromium | 11.9 | mg/kg | N* | J | 8,9 |
| K1204226 | SL0323 | K1204226-021 | SW6020A_3050B | Cadmium | 0.075 | mg/kg | | U | 7 |
| K1204226 | SL0323 | K1204226-021 | SW6020A_3050B | Chromium | 6.67 | mg/kg | N* | J | 8,9 |
| K1204226 | SL0326 | K1204226-024 | SW6020A_3050B | Chromium | 8.9 | mg/kg | N* | J | 8,9 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| K1204226 | SL0328 | K1204226-026 | SW6020A_3050B | Cadmium | 0.055 | mg/kg | | U | 7 |
| K1204226 | SL0328 | K1204226-026 | SW6020A_3050B | Chromium | 3.9 | mg/kg | N* | J | 8,9 |
| K1204226 | SL0330 | K1204226-028 | SW6020A_3050B | Cadmium | 0.067 | mg/kg | | U | 7 |
| K1204226 | SL0330 | K1204226-028 | SW6020A_3050B | Chromium | 4.77 | mg/kg | N* | J | 8,9 |
| K1204265 | FW0001 | K1204265-014 | SW6020A_3050B | Arsenic | 0.08 | ug | J | U | 6 |
| K1204265 | FW0001 | K1204265-014 | SW6020A_3050B | Cadmium | 0.027 | ug | | U | 7 |
| K1204265 | FB0001 | K1204265-016 | SW6020A_3050B | Cadmium | 0.022 | ug | | U | 7 |
| K1204265 | FB0001 | K1204265-016 | SW6020A_3050B | Chromium | 0.08 | ug | J | U | 7 |
| K1204325 | SL0342 | K1204325-002 | SW6020A_3050B | Arsenic | 4.61 | mg/kg | * | J | 9 |
| K1204325 | SL0342 | K1204325-002DUP | SW6020A_3050B | Arsenic | 5.66 | mg/kg | | J | 9 |
| K1204325 | SL0343 | K1204325-003 | SW6020A_3050B | Arsenic | 2.05 | mg/kg | * | J | 9 |
| K1204325 | SL0343 | K1204325-003 | SW6020A_3050B | Cadmium | 0.04 | mg/kg | J | U | 7 |
| K1204325 | SL0344 | K1204325-004 | SW6020A_3050B | Arsenic | 2.42 | mg/kg | * | J | 9 |
| K1204325 | SL0344 | K1204325-004 | SW6020A_3050B | Cadmium | 0.032 | mg/kg | J | U | 7 |
| K1204325 | SL0352 | K1204325-005 | SW6020A_3050B | Arsenic | 6.85 | mg/kg | * | J | 9 |
| K1204325 | SL0386 | K1204325-007 | SW6020A_3050B | Arsenic | 4.15 | mg/kg | * | J | 9 |
| K1204325 | SL0387 | K1204325-008 | SW6020A_3050B | Arsenic | 4.7 | mg/kg | * | J | 9 |
| K1204325 | SL0390 | K1204325-011 | SW6020A_3050B | Arsenic | 6.77 | mg/kg | * | J | 9 |
| K1204325 | SL0392 | K1204325-013 | SW6020A_3050B | Arsenic | 3.66 | mg/kg | * | J | 9 |
| K1204325 | SL0394 | K1204325-015 | SW6020A_3050B | Arsenic | 5.28 | mg/kg | * | J | 9 |
| K1204325 | SL0398 | K1204325-018 | SW6020A_3050B | Arsenic | 10.3 | mg/kg | * | J | 9 |
| K1204325 | SL0399 | K1204325-019 | SW6020A_3050B | Arsenic | 4.92 | mg/kg | * | J | 9 |
| K1204325 | SL0400 | K1204325-020 | SW6020A_3050B | Arsenic | 5.09 | mg/kg | * | J | 9 |
| K1204325 | SL0402 | K1204325-021 | SW6020A_3050B | Arsenic | 3.02 | mg/kg | * | J | 9 |
| K1204325 | SL0404 | K1204325-022 | SW6020A_3050B | Arsenic | 1.25 | mg/kg | * | J | 9 |
| K1204325 | SL0404 | K1204325-022 | SW6020A_3050B | Cadmium | 0.035 | mg/kg | | U | 7 |
| K1204342 | SL0345 | K1204342-003 | SW6020A_3050B | Cadmium | 0.112 | mg/kg | | J | 16 |
| K1204342 | SL0345 | K1204342-003DUP | SW6020A_3050B | Cadmium | 0.128 | mg/kg | | J | 16 |
| K1204342 | SL0349 | K1204342-005 | SW6020A_3050B | Cadmium | 0.122 | mg/kg | | J | 16 |
| K1204342 | SL0351 | K1204342-007 | SW6020A_3050B | Cadmium | 0.091 | mg/kg | | UJ | 7,16 |
| K1204377 | SL0418 | K1204377-010 | SW6020A_3050B | Chromium | 53.5 | mg/kg | | J | 16 |
| K1204377 | SL0419 | K1204377-011 | SW6020A_3050B | Chromium | 85.1 | mg/kg | | J | 16 |
| K1204377 | SL0421 | K1204377-013 | SW6020A_3050B | Chromium | 24.6 | mg/kg | | J | 16 |
| K1204377 | SL0423 | K1204377-015 | SW6020A_3050B | Chromium | 25.2 | mg/kg | | J | 16 |
| K1204377 | SL0426 | K1204377-017 | SW6020A_3050B | Chromium | 13.5 | mg/kg | | J | 16 |
| K1204377 | SL0427 | K1204377-018 | SW6020A_3050B | Chromium | 9.84 | mg/kg | | J | 16 |
| K1204377 | SL0442 | K1204377-031 | SW6020A_3050B | Chromium | 110 | mg/kg | | J | 16 |
| K1204377 | SL0443 | K1204377-032 | SW6020A_3050B | Chromium | 122 | mg/kg | | J | 16 |
| K1204377 | SL0445 | K1204377-034 | SW6020A_3050B | Chromium | 14.7 | mg/kg | | J | 16 |
| K1204377 | SL0447 | K1204377-036 | SW6020A_3050B | Chromium | 6.25 | mg/kg | | J | 16 |
| K1204377 | SL0449 | K1204377-038 | SW6020A_3050B | Chromium | 101 | mg/kg | | J | 16 |

## Qualified Data Summary Table
## San Jacinto River Waste Pits - Southern Impoundments

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| K1204190 | SJMW003 | K1204190-001DISS | SW6020A_CLFAA | Thallium | 0.03 | ug/L | J | U | 7 |
| K1204190 | SJMW003 | K1204190-001DUP | SW6020A_CLFAA | Cobalt | 1.47 | ug/L | | J | 17 |
| K1204190 | SJMW003 | K1204190-001DUP | SW6020A_CLFAA | Thallium | 0.028 | ug/L | J | U | 7 |
| K1204339 | ERB_20120505 | K1204339-003 | SW6020A_CLFAA | Cobalt | 0.012 | ug/L | J | U | 7 |
| K1204339 | ERB_20120505 | K1204339-003DISS | SW6020A_CLFAA | Cobalt | 0.056 | ug/L | | U | 7 |
| K1204356 | FW0002 | K1204356-001 | SW6020A_CLFAA | Arsenic | 0.08 | ug | J | U | 6 |
| K1204356 | FW0002 | K1204356-001 | SW6020A_CLFAA | Cadmium | 0.028 | ug | | U | 7 |
| K1204356 | SL0353 | K1204356-002 | SW6020A_CLFAA | Arsenic | 3.78 | mg/kg | N | J | 8 |
| K1204356 | SL0353 | K1204356-002 | SW6020A_CLFAA | Chromium | 29 | mg/kg | N* | J | 8,9 |
| K1204356 | SL0354 | K1204356-003 | SW6020A_CLFAA | Arsenic | 4.32 | mg/kg | N | J | 8 |
| K1204356 | SL0354 | K1204356-003 | SW6020A_CLFAA | Chromium | 22.5 | mg/kg | N* | J | 8,9 |
| K1204356 | SL0356 | K1204356-006 | SW6020A_CLFAA | Arsenic | 7.78 | mg/kg | N | J | 8 |
| K1204356 | SL0356 | K1204356-006 | SW6020A_CLFAA | Chromium | 37.1 | mg/kg | N* | J | 8,9 |
| K1204356 | SL0358 | K1204356-008 | SW6020A_CLFAA | Arsenic | 6.07 | mg/kg | N | J | 8 |
| K1204356 | SL0358 | K1204356-008 | SW6020A_CLFAA | Chromium | 30.1 | mg/kg | N* | J | 8,9 |
| K1204356 | SL0360 | K1204356-010 | SW6020A_CLFAA | Arsenic | 1.6 | mg/kg | N | J | 8 |
| K1204356 | SL0360 | K1204356-010 | SW6020A_CLFAA | Cadmium | 0.067 | mg/kg | | U | 7 |
| K1204356 | SL0360 | K1204356-010 | SW6020A_CLFAA | Chromium | 3.42 | mg/kg | N* | J | 8,9 |
| K1204356 | SL0300 | K1204356-012 | SW6020A_CLFAA | Arsenic | 105 | mg/kg | N | J | 8 |
| K1204356 | SL0300 | K1204356-012 | SW6020A_CLFAA | Chromium | 60.2 | mg/kg | N* | J | 8,9 |
| K1204356 | SL0311 | K1204356-013 | SW6020A_CLFAA | Arsenic | 18.4 | mg/kg | N | J | 8 |
| K1204356 | SL0311 | K1204356-013 | SW6020A_CLFAA | Chromium | 20.7 | mg/kg | N* | J | 8,9 |
| K1204356 | SL0363 | K1204356-014 | SW6020A_CLFAA | Arsenic | 6.44 | mg/kg | N | J | 8 |
| K1204356 | SL0363 | K1204356-014 | SW6020A_CLFAA | Chromium | 61.1 | mg/kg | N* | J | 8,9 |
| K1204356 | SL0371 | K1204356-015 | SW6020A_CLFAA | Arsenic | 2.3 | mg/kg | N | J | 8 |
| K1204356 | SL0371 | K1204356-015 | SW6020A_CLFAA | Cadmium | 0.045 | mg/kg | | U | 7 |
| K1204356 | SL0371 | K1204356-015 | SW6020A_CLFAA | Chromium | 7.05 | mg/kg | N* | J | 8,9 |
| K1204356 | SL0321 | K1204356-018 | SW6020A_CLFAA | Arsenic | 2.39 | mg/kg | N | J | 8 |
| K1204356 | SL0321 | K1204356-018 | SW6020A_CLFAA | Chromium | 20.6 | mg/kg | N* | J | 8,9 |
| K1204356 | SL0364 | K1204356-019 | SW6020A_CLFAA | Arsenic | 10.5 | mg/kg | N | J | 8 |
| K1204356 | SL0364 | K1204356-019 | SW6020A_CLFAA | Chromium | 14.3 | mg/kg | N* | J | 8,9 |
| K1204356 | SL0365 | K1204356-020 | SW6020A_CLFAA | Arsenic | 6.67 | mg/kg | N | J | 8 |
| K1204356 | SL0365 | K1204356-020 | SW6020A_CLFAA | Chromium | 11.2 | mg/kg | N* | J | 8,9 |
| K1204356 | SL0368 | K1204356-022 | SW6020A_CLFAA | Arsenic | 3.31 | mg/kg | N | J | 8 |
| K1204356 | SL0368 | K1204356-022 | SW6020A_CLFAA | Chromium | 23.3 | mg/kg | N* | J | 8,9 |
| K1204356 | SL0369 | K1204356-023 | SW6020A_CLFAA | Arsenic | 4.43 | mg/kg | N | J | 8 |
| K1204356 | SL0369 | K1204356-023 | SW6020A_CLFAA | Chromium | 28.7 | mg/kg | N* | J | 8,9 |
| K1204356 | SL0332 | K1204356-024 | SW6020A_CLFAA | Arsenic | 89 | mg/kg | N | J | 8 |
| K1204356 | SL0332 | K1204356-024 | SW6020A_CLFAA | Chromium | 52.1 | mg/kg | N* | J | 8,9 |
| K1204356 | SL0332 | K1204356-024DUP | SW6020A_CLFAA | Arsenic | 74.35 | mg/kg | | J | 8 |
| K1204356 | SL0332 | K1204356-024DUP | SW6020A_CLFAA | Chromium | 78.45 | mg/kg | | J | 8,9 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| K1204449 | SL0312 | K1204449-010DUP | SW6020A_CLFAA | Arsenic | 36.85 | mg/kg | | DNR | 11 |
| K1204449 | SL0312 | K1204449-010DUP | SW6020A_CLFAA | Cadmium | 1.38 | mg/kg | | DNR | 11 |
| K1204449 | SL0312 | K1204449-010DUP | SW6020A_CLFAA | Chromium | 144.52 | mg/kg | | DNR | 11 |
| K1204449 | FW0007 | K1204449-019 | SW6020A_CLFAA | Arsenic | 0.13 | ug | J | U | 6 |
| K1204449 | FW0007 | K1204449-019 | SW6020A_CLFAA | Cadmium | 0.026 | ug | | U | 7 |
| K1204449 | FW0008 | K1204449-020 | SW6020A_CLFAA | Arsenic | 0.15 | ug | J | U | 6 |
| K1204449 | FW0008 | K1204449-020 | SW6020A_CLFAA | Cadmium | 0.026 | ug | | U | 7 |
| K1204449 | SL0347 | K1204449-023 | SW6020A_CLFAA | Chromium | 9.11 | mg/kg | N* | J | 8,9 |
| K1204449 | FW0009 | K1204449-029 | SW6020A_CLFAA | Arsenic | 0.14 | ug | J | U | 6 |
| K1204449 | FW0009 | K1204449-029 | SW6020A_CLFAA | Cadmium | 0.03 | ug | | U | 7 |
| K1204449 | FW0010 | K1204449-030 | SW6020A_CLFAA | Arsenic | 0.18 | ug | J | U | 6 |
| K1204449 | FW0010 | K1204449-030 | SW6020A_CLFAA | Cadmium | 0.031 | ug | | U | 7 |
| K1204452 | SL0333 | K1204452-001 | SW6020A_CLFAA | Chromium | 62.7 | mg/kg | N* | J | 8,9 |
| K1204452 | SL0334 | K1204452-002 | SW6020A_CLFAA | Chromium | 8.89 | mg/kg | N* | J | 8,9 |
| K1204452 | SL0336 | K1204452-004 | SW6020A_CLFAA | Chromium | 18.7 | mg/kg | N* | J | 8,9 |
| K1204452 | SL0338 | K1204452-006 | SW6020A_CLFAA | Chromium | 41.3 | mg/kg | N* | J | 8,9 |
| K1204452 | SL0340 | K1204452-008 | SW6020A_CLFAA | Chromium | 20.3 | mg/kg | N* | J | 8,9 |
| K1204452 | FW0003 | K1204452-010 | SW6020A_CLFAA | Arsenic | 0.71 | ug | | U | 6 |
| K1204452 | FW0003 | K1204452-010 | SW6020A_CLFAA | Cadmium | 0.023 | ug | | U | 7 |
| K1204452 | SL0441 | K1204452-011 | SW6020A_CLFAA | Chromium | 86.3 | mg/kg | N* | J | 8,9 |
| K1204452 | SL0417 | K1204452-012 | SW6020A_CLFAA | Chromium | 27.1 | mg/kg | N* | J | 8,9 |
| K1204452 | SL0429 | K1204452-013 | SW6020A_CLFAA | Chromium | 37.7 | mg/kg | N* | J | 8,9 |
| K1204452 | SL0385 | K1204452-015 | SW6020A_CLFAA | Chromium | 23.7 | mg/kg | N* | J | 8,9 |
| K1204452 | SL0397 | K1204452-016 | SW6020A_CLFAA | Chromium | 26 | mg/kg | N* | J | 8,9 |
| K1204452 | FB0002 | K1204452-019 | SW6020A_CLFAA | Cadmium | 0.022 | ug | | U | 7 |
| K1204452 | FB0002 | K1204452-019 | SW6020A_CLFAA | Chromium | 0.09 | ug | J | U | 7 |
| K1204452 | FW0004 | K1204452-020 | SW6020A_CLFAA | Arsenic | 0.28 | ug | J | U | 6 |
| K1204452 | FW0004 | K1204452-020 | SW6020A_CLFAA | Cadmium | 0.024 | ug | | U | 7 |
| K1204452 | FW0005 | K1204452-021 | SW6020A_CLFAA | Arsenic | 0.4 | ug | J | U | 6 |
| K1204452 | FW0005 | K1204452-021 | SW6020A_CLFAA | Cadmium | 0.022 | ug | | U | 7 |
| K1204452 | FW0006 | K1204452-022 | SW6020A_CLFAA | Arsenic | 0.1 | ug | J | U | 6 |
| K1204452 | FW0006 | K1204452-022 | SW6020A_CLFAA | Cadmium | 0.022 | ug | | U | 7 |
| K1204190 | SJMW003 | K1204190-001 | SW7470A | Mercury | 0.03 | ug/L | J | U | 7 |
| K1204265 | SD0002 | K1204265-002 | SW7471B | Mercury | 0.026 | mg/kg | | J | 7 |
| K1204265 | SD0003 | K1204265-003 | SW7471B | Mercury | 0.024 | mg/kg | | J | 7 |
| K1204356 | SL0353 | K1204356-002 | SW7471B | Mercury | 0.017 | mg/kg | J | J | 7 |
| K1204356 | SL0353 | K1204356-002DUP | SW7471B | Mercury | 0.013 | mg/kg | J | J | 7 |
| K1204356 | SL0354 | K1204356-003 | SW7471B | Mercury | 0.003 | mg/kg | U | UJ | 7 |
| E1200475 | SL0301 | E1200475-001 | EPA1668A | 2,2',3,4',5,6'-Hexachlorobiphenyl | 8.5 | ng/kg | JK | U | 22 |
| E1200475 | SL0301 | E1200475-001 | EPA1668A | 2,2',3,5,6,6'-Hexachlorobiphenyl | 7.44 | ng/kg | JK | U | 22 |
| E1200475 | SL0301 | E1200475-001 | EPA1668A | 2,2',4,5',6-Pentachlorobiphenyl | 8.07 | ng/kg | JK | U | 22 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| E1200475 | SL0301 | E1200475-001 | EPA1668A | 2,2',6,6'-Tetrachlorobiphenyl | 2.08 | ng/kg | JK | U | 22 |
| E1200475 | SL0301 | E1200475-001 | EPA1668A | 2,3,4,4',5-Pentachlorobiphenyl | 55.5 | ng/kg | JK | U | 22 |
| E1200475 | SL0301 | E1200475-001 | EPA1668A | 2,3',4,5'-Tetrachlorobiphenyl | 1.57 | ng/kg | JK | U | 22 |
| E1200475 | SL0301 | E1200475-001 | EPA1668A | 2,3',5,5'-Tetrachlorobiphenyl | 4.15 | ng/kg | JK | U | 22 |
| E1200475 | SL0301 | E1200475-001 | EPA1668A | 2,4-Dichlorobiphenyl | 16.1 | ng/kg | JK | U | 22 |
| E1200475 | SL0301 | E1200475-001 | EPA1668A | 3,3',4,4',5,5'-Hexachlorobiphenyl | 6.72 | ng/kg | JK | U | 22 |
| E1200475 | SL0301 | E1200475-001 | EPA1668A | 3,3'-Dichlorobiphenyl | 25.8 | ng/kg | JK | U | 22 |
| E1200475 | SL0301 | E1200475-001 | EPA1668A | 3,4,4',5-Tetrachlorobiphenyl | 6.57 | ng/kg | JK | U | 22 |
| E1200475 | SL0301 | E1200475-001 | EPA1668A | Coelution of PCB 093 and 100 | 17.6 | ng/kg | JK | U | 22 |
| E1200475 | SL0301 | E1200475-001 | EPA1668A | Coelution of PCB 147 and 149 | 8760 | ng/kg | | J | 14 |
| E1200475 | SL0302 | E1200475-002 | EPA1668A | 2,2',3,4,4',5,6'-Heptachlorobiphenyl | 8.81 | ng/kg | JK | U | 22 |
| E1200475 | SL0302 | E1200475-002 | EPA1668A | 2,2',3,4',5,6'-Hexachlorobiphenyl | 4.73 | ng/kg | JK | U | 22 |
| E1200475 | SL0302 | E1200475-002 | EPA1668A | 2,2',4,4',5,6'-Hexachlorobiphenyl | 39.4 | ng/kg | JK | U | 22 |
| E1200475 | SL0302 | E1200475-002 | EPA1668A | 2,2',4,5',6-Pentachlorobiphenyl | 13.5 | ng/kg | JK | U | 22 |
| E1200475 | SL0302 | E1200475-002 | EPA1668A | 2,2',6,6'-Tetrachlorobiphenyl | 2.55 | ng/kg | JK | U | 22 |
| E1200475 | SL0302 | E1200475-002 | EPA1668A | 2,3',5,5'-Tetrachlorobiphenyl | 4.91 | ng/kg | JK | U | 22 |
| E1200475 | SL0302 | E1200475-002 | EPA1668A | Coelution of PCB 098 and 102 | 129 | ng/kg | JK | U | 22 |
| E1200475 | SL0302 | E1200475-002 | EPA1668A | Coelution of PCB 147 and 149 | 8580 | ng/kg | | J | 14 |
| E1200475 | SL0303 | E1200475-003 | EPA1668A | 2,2',3,4,4',5,6'-Heptachlorobiphenyl | 9.12 | ng/kg | JK | U | 22 |
| E1200475 | SL0303 | E1200475-003 | EPA1668A | 2,2',3,4',5,6'-Hexachlorobiphenyl | 7.64 | ng/kg | JK | U | 22 |
| E1200475 | SL0303 | E1200475-003 | EPA1668A | 2,2',4,5',6-Pentachlorobiphenyl | 26.8 | ng/kg | JK | U | 22 |
| E1200475 | SL0303 | E1200475-003 | EPA1668A | 2,3',5'-Trichlorobiphenyl | 2.57 | ng/kg | JK | U | 22 |
| E1200475 | SL0303 | E1200475-003 | EPA1668A | 3-Chlorobiphenyl | 17 | ng/kg | K | U | 22 |
| E1200475 | SL0303 | E1200475-003 | EPA1668A | Coelution of PCB 012 and 013 | 48.1 | ng/kg | JK | U | 22 |
| E1200475 | SL0303 | E1200475-003 | EPA1668A | Coelution of PCB 147 and 149 | 11100 | ng/kg | | J | 14 |
| E1200475 | SL0304 | E1200475-004 | EPA1668A | 2,2',3,4',6,6'-Hexachlorobiphenyl | 1.45 | ng/kg | JK | U | 22 |
| E1200475 | SL0304 | E1200475-004 | EPA1668A | 2,3,3',4,4',5',6-Heptachlorobiphenyl | 25 | ng/kg | JK | U | 22 |
| E1200475 | SL0304 | E1200475-004 | EPA1668A | 2,3',4,4',5'-Pentachlorobiphenyl | 23.5 | ng/kg | JK | U | 22 |
| E1200475 | SL0304 | E1200475-004 | EPA1668A | 2,3',4,5-Tetrachlorobiphenyl | 11.8 | ng/kg | JK | U | 22 |
| E1200475 | SL0304 | E1200475-004 | EPA1668A | 2,3',5,5'-Tetrachlorobiphenyl | 1.62 | ng/kg | JK | U | 22 |
| E1200475 | SL0304 | E1200475-004 | EPA1668A | 2,3'-Dichlorobiphenyl | 33.9 | ng/kg | JK | U | 22 |
| E1200475 | SL0304 | E1200475-004 | EPA1668A | 2-Chlorobiphenyl | 19.5 | ng/kg | BJ | U | 7 |
| E1200475 | SL0305 | E1200475-005 | EPA1668A | 2,2',3,3',4,4',5,6,6'-Nonachlorobiphenyl | 13.8 | ng/kg | JK | U | 22 |
| E1200475 | SL0305 | E1200475-005 | EPA1668A | 2,2',3,3',4,5',6,6'-Octachlorobiphenyl | 34.7 | ng/kg | JK | U | 22 |
| E1200475 | SL0305 | E1200475-005 | EPA1668A | 2,2',3,3',4,6-Hexachlorobiphenyl | 23.7 | ng/kg | JK | U | 22 |
| E1200475 | SL0305 | E1200475-005 | EPA1668A | 2,2',3,3',5,5'-Hexachlorobiphenyl | 24.3 | ng/kg | JK | U | 22 |
| E1200475 | SL0305 | E1200475-005 | EPA1668A | 2,2',3,4,4',5-Hexachlorobiphenyl | 105 | ng/kg | JK | U | 22 |
| E1200475 | SL0305 | E1200475-005 | EPA1668A | 2,2',4,4',5,6'-Hexachlorobiphenyl | 10.5 | ng/kg | JK | U | 22 |
| E1200475 | SL0305 | E1200475-005 | EPA1668A | 2,2',4,5',6-Pentachlorobiphenyl | 6.27 | ng/kg | JK | U | 22 |
| E1200475 | SL0305 | E1200475-005 | EPA1668A | 2,3,3',4',5,5'-Hexachlorobiphenyl | 18.9 | ng/kg | JK | U | 22 |
| E1200475 | SL0305 | E1200475-005 | EPA1668A | 2,3,3',4,5,5'-Hexachlorobiphenyl | 16.4 | ng/kg | JK | U | 22 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| E1200475 | SL0305 | E1200475-005 | EPA1668A | Coelution of PCB 043 and 073 | 13.6 | ng/kg | JK | U | 22 |
| E1200475 | SL0305 | E1200475-005 | EPA1668A | Coelution of PCB 147 and 149 | 1570 | ng/kg | | J | 14 |
| E1200475 | SL0306 | E1200475-006 | EPA1668A | 2,2',3,4,4',5,5',6-Octachlorobiphenyl | 179 | ng/kg | J | J | 14 |
| E1200475 | SL0306 | E1200475-006 | EPA1668A | 2,2',3,4,4',5,6-Heptachlorobiphenyl | 13.6 | ng/kg | JK | U | 22 |
| E1200475 | SL0306 | E1200475-006 | EPA1668A | 2,2',3,5,6'-Pentachlorobiphenyl | 5.65 | ng/kg | JK | U | 22 |
| E1200475 | SL0306 | E1200475-006 | EPA1668A | 2,2',4,4',5,6'-Hexachlorobiphenyl | 12.1 | ng/kg | JK | U | 22 |
| E1200475 | SL0306 | E1200475-006 | EPA1668A | 2,2',4,5',6-Pentachlorobiphenyl | 7.08 | ng/kg | JK | U | 22 |
| E1200475 | SL0306 | E1200475-006 | EPA1668A | 2,3',4,5-Tetrachlorobiphenyl | 5.61 | ng/kg | JK | U | 22 |
| E1200475 | SL0306 | E1200475-006 | EPA1668A | 2,3,4',5-Tetrachlorobiphenyl | 9.64 | ng/kg | JK | U | 22 |
| E1200475 | SL0306 | E1200475-006 | EPA1668A | 4-Chlorobiphenyl | 81.9 | ng/kg | BJK | U | 22 |
| E1200475 | SL0306 | E1200475-006 | EPA1668A | Coelution of PCB 050 and 053 | 43.7 | ng/kg | JK | U | 22 |
| E1200475 | SL0307 | E1200475-007 | EPA1668A | 2,2',3,3',4,5',6,6'-Octachlorobiphenyl | 5.56 | ng/kg | JK | U | 22 |
| E1200475 | SL0307 | E1200475-007 | EPA1668A | 2,2',3,3',4,5,6,6'-Octachlorobiphenyl | 6.18 | ng/kg | JK | U | 22 |
| E1200475 | SL0307 | E1200475-007 | EPA1668A | 2,2',3,3',4,5'-Hexachlorobiphenyl | 13.5 | ng/kg | JK | U | 22 |
| E1200475 | SL0307 | E1200475-007 | EPA1668A | 2,2',3,3',5,5',6,6'-Octachlorobiphenyl | 9.03 | ng/kg | JK | U | 22 |
| E1200475 | SL0307 | E1200475-007 | EPA1668A | 2,2',3,4,4',5-Hexachlorobiphenyl | 11.1 | ng/kg | JK | U | 22 |
| E1200475 | SL0307 | E1200475-007 | EPA1668A | 2,2',3,4,5',6-Hexachlorobiphenyl | 11.6 | ng/kg | JK | U | 22 |
| E1200475 | SL0307 | E1200475-007 | EPA1668A | 2,2',3,4'-Tetrachlorobiphenyl | 8.65 | ng/kg | JK | U | 22 |
| E1200475 | SL0307 | E1200475-007 | EPA1668A | 2,3,3',4',5',6-Hexachlorobiphenyl | 13.6 | ng/kg | JK | U | 22 |
| E1200475 | SL0307 | E1200475-007 | EPA1668A | 2,3',4,4',5,5'-Hexachlorobiphenyl | 9.38 | ng/kg | JK | U | 22 |
| E1200475 | SL0307 | E1200475-007 | EPA1668A | 2,3,4,4'-Tetrachlorobiphenyl | 6.01 | ng/kg | JK | U | 22 |
| E1200475 | SL0307 | E1200475-007 | EPA1668A | 2,3',4-Trichlorobiphenyl | 1.71 | ng/kg | JK | U | 22 |
| E1200475 | SL0307 | E1200475-007 | EPA1668A | 2,3,4'-Trichlorobiphenyl | 12.2 | ng/kg | JK | U | 22 |
| E1200475 | SL0307 | E1200475-007 | EPA1668A | 3,3',4,4'-Tetrachlorobiphenyl | 5.37 | ng/kg | JK | U | 22 |
| E1200475 | SL0307 | E1200475-007 | EPA1668A | Coelution of PCB 108 and 124 | 3.98 | ng/kg | JK | U | 22 |
| E1200475 | SL0307 | E1200475-007 | EPA1668A | Coelution of PCB 147 and 149 | 181 | ng/kg | J | J | 14 |
| E1200475 | SL0308 | E1200475-008 | EPA1668A | 2,2',3,3',4,6-Hexachlorobiphenyl | 87.2 | ng/kg | JK | U | 22 |
| E1200475 | SL0308 | E1200475-008 | EPA1668A | 2,2',3,4',5,6'-Hexachlorobiphenyl | 3.47 | ng/kg | JK | U | 22 |
| E1200475 | SL0308 | E1200475-008 | EPA1668A | 2,2',3,5,6,6'-Hexachlorobiphenyl | 3.07 | ng/kg | JK | U | 22 |
| E1200475 | SL0308 | E1200475-008 | EPA1668A | 2,2',3,5,6'-Pentachlorobiphenyl | 9.19 | ng/kg | JK | U | 22 |
| E1200475 | SL0308 | E1200475-008 | EPA1668A | 2,2',4,5',6-Pentachlorobiphenyl | 16.5 | ng/kg | JK | U | 22 |
| E1200475 | SL0308 | E1200475-008 | EPA1668A | 2,3,3',4',5'-Pentachlorobiphenyl | 38.5 | ng/kg | JK | U | 22 |
| E1200475 | SL0308 | E1200475-008 | EPA1668A | 2,3',4,5-Tetrachlorobiphenyl | 7.64 | ng/kg | JK | U | 22 |
| E1200475 | SL0308 | E1200475-008 | EPA1668A | 2,3',5,5'-Tetrachlorobiphenyl | 3.95 | ng/kg | JK | U | 22 |
| E1200475 | SL0308 | E1200475-008 | EPA1668A | 2,3,6-Trichlorobiphenyl | 10.1 | ng/kg | JK | U | 22 |
| E1200475 | SL0308 | E1200475-008 | EPA1668A | 3,3',4-Trichlorobiphenyl | 18.7 | ng/kg | JK | U | 22 |
| E1200475 | SL0308 | E1200475-008 | EPA1668A | 3,4',5-Trichlorobiphenyl | 6.95 | ng/kg | JK | U | 22 |
| E1200475 | SL0308 | E1200475-008 | EPA1668A | Coelution of PCB 043 and 073 | 6.43 | ng/kg | JK | U | 22 |
| E1200475 | SL0309 | E1200475-009 | EPA1668A | 2,2',3,3',4,4',5,6-Octachlorobiphenyl | 5.87 | ng/kg | JK | U | 22 |
| E1200475 | SL0309 | E1200475-009 | EPA1668A | 2,2',3,3',4,5,5'-Heptachlorobiphenyl | 4.99 | ng/kg | JK | U | 22 |
| E1200475 | SL0309 | E1200475-009 | EPA1668A | 2,2',3,3',4,6,6'-Heptachlorobiphenyl | 3.03 | ng/kg | JK | U | 22 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| E1200475 | SL0309 | E1200475-009 | EPA1668A | 2,2',3,3',4-Pentachlorobiphenyl | 9.62 | ng/kg | JK | U | 22 |
| E1200475 | SL0309 | E1200475-009 | EPA1668A | 2,2',3,3',5,5',6-Heptachlorobiphenyl | 5.78 | ng/kg | JK | U | 22 |
| E1200475 | SL0309 | E1200475-009 | EPA1668A | 2,2',3,3',5,6,6'-Heptachlorobiphenyl | 11.3 | ng/kg | JK | U | 22 |
| E1200475 | SL0309 | E1200475-009 | EPA1668A | 2,2',3,4,5',6-Hexachlorobiphenyl | 4.8 | ng/kg | JK | U | 22 |
| E1200475 | SL0309 | E1200475-009 | EPA1668A | 2,2',3,4'-Tetrachlorobiphenyl | 3.17 | ng/kg | JK | U | 22 |
| E1200475 | SL0309 | E1200475-009 | EPA1668A | 2,3,3',4,4',5,6-Heptachlorobiphenyl | 5.56 | ng/kg | JK | U | 22 |
| E1200475 | SL0309 | E1200475-009 | EPA1668A | 2,3,3',4',5-Pentachlorobiphenyl | 3.16 | ng/kg | JK | U | 22 |
| E1200475 | SL0309 | E1200475-009 | EPA1668A | 2,3,3',4'-Tetrachlorobiphenyl | 3.87 | ng/kg | JK | U | 22 |
| E1200475 | SL0309 | E1200475-009 | EPA1668A | 2,3,4'-Trichlorobiphenyl | 3.91 | ng/kg | JK | U | 22 |
| E1200475 | SL0309 | E1200475-009 | EPA1668A | Coelution of PCB 044, 047, and 065 | 20.3 | ng/kg | BJ | U | 7 |
| E1200475 | SL0309 | E1200475-009 | EPA1668A | Coelution of PCB 049 and 069 | 7.82 | ng/kg | JK | U | 22 |
| E1200475 | SL0309 | E1200475-009 | EPA1668A | Coelution of PCB 050 and 053 | 2.18 | ng/kg | JK | U | 22 |
| E1200475 | SL0309 | E1200475-009 | EPA1668A | Coelution of PCB 085 and 116 | 9.35 | ng/kg | JK | U | 22 |
| E1200475 | SL0309 | E1200475-009 | EPA1668A | Coelution of PCB 088 and 091 | 9.8 | ng/kg | JK | U | 22 |
| E1200475 | SL0309 | E1200475-009 | EPA1668A | Coelution of PCB 147 and 149 | 92.7 | ng/kg | J | J | 14 |
| E1200475 | SL0310 | E1200475-010 | EPA1668A | 2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl | 8.28 | ng/kg | JK | U | 22 |
| E1200475 | SL0310 | E1200475-010 | EPA1668A | 2,2',3,3',4,4',5,5'-Octachlorobiphenyl | 17.2 | ng/kg | JK | U | 22 |
| E1200475 | SL0310 | E1200475-010 | EPA1668A | 2,2',3,3',4,5,6,6'-Octachlorobiphenyl | 2 | ng/kg | JK | U | 22 |
| E1200475 | SL0310 | E1200475-010 | EPA1668A | 2,2',3,3',4,5,6'-Heptachlorobiphenyl | 36.6 | ng/kg | JK | U | 22 |
| E1200475 | SL0310 | E1200475-010 | EPA1668A | 2,2',3,3',4,5'-Hexachlorobiphenyl | 5.93 | ng/kg | JK | U | 22 |
| E1200475 | SL0310 | E1200475-010 | EPA1668A | 2,2',3,4,4',5',6-Heptachlorobiphenyl | 25.8 | ng/kg | JK | U | 22 |
| E1200475 | SL0310 | E1200475-010 | EPA1668A | 2,2',3-Trichlorobiphenyl | 5.06 | ng/kg | BJK | U | 22 |
| E1200475 | SL0310 | E1200475-010 | EPA1668A | 2,2',4-Trichlorobiphenyl | 6.88 | ng/kg | BJ | U | 7 |
| E1200475 | SL0310 | E1200475-010 | EPA1668A | 2,3,4,4'-Tetrachlorobiphenyl | 2.89 | ng/kg | JK | U | 22 |
| E1200475 | SL0310 | E1200475-010 | EPA1668A | 2,3,4',5,6-Pentachlorobiphenyl | 3.1 | ng/kg | JK | U | 22 |
| E1200475 | SL0310 | E1200475-010 | EPA1668A | Coelution of PCB 018 and 030 | 12.2 | ng/kg | BJ | U | 7 |
| E1200475 | SL0310 | E1200475-010 | EPA1668A | Coelution of PCB 108 and 124 | 3.76 | ng/kg | JK | U | 22 |
| E1200475 | SL0310 | E1200475-010 | EPA1668A | Coelution of PCB 139 and 140 | 2.23 | ng/kg | JK | U | 22 |
| E1200475 | SL0310 | E1200475-010 | EPA1668A | Coelution of PCB 156 and 157 | 30.1 | ng/kg | JK | U | 22 |
| E1200475 | SL0312 | E1200475-011 | EPA1668A | 2,2',3,3',4,6-Hexachlorobiphenyl | 8.19 | ng/kg | JK | U | 22 |
| E1200475 | SL0312 | E1200475-011 | EPA1668A | 2,2',3,4,4',5,6'-Heptachlorobiphenyl | 3.06 | ng/kg | JK | U | 22 |
| E1200475 | SL0312 | E1200475-011 | EPA1668A | 2,2',3,4',5,6'-Hexachlorobiphenyl | 1.26 | ng/kg | JK | U | 22 |
| E1200475 | SL0312 | E1200475-011 | EPA1668A | 2,2',3,5,6,6'-Hexachlorobiphenyl | 0.986 | ng/kg | JK | U | 22 |
| E1200475 | SL0312 | E1200475-011 | EPA1668A | 2,2',3,5,6'-Pentachlorobiphenyl | 1.97 | ng/kg | JK | U | 22 |
| E1200475 | SL0312 | E1200475-011 | EPA1668A | 2,2',3,6,6'-Pentachlorobiphenyl | 1.47 | ng/kg | JK | U | 22 |
| E1200475 | SL0312 | E1200475-011 | EPA1668A | 2,2',4,4',5,6'-Hexachlorobiphenyl | 6.82 | ng/kg | JK | U | 22 |
| E1200475 | SL0312 | E1200475-011 | EPA1668A | 2,2',4,5-Tetrachlorobiphenyl | 12 | ng/kg | JK | U | 22 |
| E1200475 | SL0312 | E1200475-011 | EPA1668A | 2,2',6-Trichlorobiphenyl | 8.58 | ng/kg | JK | U | 22 |
| E1200475 | SL0312 | E1200475-011 | EPA1668A | 2,3',4,4',5'-Pentachlorobiphenyl | 12 | ng/kg | JK | U | 22 |
| E1200475 | SL0312 | E1200475-011 | EPA1668A | 2,3,4,4',5-Pentachlorobiphenyl | 10.4 | ng/kg | JK | U | 22 |
| E1200475 | SL0312 | E1200475-011 | EPA1668A | 2,3',4,5,5'-Pentachlorobiphenyl | 1.5 | ng/kg | JK | U | 22 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| E1200475 | SL0312 | E1200475-011 | EPA1668A | 2,3',4,5-Tetrachlorobiphenyl | 2.88 | ng/kg | JK | U | 22 |
| E1200475 | SL0312 | E1200475-011 | EPA1668A | 3,3',4,5'-Tetrachlorobiphenyl | 1.29 | ng/kg | JK | U | 22 |
| E1200475 | SL0312 | E1200475-011 | EPA1668A | Coelution of PCB 059, 062, and 075 | 7.59 | ng/kg | JK | U | 22 |
| E1200475 | SL0312 | E1200475-011 | EPA1668A | Coelution of PCB 098 and 102 | 10.3 | ng/kg | JK | U | 22 |
| E1200475 | SL0312 | E1200475-011 | EPA1668A | Coelution of PCB 147 and 149 | 858 | ng/kg | | J | 14 |
| E1200475 | SL0313 | E1200475-012 | EPA1668A | 2,2',3,3',5,6-Hexachlorobiphenyl | 35.1 | ng/kg | JK | U | 22 |
| E1200475 | SL0313 | E1200475-012 | EPA1668A | 2,2',3,4,4',5,6-Heptachlorobiphenyl | 2.65 | ng/kg | JK | U | 22 |
| E1200475 | SL0313 | E1200475-012 | EPA1668A | 2,2',3,6'-Tetrachlorobiphenyl | 11.3 | ng/kg | JK | U | 22 |
| E1200475 | SL0313 | E1200475-012 | EPA1668A | 2,3,3',4',5,5'-Hexachlorobiphenyl | 8.44 | ng/kg | JK | U | 22 |
| E1200475 | SL0313 | E1200475-012 | EPA1668A | 2,3,3',4,5,5'-Hexachlorobiphenyl | 5.63 | ng/kg | JK | U | 22 |
| E1200475 | SL0313 | E1200475-012 | EPA1668A | 2,3',4,4',5'-Pentachlorobiphenyl | 10.6 | ng/kg | JK | U | 22 |
| E1200475 | SL0313 | E1200475-012 | EPA1668A | 2,3,4,4',5-Pentachlorobiphenyl | 7.78 | ng/kg | JK | U | 22 |
| E1200475 | SL0313 | E1200475-012 | EPA1668A | 2,3'-Dichlorobiphenyl | 14.6 | ng/kg | JK | U | 22 |
| E1200475 | SL0313 | E1200475-012 | EPA1668A | Coelution of PCB 147 and 149 | 496 | ng/kg | J | J | 14 |
| E1200475 | SL0315 | E1200475-014 | EPA1668A | 2,2',3,3',4,4',5,6,6'-Nonachlorobiphenyl | 7.42 | ng/kg | JK | U | 22 |
| E1200475 | SL0315 | E1200475-014 | EPA1668A | 2,2',3,3',4,5',6,6'-Octachlorobiphenyl | 18.6 | ng/kg | JK | U | 22 |
| E1200475 | SL0315 | E1200475-014 | EPA1668A | 2,2',3,3',4,5',6-Heptachlorobiphenyl | 12 | ng/kg | JK | U | 22 |
| E1200475 | SL0315 | E1200475-014 | EPA1668A | 2,2',3,4,4',5,6-Heptachlorobiphenyl | 7.99 | ng/kg | JK | U | 22 |
| E1200475 | SL0315 | E1200475-014 | EPA1668A | 2,2',3,6,6'-Pentachlorobiphenyl | 3.17 | ng/kg | JK | U | 22 |
| E1200475 | SL0315 | E1200475-014 | EPA1668A | 2,2',3-Trichlorobiphenyl | 9.05 | ng/kg | BJ | U | 7 |
| E1200475 | SL0315 | E1200475-014 | EPA1668A | 2,2',4,5',6-Pentachlorobiphenyl | 4.86 | ng/kg | JK | U | 22 |
| E1200475 | SL0315 | E1200475-014 | EPA1668A | 2,2',4-Trichlorobiphenyl | 8.32 | ng/kg | BJ | U | 7 |
| E1200475 | SL0315 | E1200475-014 | EPA1668A | 2,3',4,4',5'-Pentachlorobiphenyl | 13.4 | ng/kg | JK | U | 22 |
| E1200475 | SL0315 | E1200475-014 | EPA1668A | 2,3',5,5'-Tetrachlorobiphenyl | 1.61 | ng/kg | JK | U | 22 |
| E1200475 | SL0315 | E1200475-014 | EPA1668A | 3,3',4,5'-Tetrachlorobiphenyl | 7.35 | ng/kg | JK | U | 22 |
| E1200475 | SL0315 | E1200475-014 | EPA1668A | 3,3',4,5-Tetrachlorobiphenyl | 1.34 | ng/kg | JK | U | 22 |
| E1200475 | SL0315 | E1200475-014 | EPA1668A | 3,3',4-Trichlorobiphenyl | 3.91 | ng/kg | JK | U | 22 |
| E1200475 | SL0315 | E1200475-014 | EPA1668A | 3,4',5-Trichlorobiphenyl | 1.81 | ng/kg | JK | U | 22 |
| E1200475 | SL0315 | E1200475-014 | EPA1668A | 3,4,5-Trichlorobiphenyl | 3.51 | ng/kg | JK | U | 22 |
| E1200475 | SL0315 | E1200475-014 | EPA1668A | Coelution of PCB 018 and 030 | 21.8 | ng/kg | BJ | U | 7 |
| E1200475 | SL0315 | E1200475-014 | EPA1668A | Coelution of PCB 045 and 051 | 1.88 | ng/kg | JK | U | 22 |
| E1200475 | SL0315 | E1200475-014 | EPA1668A | Coelution of PCB 050 and 053 | 5.67 | ng/kg | JK | U | 22 |
| E1200475 | SL0315 | E1200475-014 | EPA1668A | Coelution of PCB 098 and 102 | 16.6 | ng/kg | JK | U | 22 |
| E1200475 | SL0316 | E1200475-015 | EPA1668A | 2,2',3,3',4,4',5,6'-Octachlorobiphenyl | 6.36 | ng/kg | JK | U | 22 |
| E1200475 | SL0316 | E1200475-015 | EPA1668A | 2,2',3,3',4,4',5,6-Octachlorobiphenyl | 4.88 | ng/kg | JK | U | 22 |
| E1200475 | SL0316 | E1200475-015 | EPA1668A | 2,2',3,3',4,5,5',6,6'-Nonachlorobiphenyl | 1.71 | ng/kg | JK | U | 22 |
| E1200475 | SL0316 | E1200475-015 | EPA1668A | 2,2',3,3',4,5'-Hexachlorobiphenyl | 4.85 | ng/kg | JK | U | 22 |
| E1200475 | SL0316 | E1200475-015 | EPA1668A | 2,2',3,3',4-Pentachlorobiphenyl | 6.35 | ng/kg | JK | U | 22 |
| E1200475 | SL0316 | E1200475-015 | EPA1668A | 2,2',3,3',6-Pentachlorobiphenyl | 12.9 | ng/kg | BJK | U | 22 |
| E1200475 | SL0316 | E1200475-015 | EPA1668A | 2,2',3,4,4',5-Hexachlorobiphenyl | 3.54 | ng/kg | JK | U | 22 |
| E1200475 | SL0316 | E1200475-015 | EPA1668A | 2,2',3,4,5,5'-Hexachlorobiphenyl | 15.7 | ng/kg | JK | U | 22 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| E1200475 | SL0316 | E1200475-015 | EPA1668A | 2,2',3-Trichlorobiphenyl | 7.5 | ng/kg | BJ | U | 7 |
| E1200475 | SL0316 | E1200475-015 | EPA1668A | 2,2',4,5-Tetrachlorobiphenyl | 1.89 | ng/kg | JK | U | 22 |
| E1200475 | SL0316 | E1200475-015 | EPA1668A | 2,2',4-Trichlorobiphenyl | 7.28 | ng/kg | BJ | U | 7 |
| E1200475 | SL0316 | E1200475-015 | EPA1668A | 2,2',5,5'-Tetrachlorobiphenyl | 32.3 | ng/kg | BJ | U | 7 |
| E1200475 | SL0316 | E1200475-015 | EPA1668A | 2,3,3',4',5-Pentachlorobiphenyl | 3.46 | ng/kg | JK | U | 22 |
| E1200475 | SL0316 | E1200475-015 | EPA1668A | 2,3,3',4'-Tetrachlorobiphenyl | 3.97 | ng/kg | JK | U | 22 |
| E1200475 | SL0316 | E1200475-015 | EPA1668A | 2,3,4,4'-Tetrachlorobiphenyl | 2.68 | ng/kg | JK | U | 22 |
| E1200475 | SL0316 | E1200475-015 | EPA1668A | 2,3,4',6-Tetrachlorobiphenyl | 6.9 | ng/kg | BJ | U | 7 |
| E1200475 | SL0316 | E1200475-015 | EPA1668A | 2,3,4'-Trichlorobiphenyl | 5.35 | ng/kg | BJK | U | 22 |
| E1200475 | SL0316 | E1200475-015 | EPA1668A | 3,3',4,4'-Tetrachlorobiphenyl | 1.96 | ng/kg | JK | U | 22 |
| E1200475 | SL0316 | E1200475-015 | EPA1668A | Coelution of PCB 018 and 030 | 13 | ng/kg | BJ | U | 7 |
| E1200475 | SL0316 | E1200475-015 | EPA1668A | Coelution of PCB 021 and 033 | 7.1 | ng/kg | BJ | U | 7 |
| E1200475 | SL0316 | E1200475-015 | EPA1668A | Coelution of PCB 044, 047, and 065 | 14.8 | ng/kg | BJ | U | 7 |
| E1200475 | SL0316 | E1200475-015 | EPA1668A | Coelution of PCB 156 and 157 | 13.7 | ng/kg | JK | U | 22 |
| E1200475 | SL0316 | E1200475-015 | EPA1668A | Coelution of PCB 171 and 173 | 7.36 | ng/kg | JK | U | 22 |
| E1200475 | SL0317 | E1200475-016 | EPA1668A | 2,2',3,3',4,4',5,6-Octachlorobiphenyl | 1.86 | ng/kg | JK | U | 22 |
| E1200475 | SL0317 | E1200475-016 | EPA1668A | 2,2',3,3',4,5,6'-Heptachlorobiphenyl | 9.68 | ng/kg | JK | U | 22 |
| E1200475 | SL0317 | E1200475-016 | EPA1668A | 2,2',3,3',4,5'-Hexachlorobiphenyl | 2.95 | ng/kg | JK | U | 22 |
| E1200475 | SL0317 | E1200475-016 | EPA1668A | 2,2',3,3',4,6,6'-Heptachlorobiphenyl | 1.45 | ng/kg | JK | U | 22 |
| E1200475 | SL0317 | E1200475-016 | EPA1668A | 2,2',3,3',5,5',6-Heptachlorobiphenyl | 1.67 | ng/kg | JK | U | 22 |
| E1200475 | SL0317 | E1200475-016 | EPA1668A | 2,2',3,3',5,6-Hexachlorobiphenyl | 2.25 | ng/kg | JK | U | 22 |
| E1200475 | SL0317 | E1200475-016 | EPA1668A | 2,2',3,5,5'-Pentachlorobiphenyl | 7.36 | ng/kg | JK | U | 22 |
| E1200475 | SL0317 | E1200475-016 | EPA1668A | 2,2',5,5'-Tetrachlorobiphenyl | 15.6 | ng/kg | BJ | U | 7 |
| E1200475 | SL0317 | E1200475-016 | EPA1668A | 2,3,3',4'-Tetrachlorobiphenyl | 1.27 | ng/kg | JK | U | 22 |
| E1200475 | SL0317 | E1200475-016 | EPA1668A | 2,4',5-Trichlorobiphenyl | 2.42 | ng/kg | JK | U | 22 |
| E1200475 | SL0317 | E1200475-016 | EPA1668A | 3,4,4'-Trichlorobiphenyl | 6.86 | ng/kg | JK | U | 22 |
| E1200475 | SL0317 | E1200475-016 | EPA1668A | 4-Chlorobiphenyl | 33 | ng/kg | JK | U | 22 |
| E1200475 | SL0317 | E1200475-016 | EPA1668A | Coelution of PCB 021 and 033 | 1.69 | ng/kg | JK | U | 22 |
| E1200475 | SL0317 | E1200475-016 | EPA1668A | Coelution of PCB 044, 047, and 065 | 7.32 | ng/kg | BJ | U | 7 |
| E1200475 | SL0317 | E1200475-016 | EPA1668A | Coelution of PCB 049 and 069 | 3.31 | ng/kg | JK | U | 22 |
| E1200475 | SL0317 | E1200475-016 | EPA1668A | Coelution of PCB 085 and 116 | 2.79 | ng/kg | JK | U | 22 |
| E1200475 | SL0317 | E1200475-016 | EPA1668A | Coelution of PCB 088 and 091 | 4.12 | ng/kg | JK | U | 22 |
| E1200475 | SL0317 | E1200475-016 | EPA1668A | Coelution of PCB 198 and 199 | 5.82 | ng/kg | JK | U | 22 |
| E1200475 | SL0319 | E1200475-018 | EPA1668A | 2,2',3,5',6-Pentachlorobiphenyl | 4.58 | ng/kg | BJ | U | 7 |
| E1200475 | SL0319 | E1200475-018 | EPA1668A | 2,2',5,5'-Tetrachlorobiphenyl | 7.35 | ng/kg | BJ | U | 7 |
| E1200475 | SL0319 | E1200475-018 | EPA1668A | Coelution of PCB 018 and 030 | 4.13 | ng/kg | BJK | U | 22 |
| E1200475 | SL0319 | E1200475-018 | EPA1668A | Coelution of PCB 020 and 028 | 3.72 | ng/kg | BJ | U | 7 |
| E1200475 | SL0319 | E1200475-018 | EPA1668A | Coelution of PCB 044, 047, and 065 | 3.99 | ng/kg | BJ | U | 7 |
| E1200475 | SL0319 | E1200475-018 | EPA1668A | Coelution of PCB 061, 070, 074, and 076 | 3.63 | ng/kg | BJ | U | 7 |
| E1200475 | SL0319 | E1200475-018 | EPA1668A | Coelution of PCB 090, 101, and 113 | 3.7 | ng/kg | BJK | U | 22 |
| E1200475 | SL0319 | E1200475-018 | EPA1668A | Coelution of PCB 110 and 115 | 4.17 | ng/kg | BJK | U | 22 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| E1200475 | SL0322 | E1200475-020 | EPA1668A | 2,2',3,3',4,5',6,6'-Octachlorobiphenyl | 5.12 | ng/kg | JK | U | 22 |
| E1200475 | SL0322 | E1200475-020 | EPA1668A | 2,2',3,3',4,5,6,6'-Octachlorobiphenyl | 3.8 | ng/kg | JK | U | 22 |
| E1200475 | SL0322 | E1200475-020 | EPA1668A | 2,2',3,3',4,5',6-Heptachlorobiphenyl | 2.27 | ng/kg | JK | U | 22 |
| E1200475 | SL0322 | E1200475-020 | EPA1668A | 2,2',3,3',4,5'-Hexachlorobiphenyl | 15.1 | ng/kg | JK | U | 22 |
| E1200475 | SL0322 | E1200475-020 | EPA1668A | 2,2',3,3',4-Pentachlorobiphenyl | 5.61 | ng/kg | JK | U | 22 |
| E1200475 | SL0322 | E1200475-020 | EPA1668A | 2,2',3,3',5,5'-Hexachlorobiphenyl | 3.43 | ng/kg | JK | U | 22 |
| E1200475 | SL0322 | E1200475-020 | EPA1668A | 2,2',3,3',5,6,6'-Heptachlorobiphenyl | 12 | ng/kg | JK | U | 22 |
| E1200475 | SL0322 | E1200475-020 | EPA1668A | 2,2',3,4,5',6-Hexachlorobiphenyl | 3.56 | ng/kg | JK | U | 22 |
| E1200475 | SL0322 | E1200475-020 | EPA1668A | 2,2',4,5-Tetrachlorobiphenyl | 1.86 | ng/kg | JK | U | 22 |
| E1200475 | SL0322 | E1200475-020 | EPA1668A | 2,2',5,5'-Tetrachlorobiphenyl | 31.9 | ng/kg | BJ | U | 7 |
| E1200475 | SL0322 | E1200475-020 | EPA1668A | 2,3,3',4,4',5,5',6-Octachlorobiphenyl | 2.17 | ng/kg | JK | U | 22 |
| E1200475 | SL0322 | E1200475-020 | EPA1668A | 2,3,3',4,4',5,5'-Heptachlorobiphenyl | 4.04 | ng/kg | JK | U | 22 |
| E1200475 | SL0322 | E1200475-020 | EPA1668A | 2,3,3',4,4',5',6-Heptachlorobiphenyl | 2.59 | ng/kg | JK | U | 22 |
| E1200475 | SL0322 | E1200475-020 | EPA1668A | 2,3',4,4',5'-Pentachlorobiphenyl | 4.97 | ng/kg | JK | U | 22 |
| E1200475 | SL0322 | E1200475-020 | EPA1668A | 2,3,4',6-Tetrachlorobiphenyl | 9.34 | ng/kg | BJ | U | 7 |
| E1200475 | SL0322 | E1200475-020 | EPA1668A | 2,3,4'-Trichlorobiphenyl | 4.07 | ng/kg | BJ | U | 7 |
| E1200475 | SL0322 | E1200475-020 | EPA1668A | 2-Chlorobiphenyl | 7.86 | ng/kg | BJ | U | 7 |
| E1200475 | SL0322 | E1200475-020 | EPA1668A | 4-Chlorobiphenyl | 6.61 | ng/kg | BJK | U | 22 |
| E1200475 | SL0322 | E1200475-020 | EPA1668A | Coelution of PCB 018 and 030 | 7.78 | ng/kg | BJ | U | 7 |
| E1200475 | SL0322 | E1200475-020 | EPA1668A | Coelution of PCB 020 and 028 | 11.3 | ng/kg | BJ | U | 7 |
| E1200475 | SL0322 | E1200475-020 | EPA1668A | Coelution of PCB 021 and 033 | 4.26 | ng/kg | BJ | U | 7 |
| E1200475 | SL0322 | E1200475-020 | EPA1668A | Coelution of PCB 044, 047, and 065 | 17.4 | ng/kg | BJ | U | 7 |
| E1200475 | SL0322 | E1200475-020 | EPA1668A | Coelution of PCB 049 and 069 | 9.94 | ng/kg | BJK | U | 22 |
| E1200475 | SL0322 | E1200475-020 | EPA1668A | Coelution of PCB 050 and 053 | 2.02 | ng/kg | JK | U | 22 |
| E1200475 | SL0322 | E1200475-020 | EPA1668A | Coelution of PCB 059, 062, and 075 | 0.95 | ng/kg | JK | U | 22 |
| E1200476 | SL0323 | E1200476-001 | EPA1668A | 2,2',3,3',4,4',5,6-Octachlorobiphenyl | 53.3 | ng/kg | JK | U | 22 |
| E1200476 | SL0323 | E1200476-001 | EPA1668A | 2,2',3,3',4,6-Hexachlorobiphenyl | 5.06 | ng/kg | JK | U | 22 |
| E1200476 | SL0323 | E1200476-001 | EPA1668A | 2,2',3,4,4',5,6-Heptachlorobiphenyl | 1.98 | ng/kg | JK | U | 22 |
| E1200476 | SL0323 | E1200476-001 | EPA1668A | 2,2',4,4',5,6'-Hexachlorobiphenyl | 1.81 | ng/kg | JK | U | 22 |
| E1200476 | SL0323 | E1200476-001 | EPA1668A | 2,2',4,5-Tetrachlorobiphenyl | 3.1 | ng/kg | JK | U | 22 |
| E1200476 | SL0323 | E1200476-001 | EPA1668A | 2,3,3',4,5,5'-Hexachlorobiphenyl | 4.56 | ng/kg | JK | U | 22 |
| E1200476 | SL0323 | E1200476-001 | EPA1668A | 2,3,3',4'-Tetrachlorobiphenyl | 17.2 | ng/kg | J | J | 14 |
| E1200476 | SL0323 | E1200476-001 | EPA1668A | 2,3,4,4',5-Pentachlorobiphenyl | 6.84 | ng/kg | JK | U | 22 |
| E1200476 | SL0323 | E1200476-001 | EPA1668A | 3,3',4,4'-Tetrachlorobiphenyl | 9.69 | ng/kg | JK | U | 22 |
| E1200476 | SL0323 | E1200476-001 | EPA1668A | Coelution of PCB 021 and 033 | 5.13 | ng/kg | JK | U | 22 |
| E1200476 | SL0323 | E1200476-001 | EPA1668A | Coelution of PCB 098 and 102 | 3.66 | ng/kg | JK | U | 22 |
| E1200476 | SL0324 | E1200476-002 | EPA1668A | 2,2',3-Trichlorobiphenyl | 5.49 | ng/kg | BJ | U | 7 |
| E1200476 | SL0324 | E1200476-002 | EPA1668A | 2,2',4,4',5,6'-Hexachlorobiphenyl | 2.9 | ng/kg | JK | U | 22 |
| E1200476 | SL0324 | E1200476-002 | EPA1668A | 2,2',4-Trichlorobiphenyl | 3.88 | ng/kg | BJK | U | 22 |
| E1200476 | SL0324 | E1200476-002 | EPA1668A | 2,2'-Dichlorobiphenyl | 122 | ng/kg | JK | U | 22 |
| E1200476 | SL0324 | E1200476-002 | EPA1668A | 2,3,3',4'-Tetrachlorobiphenyl | 31.8 | ng/kg | J | J | 14 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| E1200476 | SL0324 | E1200476-002 | EPA1668A | 3,3',4,4',5,5'-Hexachlorobiphenyl | 3.04 | ng/kg | JK | U | 22 |
| E1200476 | SL0324 | E1200476-002 | EPA1668A | 3,3',4,5'-Tetrachlorobiphenyl | 7.39 | ng/kg | JK | U | 22 |
| E1200476 | SL0324 | E1200476-002 | EPA1668A | 3,3',4,5-Tetrachlorobiphenyl | 2.67 | ng/kg | JK | U | 22 |
| E1200476 | SL0324 | E1200476-002 | EPA1668A | 3-Chlorobiphenyl | 2.46 | ng/kg | JK | U | 22 |
| E1200476 | SL0324 | E1200476-002 | EPA1668A | Coelution of PCB 018 and 030 | 9.87 | ng/kg | BJ | U | 7 |
| E1200476 | SL0324 | E1200476-002 | EPA1668A | Coelution of PCB 093 and 100 | 2.98 | ng/kg | JK | U | 22 |
| E1200476 | SL0324 | E1200476-002 | EPA1668A | Coelution of PCB 108 and 124 | 29.1 | ng/kg | JK | U | 22 |
| E1200476 | SL0324 | E1200476-002 | EPA1668A | Coelution of PCB 139 and 140 | 23.5 | ng/kg | JK | U | 22 |
| E1200476 | SL0324 | E1200476-002 | EPA1668A | Coelution of PCB 147 and 149 | 856 | ng/kg | B | J | 14 |
| E1200476 | SL0325 | E1200476-003 | EPA1668A | 2,2',3,3',4,4',5,6,6'-Nonachlorobiphenyl | 9.52 | ng/kg | JK | U | 22 |
| E1200476 | SL0325 | E1200476-003 | EPA1668A | 2,2',3,3',4,4',6,6'-Octachlorobiphenyl | 3.3 | ng/kg | JK | U | 22 |
| E1200476 | SL0325 | E1200476-003 | EPA1668A | 2,2',3,3',4,5,5',6,6'-Nonachlorobiphenyl | 14.2 | ng/kg | JK | U | 22 |
| E1200476 | SL0325 | E1200476-003 | EPA1668A | 2,2',3,3',4,6-Hexachlorobiphenyl | 10.1 | ng/kg | JK | U | 22 |
| E1200476 | SL0325 | E1200476-003 | EPA1668A | 2,2',3,4,5',6-Hexachlorobiphenyl | 32.1 | ng/kg | JK | U | 22 |
| E1200476 | SL0325 | E1200476-003 | EPA1668A | 2,2',3-Trichlorobiphenyl | 4.34 | ng/kg | BJ | U | 7 |
| E1200476 | SL0325 | E1200476-003 | EPA1668A | 2,2',4,5',6-Pentachlorobiphenyl | 1.73 | ng/kg | JK | U | 22 |
| E1200476 | SL0325 | E1200476-003 | EPA1668A | 2,2',4-Trichlorobiphenyl | 3.47 | ng/kg | BJ | U | 7 |
| E1200476 | SL0325 | E1200476-003 | EPA1668A | 2,3,3',4',5,5'-Hexachlorobiphenyl | 3.85 | ng/kg | JK | U | 22 |
| E1200476 | SL0325 | E1200476-003 | EPA1668A | 2,3,3',4',5'-Pentachlorobiphenyl | 5.64 | ng/kg | JK | U | 22 |
| E1200476 | SL0325 | E1200476-003 | EPA1668A | 3,3',4-Trichlorobiphenyl | 3.36 | ng/kg | JK | U | 22 |
| E1200476 | SL0325 | E1200476-003 | EPA1668A | Coelution of PCB 018 and 030 | 9.33 | ng/kg | BJ | U | 7 |
| E1200476 | SL0325 | E1200476-003 | EPA1668A | Coelution of PCB 026 and 029 | 3.4 | ng/kg | JK | U | 22 |
| E1200476 | SL0325 | E1200476-003 | EPA1668A | Coelution of PCB 049 and 069 | 24.4 | ng/kg | BJK | U | 22 |
| E1200476 | SL0325 | E1200476-003 | EPA1668A | Coelution of PCB 059, 062, and 075 | 3.13 | ng/kg | JK | U | 22 |
| E1200476 | SL0325 | E1200476-003 | EPA1668A | Coelution of PCB 108 and 124 | 28.2 | ng/kg | JK | U | 22 |
| E1200476 | SL0325 | E1200476-003 | EPA1668A | Coelution of PCB 147 and 149 | 675 | ng/kg | B | J | 14 |
| E1200476 | SL0326 | E1200476-004 | EPA1668A | 2,2',3,3',4,6-Hexachlorobiphenyl | 117 | ng/kg | JK | U | 22 |
| E1200476 | SL0326 | E1200476-004 | EPA1668A | 2,2',3,4,4',5,6,6'-Octachlorobiphenyl | 0.923 | ng/kg | JK | U | 22 |
| E1200476 | SL0326 | E1200476-004 | EPA1668A | 2,2',3,4,4',5,6'-Heptachlorobiphenyl | 7.41 | ng/kg | JK | U | 22 |
| E1200476 | SL0326 | E1200476-004 | EPA1668A | 2,2',3,4',5,6'-Hexachlorobiphenyl | 3.47 | ng/kg | JK | U | 22 |
| E1200476 | SL0326 | E1200476-004 | EPA1668A | 3,3',4-Trichlorobiphenyl | 13.3 | ng/kg | JK | U | 22 |
| E1200476 | SL0326 | E1200476-004 | EPA1668A | 3,4',5-Trichlorobiphenyl | 4.14 | ng/kg | JK | U | 22 |
| E1200476 | SL0326 | E1200476-004 | EPA1668A | 3,4,5-Trichlorobiphenyl | 15.9 | ng/kg | JK | U | 22 |
| E1200476 | SL0326 | E1200476-004 | EPA1668A | 3-Chlorobiphenyl | 19.5 | ng/kg | K | U | 22 |
| E1200476 | SL0326 | E1200476-004 | EPA1668A | Coelution of PCB 147 and 149 | 5730 | ng/kg | | J | 14 |
| E1200476 | SL0327 | E1200476-005 | EPA1668A | 2,2',3,3',4,4',5,5',6,6'-Decachlorobiphenyl | 5.14 | ng/kg | JK | U | 22 |
| E1200476 | SL0327 | E1200476-005 | EPA1668A | 2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl | 5.42 | ng/kg | JK | U | 22 |
| E1200476 | SL0327 | E1200476-005 | EPA1668A | 2,2',3,3',4,4',5,6'-Octachlorobiphenyl | 7.11 | ng/kg | JK | U | 22 |
| E1200476 | SL0327 | E1200476-005 | EPA1668A | 2,2',3,3',4,4',5,6-Octachlorobiphenyl | 4.08 | ng/kg | JK | U | 22 |
| E1200476 | SL0327 | E1200476-005 | EPA1668A | 2,2',3,3',4,5,5'-Heptachlorobiphenyl | 4.17 | ng/kg | JK | U | 22 |
| E1200476 | SL0327 | E1200476-005 | EPA1668A | 2,2',3,3',4,5',6,6'-Octachlorobiphenyl | 1.2 | ng/kg | JK | U | 22 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| E1200476 | SL0327 | E1200476-005 | EPA1668A | 2,2',3,3',4,5,6,6'-Octachlorobiphenyl | 1.82 | ng/kg | JK | U | 22 |
| E1200476 | SL0327 | E1200476-005 | EPA1668A | 2,2',3,3',4,6,6'-Heptachlorobiphenyl | 3.89 | ng/kg | JK | U | 22 |
| E1200476 | SL0327 | E1200476-005 | EPA1668A | 2,2',3,3',5,5',6,6'-Octachlorobiphenyl | 2.7 | ng/kg | JK | U | 22 |
| E1200476 | SL0327 | E1200476-005 | EPA1668A | 2,2',3,3',5,5',6-Heptachlorobiphenyl | 5.46 | ng/kg | JK | U | 22 |
| E1200476 | SL0327 | E1200476-005 | EPA1668A | 2,2',3,4,4',5',6-Heptachlorobiphenyl | 19.7 | ng/kg | JK | U | 22 |
| E1200476 | SL0327 | E1200476-005 | EPA1668A | 2,2',3,4,4',5-Hexachlorobiphenyl | 6.89 | ng/kg | JK | U | 22 |
| E1200476 | SL0327 | E1200476-005 | EPA1668A | 2,2',3,4'-Tetrachlorobiphenyl | 2.71 | ng/kg | JK | U | 22 |
| E1200476 | SL0327 | E1200476-005 | EPA1668A | 2,3,3',4,4',5,6-Heptachlorobiphenyl | 4.95 | ng/kg | JK | U | 22 |
| E1200476 | SL0327 | E1200476-005 | EPA1668A | 2,3,3',4',5',6-Hexachlorobiphenyl | 10.6 | ng/kg | JK | U | 22 |
| E1200476 | SL0327 | E1200476-005 | EPA1668A | 2,3,3',4',5-Pentachlorobiphenyl | 5.63 | ng/kg | JK | U | 22 |
| E1200476 | SL0327 | E1200476-005 | EPA1668A | 3,4,4'-Trichlorobiphenyl | 7.95 | ng/kg | JK | U | 22 |
| E1200476 | SL0327 | E1200476-005 | EPA1668A | 3-Chlorobiphenyl | 1.29 | ng/kg | JK | U | 22 |
| E1200476 | SL0327 | E1200476-005 | EPA1668A | Coelution of PCB 018 and 030 | 3.67 | ng/kg | JK | U | 22 |
| E1200476 | SL0327 | E1200476-005 | EPA1668A | Coelution of PCB 021 and 033 | 2.94 | ng/kg | JK | U | 22 |
| E1200476 | SL0327 | E1200476-005 | EPA1668A | Coelution of PCB 044, 047, and 065 | 22.9 | ng/kg | BJ | U | 7 |
| E1200476 | SL0327 | E1200476-005 | EPA1668A | Coelution of PCB 085 and 116 | 11.5 | ng/kg | JK | U | 22 |
| E1200476 | SL0327 | E1200476-005 | EPA1668A | Coelution of PCB 147 and 149 | 122 | ng/kg | J | J | 14 |
| E1200476 | SL0328 | E1200476-006 | EPA1668A | 2,2',3,3',4,6'-Hexachlorobiphenyl | 3.08 | ng/kg | JK | U | 22 |
| E1200476 | SL0328 | E1200476-006 | EPA1668A | 2,2',3,3',6-Pentachlorobiphenyl | 3.81 | ng/kg | JK | U | 22 |
| E1200476 | SL0328 | E1200476-006 | EPA1668A | 2,2',3,5',6-Pentachlorobiphenyl | 13.8 | ng/kg | BJ | U | 7 |
| E1200476 | SL0328 | E1200476-006 | EPA1668A | 2,2',5,5'-Tetrachlorobiphenyl | 14.1 | ng/kg | BJ | U | 7 |
| E1200476 | SL0328 | E1200476-006 | EPA1668A | 2,3,4',6-Tetrachlorobiphenyl | 2.08 | ng/kg | JK | U | 22 |
| E1200476 | SL0328 | E1200476-006 | EPA1668A | Coelution of PCB 018 and 030 | 4.04 | ng/kg | JK | U | 22 |
| E1200476 | SL0328 | E1200476-006 | EPA1668A | Coelution of PCB 044, 047, and 065 | 10.7 | ng/kg | BJ | U | 7 |
| E1200476 | SL0328 | E1200476-006 | EPA1668A | Coelution of PCB 049 and 069 | 2.86 | ng/kg | JK | U | 22 |
| E1200476 | SL0328 | E1200476-006 | EPA1668A | Coelution of PCB 083 and 099 | 5.62 | ng/kg | JK | U | 22 |
| E1200476 | SL0328 | E1200476-006 | EPA1668A | Coelution of PCB 135 and 151 | 3.91 | ng/kg | JK | U | 22 |
| E1200476 | SL0329 | E1200476-007 | EPA1668A | 2,2',3,5',6-Pentachlorobiphenyl | 4.71 | ng/kg | BJK | U | 22 |
| E1200476 | SL0329 | E1200476-007 | EPA1668A | 2,2',5,5'-Tetrachlorobiphenyl | 4.73 | ng/kg | BJ | U | 7 |
| E1200476 | SL0329 | E1200476-007 | EPA1668A | Coelution of PCB 061, 070, 074, and 076 | 3.26 | ng/kg | JK | U | 22 |
| E1200476 | SL0329 | E1200476-007 | EPA1668A | Coelution of PCB 110 and 115 | 4.4 | ng/kg | JK | U | 22 |
| E1200476 | SL0329 | E1200476-007 | EPA1668A | Coelution of PCB 129, 138, and 163 | 4.83 | ng/kg | JK | U | 22 |
| E1200476 | SL0330 | E1200476-008 | EPA1668A | 2,2',3,5',6-Pentachlorobiphenyl | 5 | ng/kg | BJK | U | 22 |
| E1200476 | SL0330 | E1200476-008 | EPA1668A | 2,2',5,5'-Tetrachlorobiphenyl | 7.58 | ng/kg | BJ | U | 7 |
| E1200476 | SL0330 | E1200476-008 | EPA1668A | 2,3,3',4,4'-Pentachlorobiphenyl | 1.87 | ng/kg | JK | U | 22 |
| E1200476 | SL0330 | E1200476-008 | EPA1668A | 2,3',4,4',5-Pentachlorobiphenyl | 6.13 | ng/kg | JK | U | 22 |
| E1200476 | SL0330 | E1200476-008 | EPA1668A | 2,3',4,4'-Tetrachlorobiphenyl | 2.12 | ng/kg | JK | U | 22 |
| E1200476 | SL0330 | E1200476-008 | EPA1668A | 4-Chlorobiphenyl | 6.49 | ng/kg | JK | U | 22 |
| E1200476 | SL0330 | E1200476-008 | EPA1668A | Coelution of PCB 044, 047, and 065 | 7.7 | ng/kg | BJK | U | 22 |
| E1200476 | SL0330 | E1200476-008 | EPA1668A | Coelution of PCB 049 and 069 | 2.79 | ng/kg | JK | U | 22 |
| E1200476 | SL0330 | E1200476-008 | EPA1668A | Coelution of PCB 061, 070, 074, and 076 | 4.86 | ng/kg | JK | U | 22 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| E1200476 | SL0330 | E1200476-008 | EPA1668A | Coelution of PCB 086, 087, 097, 109, 119, and 125 | 3.39 | ng/kg | JK | U | 22 |
| E1200476 | SL0330 | E1200476-008 | EPA1668A | Coelution of PCB 090, 101, and 113 | 6.64 | ng/kg | JK | U | 22 |
| E1200476 | SL0330 | E1200476-008 | EPA1668A | Coelution of PCB 180 and 193 | 2.57 | ng/kg | JK | U | 22 |
| E1200476 | SL0331 | E1200476-009 | EPA1668A | 2,2',3,3',4,5',6-Heptachlorobiphenyl | 6.42 | ng/kg | JK | U | 22 |
| E1200476 | SL0331 | E1200476-009 | EPA1668A | 2,2',3,3',5,5'-Hexachlorobiphenyl | 7.61 | ng/kg | JK | U | 22 |
| E1200476 | SL0331 | E1200476-009 | EPA1668A | 2,2',3-Trichlorobiphenyl | 7.61 | ng/kg | JK | U | 22 |
| E1200476 | SL0331 | E1200476-009 | EPA1668A | 2,2',4,4',5,6'-Hexachlorobiphenyl | 4.12 | ng/kg | JK | U | 22 |
| E1200476 | SL0331 | E1200476-009 | EPA1668A | 2,3,3',4,4',5,5',6-Octachlorobiphenyl | 4.83 | ng/kg | JK | U | 22 |
| E1200476 | SL0331 | E1200476-009 | EPA1668A | 2,3,4,4',5-Pentachlorobiphenyl | 8.27 | ng/kg | JK | U | 22 |
| E1200476 | SL0331 | E1200476-009 | EPA1668A | 2,3,4',5-Tetrachlorobiphenyl | 1.91 | ng/kg | JK | U | 22 |
| E1200476 | SL0331 | E1200476-009 | EPA1668A | 2,4-Dichlorobiphenyl | 22 | ng/kg | JK | U | 22 |
| E1200476 | SL0331 | E1200476-009 | EPA1668A | 2,5-Dichlorobiphenyl | 16.3 | ng/kg | JK | U | 22 |
| E1200476 | SL0331 | E1200476-009 | EPA1668A | 3,3',4,4'-Tetrachlorobiphenyl | 8.86 | ng/kg | JK | U | 22 |
| E1200476 | SL0331 | E1200476-009 | EPA1668A | 3,3',4-Trichlorobiphenyl | 2 | ng/kg | JK | U | 22 |
| E1200476 | SL0331 | E1200476-009 | EPA1668A | 3-Chlorobiphenyl | 3.52 | ng/kg | JK | U | 22 |
| E1200476 | SL0331 | E1200476-009 | EPA1668A | Coelution of PCB 026 and 029 | 4.27 | ng/kg | JK | U | 22 |
| E1200476 | SL0331 | E1200476-009 | EPA1668A | Coelution of PCB 040, 041, and 071 | 9.33 | ng/kg | JK | U | 22 |
| E1200476 | SL0331 | E1200476-009 | EPA1668A | Coelution of PCB 045 and 051 | 2.18 | ng/kg | JK | U | 22 |
| E1200476 | SL0331 | E1200476-009 | EPA1668A | Coelution of PCB 059, 062, and 075 | 1.69 | ng/kg | JK | U | 22 |
| E1200476 | SL0331 | E1200476-009 | EPA1668A | Coelution of PCB 098 and 102 | 5.31 | ng/kg | JK | U | 22 |
| E1200477 | SD0001 | E1200477-001 | EPA1668A | 2,2',3,3',4,5,5'-Heptachlorobiphenyl | 47.9 | ng/kg | JK | U | 22 |
| E1200477 | SD0001 | E1200477-001 | EPA1668A | 2,2',3,4,4',5-Hexachlorobiphenyl | 53.4 | ng/kg | JK | U | 22 |
| E1200477 | SD0001 | E1200477-001 | EPA1668A | 2,2',3,4,4',6,6'-Heptachlorobiphenyl | 2.41 | ng/kg | JK | U | 22 |
| E1200477 | SD0001 | E1200477-001 | EPA1668A | 2,2',3,4',5,6,6'-Heptachlorobiphenyl | 4.18 | ng/kg | JK | U | 22 |
| E1200477 | SD0001 | E1200477-001 | EPA1668A | 2,2',3,4,5',6-Hexachlorobiphenyl | 19.9 | ng/kg | JK | U | 22 |
| E1200477 | SD0001 | E1200477-001 | EPA1668A | 2,2',3,5,6,6'-Hexachlorobiphenyl | 1.66 | ng/kg | JK | U | 22 |
| E1200477 | SD0001 | E1200477-001 | EPA1668A | 2,2',4,4',5,6'-Hexachlorobiphenyl | 31.3 | ng/kg | JK | U | 22 |
| E1200477 | SD0001 | E1200477-001 | EPA1668A | 2,2',4,4',6,6'-Hexachlorobiphenyl | 3.6 | ng/kg | JK | U | 22 |
| E1200477 | SD0001 | E1200477-001 | EPA1668A | 2,2',6-Trichlorobiphenyl | 30.3 | ng/kg | BJK | U | 22 |
| E1200477 | SD0001 | E1200477-001 | EPA1668A | 2,3,3',4,4',5,5',6-Octachlorobiphenyl | 8.46 | ng/kg | JK | U | 22 |
| E1200477 | SD0001 | E1200477-001 | EPA1668A | 2,3,3',4,4',5,5'-Heptachlorobiphenyl | 14.9 | ng/kg | JK | U | 22 |
| E1200477 | SD0001 | E1200477-001 | EPA1668A | 2,3,3',4',5,5'-Hexachlorobiphenyl | 12.2 | ng/kg | JK | U | 22 |
| E1200477 | SD0001 | E1200477-001 | EPA1668A | 2,3,3',4,5,5'-Hexachlorobiphenyl | 8.28 | ng/kg | JK | U | 22 |
| E1200477 | SD0001 | E1200477-001 | EPA1668A | 2,3,3',5'-Tetrachlorobiphenyl | 1.97 | ng/kg | JK | U | 22 |
| E1200477 | SD0001 | E1200477-001 | EPA1668A | 2,3',4,5'-Tetrachlorobiphenyl | 13.3 | ng/kg | JK | U | 22 |
| E1200477 | SD0001 | E1200477-001 | EPA1668A | 2,3,4',5-Tetrachlorobiphenyl | 19.6 | ng/kg | JK | U | 22 |
| E1200477 | SD0001 | E1200477-001 | EPA1668A | 2,5-Dichlorobiphenyl | 14.2 | ng/kg | JK | U | 22 |
| E1200477 | SD0001 | E1200477-001 | EPA1668A | 2,6-Dichlorobiphenyl | 6.67 | ng/kg | JK | U | 22 |
| E1200477 | SD0001 | E1200477-001 | EPA1668A | Coelution of PCB 012 and 013 | 39 | ng/kg | JK | U | 22 |
| E1200477 | SD0001 | E1200477-001 | EPA1668A | Coelution of PCB 093 and 100 | 30.4 | ng/kg | JK | U | 22 |
| E1200477 | SD0001 | E1200477-001 | EPA1668A | Coelution of PCB 098 and 102 | 62.9 | ng/kg | JK | U | 22 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| E1200477 | SD0002 | E1200477-002 | EPA1668A | 2,2',3,3',4,5',6-Heptachlorobiphenyl | 2.13 | ng/kg | JK | U | 22 |
| E1200477 | SD0002 | E1200477-002 | EPA1668A | 2,2',3,3',5,5'-Hexachlorobiphenyl | 7.95 | ng/kg | JK | U | 22 |
| E1200477 | SD0002 | E1200477-002 | EPA1668A | 2,2',3,4,4',5-Hexachlorobiphenyl | 12.1 | ng/kg | JK | U | 22 |
| E1200477 | SD0002 | E1200477-002 | EPA1668A | 2,2',3,4',5,6'-Hexachlorobiphenyl | 1.56 | ng/kg | JK | U | 22 |
| E1200477 | SD0002 | E1200477-002 | EPA1668A | 2,2',3,4,5',6-Hexachlorobiphenyl | 7.8 | ng/kg | JK | U | 22 |
| E1200477 | SD0002 | E1200477-002 | EPA1668A | 2,2',3,5,6'-Pentachlorobiphenyl | 2.44 | ng/kg | JK | U | 22 |
| E1200477 | SD0002 | E1200477-002 | EPA1668A | 2,2',3,6,6'-Pentachlorobiphenyl | 5.79 | ng/kg | JK | U | 22 |
| E1200477 | SD0002 | E1200477-002 | EPA1668A | 2,2',4,4',6,6'-Hexachlorobiphenyl | 3.12 | ng/kg | JK | U | 22 |
| E1200477 | SD0002 | E1200477-002 | EPA1668A | 2,3,3',4,4',5,5',6-Octachlorobiphenyl | 3.5 | ng/kg | JK | U | 22 |
| E1200477 | SD0002 | E1200477-002 | EPA1668A | 2,3,3',4',5',6-Hexachlorobiphenyl | 22.6 | ng/kg | JK | U | 22 |
| E1200477 | SD0002 | E1200477-002 | EPA1668A | 2,3,3',5'-Tetrachlorobiphenyl | 2.84 | ng/kg | JK | U | 22 |
| E1200477 | SD0002 | E1200477-002 | EPA1668A | 2,3',4,5,5'-Pentachlorobiphenyl | 5.6 | ng/kg | JK | U | 22 |
| E1200477 | SD0002 | E1200477-002 | EPA1668A | 2,3,4',5-Tetrachlorobiphenyl | 7.08 | ng/kg | JK | U | 22 |
| E1200477 | SD0002 | E1200477-002 | EPA1668A | Coelution of PCB 059, 062, and 075 | 21.3 | ng/kg | JK | U | 22 |
| E1200477 | SD0003 | E1200477-003 | EPA1668A | 2,2',3,3',4,4',5,6-Octachlorobiphenyl | 3.89 | ng/kg | JK | U | 22 |
| E1200477 | SD0003 | E1200477-003 | EPA1668A | 2,2',3,3',4,5',6,6'-Octachlorobiphenyl | 2.44 | ng/kg | JK | U | 22 |
| E1200477 | SD0003 | E1200477-003 | EPA1668A | 2,2',3,3',4,5'-Hexachlorobiphenyl | 2.96 | ng/kg | JK | U | 22 |
| E1200477 | SD0003 | E1200477-003 | EPA1668A | 2,2',3,3',5,6-Hexachlorobiphenyl | 2.58 | ng/kg | JK | U | 22 |
| E1200477 | SD0003 | E1200477-003 | EPA1668A | 2,2',3,4,4',5,5',6-Octachlorobiphenyl | 8.4 | ng/kg | JK | U | 22 |
| E1200477 | SD0003 | E1200477-003 | EPA1668A | 2,2',3-Trichlorobiphenyl | 9.19 | ng/kg | BJK | U | 22 |
| E1200477 | SD0003 | E1200477-003 | EPA1668A | 2,2',4,4',5,6'-Hexachlorobiphenyl | 2.88 | ng/kg | JK | U | 22 |
| E1200477 | SD0003 | E1200477-003 | EPA1668A | 2,2',4,5',6-Pentachlorobiphenyl | 1.99 | ng/kg | JK | U | 22 |
| E1200477 | SD0003 | E1200477-003 | EPA1668A | 2,2',4-Trichlorobiphenyl | 14.3 | ng/kg | BJ | U | 7 |
| E1200477 | SD0003 | E1200477-003 | EPA1668A | 2,3,3',4,4',5,6-Heptachlorobiphenyl | 3.34 | ng/kg | JK | U | 22 |
| E1200477 | SD0003 | E1200477-003 | EPA1668A | 2,3,3',4,4'-Pentachlorobiphenyl | 11.1 | ng/kg | JK | U | 22 |
| E1200477 | SD0003 | E1200477-003 | EPA1668A | 2,3,3',4',5',6-Hexachlorobiphenyl | 3.34 | ng/kg | JK | U | 22 |
| E1200477 | SD0003 | E1200477-003 | EPA1668A | 2,3,3',4',5-Pentachlorobiphenyl | 4.5 | ng/kg | JK | U | 22 |
| E1200477 | SD0003 | E1200477-003 | EPA1668A | 2,3',4,4',5,5'-Hexachlorobiphenyl | 3.87 | ng/kg | JK | U | 22 |
| E1200477 | SD0003 | E1200477-003 | EPA1668A | 2,3',4-Trichlorobiphenyl | 3.23 | ng/kg | JK | U | 22 |
| E1200477 | SD0003 | E1200477-003 | EPA1668A | 2,3,4'-Trichlorobiphenyl | 6.26 | ng/kg | BJK | U | 22 |
| E1200477 | SD0003 | E1200477-003 | EPA1668A | 2,4',6-Trichlorobiphenyl | 7.28 | ng/kg | BJK | U | 22 |
| E1200477 | SD0003 | E1200477-003 | EPA1668A | 2-Chlorobiphenyl | 42.2 | ng/kg | BJ | U | 7 |
| E1200477 | SD0003 | E1200477-003 | EPA1668A | 3,3',4,4'-Tetrachlorobiphenyl | 2.99 | ng/kg | JK | U | 22 |
| E1200477 | SD0003 | E1200477-003 | EPA1668A | 3,3'-Dichlorobiphenyl | 17.3 | ng/kg | BJ | U | 7 |
| E1200477 | SD0003 | E1200477-003 | EPA1668A | 3-Chlorobiphenyl | 3.01 | ng/kg | JK | U | 22 |
| E1200477 | SD0003 | E1200477-003 | EPA1668A | Coelution of PCB 018 and 030 | 18.3 | ng/kg | BJK | U | 22 |
| E1200477 | SD0003 | E1200477-003 | EPA1668A | Coelution of PCB 021 and 033 | 11.2 | ng/kg | BJK | U | 22 |
| E1200477 | SD0003 | E1200477-003 | EPA1668A | Coelution of PCB 026 and 029 | 4.85 | ng/kg | JK | U | 22 |
| E1200477 | SD0003 | E1200477-003 | EPA1668A | Coelution of PCB 045 and 051 | 10.6 | ng/kg | JK | U | 22 |
| E1200477 | SD0003 | E1200477-003 | EPA1668A | Coelution of PCB 098 and 102 | 2.14 | ng/kg | JK | U | 22 |
| E1200477 | SD0003 | E1200477-003 | EPA1668A | Coelution of PCB 156 and 157 | 8.77 | ng/kg | JK | U | 22 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| E1200477 | SD0004 | E1200477-004 | EPA1668A | 2,2',3,3',4,4',5,6-Octachlorobiphenyl | 31.8 | ng/kg | JK | U | 22 |
| E1200477 | SD0004 | E1200477-004 | EPA1668A | 2,2',3,3',4,5',6-Heptachlorobiphenyl | 5.31 | ng/kg | JK | U | 22 |
| E1200477 | SD0004 | E1200477-004 | EPA1668A | 2,2',3,4',6,6'-Hexachlorobiphenyl | 3.14 | ng/kg | JK | U | 22 |
| E1200477 | SD0004 | E1200477-004 | EPA1668A | 2,2',3,5,6'-Pentachlorobiphenyl | 2.96 | ng/kg | JK | U | 22 |
| E1200477 | SD0004 | E1200477-004 | EPA1668A | 2,2',3,6,6'-Pentachlorobiphenyl | 6 | ng/kg | JK | U | 22 |
| E1200477 | SD0004 | E1200477-004 | EPA1668A | 2,3,3',4',5'-Pentachlorobiphenyl | 4.51 | ng/kg | JK | U | 22 |
| E1200477 | SD0004 | E1200477-004 | EPA1668A | 2,3',6-Trichlorobiphenyl | 21.8 | ng/kg | JK | U | 22 |
| E1200477 | SD0004 | E1200477-004 | EPA1668A | 2,3'-Dichlorobiphenyl | 40.6 | ng/kg | JK | U | 22 |
| E1200477 | SD0004 | E1200477-004 | EPA1668A | 3,3',4,5'-Tetrachlorobiphenyl | 3.77 | ng/kg | JK | U | 22 |
| E1200477 | SD0004 | E1200477-004 | EPA1668A | Coelution of PCB 043 and 073 | 7.36 | ng/kg | JK | U | 22 |
| E1200477 | SD0004 | E1200477-004 | EPA1668A | Coelution of PCB 093 and 100 | 17.5 | ng/kg | JK | U | 22 |
| E1200477 | SD0004 | E1200477-004 | EPA1668A | Coelution of PCB 108 and 124 | 18 | ng/kg | JK | U | 22 |
| E1200477 | SD0005 | E1200477-005 | EPA1668A | 2,2',3,3',4,4',5,5'-Octachlorobiphenyl | 59.6 | ng/kg | JK | U | 22 |
| E1200477 | SD0005 | E1200477-005 | EPA1668A | 2,2',3,3',4,4',5,6-Octachlorobiphenyl | 22.7 | ng/kg | JK | U | 22 |
| E1200477 | SD0005 | E1200477-005 | EPA1668A | 2,2',3,3',4,5,5'-Heptachlorobiphenyl | 25.8 | ng/kg | JK | U | 22 |
| E1200477 | SD0005 | E1200477-005 | EPA1668A | 2,2',3,3',4,5',6,6'-Octachlorobiphenyl | 9.39 | ng/kg | JK | U | 22 |
| E1200477 | SD0005 | E1200477-005 | EPA1668A | 2,2',3,3',4,6-Hexachlorobiphenyl | 15.7 | ng/kg | JK | U | 22 |
| E1200477 | SD0005 | E1200477-005 | EPA1668A | 2,2',3,4,5',6-Hexachlorobiphenyl | 23.4 | ng/kg | JK | U | 22 |
| E1200477 | SD0005 | E1200477-005 | EPA1668A | 2,2',4,4',5,6'-Hexachlorobiphenyl | 12.3 | ng/kg | JK | U | 22 |
| E1200477 | SD0005 | E1200477-005 | EPA1668A | 2,2'-Dichlorobiphenyl | 90.9 | ng/kg | JK | U | 22 |
| E1200477 | SD0005 | E1200477-005 | EPA1668A | 2,3,4,4',5-Pentachlorobiphenyl | 24.9 | ng/kg | JK | U | 22 |
| E1200477 | SD0005 | E1200477-005 | EPA1668A | 2,3,4',5-Tetrachlorobiphenyl | 9.49 | ng/kg | JK | U | 22 |
| E1200477 | SD0005 | E1200477-005 | EPA1668A | 2,3',5,5'-Tetrachlorobiphenyl | 8.78 | ng/kg | JK | U | 22 |
| E1200477 | SD0005 | E1200477-005 | EPA1668A | 3,3',4,5'-Tetrachlorobiphenyl | 8.37 | ng/kg | JK | U | 22 |
| E1200477 | SD0005 | E1200477-005 | EPA1668A | Coelution of PCB 093 and 100 | 15.4 | ng/kg | JK | U | 22 |
| E1200477 | SD0006 | E1200477-006 | EPA1668A | 2,2',3,3',4,5,5'-Heptachlorobiphenyl | 20.2 | ng/kg | JK | U | 22 |
| E1200477 | SD0006 | E1200477-006 | EPA1668A | 2,2',3,3',4,5,6,6'-Octachlorobiphenyl | 7.08 | ng/kg | JK | U | 22 |
| E1200477 | SD0006 | E1200477-006 | EPA1668A | 2,2',3,3',4,5',6-Heptachlorobiphenyl | 4.68 | ng/kg | JK | U | 22 |
| E1200477 | SD0006 | E1200477-006 | EPA1668A | 2,2',3,3',4,6-Hexachlorobiphenyl | 3.07 | ng/kg | JK | U | 22 |
| E1200477 | SD0006 | E1200477-006 | EPA1668A | 2,2',3,3',5,5'-Hexachlorobiphenyl | 8.73 | ng/kg | JK | U | 22 |
| E1200477 | SD0006 | E1200477-006 | EPA1668A | 2,2',3,4',5,6'-Hexachlorobiphenyl | 2.22 | ng/kg | JK | U | 22 |
| E1200477 | SD0006 | E1200477-006 | EPA1668A | 2,2',3,4',6,6'-Hexachlorobiphenyl | 3.16 | ng/kg | JK | U | 22 |
| E1200477 | SD0006 | E1200477-006 | EPA1668A | 2,2',3,6,6'-Pentachlorobiphenyl | 5.82 | ng/kg | JK | U | 22 |
| E1200477 | SD0006 | E1200477-006 | EPA1668A | 2,2',4,4',5,6'-Hexachlorobiphenyl | 10.2 | ng/kg | JK | U | 22 |
| E1200477 | SD0006 | E1200477-006 | EPA1668A | 2,2',6,6'-Tetrachlorobiphenyl | 4.07 | ng/kg | JK | U | 22 |
| E1200477 | SD0006 | E1200477-006 | EPA1668A | 2,2'-Dichlorobiphenyl | 94.5 | ng/kg | JK | U | 22 |
| E1200477 | SD0006 | E1200477-006 | EPA1668A | 2,3,3',4,4',5,5',6-Octachlorobiphenyl | 5.51 | ng/kg | JK | U | 22 |
| E1200477 | SD0006 | E1200477-006 | EPA1668A | 2,3,3',4,4',5,5'-Heptachlorobiphenyl | 5.02 | ng/kg | JK | U | 22 |
| E1200477 | SD0006 | E1200477-006 | EPA1668A | 2,3',4,4',5'-Pentachlorobiphenyl | 9.54 | ng/kg | JK | U | 22 |
| E1200477 | SD0006 | E1200477-006 | EPA1668A | 2,3,4,4',5-Pentachlorobiphenyl | 6.76 | ng/kg | JK | U | 22 |
| E1200477 | SD0006 | E1200477-006 | EPA1668A | 2,3',5'-Trichlorobiphenyl | 5.55 | ng/kg | JK | U | 22 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| E1200477 | SD0006 | E1200477-006 | EPA1668A | 3,3',4-Trichlorobiphenyl | 2.83 | ng/kg | JK | U | 22 |
| E1200477 | SD0006 | E1200477-006 | EPA1668A | Coelution of PCB 085 and 116 | 66 | ng/kg | JK | U | 22 |
| E1200477 | SD0006 | E1200477-006 | EPA1668A | Coelution of PCB 098 and 102 | 9.99 | ng/kg | JK | U | 22 |
| E1200477 | SD0006 | E1200477-006 | EPA1668A | Coelution of PCB 108 and 124 | 10.2 | ng/kg | JK | U | 22 |
| E1200477 | SD0007 | E1200477-007 | EPA1668A | 2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl | 57.2 | ng/kg | JK | U | 22 |
| E1200477 | SD0007 | E1200477-007 | EPA1668A | 2,2',3,3',4,4',5,6,6'-Nonachlorobiphenyl | 24.8 | ng/kg | JK | U | 22 |
| E1200477 | SD0007 | E1200477-007 | EPA1668A | 2,2',3,3',4,4',5,6'-Octachlorobiphenyl | 34.7 | ng/kg | JK | U | 22 |
| E1200477 | SD0007 | E1200477-007 | EPA1668A | 2,2',3,3',4,4',5,6-Octachlorobiphenyl | 29.8 | ng/kg | JK | U | 22 |
| E1200477 | SD0007 | E1200477-007 | EPA1668A | 2,2',3,3',4,5',6,6'-Octachlorobiphenyl | 17.1 | ng/kg | JK | U | 22 |
| E1200477 | SD0007 | E1200477-007 | EPA1668A | 2,2',3,3',4,5,6,6'-Octachlorobiphenyl | 20 | ng/kg | JK | U | 22 |
| E1200477 | SD0007 | E1200477-007 | EPA1668A | 2,2',3,3',5,5',6,6'-Octachlorobiphenyl | 15.2 | ng/kg | JK | U | 22 |
| E1200477 | SD0007 | E1200477-007 | EPA1668A | 2,2',3,3',5,6,6'-Heptachlorobiphenyl | 66 | ng/kg | JK | U | 22 |
| E1200477 | SD0007 | E1200477-007 | EPA1668A | 2,2',3,3',6-Pentachlorobiphenyl | 59.6 | ng/kg | BJK | UJ | 14,22 |
| E1200477 | SD0007 | E1200477-007 | EPA1668A | 2,2',3,4,4',5',6-Heptachlorobiphenyl | 131 | ng/kg | J | J | 14 |
| E1200477 | SD0007 | E1200477-007 | EPA1668A | 2,2',3,4',5,5',6-Heptachlorobiphenyl | 90.2 | ng/kg | J | J | 14 |
| E1200477 | SD0007 | E1200477-007 | EPA1668A | 2,2',3,4'-Tetrachlorobiphenyl | 53.1 | ng/kg | JK | U | 22 |
| E1200477 | SD0007 | E1200477-007 | EPA1668A | 2,3,3',4,4',6-Hexachlorobiphenyl | 54 | ng/kg | JK | U | 22 |
| E1200477 | SD0007 | E1200477-007 | EPA1668A | 2,3',4,4',5,5'-Hexachlorobiphenyl | 35.5 | ng/kg | JK | U | 22 |
| E1200477 | SD0007 | E1200477-007 | EPA1668A | 2,3,4',6-Tetrachlorobiphenyl | 69.6 | ng/kg | BJK | U | 22 |
| E1200477 | SD0007 | E1200477-007 | EPA1668A | 3,3',4,4'-Tetrachlorobiphenyl | 32.8 | ng/kg | JK | U | 22 |
| E1200477 | SD0007 | E1200477-007 | EPA1668A | 4,4'-Dichlorobiphenyl | 338 | ng/kg | BJK | U | 22 |
| E1200477 | SD0007 | E1200477-007 | EPA1668A | Coelution of PCB 044, 047, and 065 | 451 | ng/kg | BJK | U | 22 |
| E1200477 | SD0007 | E1200477-007 | EPA1668A | Coelution of PCB 061, 070, 074, and 076 | 512 | ng/kg | BJ | J | 14 |
| E1200477 | SD0007 | E1200477-007 | EPA1668A | Coelution of PCB 085 and 116 | 67.9 | ng/kg | JK | U | 22 |
| E1200477 | SD0007 | E1200477-007 | EPA1668A | Coelution of PCB 156 and 157 | 113 | ng/kg | JK | U | 22 |
| E1200477 | SD0008 | E1200477-008 | EPA1668A | 2,2',3,3',4,4',5,6-Octachlorobiphenyl | 30.6 | ng/kg | JK | U | 22 |
| E1200477 | SD0008 | E1200477-008 | EPA1668A | 2,2',3,4,4',5,6-Heptachlorobiphenyl | 5.26 | ng/kg | JK | U | 22 |
| E1200477 | SD0008 | E1200477-008 | EPA1668A | 2,2',3,4,4',6,6'-Heptachlorobiphenyl | 1.71 | ng/kg | JK | U | 22 |
| E1200477 | SD0008 | E1200477-008 | EPA1668A | 2,2',3,4',5,6,6'-Heptachlorobiphenyl | 2.17 | ng/kg | JK | U | 22 |
| E1200477 | SD0008 | E1200477-008 | EPA1668A | 2,2',3,5,6,6'-Hexachlorobiphenyl | 3.32 | ng/kg | JK | U | 22 |
| E1200477 | SD0008 | E1200477-008 | EPA1668A | 2,2',4,4',6,6'-Hexachlorobiphenyl | 2.14 | ng/kg | JK | U | 22 |
| E1200477 | SD0008 | E1200477-008 | EPA1668A | 2,3,3',4,4',5,5',6-Octachlorobiphenyl | 6.21 | ng/kg | JK | U | 22 |
| E1200477 | SD0008 | E1200477-008 | EPA1668A | 2,3,3',4,4',5,5'-Heptachlorobiphenyl | 11.6 | ng/kg | JK | U | 22 |
| E1200477 | SD0008 | E1200477-008 | EPA1668A | 2,3,3',4',5'-Pentachlorobiphenyl | 20.4 | ng/kg | JK | U | 22 |
| E1200477 | SD0008 | E1200477-008 | EPA1668A | 2,3',4,5,5'-Pentachlorobiphenyl | 10.4 | ng/kg | JK | U | 22 |
| E1200477 | SD0008 | E1200477-008 | EPA1668A | 2,3,4',5-Tetrachlorobiphenyl | 9.35 | ng/kg | JK | U | 22 |
| E1200477 | SD0008 | E1200477-008 | EPA1668A | 2,3',5,5'-Tetrachlorobiphenyl | 21 | ng/kg | JK | U | 22 |
| E1200477 | SD0008 | E1200477-008 | EPA1668A | 3,3',4,4',5-Pentachlorobiphenyl | 12 | ng/kg | JK | U | 22 |
| E1200477 | SD0008 | E1200477-008 | EPA1668A | 3,3',4-Trichlorobiphenyl | 25.8 | ng/kg | JK | U | 22 |
| E1200477 | SD0008 | E1200477-008 | EPA1668A | 4-Chlorobiphenyl | 71.9 | ng/kg | BJK | U | 22 |
| E1200477 | SD0008 | E1200477-008 | EPA1668A | Coelution of PCB 059, 062, and 075 | 53.4 | ng/kg | JK | U | 22 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| E1200477 | SD0009 | E1200477-009 | EPA1668A | 2,2',3,3',4,4',5,6,6'-Nonachlorobiphenyl | 8.21 | ng/kg | JK | UJ | 14,22 |
| E1200477 | SD0009 | E1200477-009 | EPA1668A | 2,2',3,3',4,4',6,6'-Octachlorobiphenyl | 7.71 | ng/kg | JK | U | 22 |
| E1200477 | SD0009 | E1200477-009 | EPA1668A | 2,2',3,3',4,5',6,6'-Octachlorobiphenyl | 9.1 | ng/kg | JK | U | 22 |
| E1200477 | SD0009 | E1200477-009 | EPA1668A | 2,2',3,3',4,5,6,6'-Octachlorobiphenyl | 4.97 | ng/kg | JK | U | 22 |
| E1200477 | SD0009 | E1200477-009 | EPA1668A | 2,2',3,3',5,5',6-Heptachlorobiphenyl | 22.9 | ng/kg | JK | U | 22 |
| E1200477 | SD0009 | E1200477-009 | EPA1668A | 2,2',3,4,5',6-Hexachlorobiphenyl | 17.9 | ng/kg | JK | U | 22 |
| E1200477 | SD0009 | E1200477-009 | EPA1668A | 2,2',3,4',6,6'-Hexachlorobiphenyl | 6.99 | ng/kg | JK | U | 22 |
| E1200477 | SD0009 | E1200477-009 | EPA1668A | 2,2',4,4',6,6'-Hexachlorobiphenyl | 2.05 | ng/kg | JK | U | 22 |
| E1200477 | SD0009 | E1200477-009 | EPA1668A | 2,2',4,6,6'-Pentachlorobiphenyl | 1.36 | ng/kg | JK | U | 22 |
| E1200477 | SD0009 | E1200477-009 | EPA1668A | 2,3,3',4,4',5,5',6-Octachlorobiphenyl | 4.5 | ng/kg | JK | U | 22 |
| E1200477 | SD0009 | E1200477-009 | EPA1668A | 2,3,3',4,4',5,5'-Heptachlorobiphenyl | 3.8 | ng/kg | JK | U | 22 |
| E1200477 | SD0009 | E1200477-009 | EPA1668A | 2,3,3',4',5,5'-Hexachlorobiphenyl | 3.25 | ng/kg | JK | U | 22 |
| E1200477 | SD0009 | E1200477-009 | EPA1668A | 2,3,3',4',5'-Pentachlorobiphenyl | 5.29 | ng/kg | JK | U | 22 |
| E1200477 | SD0009 | E1200477-009 | EPA1668A | 2,3',4,4',5'-Pentachlorobiphenyl | 5.78 | ng/kg | JK | U | 22 |
| E1200477 | SD0009 | E1200477-009 | EPA1668A | 2,3,4,4',5-Pentachlorobiphenyl | 10.1 | ng/kg | JK | U | 22 |
| E1200477 | SD0009 | E1200477-009 | EPA1668A | 2,3',4,5-Tetrachlorobiphenyl | 8.42 | ng/kg | JK | U | 22 |
| E1200477 | SD0009 | E1200477-009 | EPA1668A | 2,6-Dichlorobiphenyl | 16.1 | ng/kg | JK | U | 22 |
| E1200477 | SD0009 | E1200477-009 | EPA1668A | 3,3',4,5'-Tetrachlorobiphenyl | 5.5 | ng/kg | JK | U | 22 |
| E1200477 | SD0009 | E1200477-009 | EPA1668A | 3,3',4-Trichlorobiphenyl | 5.06 | ng/kg | JK | U | 22 |
| E1200477 | SD0009 | E1200477-009 | EPA1668A | 3,3'-Dichlorobiphenyl | 16.3 | ng/kg | BJK | U | 22 |
| E1200477 | SD0009 | E1200477-009 | EPA1668A | Coelution of PCB 059, 062, and 075 | 38.1 | ng/kg | JK | U | 22 |
| E1200477 | SD0010 | E1200477-010 | EPA1668A | 2,2',3,4,4',5,6,6'-Octachlorobiphenyl | 1.7 | ng/kg | JK | U | 22 |
| E1200477 | SD0010 | E1200477-010 | EPA1668A | 2,2',3,4,4',5,6'-Heptachlorobiphenyl | 6.11 | ng/kg | JK | U | 22 |
| E1200477 | SD0010 | E1200477-010 | EPA1668A | 2,2',3,4,4',5,6-Heptachlorobiphenyl | 8.81 | ng/kg | JK | U | 22 |
| E1200477 | SD0010 | E1200477-010 | EPA1668A | 2,2',4,6,6'-Pentachlorobiphenyl | 2.61 | ng/kg | JK | U | 22 |
| E1200477 | SD0010 | E1200477-010 | EPA1668A | 2,3,3',4,5,5'-Hexachlorobiphenyl | 7.52 | ng/kg | JK | U | 22 |
| E1200477 | SD0010 | E1200477-010 | EPA1668A | 2,3,3',4',5'-Pentachlorobiphenyl | 15.7 | ng/kg | JK | U | 22 |
| E1200477 | SD0010 | E1200477-010 | EPA1668A | 2,3',4,4',5'-Pentachlorobiphenyl | 43.9 | ng/kg | JK | U | 22 |
| E1200477 | SD0010 | E1200477-010 | EPA1668A | 2,3,4,4',5-Pentachlorobiphenyl | 43.6 | ng/kg | JK | U | 22 |
| E1200477 | SD0011 | E1200477-011 | EPA1668A | 2,2',3,3',4,4',6,6'-Octachlorobiphenyl | 4.13 | ng/kg | JK | U | 22 |
| E1200477 | SD0011 | E1200477-011 | EPA1668A | 2,2',3,3',4,5',6-Heptachlorobiphenyl | 28.5 | ng/kg | JK | U | 22 |
| E1200477 | SD0011 | E1200477-011 | EPA1668A | 2,2',3,4',5,6,6'-Heptachlorobiphenyl | 2.23 | ng/kg | JK | U | 22 |
| E1200477 | SD0011 | E1200477-011 | EPA1668A | 2,2'-Dichlorobiphenyl | 142 | ng/kg | JK | U | 22 |
| E1200477 | SD0011 | E1200477-011 | EPA1668A | 2,3,3',4-Tetrachlorobiphenyl | 12.5 | ng/kg | JK | U | 22 |
| E1200477 | SD0011 | E1200477-011 | EPA1668A | 2,3,4',5-Tetrachlorobiphenyl | 52.3 | ng/kg | JK | U | 22 |
| E1200477 | SD0011 | E1200477-011 | EPA1668A | 2,3,6-Trichlorobiphenyl | 11.3 | ng/kg | JK | U | 22 |
| E1200477 | SD0011 | E1200477-011 | EPA1668A | 3,4,4',5-Tetrachlorobiphenyl | 11 | ng/kg | JK | U | 22 |
| E1200477 | SD0011 | E1200477-011 | EPA1668A | 4-Chlorobiphenyl | 73.3 | ng/kg | BJK | U | 22 |
| E1200477 | SD0012 | E1200477-012 | EPA1668A | 2,2',3,3',4,6-Hexachlorobiphenyl | 14.9 | ng/kg | JK | U | 22 |
| E1200477 | SD0012 | E1200477-012 | EPA1668A | 2,2',3,4',6,6'-Hexachlorobiphenyl | 2.62 | ng/kg | JK | U | 22 |
| E1200477 | SD0012 | E1200477-012 | EPA1668A | 2,2',4,5',6-Pentachlorobiphenyl | 11.2 | ng/kg | JK | U | 22 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| E1200477 | SD0012 | E1200477-012 | EPA1668A | 2,3,3',4,4',5,5',6-Octachlorobiphenyl | 8.79 | ng/kg | JK | U | 22 |
| E1200477 | SD0012 | E1200477-012 | EPA1668A | 2,3,3',5'-Tetrachlorobiphenyl | 1.54 | ng/kg | JK | U | 22 |
| E1200477 | SD0012 | E1200477-012 | EPA1668A | 2,3,3',5-Tetrachlorobiphenyl | 3.06 | ng/kg | JK | U | 22 |
| E1200477 | SD0012 | E1200477-012 | EPA1668A | 2,3,4,4',5-Pentachlorobiphenyl | 12.8 | ng/kg | JK | U | 22 |
| E1200477 | SD0012 | E1200477-012 | EPA1668A | 2,3',4,5,5'-Pentachlorobiphenyl | 4.96 | ng/kg | JK | U | 22 |
| E1200477 | SD0012 | E1200477-012 | EPA1668A | 2,3,4',5-Tetrachlorobiphenyl | 11.7 | ng/kg | JK | U | 22 |
| E1200477 | SD0012 | E1200477-012 | EPA1668A | 2,3,6-Trichlorobiphenyl | 12.4 | ng/kg | JK | U | 22 |
| E1200477 | SD0012 | E1200477-012 | EPA1668A | 3-Chlorobiphenyl | 7.09 | ng/kg | JK | U | 22 |
| E1200477 | SD0012 | E1200477-012 | EPA1668A | Coelution of PCB 108 and 124 | 36.1 | ng/kg | JK | U | 22 |
| E1200477 | SD0013 | E1200477-013 | EPA1668A | 2,2',3,3',4,4',6,6'-Octachlorobiphenyl | 5.81 | ng/kg | JK | U | 22 |
| E1200477 | SD0013 | E1200477-013 | EPA1668A | 2,2',3,3',4,5,6,6'-Octachlorobiphenyl | 7.96 | ng/kg | JK | U | 22 |
| E1200477 | SD0013 | E1200477-013 | EPA1668A | 2,2',3,3',4,6-Hexachlorobiphenyl | 7.09 | ng/kg | JK | U | 22 |
| E1200477 | SD0013 | E1200477-013 | EPA1668A | 2,2',3,4',6,6'-Hexachlorobiphenyl | 1.82 | ng/kg | JK | U | 22 |
| E1200477 | SD0013 | E1200477-013 | EPA1668A | 2,2',3,5,6'-Pentachlorobiphenyl | 4.51 | ng/kg | JK | U | 22 |
| E1200477 | SD0013 | E1200477-013 | EPA1668A | 2,2',3,6,6'-Pentachlorobiphenyl | 5.32 | ng/kg | JK | U | 22 |
| E1200477 | SD0013 | E1200477-013 | EPA1668A | 2,2',3-Trichlorobiphenyl | 102 | ng/kg | BJK | U | 22 |
| E1200477 | SD0013 | E1200477-013 | EPA1668A | 2,2'-Dichlorobiphenyl | 107 | ng/kg | JK | U | 22 |
| E1200477 | SD0013 | E1200477-013 | EPA1668A | 2,3',4,4',5'-Pentachlorobiphenyl | 10.7 | ng/kg | JK | U | 22 |
| E1200477 | SD0013 | E1200477-013 | EPA1668A | 2,3,4,4',5-Pentachlorobiphenyl | 8.45 | ng/kg | JK | U | 22 |
| E1200477 | SD0013 | E1200477-013 | EPA1668A | 2,3',4,5-Tetrachlorobiphenyl | 7.35 | ng/kg | JK | U | 22 |
| E1200477 | SD0013 | E1200477-013 | EPA1668A | 2,3,6-Trichlorobiphenyl | 9.14 | ng/kg | JK | U | 22 |
| E1200477 | SD0013 | E1200477-013 | EPA1668A | 2,3'-Dichlorobiphenyl | 70.5 | ng/kg | K | U | 22 |
| E1200477 | SD0013 | E1200477-013 | EPA1668A | Coelution of PCB 108 and 124 | 13 | ng/kg | JK | U | 22 |
| E1200477 | FW0001 | E1200477-014 | EPA1668A | 2,2',5,5'-Tetrachlorobiphenyl | 11.8 | pg | BJK | U | 22 |
| E1200477 | SD0014 | E1200477-015 | EPA1668A | 2,2',3,4,5',6-Hexachlorobiphenyl | 1040 | ng/kg | | J | 14 |
| E1200477 | SD0014 | E1200477-015 | EPA1668A | 2,2',3,5,6'-Pentachlorobiphenyl | 277 | ng/kg | JK | U | 22 |
| E1200477 | SD0014 | E1200477-015 | EPA1668A | 2,2',4,4',5,6'-Hexachlorobiphenyl | 927 | ng/kg | K | U | 22 |
| E1200477 | SD0014 | E1200477-015 | EPA1668A | 2,3,3',5'-Tetrachlorobiphenyl | 147 | ng/kg | JK | U | 22 |
| E1200477 | SD0014 | E1200477-015 | EPA1668A | 2,3,4',5-Tetrachlorobiphenyl | 225 | ng/kg | JK | U | 22 |
| E1200477 | FB0001 | E1200477-016 | EPA1668A | 2,2',5,5'-Tetrachlorobiphenyl | 16.7 | pg | BJ | U | 7 |
| E1200485 | SL0345 | E1200485-001 | EPA1668A | 2,2',3,3',4,4',6,6'-Octachlorobiphenyl | 1.26 | ng/kg | JK | U | 22 |
| E1200485 | SL0345 | E1200485-001 | EPA1668A | 2,2',3,3',4,6,6'-Heptachlorobiphenyl | 6.02 | ng/kg | JK | U | 22 |
| E1200485 | SL0345 | E1200485-001 | EPA1668A | 2,2',3,4,4',5-Hexachlorobiphenyl | 4.38 | ng/kg | JK | U | 22 |
| E1200485 | SL0345 | E1200485-001 | EPA1668A | 2,2',3,4,5',6-Hexachlorobiphenyl | 4.58 | ng/kg | JK | U | 22 |
| E1200485 | SL0345 | E1200485-001 | EPA1668A | 2,2',3,5,5'-Pentachlorobiphenyl | 5.22 | ng/kg | JK | U | 22 |
| E1200485 | SL0345 | E1200485-001 | EPA1668A | 2,2',4,4',5,6'-Hexachlorobiphenyl | 0.687 | ng/kg | JK | U | 22 |
| E1200485 | SL0345 | E1200485-001 | EPA1668A | 2,2',5,5'-Tetrachlorobiphenyl | 14.2 | ng/kg | BJK | U | 22 |
| E1200485 | SL0345 | E1200485-001 | EPA1668A | 2,3,3',4,4',5,5'-Heptachlorobiphenyl | 4.28 | ng/kg | JK | U | 22 |
| E1200485 | SL0345 | E1200485-001 | EPA1668A | 2,3,3',4,4',5,6-Heptachlorobiphenyl | 20.7 | ng/kg | JK | U | 22 |
| E1200485 | SL0345 | E1200485-001 | EPA1668A | 2,3,3',4',5',6-Hexachlorobiphenyl | 17.3 | ng/kg | JK | U | 22 |
| E1200485 | SL0345 | E1200485-001 | EPA1668A | 2,3,3',4'-Tetrachlorobiphenyl | 4.04 | ng/kg | JK | U | 22 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| E1200485 | SL0345 | E1200485-001 | EPA1668A | 2,3',4,4',5,5'-Hexachlorobiphenyl | 5.87 | ng/kg | JK | U | 22 |
| E1200485 | SL0345 | E1200485-001 | EPA1668A | 2,3,4,4'-Tetrachlorobiphenyl | 1.53 | ng/kg | JK | U | 22 |
| E1200485 | SL0345 | E1200485-001 | EPA1668A | 2,3,4',5,6-Pentachlorobiphenyl | 1.32 | ng/kg | JK | U | 22 |
| E1200485 | SL0345 | E1200485-001 | EPA1668A | 2,4',5-Trichlorobiphenyl | 8.28 | ng/kg | BJ | U | 7 |
| E1200485 | SL0345 | E1200485-001 | EPA1668A | 3,3',4,4'-Tetrachlorobiphenyl | 2.11 | ng/kg | JK | U | 22 |
| E1200485 | SL0345 | E1200485-001 | EPA1668A | 3,4,4'-Trichlorobiphenyl | 5.05 | ng/kg | BJK | U | 22 |
| E1200485 | SL0345 | E1200485-001 | EPA1668A | 3-Chlorobiphenyl | 1.02 | ng/kg | JK | U | 22 |
| E1200485 | SL0345 | E1200485-001 | EPA1668A | 4-Chlorobiphenyl | 3.96 | ng/kg | BJK | U | 22 |
| E1200485 | SL0345 | E1200485-001 | EPA1668A | Coelution of PCB 044, 047, and 065 | 14.4 | ng/kg | JK | U | 22 |
| E1200485 | SL0345 | E1200485-001 | EPA1668A | Coelution of PCB 088 and 091 | 4.93 | ng/kg | JK | U | 22 |
| E1200485 | SL0345 | E1200485-001 | EPA1668A | Coelution of PCB 139 and 140 | 1.52 | ng/kg | JK | U | 22 |
| E1200485 | SL0345 | E1200485-001 | EPA1668A | Coelution of PCB 147 and 149 | 151 | ng/kg | BJ | J | 14 |
| E1200485 | SL0349 | E1200485-003 | EPA1668A | 2,2',3,3',4,5',6,6'-Octachlorobiphenyl | 29.8 | ng/kg | JK | U | 22 |
| E1200485 | SL0349 | E1200485-003 | EPA1668A | 2,2',3,4,4',5,6'-Heptachlorobiphenyl | 2.03 | ng/kg | JK | U | 22 |
| E1200485 | SL0349 | E1200485-003 | EPA1668A | 2,2',3,4,4',5,6-Heptachlorobiphenyl | 3.98 | ng/kg | JK | U | 22 |
| E1200485 | SL0349 | E1200485-003 | EPA1668A | 2,2',3,4,6'-Pentachlorobiphenyl | 53 | ng/kg | J | J | 14 |
| E1200485 | SL0349 | E1200485-003 | EPA1668A | 2,2',4,4',5,6'-Hexachlorobiphenyl | 3.35 | ng/kg | JK | U | 22 |
| E1200485 | SL0349 | E1200485-003 | EPA1668A | 2,3,3',4',5,5'-Hexachlorobiphenyl | 13 | ng/kg | JK | U | 22 |
| E1200485 | SL0349 | E1200485-003 | EPA1668A | 2,3',5'-Trichlorobiphenyl | 24.9 | ng/kg | JK | U | 22 |
| E1200485 | SL0349 | E1200485-003 | EPA1668A | 3,3',4,4',5-Pentachlorobiphenyl | 9.34 | ng/kg | JK | U | 22 |
| E1200485 | SL0349 | E1200485-003 | EPA1668A | 3,3',4,5'-Tetrachlorobiphenyl | 13.9 | ng/kg | JK | U | 22 |
| E1200485 | SL0351 | E1200485-005 | EPA1668A | 2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl | 13.7 | ng/kg | JK | U | 22 |
| E1200485 | SL0351 | E1200485-005 | EPA1668A | 2,2',3,3',4,5,5'-Heptachlorobiphenyl | 5.86 | ng/kg | JK | U | 22 |
| E1200485 | SL0351 | E1200485-005 | EPA1668A | 2,2',3,3',4,5',6-Heptachlorobiphenyl | 1.35 | ng/kg | JK | U | 22 |
| E1200485 | SL0351 | E1200485-005 | EPA1668A | 2,2',3,3',4,5'-Hexachlorobiphenyl | 5.49 | ng/kg | JK | U | 22 |
| E1200485 | SL0351 | E1200485-005 | EPA1668A | 2,2',3,3',5,5',6,6'-Octachlorobiphenyl | 4.46 | ng/kg | JK | U | 22 |
| E1200485 | SL0351 | E1200485-005 | EPA1668A | 2,2',3,3',5,6-Hexachlorobiphenyl | 4.65 | ng/kg | JK | U | 22 |
| E1200485 | SL0351 | E1200485-005 | EPA1668A | 2,2',3,4,4',5,5',6-Octachlorobiphenyl | 11.3 | ng/kg | JK | U | 22 |
| E1200485 | SL0351 | E1200485-005 | EPA1668A | 2,2',3,4,4',5-Hexachlorobiphenyl | 2.84 | ng/kg | JK | U | 22 |
| E1200485 | SL0351 | E1200485-005 | EPA1668A | 2,2',3,4',5,5'-Hexachlorobiphenyl | 14.5 | ng/kg | JK | U | 22 |
| E1200485 | SL0351 | E1200485-005 | EPA1668A | 2,2',3-Trichlorobiphenyl | 9.13 | ng/kg | JK | U | 22 |
| E1200485 | SL0351 | E1200485-005 | EPA1668A | 2,2',4,4',5,6'-Hexachlorobiphenyl | 1.02 | ng/kg | JK | U | 22 |
| E1200485 | SL0351 | E1200485-005 | EPA1668A | 2,2',6,6'-Tetrachlorobiphenyl | 1.74 | ng/kg | BJ | U | 7 |
| E1200485 | SL0351 | E1200485-005 | EPA1668A | 2,2'-Dichlorobiphenyl | 15.2 | ng/kg | JK | U | 22 |
| E1200485 | SL0351 | E1200485-005 | EPA1668A | 2,3,3',4,4',5,5',6-Octachlorobiphenyl | 1.56 | ng/kg | JK | U | 22 |
| E1200485 | SL0351 | E1200485-005 | EPA1668A | 2,3,3',4,4',5,5'-Heptachlorobiphenyl | 1.51 | ng/kg | JK | U | 22 |
| E1200485 | SL0351 | E1200485-005 | EPA1668A | 2,3,3',4,4',6-Hexachlorobiphenyl | 9.07 | ng/kg | JK | U | 22 |
| E1200485 | SL0351 | E1200485-005 | EPA1668A | 2,3,3',4,4'-Pentachlorobiphenyl | 15.3 | ng/kg | JK | U | 22 |
| E1200485 | SL0351 | E1200485-005 | EPA1668A | 2,3',4-Trichlorobiphenyl | 0.966 | ng/kg | JK | U | 22 |
| E1200485 | SL0351 | E1200485-005 | EPA1668A | 3-Chlorobiphenyl | 2.04 | ng/kg | JK | U | 22 |
| E1200485 | SL0351 | E1200485-005 | EPA1668A | Coelution of PCB 059, 062, and 075 | 2.19 | ng/kg | JK | U | 22 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| E1200485 | SL0351 | E1200485-005 | EPA1668A | Coelution of PCB 085 and 116 | 5.67 | ng/kg | JK | U | 22 |
| E1200485 | SL0351 | E1200485-005 | EPA1668A | Coelution of PCB 128 and 166 | 10.9 | ng/kg | JK | U | 22 |
| E1200485 | FW0002 | E1200485-007 | EPA1668A | 2,2',5,5'-Tetrachlorobiphenyl | 22.6 | pg | BJK | U | 22 |
| E1200485 | FW0002 | E1200485-007 | EPA1668A | 3,3'-Dichlorobiphenyl | 57.1 | pg | BJK | U | 22 |
| E1200485 | SL0353 | E1200485-008 | EPA1668A | 2,2',3,3',4,5',6-Heptachlorobiphenyl | 4.01 | ng/kg | JK | U | 22 |
| E1200485 | SL0353 | E1200485-008 | EPA1668A | 2,2',3,3',5,5'-Hexachlorobiphenyl | 7.36 | ng/kg | JK | U | 22 |
| E1200485 | SL0353 | E1200485-008 | EPA1668A | 2,2',4,4',5,6'-Hexachlorobiphenyl | 1.52 | ng/kg | JK | U | 22 |
| E1200485 | SL0353 | E1200485-008 | EPA1668A | 2,2',6-Trichlorobiphenyl | 10.3 | ng/kg | JK | U | 22 |
| E1200485 | SL0353 | E1200485-008 | EPA1668A | 2,3,3',4,4',5',6-Heptachlorobiphenyl | 7.44 | ng/kg | JK | U | 22 |
| E1200485 | SL0353 | E1200485-008 | EPA1668A | 2,3,3',4,5,5'-Hexachlorobiphenyl | 8.11 | ng/kg | JK | U | 22 |
| E1200485 | SL0353 | E1200485-008 | EPA1668A | 2,3,4,4',5-Pentachlorobiphenyl | 3.54 | ng/kg | JK | U | 22 |
| E1200485 | SL0353 | E1200485-008 | EPA1668A | 2,3',4,5-Tetrachlorobiphenyl | 2.07 | ng/kg | JK | U | 22 |
| E1200485 | SL0353 | E1200485-008 | EPA1668A | 3,3',4,5'-Tetrachlorobiphenyl | 1.38 | ng/kg | JK | U | 22 |
| E1200485 | SL0353 | E1200485-008 | EPA1668A | Coelution of PCB 108 and 124 | 6.07 | ng/kg | JK | U | 22 |
| E1200485 | SL0353 | E1200485-008 | EPA1668A | Coelution of PCB 147 and 149 | 324 | ng/kg | BJ | J | 14 |
| E1200485 | SL0354 | E1200485-009 | EPA1668A | 2,2',3,3',4,4',5,5'-Octachlorobiphenyl | 4.89 | ng/kg | JK | U | 22 |
| E1200485 | SL0354 | E1200485-009 | EPA1668A | 2,2',3,3',4,5,5',6,6'-Nonachlorobiphenyl | 2.03 | ng/kg | JK | U | 22 |
| E1200485 | SL0354 | E1200485-009 | EPA1668A | 2,2',3,3',4,5',6'-Heptachlorobiphenyl | 7.83 | ng/kg | JK | U | 22 |
| E1200485 | SL0354 | E1200485-009 | EPA1668A | 2,2',3,3',4-Pentachlorobiphenyl | 1.65 | ng/kg | JK | U | 22 |
| E1200485 | SL0354 | E1200485-009 | EPA1668A | 2,2',3,3',5,5',6,6'-Octachlorobiphenyl | 1.51 | ng/kg | JK | U | 22 |
| E1200485 | SL0354 | E1200485-009 | EPA1668A | 2,2',3,3',5,5',6-Heptachlorobiphenyl | 1.68 | ng/kg | JK | U | 22 |
| E1200485 | SL0354 | E1200485-009 | EPA1668A | 2,2',3,3',6-Pentachlorobiphenyl | 3.81 | ng/kg | JK | U | 22 |
| E1200485 | SL0354 | E1200485-009 | EPA1668A | 2,2',3,4,4',5,5',6-Octachlorobiphenyl | 4.11 | ng/kg | JK | U | 22 |
| E1200485 | SL0354 | E1200485-009 | EPA1668A | 2,2',3,4',5,5',6-Heptachlorobiphenyl | 10.6 | ng/kg | JK | U | 22 |
| E1200485 | SL0354 | E1200485-009 | EPA1668A | 2,2',3,4',5,5'-Hexachlorobiphenyl | 3.51 | ng/kg | JK | U | 22 |
| E1200485 | SL0354 | E1200485-009 | EPA1668A | 2,2',3,4,5,5'-Hexachlorobiphenyl | 4.05 | ng/kg | JK | U | 22 |
| E1200485 | SL0354 | E1200485-009 | EPA1668A | 2,3,3',4,4',5,6-Heptachlorobiphenyl | 2.84 | ng/kg | JK | U | 22 |
| E1200485 | SL0354 | E1200485-009 | EPA1668A | 2,3,3',4,4',6-Hexachlorobiphenyl | 3.69 | ng/kg | JK | U | 22 |
| E1200485 | SL0354 | E1200485-009 | EPA1668A | 2,3,3',4,4'-Pentachlorobiphenyl | 9.61 | ng/kg | JK | U | 22 |
| E1200485 | SL0354 | E1200485-009 | EPA1668A | 2,3,3',4,5,5',6-Heptachlorobiphenyl | 3.28 | ng/kg | JK | U | 22 |
| E1200485 | SL0354 | E1200485-009 | EPA1668A | 2,3,3',4',5',6-Hexachlorobiphenyl | 2.55 | ng/kg | JK | U | 22 |
| E1200485 | SL0354 | E1200485-009 | EPA1668A | 2,3,3',4'-Tetrachlorobiphenyl | 4.79 | ng/kg | JK | U | 22 |
| E1200485 | SL0354 | E1200485-009 | EPA1668A | 2,3',4,4',5,5'-Hexachlorobiphenyl | 1.54 | ng/kg | JK | U | 22 |
| E1200485 | SL0354 | E1200485-009 | EPA1668A | 2,3',4,4'-Tetrachlorobiphenyl | 7.64 | ng/kg | JK | U | 22 |
| E1200485 | SL0354 | E1200485-009 | EPA1668A | 2,3,4,4'-Tetrachlorobiphenyl | 2.59 | ng/kg | JK | U | 22 |
| E1200485 | SL0354 | E1200485-009 | EPA1668A | 2-Chlorobiphenyl | 4.17 | ng/kg | BJK | U | 22 |
| E1200485 | SL0354 | E1200485-009 | EPA1668A | 3,4,4'-Trichlorobiphenyl | 6.72 | ng/kg | BJK | U | 22 |
| E1200485 | SL0354 | E1200485-009 | EPA1668A | 4-Chlorobiphenyl | 4.01 | ng/kg | BJK | U | 22 |
| E1200485 | SL0354 | E1200485-009 | EPA1668A | Coelution of PCB 040, 041, and 071 | 3.13 | ng/kg | JK | U | 22 |
| E1200485 | SL0354 | E1200485-009 | EPA1668A | Coelution of PCB 049 and 069 | 4.77 | ng/kg | JK | U | 22 |
| E1200485 | SL0354 | E1200485-009 | EPA1668A | Coelution of PCB 061, 070, 074, and 076 | 13.8 | ng/kg | BJK | U | 22 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| E1200485 | SL0354 | E1200485-009 | EPA1668A | Coelution of PCB 085 and 116 | 2.27 | ng/kg | JK | U | 22 |
| E1200485 | SL0354 | E1200485-009 | EPA1668A | Coelution of PCB 110 and 115 | 27.9 | ng/kg | BJK | U | 22 |
| E1200485 | SL0354 | E1200485-009 | EPA1668A | Coelution of PCB 135 and 151 | 6.56 | ng/kg | JK | U | 22 |
| E1200485 | SL0354 | E1200485-009 | EPA1668A | Coelution of PCB 156 and 157 | 5.11 | ng/kg | BJK | U | 22 |
| E1200485 | SL0354 | E1200485-009 | EPA1668A | Coelution of PCB 198 and 199 | 6.94 | ng/kg | JK | U | 22 |
| E1200485 | SL0356 | E1200485-011 | EPA1668A | 2,2',3,3',4,4',6,6'-Octachlorobiphenyl | 83.5 | ng/kg | JK | U | 22 |
| E1200485 | SL0356 | E1200485-011 | EPA1668A | 2,2',3,4,4',5,6'-Heptachlorobiphenyl | 20.5 | ng/kg | JK | U | 22 |
| E1200485 | SL0356 | E1200485-011 | EPA1668A | 2,2',3,4',5,6'-Hexachlorobiphenyl | 6.71 | ng/kg | JK | U | 22 |
| E1200485 | SL0356 | E1200485-011 | EPA1668A | 2,3,3',5'-Tetrachlorobiphenyl | 60.1 | ng/kg | JK | U | 22 |
| E1200485 | SL0356 | E1200485-011 | EPA1668A | Coelution of PCB 040, 041, and 071 | 17900 | ng/kg | K | U | 22 |
| E1200485 | SL0358 | E1200485-013 | EPA1668A | 2,2',3,3',4,4',6,6'-Octachlorobiphenyl | 39.3 | ng/kg | JK | U | 22 |
| E1200485 | SL0358 | E1200485-013 | EPA1668A | 2,2',3,4',5,6,6'-Heptachlorobiphenyl | 3.78 | ng/kg | JK | U | 22 |
| E1200485 | SL0358 | E1200485-013 | EPA1668A | 2,2',3,4',5,6'-Hexachlorobiphenyl | 3.46 | ng/kg | JK | U | 22 |
| E1200485 | SL0358 | E1200485-013 | EPA1668A | 2,2',3,4',6,6'-Hexachlorobiphenyl | 19.3 | ng/kg | JK | U | 22 |
| E1200485 | SL0358 | E1200485-013 | EPA1668A | 2,2',6,6'-Tetrachlorobiphenyl | 10.3 | ng/kg | BJK | U | 22 |
| E1200485 | SL0358 | E1200485-013 | EPA1668A | 2,2'-Dichlorobiphenyl | 1870 | ng/kg | K | U | 22 |
| E1200485 | SL0358 | E1200485-013 | EPA1668A | 2,3,3',4,4',5,5',6-Octachlorobiphenyl | 114 | ng/kg | JK | U | 22 |
| E1200485 | SL0358 | E1200485-013 | EPA1668A | 2,3,3',4,4',5',6-Heptachlorobiphenyl | 112 | ng/kg | JK | U | 22 |
| E1200485 | SL0358 | E1200485-013 | EPA1668A | 2,3,3',4',5,5'-Hexachlorobiphenyl | 24.7 | ng/kg | JK | U | 22 |
| E1200485 | SL0358 | E1200485-013 | EPA1668A | 2,3,3',4',5'-Pentachlorobiphenyl | 49.7 | ng/kg | JK | U | 22 |
| E1200485 | SL0358 | E1200485-013 | EPA1668A | 2,3',4,4',5'-Pentachlorobiphenyl | 126 | ng/kg | JK | U | 22 |
| E1200485 | SL0358 | E1200485-013 | EPA1668A | 2,3',6-Trichlorobiphenyl | 54.4 | ng/kg | JK | U | 22 |
| E1200485 | SL0358 | E1200485-013 | EPA1668A | 2,4-Dichlorobiphenyl | 158 | ng/kg | K | U | 22 |
| E1200485 | SL0358 | E1200485-013 | EPA1668A | 2,5-Dichlorobiphenyl | 268 | ng/kg | K | U | 22 |
| E1200485 | SL0358 | E1200485-013 | EPA1668A | 3,3',4,4',5,5'-Hexachlorobiphenyl | 9.52 | ng/kg | JK | U | 22 |
| E1200485 | SL0358 | E1200485-013 | EPA1668A | 3,3',4,4',5-Pentachlorobiphenyl | 13.5 | ng/kg | JK | U | 22 |
| E1200485 | SL0358 | E1200485-013 | EPA1668A | 3,3',4,5'-Tetrachlorobiphenyl | 101 | ng/kg | JK | U | 22 |
| E1200485 | SL0358 | E1200485-013 | EPA1668A | 3,3'-Dichlorobiphenyl | 152 | ng/kg | JK | U | 22 |
| E1200485 | SL0358 | E1200485-013 | EPA1668A | 3,4,4',5-Tetrachlorobiphenyl | 28.5 | ng/kg | JK | U | 22 |
| E1200485 | SL0358 | E1200485-013 | EPA1668A | 4-Chlorobiphenyl | 999 | ng/kg | BK | U | 22 |
| E1200485 | SL0358 | E1200485-013 | EPA1668A | Coelution of PCB 012 and 013 | 368 | ng/kg | K | U | 22 |
| E1200485 | SL0358 | E1200485-013 | EPA1668A | Coelution of PCB 147 and 149 | 5220 | ng/kg | B | J | 14 |
| E1200485 | SL0360 | E1200485-015 | EPA1668A | 2,2',3,3',4,6'-Hexachlorobiphenyl | 5.29 | ng/kg | JK | U | 22 |
| E1200485 | SL0360 | E1200485-015 | EPA1668A | 2,2',3,3',5,6,6'-Heptachlorobiphenyl | 1.58 | ng/kg | JK | U | 22 |
| E1200485 | SL0360 | E1200485-015 | EPA1668A | 2,2',3,4,4',5,5',6-Octachlorobiphenyl | 1.33 | ng/kg | JK | U | 22 |
| E1200485 | SL0360 | E1200485-015 | EPA1668A | 2,2',3,4,4',5',6-Heptachlorobiphenyl | 2.33 | ng/kg | JK | U | 22 |
| E1200485 | SL0360 | E1200485-015 | EPA1668A | 2,2',3,4',5,5',6-Heptachlorobiphenyl | 3.87 | ng/kg | JK | U | 22 |
| E1200485 | SL0360 | E1200485-015 | EPA1668A | 2,2',3,4',5,5'-Hexachlorobiphenyl | 1.77 | ng/kg | JK | U | 22 |
| E1200485 | SL0360 | E1200485-015 | EPA1668A | 2,2',5,5'-Tetrachlorobiphenyl | 10.2 | ng/kg | BJK | U | 22 |
| E1200485 | SL0360 | E1200485-015 | EPA1668A | 2,3,3',4,4',5,6-Heptachlorobiphenyl | 1.02 | ng/kg | JK | U | 22 |
| E1200485 | SL0360 | E1200485-015 | EPA1668A | 2,3,3',4',5',6-Hexachlorobiphenyl | 0.966 | ng/kg | JK | U | 22 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| E1200485 | SL0360 | E1200485-015 | EPA1668A | 2,3,3',4',5-Pentachlorobiphenyl | 0.855 | ng/kg | JK | U | 22 |
| E1200485 | SL0360 | E1200485-015 | EPA1668A | 2,3,3',4'-Tetrachlorobiphenyl | 1.38 | ng/kg | JK | U | 22 |
| E1200485 | SL0360 | E1200485-015 | EPA1668A | 2,4',5-Trichlorobiphenyl | 6.42 | ng/kg | BJ | U | 7 |
| E1200485 | SL0360 | E1200485-015 | EPA1668A | 2,4',6-Trichlorobiphenyl | 1.92 | ng/kg | JK | U | 22 |
| E1200485 | SL0360 | E1200485-015 | EPA1668A | Coelution of PCB 018 and 030 | 4.36 | ng/kg | JK | U | 22 |
| E1200485 | SL0360 | E1200485-015 | EPA1668A | Coelution of PCB 020 and 028 | 11.6 | ng/kg | BJK | U | 22 |
| E1200485 | SL0360 | E1200485-015 | EPA1668A | Coelution of PCB 021 and 033 | 4.38 | ng/kg | JK | U | 22 |
| E1200485 | SL0360 | E1200485-015 | EPA1668A | Coelution of PCB 049 and 069 | 4.33 | ng/kg | JK | U | 22 |
| E1200485 | SL0360 | E1200485-015 | EPA1668A | Coelution of PCB 061, 070, 074, and 076 | 9.31 | ng/kg | BJ | U | 7 |
| E1200485 | SL0360 | E1200485-015 | EPA1668A | Coelution of PCB 083 and 099 | 6.46 | ng/kg | JK | U | 22 |
| E1200485 | SL0360 | E1200485-015 | EPA1668A | Coelution of PCB 085 and 116 | 2.23 | ng/kg | JK | U | 22 |
| E1200485 | SL0360 | E1200485-015 | EPA1668A | Coelution of PCB 128 and 166 | 1.93 | ng/kg | JK | U | 22 |
| E1200485 | SL0360 | E1200485-015 | EPA1668A | Coelution of PCB 147 and 149 | 12.1 | ng/kg | BJ | J | 14 |
| E1200485 | SL0360 | E1200485-015 | EPA1668A | Coelution of PCB 156 and 157 | 2.64 | ng/kg | BJ | U | 7 |
| E1200485 | SL0360 | E1200485-015 | EPA1668A | Coelution of PCB 198 and 199 | 2.69 | ng/kg | JK | U | 22 |
| E1200485 | SL0300 | E1200485-017 | EPA1668A | 2,2',3,4,6,6'-Hexachlorobiphenyl | 0.8 | ng/kg | JK | U | 22 |
| E1200485 | SL0300 | E1200485-017 | EPA1668A | 2,2',3,5,6,6'-Hexachlorobiphenyl | 2.89 | ng/kg | JK | U | 22 |
| E1200485 | SL0300 | E1200485-017 | EPA1668A | 2,2',4,5',6-Pentachlorobiphenyl | 2.84 | ng/kg | JK | U | 22 |
| E1200485 | SL0300 | E1200485-017 | EPA1668A | 2,2',6,6'-Tetrachlorobiphenyl | 1.48 | ng/kg | BJ | U | 7 |
| E1200485 | SL0300 | E1200485-017 | EPA1668A | 2,2'-Dichlorobiphenyl | 94.7 | ng/kg | JK | U | 22 |
| E1200485 | SL0300 | E1200485-017 | EPA1668A | 2,3,3',4-Tetrachlorobiphenyl | 4.54 | ng/kg | JK | U | 22 |
| E1200485 | SL0300 | E1200485-017 | EPA1668A | 2,3,4',5,6-Pentachlorobiphenyl | 134 | ng/kg | JK | U | 22 |
| E1200485 | SL0300 | E1200485-017 | EPA1668A | 2,3',5,5'-Tetrachlorobiphenyl | 2.52 | ng/kg | JK | U | 22 |
| E1200485 | SL0300 | E1200485-017 | EPA1668A | 2,4-Dichlorobiphenyl | 28.4 | ng/kg | JK | U | 22 |
| E1200485 | SL0300 | E1200485-017 | EPA1668A | 3,3',4,4',5,5'-Hexachlorobiphenyl | 13.8 | ng/kg | JK | U | 22 |
| E1200485 | SL0300 | E1200485-017 | EPA1668A | 3,3',4-Trichlorobiphenyl | 13.8 | ng/kg | JK | U | 22 |
| E1200485 | SL0300 | E1200485-017 | EPA1668A | 3,3'-Dichlorobiphenyl | 31.4 | ng/kg | JK | U | 22 |
| E1200485 | SL0300 | E1200485-017 | EPA1668A | Coelution of PCB 147 and 149 | 4450 | ng/kg | B | J | 14 |
| E1200485 | SL0311 | E1200485-018 | EPA1668A | 2,3,3',4,4',5',6-Heptachlorobiphenyl | 15.5 | ng/kg | JK | U | 22 |
| E1200485 | SL0311 | E1200485-018 | EPA1668A | 2,3,4',5,6-Pentachlorobiphenyl | 8.2 | ng/kg | JK | U | 22 |
| E1200485 | SL0311 | E1200485-018 | EPA1668A | 2,3',6-Trichlorobiphenyl | 2.68 | ng/kg | JK | U | 22 |
| E1200485 | SL0311 | E1200485-018 | EPA1668A | 3,3',4,4',5-Pentachlorobiphenyl | 1.93 | ng/kg | JK | U | 22 |
| E1200485 | SL0311 | E1200485-018 | EPA1668A | 3,3',4,5'-Tetrachlorobiphenyl | 2.29 | ng/kg | JK | U | 22 |
| E1200485 | SL0311 | E1200485-018 | EPA1668A | 3,3',4-Trichlorobiphenyl | 1.93 | ng/kg | JK | U | 22 |
| E1200485 | SL0311 | E1200485-018 | EPA1668A | Coelution of PCB 139 and 140 | 8.91 | ng/kg | JK | U | 22 |
| E1200485 | SL0364 | E1200485-019 | EPA1668A | 2,2',3-Trichlorobiphenyl | 5.98 | ng/kg | JK | U | 22 |
| E1200485 | SL0364 | E1200485-019 | EPA1668A | 2,2',4,4',5,6'-Hexachlorobiphenyl | 5.24 | ng/kg | JK | U | 22 |
| E1200485 | SL0364 | E1200485-019 | EPA1668A | 2,2',4,5-Tetrachlorobiphenyl | 2.61 | ng/kg | JK | U | 22 |
| E1200485 | SL0364 | E1200485-019 | EPA1668A | 2,3,3',4'-Tetrachlorobiphenyl | 12.9 | ng/kg | JK | U | 22 |
| E1200485 | SL0364 | E1200485-019 | EPA1668A | 2,3,4,4'-Tetrachlorobiphenyl | 6.04 | ng/kg | JK | U | 22 |
| E1200485 | SL0364 | E1200485-019 | EPA1668A | 2,3',4-Trichlorobiphenyl | 1.64 | ng/kg | JK | U | 22 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| E1200485 | SL0364 | E1200485-019 | EPA1668A | 3-Chlorobiphenyl | 1.48 | ng/kg | JK | U | 22 |
| E1200485 | SL0364 | E1200485-019 | EPA1668A | 4-Chlorobiphenyl | 13.3 | ng/kg | BJK | U | 22 |
| E1200485 | SL0364 | E1200485-019 | EPA1668A | Coelution of PCB 026 and 029 | 3.29 | ng/kg | JK | U | 22 |
| E1200485 | SL0364 | E1200485-019 | EPA1668A | Coelution of PCB 093 and 100 | 5.11 | ng/kg | JK | U | 22 |
| E1200485 | SL0364 | E1200485-019 | EPA1668A | Coelution of PCB 147 and 149 | 652 | ng/kg | BJ | J | 14 |
| E1200485 | SL0365 | E1200485-020 | EPA1668A | 2,2',3,3',4,4',5,5',6,6'-Decachlorobiphenyl | 48.2 | ng/kg | BJK | U | 22 |
| E1200485 | SL0365 | E1200485-020 | EPA1668A | 2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl | 24.7 | ng/kg | JK | U | 22 |
| E1200485 | SL0365 | E1200485-020 | EPA1668A | 2,2',3,3',4,4',5,6'-Octachlorobiphenyl | 19.5 | ng/kg | JK | U | 22 |
| E1200485 | SL0365 | E1200485-020 | EPA1668A | 2,2',3,3',4,5,6,6'-Octachlorobiphenyl | 3.45 | ng/kg | JK | U | 22 |
| E1200485 | SL0365 | E1200485-020 | EPA1668A | 2,2',3,3',5,5',6-Heptachlorobiphenyl | 12.5 | ng/kg | JK | U | 22 |
| E1200485 | SL0365 | E1200485-020 | EPA1668A | 2,2',3,4,4',5-Hexachlorobiphenyl | 11.3 | ng/kg | JK | U | 22 |
| E1200485 | SL0365 | E1200485-020 | EPA1668A | 2,2',3,4,5,5'-Hexachlorobiphenyl | 26.6 | ng/kg | JK | U | 22 |
| E1200485 | SL0365 | E1200485-020 | EPA1668A | 2,2',3,5,5'-Pentachlorobiphenyl | 11.7 | ng/kg | JK | U | 22 |
| E1200485 | SL0365 | E1200485-020 | EPA1668A | 2,3,3',4'-Tetrachlorobiphenyl | 8.46 | ng/kg | JK | U | 22 |
| E1200485 | SL0365 | E1200485-020 | EPA1668A | 2,3',4,4',5,5'-Hexachlorobiphenyl | 6.34 | ng/kg | JK | U | 22 |
| E1200485 | SL0365 | E1200485-020 | EPA1668A | 3,4,4'-Trichlorobiphenyl | 11.5 | ng/kg | BJK | U | 22 |
| E1200485 | SL0365 | E1200485-020 | EPA1668A | Coelution of PCB 018 and 030 | 6.15 | ng/kg | JK | U | 22 |
| E1200485 | SL0365 | E1200485-020 | EPA1668A | Coelution of PCB 020 and 028 | 14.4 | ng/kg | BJK | U | 22 |
| E1200485 | SL0365 | E1200485-020 | EPA1668A | Coelution of PCB 044, 047, and 065 | 19.1 | ng/kg | JK | U | 22 |
| E1200485 | SL0365 | E1200485-020 | EPA1668A | Coelution of PCB 085 and 116 | 5.85 | ng/kg | JK | U | 22 |
| E1200485 | SL0365 | E1200485-020 | EPA1668A | Coelution of PCB 139 and 140 | 3.14 | ng/kg | JK | U | 22 |
| E1200485 | SL0365 | E1200485-020 | EPA1668A | Coelution of PCB 198 and 199 | 42.4 | ng/kg | JK | U | 22 |
| E1200486 | SL0368 | E1200486-002 | EPA1668A | 2,2',3,4,4',5,6-Heptachlorobiphenyl | 5.18 | ng/kg | JK | U | 22 |
| E1200486 | SL0368 | E1200486-002 | EPA1668A | 2,2',3,4',5,6,6'-Heptachlorobiphenyl | 1.86 | ng/kg | JK | U | 22 |
| E1200486 | SL0368 | E1200486-002 | EPA1668A | 2,2',3,4',6,6'-Hexachlorobiphenyl | 5.36 | ng/kg | JK | U | 22 |
| E1200486 | SL0368 | E1200486-002 | EPA1668A | 2,2',4,4',5,6'-Hexachlorobiphenyl | 29.9 | ng/kg | JK | U | 22 |
| E1200486 | SL0368 | E1200486-002 | EPA1668A | 2,3,3',4',5,5'-Hexachlorobiphenyl | 30.9 | ng/kg | JK | U | 22 |
| E1200486 | SL0368 | E1200486-002 | EPA1668A | 2,3,4,4',5-Pentachlorobiphenyl | 21.8 | ng/kg | JK | U | 22 |
| E1200486 | SL0368 | E1200486-002 | EPA1668A | 2,3',4,5',6-Pentachlorobiphenyl | 3.76 | ng/kg | JK | U | 22 |
| E1200486 | SL0368 | E1200486-002 | EPA1668A | 3,3',4,5'-Tetrachlorobiphenyl | 5.76 | ng/kg | JK | U | 22 |
| E1200486 | SL0368 | E1200486-002 | EPA1668A | 3,4,4',5-Tetrachlorobiphenyl | 2.58 | ng/kg | JK | U | 22 |
| E1200486 | SL0368 | E1200486-002 | EPA1668A | Coelution of PCB 108 and 124 | 26.3 | ng/kg | JK | U | 22 |
| E1200486 | SL0369 | E1200486-003 | EPA1668A | 2,2',3,3',5,5'-Hexachlorobiphenyl | 79.6 | ng/kg | JK | U | 22 |
| E1200486 | SL0369 | E1200486-003 | EPA1668A | 2,2',3,4,4',5,6,6'-Octachlorobiphenyl | 4.34 | ng/kg | JK | U | 22 |
| E1200486 | SL0369 | E1200486-003 | EPA1668A | 2,2',3,4,4',5,6-Heptachlorobiphenyl | 10.5 | ng/kg | JK | U | 22 |
| E1200486 | SL0369 | E1200486-003 | EPA1668A | 2,2',3,4,4',6,6'-Heptachlorobiphenyl | 2.97 | ng/kg | JK | U | 22 |
| E1200486 | SL0369 | E1200486-003 | EPA1668A | 2,2',3,4,5',6-Hexachlorobiphenyl | 346 | ng/kg | J | J | 14 |
| E1200486 | SL0369 | E1200486-003 | EPA1668A | 2,2',3,4',6,6'-Hexachlorobiphenyl | 8.06 | ng/kg | JK | U | 22 |
| E1200486 | SL0369 | E1200486-003 | EPA1668A | 2,2',3,4,6,6'-Hexachlorobiphenyl | 1.84 | ng/kg | JK | U | 22 |
| E1200486 | SL0369 | E1200486-003 | EPA1668A | 2,2',3,5,6,6'-Hexachlorobiphenyl | 2.56 | ng/kg | JK | U | 22 |
| E1200486 | SL0369 | E1200486-003 | EPA1668A | 2,2',4,5',6-Pentachlorobiphenyl | 35.9 | ng/kg | JK | U | 22 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| E1200486 | SL0369 | E1200486-003 | EPA1668A | 2,2',6,6'-Tetrachlorobiphenyl | 7.38 | ng/kg | BJK | U | 22 |
| E1200486 | SL0369 | E1200486-003 | EPA1668A | 2,3',4,5'-Tetrachlorobiphenyl | 8.19 | ng/kg | JK | U | 22 |
| E1200486 | SL0369 | E1200486-003 | EPA1668A | 2,3',5'-Trichlorobiphenyl | 6.26 | ng/kg | JK | U | 22 |
| E1200486 | SL0369 | E1200486-003 | EPA1668A | 2,3,5-Trichlorobiphenyl | 8.92 | ng/kg | JK | U | 22 |
| E1200486 | SL0369 | E1200486-003 | EPA1668A | 3,4,5-Trichlorobiphenyl | 5.37 | ng/kg | JK | U | 22 |
| E1200486 | SL0369 | E1200486-003 | EPA1668A | 4-Chlorobiphenyl | 860 | ng/kg | BK | U | 22 |
| E1200486 | SL0369 | E1200486-003 | EPA1668A | Coelution of PCB 043 and 073 | 27.3 | ng/kg | JK | U | 22 |
| E1200486 | SL0369 | E1200486-003 | EPA1668A | Coelution of PCB 108 and 124 | 110 | ng/kg | JK | U | 22 |
| E1200486 | SL0371 | E1200486-005 | EPA1668A | 2,2',3,3',6-Pentachlorobiphenyl | 2.21 | ng/kg | JK | U | 22 |
| E1200486 | SL0371 | E1200486-005 | EPA1668A | 2,2',3,4,5,5'-Hexachlorobiphenyl | 1.69 | ng/kg | JK | U | 22 |
| E1200486 | SL0371 | E1200486-005 | EPA1668A | 2,2',3,5',6-Pentachlorobiphenyl | 7.86 | ng/kg | BJK | U | 22 |
| E1200486 | SL0371 | E1200486-005 | EPA1668A | 2,2',5,5'-Tetrachlorobiphenyl | 5.9 | ng/kg | BJK | U | 22 |
| E1200486 | SL0371 | E1200486-005 | EPA1668A | Coelution of PCB 049 and 069 | 1.47 | ng/kg | JK | U | 22 |
| E1200486 | SL0371 | E1200486-005 | EPA1668A | Coelution of PCB 061, 070, 074, and 076 | 4.29 | ng/kg | BJ | U | 7 |
| E1200486 | SL0371 | E1200486-005 | EPA1668A | Coelution of PCB 083 and 099 | 2.56 | ng/kg | JK | U | 22 |
| E1200486 | SL0371 | E1200486-005 | EPA1668A | Coelution of PCB 086, 087, 097, 109, 119, and 125 | 3.91 | ng/kg | JK | U | 22 |
| E1200486 | SL0371 | E1200486-005 | EPA1668A | Coelution of PCB 129, 138, and 163 | 8.86 | ng/kg | BJK | U | 22 |
| E1200486 | SL0371 | E1200486-005 | EPA1668A | Coelution of PCB 153 and 168 | 5.25 | ng/kg | BJK | U | 22 |
| E1200486 | SL0371 | E1200486-005 | EPA1668A | Coelution of PCB 180 and 193 | 4.57 | ng/kg | JK | U | 22 |
| E1200486 | SL0321 | E1200486-007 | EPA1668A | 2,2',3,6,6'-Pentachlorobiphenyl | 2.07 | ng/kg | JK | U | 22 |
| E1200486 | SL0321 | E1200486-007 | EPA1668A | 2,2',4,4',5,6'-Hexachlorobiphenyl | 3.87 | ng/kg | JK | U | 22 |
| E1200486 | SL0321 | E1200486-007 | EPA1668A | 2,3,3',4,4',5,5'-Heptachlorobiphenyl | 29 | ng/kg | JK | U | 22 |
| E1200486 | SL0321 | E1200486-007 | EPA1668A | 2,3,3',4',5'-Pentachlorobiphenyl | 7.46 | ng/kg | JK | U | 22 |
| E1200486 | SL0321 | E1200486-007 | EPA1668A | 2,3,3',4',5-Pentachlorobiphenyl | 41.7 | ng/kg | JK | U | 22 |
| E1200486 | SL0321 | E1200486-007 | EPA1668A | 2,3,3',4'-Tetrachlorobiphenyl | 203 | ng/kg | J | J | 14 |
| E1200486 | SL0321 | E1200486-007 | EPA1668A | 2,3',4,5'-Tetrachlorobiphenyl | 1.37 | ng/kg | JK | U | 22 |
| E1200486 | SL0321 | E1200486-007 | EPA1668A | 2,3',4,5-Tetrachlorobiphenyl | 9.85 | ng/kg | JK | U | 22 |
| E1200486 | SL0321 | E1200486-007 | EPA1668A | 2,3',5,5'-Tetrachlorobiphenyl | 2.95 | ng/kg | JK | U | 22 |
| E1200486 | SL0321 | E1200486-007 | EPA1668A | 2,4'-Dichlorobiphenyl | 120 | ng/kg | JK | U | 22 |
| E1200486 | SL0321 | E1200486-007 | EPA1668A | 3,3',4,4',5-Pentachlorobiphenyl | 9.02 | ng/kg | JK | U | 22 |
| E1200486 | SL0321 | E1200486-007 | EPA1668A | Coelution of PCB 043 and 073 | 4.7 | ng/kg | JK | U | 22 |
| E1200486 | SL0321 | E1200486-007 | EPA1668A | Coelution of PCB 093 and 100 | 3.22 | ng/kg | JK | U | 22 |
| E1200486 | SL0321 | E1200486-007 | EPA1668A | Coelution of PCB 098 and 102 | 9.83 | ng/kg | JK | U | 22 |
| E1200486 | SL0332 | E1200486-008 | EPA1668A | 2,2',3,4,4',5,6-Heptachlorobiphenyl | 46 | ng/kg | JK | U | 22 |
| E1200486 | SL0332 | E1200486-008 | EPA1668A | 2,2',3,4,6,6'-Hexachlorobiphenyl | 9.72 | ng/kg | JK | U | 22 |
| E1200486 | SL0332 | E1200486-008 | EPA1668A | 2,2',6,6'-Tetrachlorobiphenyl | 5.62 | ng/kg | BJ | U | 7 |
| E1200486 | SL0332 | E1200486-008 | EPA1668A | 2,3,3',4'-Tetrachlorobiphenyl | 975 | ng/kg | | J | 14 |
| E1200486 | SL0332 | E1200486-008 | EPA1668A | 2,5-Dichlorobiphenyl | 38.1 | ng/kg | JK | U | 22 |
| E1200486 | SL0332 | E1200486-008 | EPA1668A | 2,6-Dichlorobiphenyl | 17.7 | ng/kg | JK | U | 22 |
| E1200486 | SL0332 | E1200486-008 | EPA1668A | 3,3',4-Trichlorobiphenyl | 31.5 | ng/kg | JK | U | 22 |
| E1200486 | SL0332 | E1200486-008 | EPA1668A | 3,3'-Dichlorobiphenyl | 45.5 | ng/kg | JK | U | 22 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| E1200486 | SL0332 | E1200486-008 | EPA1668A | 3,4,4',5-Tetrachlorobiphenyl | 6.52 | ng/kg | JK | U | 22 |
| E1200486 | SL0342 | E1200486-019 | EPA1668A | 2,2',3-Trichlorobiphenyl | 6.11 | ng/kg | JK | U | 22 |
| E1200486 | SL0342 | E1200486-019 | EPA1668A | 2,2',4,5-Tetrachlorobiphenyl | 2.75 | ng/kg | JK | U | 22 |
| E1200486 | SL0342 | E1200486-019 | EPA1668A | 2,2',6,6'-Tetrachlorobiphenyl | 2.07 | ng/kg | BJ | U | 7 |
| E1200486 | SL0342 | E1200486-019 | EPA1668A | 2,3,3',4,4',5,5',6-Octachlorobiphenyl | 12.1 | ng/kg | JK | U | 22 |
| E1200486 | SL0342 | E1200486-019 | EPA1668A | 2,3,3',4',5,5'-Hexachlorobiphenyl | 4.02 | ng/kg | JK | U | 22 |
| E1200486 | SL0342 | E1200486-019 | EPA1668A | 2,3,3',4'-Tetrachlorobiphenyl | 13.4 | ng/kg | J | J | 14 |
| E1200486 | SL0342 | E1200486-019 | EPA1668A | 2,3,4',5,6-Pentachlorobiphenyl | 5.05 | ng/kg | JK | U | 22 |
| E1200486 | SL0342 | E1200486-019 | EPA1668A | 2,3',4-Trichlorobiphenyl | 2.34 | ng/kg | JK | U | 22 |
| E1200486 | SL0342 | E1200486-019 | EPA1668A | 2,3',6-Trichlorobiphenyl | 1.65 | ng/kg | JK | U | 22 |
| E1200486 | SL0342 | E1200486-019 | EPA1668A | 2,4',6-Trichlorobiphenyl | 4.94 | ng/kg | JK | U | 22 |
| E1200486 | SL0342 | E1200486-019 | EPA1668A | 2,4'-Dichlorobiphenyl | 14.8 | ng/kg | JK | U | 22 |
| E1200486 | SL0342 | E1200486-019 | EPA1668A | 3,3',4,4',5-Pentachlorobiphenyl | 10.4 | ng/kg | JK | U | 22 |
| E1200486 | SL0342 | E1200486-019 | EPA1668A | 3-Chlorobiphenyl | 1.62 | ng/kg | JK | U | 22 |
| E1200486 | SL0342 | E1200486-019 | EPA1668A | Coelution of PCB 021 and 033 | 6.78 | ng/kg | JK | U | 22 |
| E1200486 | SL0343 | E1200486-020 | EPA1668A | 2,2',3,3',4,4',5,5',6,6'-Decachlorobiphenyl | 11.1 | ng/kg | BJK | U | 22 |
| E1200486 | SL0343 | E1200486-020 | EPA1668A | 2,2',3,3',4,4',5,6'-Octachlorobiphenyl | 4.84 | ng/kg | JK | U | 22 |
| E1200486 | SL0343 | E1200486-020 | EPA1668A | 2,2',3,3',4,5,5'-Heptachlorobiphenyl | 4.73 | ng/kg | JK | U | 22 |
| E1200486 | SL0343 | E1200486-020 | EPA1668A | 2,2',3,3',4,5'-Hexachlorobiphenyl | 3.18 | ng/kg | JK | U | 22 |
| E1200486 | SL0343 | E1200486-020 | EPA1668A | 2,2',3,4,5',6-Hexachlorobiphenyl | 2.11 | ng/kg | JK | U | 22 |
| E1200486 | SL0343 | E1200486-020 | EPA1668A | 2,2',5,5'-Tetrachlorobiphenyl | 5.96 | ng/kg | BJ | U | 7 |
| E1200486 | SL0343 | E1200486-020 | EPA1668A | 2,4',5-Trichlorobiphenyl | 2.57 | ng/kg | BJK | U | 22 |
| E1200486 | SL0343 | E1200486-020 | EPA1668A | Coelution of PCB 044, 047, and 065 | 5.43 | ng/kg | JK | U | 22 |
| E1200486 | SL0343 | E1200486-020 | EPA1668A | Coelution of PCB 061, 070, 074, and 076 | 4.82 | ng/kg | BJ | U | 7 |
| E1200486 | SL0343 | E1200486-020 | EPA1668A | Coelution of PCB 083 and 099 | 8.86 | ng/kg | JK | U | 22 |
| E1200486 | SL0343 | E1200486-020 | EPA1668A | Coelution of PCB 085 and 116 | 1.72 | ng/kg | JK | U | 22 |
| E1200486 | SL0343 | E1200486-020 | EPA1668A | Coelution of PCB 086, 087, 097, 109, 119, and 125 | 5.5 | ng/kg | JK | U | 22 |
| E1200487 | SL0344 | E1200487-001 | EPA1668A | 2,2',3,3',4,5,5',6,6'-Nonachlorobiphenyl | 2.85 | ng/kg | JK | U | 22 |
| E1200487 | SL0344 | E1200487-001 | EPA1668A | 2,2',3,3',4,5,5'-Heptachlorobiphenyl | 9.03 | ng/kg | JK | U | 22 |
| E1200487 | SL0344 | E1200487-001 | EPA1668A | 2,2',3,3',4,5',6,6'-Octachlorobiphenyl | 2.65 | ng/kg | JK | U | 22 |
| E1200487 | SL0344 | E1200487-001 | EPA1668A | 2,2',3,3',4-Pentachlorobiphenyl | 2.2 | ng/kg | JK | U | 22 |
| E1200487 | SL0344 | E1200487-001 | EPA1668A | 2,2',3,3',5,6-Hexachlorobiphenyl | 4.36 | ng/kg | JK | U | 22 |
| E1200487 | SL0344 | E1200487-001 | EPA1668A | 2,2',3,4,4',5,5',6-Octachlorobiphenyl | 18.9 | ng/kg | JK | U | 22 |
| E1200487 | SL0344 | E1200487-001 | EPA1668A | 2,2',5,5'-Tetrachlorobiphenyl | 10.5 | ng/kg | BJ | U | 7 |
| E1200487 | SL0344 | E1200487-001 | EPA1668A | 2,3,3',4,4',5,5',6-Octachlorobiphenyl | 1.89 | ng/kg | JK | U | 22 |
| E1200487 | SL0344 | E1200487-001 | EPA1668A | 2,3,3',4,4',5,5'-Heptachlorobiphenyl | 3.54 | ng/kg | JK | U | 22 |
| E1200487 | SL0344 | E1200487-001 | EPA1668A | 2,3,3',4',5',6-Hexachlorobiphenyl | 9 | ng/kg | JK | U | 22 |
| E1200487 | SL0344 | E1200487-001 | EPA1668A | 2,3',4,4',5,5'-Hexachlorobiphenyl | 7.74 | ng/kg | JK | U | 22 |
| E1200487 | SL0344 | E1200487-001 | EPA1668A | 2,3',4,4'-Tetrachlorobiphenyl | 5.62 | ng/kg | JK | U | 22 |
| E1200487 | SL0344 | E1200487-001 | EPA1668A | 2,4',5-Trichlorobiphenyl | 5.23 | ng/kg | BJ | U | 7 |
| E1200487 | SL0344 | E1200487-001 | EPA1668A | 2,4',6-Trichlorobiphenyl | 2.36 | ng/kg | JK | U | 22 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| E1200487 | SL0344 | E1200487-001 | EPA1668A | 3,4,4'-Trichlorobiphenyl | 2.56 | ng/kg | JK | U | 22 |
| E1200487 | SL0344 | E1200487-001 | EPA1668A | Coelution of PCB 018 and 030 | 3.22 | ng/kg | BJK | U | 22 |
| E1200487 | SL0344 | E1200487-001 | EPA1668A | Coelution of PCB 021 and 033 | 2.68 | ng/kg | JK | U | 22 |
| E1200487 | SL0344 | E1200487-001 | EPA1668A | Coelution of PCB 061, 070, 074, and 076 | 10.7 | ng/kg | BJK | U | 22 |
| E1200487 | SL0344 | E1200487-001 | EPA1668A | Coelution of PCB 085 and 116 | 5.63 | ng/kg | JK | U | 22 |
| E1200487 | SL0344 | E1200487-001 | EPA1668A | Coelution of PCB 088 and 091 | 4.66 | ng/kg | JK | U | 22 |
| E1200487 | SL0352 | E1200487-002 | EPA1668A | 2,2',3,3',5,6-Hexachlorobiphenyl | 110 | ng/kg | JK | U | 22 |
| E1200487 | SL0352 | E1200487-002 | EPA1668A | 2,2',3,4,4',5-Hexachlorobiphenyl | 179 | ng/kg | JK | U | 22 |
| E1200487 | SL0352 | E1200487-002 | EPA1668A | 2,2',3,4'-Tetrachlorobiphenyl | 19.7 | ng/kg | JK | U | 22 |
| E1200487 | SL0352 | E1200487-002 | EPA1668A | 2,3,3',4,5,5'-Hexachlorobiphenyl | 31.2 | ng/kg | JK | U | 22 |
| E1200487 | SL0352 | E1200487-002 | EPA1668A | 2,3',4,4',5'-Pentachlorobiphenyl | 9.88 | ng/kg | JK | U | 22 |
| E1200487 | SL0352 | E1200487-002 | EPA1668A | 2,3',4-Trichlorobiphenyl | 11 | ng/kg | JK | U | 22 |
| E1200487 | SL0352 | E1200487-002 | EPA1668A | 3-Chlorobiphenyl | 8.8 | ng/kg | JK | U | 22 |
| E1200487 | SL0352 | E1200487-002 | EPA1668A | Coelution of PCB 026 and 029 | 19.9 | ng/kg | JK | U | 22 |
| E1200487 | SL0352 | E1200487-002 | EPA1668A | Coelution of PCB 093 and 100 | 10.9 | ng/kg | JK | U | 22 |
| E1200487 | SL0352 | E1200487-002 | EPA1668A | Coelution of PCB 098 and 102 | 13.8 | ng/kg | JK | U | 22 |
| E1200487 | SL0363 | E1200487-003 | EPA1668A | 2,2',3,3',4,4',6,6'-Octachlorobiphenyl | 13.7 | ng/kg | JK | U | 22 |
| E1200487 | SL0363 | E1200487-003 | EPA1668A | 2,2',3,4,4',5-Hexachlorobiphenyl | 108 | ng/kg | JK | U | 22 |
| E1200487 | SL0363 | E1200487-003 | EPA1668A | 2,2',3,4',6,6'-Hexachlorobiphenyl | 3.14 | ng/kg | JK | U | 22 |
| E1200487 | SL0363 | E1200487-003 | EPA1668A | 2,2',4,5-Tetrachlorobiphenyl | 11.6 | ng/kg | JK | U | 22 |
| E1200487 | SL0363 | E1200487-003 | EPA1668A | 2,3,3',4,4',5',6-Heptachlorobiphenyl | 46.4 | ng/kg | JK | U | 22 |
| E1200487 | SL0363 | E1200487-003 | EPA1668A | 2,3,3',4',5-Pentachlorobiphenyl | 34.7 | ng/kg | JK | U | 22 |
| E1200487 | SL0363 | E1200487-003 | EPA1668A | 2,3',4,4',5'-Pentachlorobiphenyl | 6.02 | ng/kg | JK | U | 22 |
| E1200487 | SL0363 | E1200487-003 | EPA1668A | 2,3,4,4',5-Pentachlorobiphenyl | 5.03 | ng/kg | JK | U | 22 |
| E1200487 | SL0363 | E1200487-003 | EPA1668A | 2,3',4,4'-Tetrachlorobiphenyl | 109 | ng/kg | JK | U | 22 |
| E1200487 | SL0363 | E1200487-003 | EPA1668A | 2,3,4'-Trichlorobiphenyl | 33.4 | ng/kg | JK | U | 22 |
| E1200487 | SL0363 | E1200487-003 | EPA1668A | 3,3',4,5'-Tetrachlorobiphenyl | 5.59 | ng/kg | JK | U | 22 |
| E1200487 | SL0363 | E1200487-003 | EPA1668A | Coelution of PCB 085 and 116 | 176 | ng/kg | JK | U | 22 |
| E1200487 | SL0363 | E1200487-003 | EPA1668A | Coelution of PCB 098 and 102 | 23.1 | ng/kg | JK | U | 22 |
| E1200487 | SL0363 | E1200487-003 | EPA1668A | Coelution of PCB 108 and 124 | 6.96 | ng/kg | JK | U | 22 |
| E1200487 | SL0386 | E1200487-004 | EPA1668A | 2,2',3,3',4,4',6,6'-Octachlorobiphenyl | 18.2 | ng/kg | JK | U | 22 |
| E1200487 | SL0386 | E1200487-004 | EPA1668A | 2,2',3,3',4,6-Hexachlorobiphenyl | 20.8 | ng/kg | JK | U | 22 |
| E1200487 | SL0386 | E1200487-004 | EPA1668A | 2,2',3,4,4',5,6'-Heptachlorobiphenyl | 5.01 | ng/kg | JK | U | 22 |
| E1200487 | SL0386 | E1200487-004 | EPA1668A | 2,2',3,4',5,6,6'-Heptachlorobiphenyl | 4.76 | ng/kg | JK | U | 22 |
| E1200487 | SL0386 | E1200487-004 | EPA1668A | 2,2',3,4,5',6-Hexachlorobiphenyl | 56.4 | ng/kg | JK | U | 22 |
| E1200487 | SL0386 | E1200487-004 | EPA1668A | 2,2',3,4',6,6'-Hexachlorobiphenyl | 8.9 | ng/kg | JK | U | 22 |
| E1200487 | SL0386 | E1200487-004 | EPA1668A | 2,2',3,5,6'-Pentachlorobiphenyl | 31.4 | ng/kg | JK | U | 22 |
| E1200487 | SL0386 | E1200487-004 | EPA1668A | 2,3,3',4',5,5'-Hexachlorobiphenyl | 22.2 | ng/kg | JK | U | 22 |
| E1200487 | SL0386 | E1200487-004 | EPA1668A | 2,3,3',4'-Tetrachlorobiphenyl | 151 | ng/kg | J | J | 14 |
| E1200487 | SL0386 | E1200487-004 | EPA1668A | 2,3,3',5,5'-Pentachlorobiphenyl | 4.72 | ng/kg | JK | U | 22 |
| E1200487 | SL0386 | E1200487-004 | EPA1668A | 2,3',4,4',5'-Pentachlorobiphenyl | 22.8 | ng/kg | JK | U | 22 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| E1200487 | SL0386 | E1200487-004 | EPA1668A | 2,3',4,5,5'-Pentachlorobiphenyl | 10.1 | ng/kg | JK | U | 22 |
| E1200487 | SL0386 | E1200487-004 | EPA1668A | 2,3',4,5'-Tetrachlorobiphenyl | 24.9 | ng/kg | JK | U | 22 |
| E1200487 | SL0386 | E1200487-004 | EPA1668A | 2,3',4,5-Tetrachlorobiphenyl | 6.75 | ng/kg | JK | U | 22 |
| E1200487 | SL0386 | E1200487-004 | EPA1668A | 2,3,4',5-Tetrachlorobiphenyl | 13.7 | ng/kg | JK | U | 22 |
| E1200487 | SL0386 | E1200487-004 | EPA1668A | 2,3',5,5'-Tetrachlorobiphenyl | 6.26 | ng/kg | JK | U | 22 |
| E1200487 | SL0386 | E1200487-004 | EPA1668A | 2,3',6-Trichlorobiphenyl | 16 | ng/kg | JK | U | 22 |
| E1200487 | SL0386 | E1200487-004 | EPA1668A | 3,3',4,5'-Tetrachlorobiphenyl | 11.4 | ng/kg | JK | U | 22 |
| E1200487 | SL0386 | E1200487-004 | EPA1668A | Coelution of PCB 043 and 073 | 6.99 | ng/kg | JK | U | 22 |
| E1200487 | SL0386 | E1200487-004 | EPA1668A | Coelution of PCB 139 and 140 | 46.4 | ng/kg | JK | U | 22 |
| E1200487 | SL0386 | E1200487-004 | EPA1668A | Coelution of PCB 147 and 149 | 2050 | ng/kg | B | J | 14 |
| E1200487 | SL0387 | E1200487-005 | EPA1668A | 2,2',3,3',4,6-Hexachlorobiphenyl | 14.2 | ng/kg | JK | U | 22 |
| E1200487 | SL0387 | E1200487-005 | EPA1668A | 2,2',3,3',5,5',6,6'-Octachlorobiphenyl | 124 | ng/kg | JK | U | 22 |
| E1200487 | SL0387 | E1200487-005 | EPA1668A | 2,2',3,4',5,6'-Hexachlorobiphenyl | 7.61 | ng/kg | JK | U | 22 |
| E1200487 | SL0387 | E1200487-005 | EPA1668A | 2,2',3,4',6,6'-Hexachlorobiphenyl | 2.56 | ng/kg | JK | U | 22 |
| E1200487 | SL0387 | E1200487-005 | EPA1668A | 2,2',3,6'-Tetrachlorobiphenyl | 11.7 | ng/kg | JK | U | 22 |
| E1200487 | SL0387 | E1200487-005 | EPA1668A | 2,2',3-Trichlorobiphenyl | 24.3 | ng/kg | JK | U | 22 |
| E1200487 | SL0387 | E1200487-005 | EPA1668A | 2,2',4,5-Tetrachlorobiphenyl | 11.6 | ng/kg | JK | U | 22 |
| E1200487 | SL0387 | E1200487-005 | EPA1668A | 2,3,3',4'-Tetrachlorobiphenyl | 67.3 | ng/kg | J | J | 14 |
| E1200487 | SL0387 | E1200487-005 | EPA1668A | 2,3',4,5,5'-Pentachlorobiphenyl | 4.63 | ng/kg | JK | U | 22 |
| E1200487 | SL0387 | E1200487-005 | EPA1668A | 2,3',4-Trichlorobiphenyl | 11.7 | ng/kg | JK | U | 22 |
| E1200487 | SL0387 | E1200487-005 | EPA1668A | 3,3',4,5'-Tetrachlorobiphenyl | 3.93 | ng/kg | JK | U | 22 |
| E1200487 | SL0387 | E1200487-005 | EPA1668A | 4-Chlorobiphenyl | 46.2 | ng/kg | JK | U | 22 |
| E1200487 | SL0387 | E1200487-005 | EPA1668A | Coelution of PCB 026 and 029 | 19.2 | ng/kg | JK | U | 22 |
| E1200487 | SL0387 | E1200487-005 | EPA1668A | Coelution of PCB 098 and 102 | 10.4 | ng/kg | JK | U | 22 |
| E1200487 | SL0387 | E1200487-005 | EPA1668A | Coelution of PCB 147 and 149 | 1620 | ng/kg | B | J | 14 |
| E1200487 | SL0390 | E1200487-008 | EPA1668A | 2,2',3,3',4,4',6,6'-Octachlorobiphenyl | 1790 | ng/kg | K | U | 22 |
| E1200487 | SL0390 | E1200487-008 | EPA1668A | 2,2',3,4,5',6-Hexachlorobiphenyl | 12200 | ng/kg | | J | 14 |
| E1200487 | SL0390 | E1200487-008 | EPA1668A | 2,2',3,4',6,6'-Hexachlorobiphenyl | 53.6 | ng/kg | JK | U | 22 |
| E1200487 | SL0390 | E1200487-008 | EPA1668A | 2,2',4,4',5,6'-Hexachlorobiphenyl | 435 | ng/kg | JK | U | 22 |
| E1200487 | SL0390 | E1200487-008 | EPA1668A | 2,3',4,5-Tetrachlorobiphenyl | 134 | ng/kg | JK | U | 22 |
| E1200487 | SL0390 | E1200487-008 | EPA1668A | 3,3',4,5'-Tetrachlorobiphenyl | 292 | ng/kg | JK | U | 22 |
| E1200487 | SL0390 | E1200487-008 | EPA1668A | 3,3',4-Trichlorobiphenyl | 154 | ng/kg | JK | U | 22 |
| E1200487 | SL0392 | E1200487-010 | EPA1668A | 2,2',3,4,5',6-Hexachlorobiphenyl | 10200 | ng/kg | | J | 14 |
| E1200487 | SL0392 | E1200487-010 | EPA1668A | 2,2',3,5,6'-Pentachlorobiphenyl | 373 | ng/kg | JK | U | 22 |
| E1200487 | SL0392 | E1200487-010 | EPA1668A | 2,2',4,5',6-Pentachlorobiphenyl | 288 | ng/kg | JK | U | 22 |
| E1200487 | SL0392 | E1200487-010 | EPA1668A | 3,3',5,5'-Tetrachlorobiphenyl | 150 | ng/kg | JK | U | 22 |
| E1200487 | SL0392 | E1200487-010 | EPA1668A | Coelution of PCB 012 and 013 | 1510 | ng/kg | K | U | 22 |
| E1200487 | SL0392 | E1200487-010 | EPA1668A | Coelution of PCB 098 and 102 | 1180 | ng/kg | K | U | 22 |
| E1200487 | SL0394 | E1200487-012 | EPA1668A | 2,3,3',4',5,5'-Hexachlorobiphenyl | 2900 | ng/kg | K | U | 22 |
| E1200487 | SL0394 | E1200487-012 | EPA1668A | 2,3,3',4'-Tetrachlorobiphenyl | 14100 | ng/kg | | J | 14 |
| E1200487 | SL0394 | E1200487-012 | EPA1668A | 2,3,3',4-Tetrachlorobiphenyl | 4100 | ng/kg | | J | 14 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| E1200487 | SL0394 | E1200487-012 | EPA1668A | 2,3',4,4',5,5'-Hexachlorobiphenyl | 11600 | ng/kg | K | U | 22 |
| E1200487 | SL0394 | E1200487-012 | EPA1668A | 3,3',4-Trichlorobiphenyl | 369 | ng/kg | K | U | 22 |
| E1200487 | SL0398 | E1200487-014 | EPA1668A | 2,2',3,4',5,6,6'-Heptachlorobiphenyl | 37.6 | ng/kg | JK | U | 22 |
| E1200487 | SL0398 | E1200487-014 | EPA1668A | 2,2',4,4',6,6'-Hexachlorobiphenyl | 8.36 | ng/kg | JK | U | 22 |
| E1200487 | SL0398 | E1200487-014 | EPA1668A | 2,3-Dichlorobiphenyl | 78.5 | ng/kg | K | U | 22 |
| E1200487 | SL0398 | E1200487-014 | EPA1668A | 3,3',5,5'-Tetrachlorobiphenyl | 3.56 | ng/kg | JK | U | 22 |
| E1200487 | SL0398 | E1200487-014 | EPA1668A | 3,4,4',5-Tetrachlorobiphenyl | 14.3 | ng/kg | JK | U | 22 |
| E1200487 | SL0399 | E1200487-015 | EPA1668A | 2,3,3',4',5'-Pentachlorobiphenyl | 392 | ng/kg | JK | U | 22 |
| E1200487 | SL0399 | E1200487-015 | EPA1668A | 2,3,3',5,5'-Pentachlorobiphenyl | 59.1 | ng/kg | JK | U | 22 |
| E1200487 | SL0399 | E1200487-015 | EPA1668A | 2,3',5'-Trichlorobiphenyl | 13.9 | ng/kg | JK | U | 22 |
| E1200487 | SL0399 | E1200487-015 | EPA1668A | 2,3-Dichlorobiphenyl | 27.2 | ng/kg | JK | U | 22 |
| E1200487 | SL0399 | E1200487-015 | EPA1668A | 2,6-Dichlorobiphenyl | 24.2 | ng/kg | JK | U | 22 |
| E1200487 | SL0399 | E1200487-015 | EPA1668A | 3,3',5,5'-Tetrachlorobiphenyl | 12.7 | ng/kg | JK | U | 22 |
| E1200487 | SL0400 | E1200487-016 | EPA1668A | 2,2',3,4,4',5,6'-Heptachlorobiphenyl | 64.8 | ng/kg | JK | U | 22 |
| E1200487 | SL0400 | E1200487-016 | EPA1668A | 2,3,4',5,6-Pentachlorobiphenyl | 2550 | ng/kg | K | U | 22 |
| E1200487 | SL0400 | E1200487-016 | EPA1668A | 2,6-Dichlorobiphenyl | 39.5 | ng/kg | JK | U | 22 |
| E1200487 | SL0400 | E1200487-016 | EPA1668A | 3,3',4-Trichlorobiphenyl | 31.4 | ng/kg | JK | U | 22 |
| E1200487 | SL0402 | E1200487-018 | EPA1668A | 2,2',3,4,4',5,6'-Heptachlorobiphenyl | 3.47 | ng/kg | JK | U | 22 |
| E1200487 | SL0402 | E1200487-018 | EPA1668A | 2,2',3,4',5,6'-Hexachlorobiphenyl | 2.01 | ng/kg | JK | U | 22 |
| E1200487 | SL0402 | E1200487-018 | EPA1668A | 2,2',3,4',6,6'-Hexachlorobiphenyl | 2.39 | ng/kg | JK | U | 22 |
| E1200487 | SL0402 | E1200487-018 | EPA1668A | 2,2',3,4,6'-Pentachlorobiphenyl | 9.29 | ng/kg | JK | U | 22 |
| E1200487 | SL0402 | E1200487-018 | EPA1668A | 2,2',3,5,6,6'-Hexachlorobiphenyl | 1.6 | ng/kg | JK | U | 22 |
| E1200487 | SL0402 | E1200487-018 | EPA1668A | 2,2',4,5',6-Pentachlorobiphenyl | 8.03 | ng/kg | JK | U | 22 |
| E1200487 | SL0402 | E1200487-018 | EPA1668A | 2,2'-Dichlorobiphenyl | 175 | ng/kg | JK | U | 22 |
| E1200487 | SL0402 | E1200487-018 | EPA1668A | 2,3,3',4',5,5'-Hexachlorobiphenyl | 34.2 | ng/kg | JK | U | 22 |
| E1200487 | SL0402 | E1200487-018 | EPA1668A | 2,3,4',5-Tetrachlorobiphenyl | 5.74 | ng/kg | JK | U | 22 |
| E1200487 | SL0402 | E1200487-018 | EPA1668A | 3,3',4,5'-Tetrachlorobiphenyl | 10 | ng/kg | JK | U | 22 |
| E1200487 | SL0402 | E1200487-018 | EPA1668A | Coelution of PCB 043 and 073 | 3.48 | ng/kg | JK | U | 22 |
| E1200487 | SL0402 | E1200487-018 | EPA1668A | Coelution of PCB 093 and 100 | 11.3 | ng/kg | JK | U | 22 |
| E1200487 | SL0402 | E1200487-018 | EPA1668A | Coelution of PCB 108 and 124 | 49.6 | ng/kg | JK | U | 22 |
| E1200487 | SL0404 | E1200487-020 | EPA1668A | 2,2',3,3',4,4',5,5'-Octachlorobiphenyl | 6.2 | ng/kg | JK | U | 22 |
| E1200487 | SL0404 | E1200487-020 | EPA1668A | 2,2',3,3',4,4',5,6-Octachlorobiphenyl | 2.3 | ng/kg | JK | U | 22 |
| E1200487 | SL0404 | E1200487-020 | EPA1668A | 2,2',3,3',4,5',6'-Heptachlorobiphenyl | 6.34 | ng/kg | JK | U | 22 |
| E1200487 | SL0404 | E1200487-020 | EPA1668A | 2,2',3,3',5,5',6-Heptachlorobiphenyl | 1.36 | ng/kg | JK | U | 22 |
| E1200487 | SL0404 | E1200487-020 | EPA1668A | 2,2',3,3',6,6'-Hexachlorobiphenyl | 3.95 | ng/kg | JK | U | 22 |
| E1200487 | SL0404 | E1200487-020 | EPA1668A | 2,2',3,5',6-Pentachlorobiphenyl | 14.3 | ng/kg | BJ | U | 7 |
| E1200487 | SL0404 | E1200487-020 | EPA1668A | 2,2',4-Trichlorobiphenyl | 2.47 | ng/kg | JK | U | 22 |
| E1200487 | SL0404 | E1200487-020 | EPA1668A | 2,2',5,5'-Tetrachlorobiphenyl | 8.4 | ng/kg | BJ | U | 7 |
| E1200487 | SL0404 | E1200487-020 | EPA1668A | 2,3',4,4'-Tetrachlorobiphenyl | 3.04 | ng/kg | JK | U | 22 |
| E1200487 | SL0404 | E1200487-020 | EPA1668A | 2,4',5-Trichlorobiphenyl | 5.17 | ng/kg | BJK | U | 22 |
| E1200487 | SL0404 | E1200487-020 | EPA1668A | Coelution of PCB 018 and 030 | 3.8 | ng/kg | BJK | U | 22 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| E1200487 | SL0404 | E1200487-020 | EPA1668A | Coelution of PCB 021 and 033 | 2.55 | ng/kg | JK | U | 22 |
| E1200487 | SL0404 | E1200487-020 | EPA1668A | Coelution of PCB 083 and 099 | 6.72 | ng/kg | JK | U | 22 |
| E1200487 | SL0404 | E1200487-020 | EPA1668A | Coelution of PCB 088 and 091 | 1.96 | ng/kg | JK | U | 22 |
| E1200487 | SL0404 | E1200487-020 | EPA1668A | Coelution of PCB 156 and 157 | 4.26 | ng/kg | JK | U | 22 |
| E1200488 | SL0418 | E1200488-010 | EPA1668A | 2,2',3,3',4,4',6,6'-Octachlorobiphenyl | 249 | ng/kg | JK | U | 22 |
| E1200488 | SL0418 | E1200488-010 | EPA1668A | 2,2',4,5',6-Pentachlorobiphenyl | 41.9 | ng/kg | JK | U | 22 |
| E1200488 | SL0418 | E1200488-010 | EPA1668A | 2,2'-Dichlorobiphenyl | 134 | ng/kg | JK | U | 22 |
| E1200488 | SL0418 | E1200488-010 | EPA1668A | 2,5-Dichlorobiphenyl | 28.7 | ng/kg | JK | U | 22 |
| E1200488 | SL0418 | E1200488-010 | EPA1668A | 3,3',4-Trichlorobiphenyl | 24 | ng/kg | JK | U | 22 |
| E1200488 | SL0418 | E1200488-010 | EPA1668A | Coelution of PCB 043 and 073 | 74.8 | ng/kg | JK | U | 22 |
| E1200488 | SL0419 | E1200488-011 | EPA1668A | 2,2',3,4,4',5,6'-Heptachlorobiphenyl | 25 | ng/kg | JK | U | 22 |
| E1200488 | SL0419 | E1200488-011 | EPA1668A | 2,2'-Dichlorobiphenyl | 109 | ng/kg | JK | U | 22 |
| E1200488 | SL0419 | E1200488-011 | EPA1668A | Coelution of PCB 043 and 073 | 89.4 | ng/kg | JK | U | 22 |
| E1200488 | SL0421 | E1200488-013 | EPA1668A | 2,2',3,4,4',5,6'-Heptachlorobiphenyl | 10.1 | ng/kg | JK | U | 22 |
| E1200488 | SL0421 | E1200488-013 | EPA1668A | 2,2',3,4',5,6'-Hexachlorobiphenyl | 4.67 | ng/kg | JK | U | 22 |
| E1200488 | SL0421 | E1200488-013 | EPA1668A | 2,2',3,5,6,6'-Hexachlorobiphenyl | 8.81 | ng/kg | JK | U | 22 |
| E1200488 | SL0421 | E1200488-013 | EPA1668A | 2,3-Dichlorobiphenyl | 31.8 | ng/kg | JK | U | 22 |
| E1200488 | SL0421 | E1200488-013 | EPA1668A | 3,3',4,5'-Tetrachlorobiphenyl | 66.8 | ng/kg | JK | U | 22 |
| E1200488 | SL0421 | E1200488-013 | EPA1668A | Coelution of PCB 093 and 100 | 86.8 | ng/kg | JK | U | 22 |
| E1200488 | SL0423 | E1200488-015 | EPA1668A | 2,2',3,4,5',6-Hexachlorobiphenyl | 2990 | ng/kg | | J | 14 |
| E1200488 | SL0423 | E1200488-015 | EPA1668A | 2,2',3,5,6,6'-Hexachlorobiphenyl | 51.7 | ng/kg | JK | U | 22 |
| E1200488 | SL0423 | E1200488-015 | EPA1668A | 2,3,3',4',5'-Pentachlorobiphenyl | 636 | ng/kg | JK | U | 22 |
| E1200488 | SL0423 | E1200488-015 | EPA1668A | 2,3',4,5'-Tetrachlorobiphenyl | 379 | ng/kg | JK | U | 22 |
| E1200488 | SL0423 | E1200488-015 | EPA1668A | 2,3',5'-Trichlorobiphenyl | 64.3 | ng/kg | JK | U | 22 |
| E1200488 | SL0423 | E1200488-015 | EPA1668A | 3,3',4,5-Tetrachlorobiphenyl | 967 | ng/kg | JK | U | 22 |
| E1200488 | SL0423 | E1200488-015 | EPA1668A | 3,3',4-Trichlorobiphenyl | 148 | ng/kg | JK | U | 22 |
| E1200488 | SL0423 | E1200488-015 | EPA1668A | 3,4,4',5-Tetrachlorobiphenyl | 42.6 | ng/kg | JK | U | 22 |
| E1200488 | SL0423 | E1200488-015 | EPA1668A | 3,4,5-Trichlorobiphenyl | 304 | ng/kg | JK | U | 22 |
| E1200488 | SL0423 | E1200488-015 | EPA1668A | Coelution of PCB 043 and 073 | 140 | ng/kg | JK | U | 22 |
| E1200488 | SL0426 | E1200488-017 | EPA1668A | 2,2',3,3',4,5,6,6'-Octachlorobiphenyl | 22.8 | ng/kg | JK | U | 22 |
| E1200488 | SL0426 | E1200488-017 | EPA1668A | 2,2',3,3',4,5',6-Heptachlorobiphenyl | 9.76 | ng/kg | JK | U | 22 |
| E1200488 | SL0426 | E1200488-017 | EPA1668A | 2,2',3,3',5,5'-Hexachlorobiphenyl | 9.67 | ng/kg | JK | U | 22 |
| E1200488 | SL0426 | E1200488-017 | EPA1668A | 2,2',3,4,6'-Pentachlorobiphenyl | 3.85 | ng/kg | JK | U | 22 |
| E1200488 | SL0426 | E1200488-017 | EPA1668A | 2,2',3,6,6'-Pentachlorobiphenyl | 5.35 | ng/kg | JK | U | 22 |
| E1200488 | SL0426 | E1200488-017 | EPA1668A | 2,2',3-Trichlorobiphenyl | 45.4 | ng/kg | JK | U | 22 |
| E1200488 | SL0426 | E1200488-017 | EPA1668A | 2,2',4,4',5,6'-Hexachlorobiphenyl | 6.31 | ng/kg | JK | U | 22 |
| E1200488 | SL0426 | E1200488-017 | EPA1668A | 2,2',4,5',6-Pentachlorobiphenyl | 6.78 | ng/kg | JK | U | 22 |
| E1200488 | SL0426 | E1200488-017 | EPA1668A | 2,2',6-Trichlorobiphenyl | 14.6 | ng/kg | JK | U | 22 |
| E1200488 | SL0426 | E1200488-017 | EPA1668A | 2,3,3',4,4',5,5',6-Octachlorobiphenyl | 8.35 | ng/kg | JK | U | 22 |
| E1200488 | SL0426 | E1200488-017 | EPA1668A | 2,3,4,4',5-Pentachlorobiphenyl | 11.2 | ng/kg | JK | U | 22 |
| E1200488 | SL0426 | E1200488-017 | EPA1668A | 2,3',4,5,5'-Pentachlorobiphenyl | 2.67 | ng/kg | JK | U | 22 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| E1200488 | SL0426 | E1200488-017 | EPA1668A | 2,3',4,5-Tetrachlorobiphenyl | 9.11 | ng/kg | JK | U | 22 |
| E1200488 | SL0426 | E1200488-017 | EPA1668A | 2,3',6-Trichlorobiphenyl | 7.52 | ng/kg | JK | U | 22 |
| E1200488 | SL0426 | E1200488-017 | EPA1668A | Coelution of PCB 026 and 029 | 37.4 | ng/kg | JK | U | 22 |
| E1200488 | SL0426 | E1200488-017 | EPA1668A | Coelution of PCB 045 and 051 | 35.3 | ng/kg | JK | U | 22 |
| E1200488 | SL0426 | E1200488-017 | EPA1668A | Coelution of PCB 108 and 124 | 16.4 | ng/kg | JK | U | 22 |
| E1200488 | SL0427 | E1200488-018 | EPA1668A | 2,2',3,3',4,5,5'-Heptachlorobiphenyl | 160 | ng/kg | JK | U | 22 |
| E1200488 | SL0427 | E1200488-018 | EPA1668A | 2,2',3,3',4,5',6-Heptachlorobiphenyl | 35.7 | ng/kg | JK | U | 22 |
| E1200488 | SL0427 | E1200488-018 | EPA1668A | 2,2',3,6,6'-Pentachlorobiphenyl | 23 | ng/kg | JK | U | 22 |
| E1200488 | SL0427 | E1200488-018 | EPA1668A | 2,2',3-Trichlorobiphenyl | 106 | ng/kg | JK | U | 22 |
| E1200488 | SL0427 | E1200488-018 | EPA1668A | 2,3,3',4,4',5,5',6-Octachlorobiphenyl | 54 | ng/kg | JK | U | 22 |
| E1200488 | SL0427 | E1200488-018 | EPA1668A | 2,3,3',4,4',5',6-Heptachlorobiphenyl | 30.1 | ng/kg | JK | U | 22 |
| E1200488 | SL0427 | E1200488-018 | EPA1668A | 2,3,3',4,5,5'-Hexachlorobiphenyl | 32.1 | ng/kg | JK | U | 22 |
| E1200488 | SL0427 | E1200488-018 | EPA1668A | 2,3,3',4',5-Pentachlorobiphenyl | 144 | ng/kg | JK | U | 22 |
| E1200488 | SL0427 | E1200488-018 | EPA1668A | 2,3,3',4'-Tetrachlorobiphenyl | 34.2 | ng/kg | JK | U | 22 |
| E1200488 | SL0427 | E1200488-018 | EPA1668A | 2,3',4,4',5'-Pentachlorobiphenyl | 31.9 | ng/kg | JK | U | 22 |
| E1200488 | SL0427 | E1200488-018 | EPA1668A | 2,3,4,4',5-Pentachlorobiphenyl | 32.7 | ng/kg | JK | U | 22 |
| E1200488 | SL0427 | E1200488-018 | EPA1668A | 2,3,4',5,6-Pentachlorobiphenyl | 83.1 | ng/kg | JK | U | 22 |
| E1200488 | SL0427 | E1200488-018 | EPA1668A | 2,3,4',5-Tetrachlorobiphenyl | 15.5 | ng/kg | JK | U | 22 |
| E1200488 | SL0427 | E1200488-018 | EPA1668A | 2,4'-Dichlorobiphenyl | 2160 | ng/kg | K | U | 22 |
| E1200488 | SL0427 | E1200488-018 | EPA1668A | 3,4,4'-Trichlorobiphenyl | 154 | ng/kg | JK | U | 22 |
| E1200488 | SL0427 | E1200488-018 | EPA1668A | 4-Chlorobiphenyl | 400 | ng/kg | K | U | 22 |
| E1200488 | SL0427 | E1200488-018 | EPA1668A | Coelution of PCB 093 and 100 | 36.8 | ng/kg | JK | U | 22 |
| E1200488 | SL0427 | E1200488-018 | EPA1668A | Coelution of PCB 098 and 102 | 54.6 | ng/kg | JK | U | 22 |
| E1200488 | SL0427 | E1200488-018 | EPA1668A | Coelution of PCB 139 and 140 | 35.7 | ng/kg | JK | U | 22 |
| E1200493 | SL0442 | E1200493-010 | EPA1668A | 2,2',3,4,4',5,6'-Heptachlorobiphenyl | 5.28 | ng/kg | JK | U | 22 |
| E1200493 | SL0442 | E1200493-010 | EPA1668A | 2,2',3,5,6,6'-Hexachlorobiphenyl | 3.94 | ng/kg | JK | U | 22 |
| E1200493 | SL0442 | E1200493-010 | EPA1668A | 2,3,3',4,4',5',6-Heptachlorobiphenyl | 26.5 | ng/kg | JK | U | 22 |
| E1200493 | SL0442 | E1200493-010 | EPA1668A | 2,3,3',4',5,5'-Hexachlorobiphenyl | 29.2 | ng/kg | JK | U | 22 |
| E1200493 | SL0442 | E1200493-010 | EPA1668A | 2,3,3',4',5'-Pentachlorobiphenyl | 36 | ng/kg | JK | U | 22 |
| E1200493 | SL0442 | E1200493-010 | EPA1668A | 2,3',5,5'-Tetrachlorobiphenyl | 13.8 | ng/kg | JK | U | 22 |
| E1200493 | SL0442 | E1200493-010 | EPA1668A | 2,3-Dichlorobiphenyl | 23.5 | ng/kg | JK | U | 22 |
| E1200493 | SL0442 | E1200493-010 | EPA1668A | 2,6-Dichlorobiphenyl | 48.1 | ng/kg | JK | U | 22 |
| E1200493 | SL0443 | E1200493-011 | EPA1668A | 2,2',3,4',5,6'-Hexachlorobiphenyl | 3.51 | ng/kg | JK | U | 22 |
| E1200493 | SL0443 | E1200493-011 | EPA1668A | 2,2',3,5,6,6'-Hexachlorobiphenyl | 6.63 | ng/kg | JK | U | 22 |
| E1200493 | SL0443 | E1200493-011 | EPA1668A | 2,3',4,5'-Tetrachlorobiphenyl | 11.4 | ng/kg | JK | U | 22 |
| E1200493 | SL0443 | E1200493-011 | EPA1668A | 2,3',5'-Trichlorobiphenyl | 7.56 | ng/kg | JK | U | 22 |
| E1200493 | SL0443 | E1200493-011 | EPA1668A | 2,6-Dichlorobiphenyl | 58.5 | ng/kg | K | U | 22 |
| E1200493 | SL0443 | E1200493-011 | EPA1668A | 4-Chlorobiphenyl | 300 | ng/kg | K | U | 22 |
| E1200493 | SL0445 | E1200493-013 | EPA1668A | 2,2',3,3',4,5,5'-Heptachlorobiphenyl | 11.4 | ng/kg | JK | U | 22 |
| E1200493 | SL0445 | E1200493-013 | EPA1668A | 2,2',3,3',4,5',6-Heptachlorobiphenyl | 2.45 | ng/kg | JK | U | 22 |
| E1200493 | SL0445 | E1200493-013 | EPA1668A | 2,2',3,3',4,6-Hexachlorobiphenyl | 5.47 | ng/kg | JK | U | 22 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| E1200493 | SL0445 | E1200493-013 | EPA1668A | 2,2',3,3',5,5',6-Heptachlorobiphenyl | 13 | ng/kg | JK | U | 22 |
| E1200493 | SL0445 | E1200493-013 | EPA1668A | 2,2',3,4,6'-Pentachlorobiphenyl | 11.1 | ng/kg | JK | U | 22 |
| E1200493 | SL0445 | E1200493-013 | EPA1668A | 2,2',3,5,6'-Pentachlorobiphenyl | 2.81 | ng/kg | JK | U | 22 |
| E1200493 | SL0445 | E1200493-013 | EPA1668A | 2,3,3',4',5'-Pentachlorobiphenyl | 5.69 | ng/kg | JK | U | 22 |
| E1200493 | SL0445 | E1200493-013 | EPA1668A | 2,3,3',5-Tetrachlorobiphenyl | 3.7 | ng/kg | JK | U | 22 |
| E1200493 | SL0445 | E1200493-013 | EPA1668A | 2,3,4',5,6-Pentachlorobiphenyl | 5.82 | ng/kg | JK | U | 22 |
| E1200493 | SL0445 | E1200493-013 | EPA1668A | 2,3',5,5'-Tetrachlorobiphenyl | 2.25 | ng/kg | JK | U | 22 |
| E1200493 | SL0445 | E1200493-013 | EPA1668A | 3,3',4,5'-Tetrachlorobiphenyl | 2.69 | ng/kg | JK | U | 22 |
| E1200493 | SL0445 | E1200493-013 | EPA1668A | Coelution of PCB 085 and 116 | 77.9 | ng/kg | JK | U | 22 |
| E1200493 | SL0445 | E1200493-013 | EPA1668A | Coelution of PCB 093 and 100 | 5.14 | ng/kg | JK | U | 22 |
| E1200493 | SL0447 | E1200493-015 | EPA1668A | 2,2',3,3',4,5,6'-Heptachlorobiphenyl | 1.39 | ng/kg | JK | U | 22 |
| E1200493 | SL0447 | E1200493-015 | EPA1668A | 2,2',3,3',5,6,6'-Heptachlorobiphenyl | 0.634 | ng/kg | JK | U | 22 |
| E1200493 | SL0447 | E1200493-015 | EPA1668A | 2,2',3,4',5,5'-Hexachlorobiphenyl | 1.12 | ng/kg | JK | U | 22 |
| E1200493 | SL0447 | E1200493-015 | EPA1668A | 2,3,3',4,4',6-Hexachlorobiphenyl | 0.59 | ng/kg | JK | U | 22 |
| E1200493 | SL0447 | E1200493-015 | EPA1668A | 2,3',4,4'-Tetrachlorobiphenyl | 4.73 | ng/kg | JK | U | 22 |
| E1200493 | SL0447 | E1200493-015 | EPA1668A | 2,3,4,4'-Tetrachlorobiphenyl | 1.19 | ng/kg | JK | U | 22 |
| E1200493 | SL0447 | E1200493-015 | EPA1668A | 2,3',6-Trichlorobiphenyl | 0.767 | ng/kg | JK | U | 22 |
| E1200493 | SL0447 | E1200493-015 | EPA1668A | 2,4',6-Trichlorobiphenyl | 2.66 | ng/kg | JK | U | 22 |
| E1200493 | SL0447 | E1200493-015 | EPA1668A | Coelution of PCB 040, 041, and 071 | 2.2 | ng/kg | JK | U | 22 |
| E1200493 | SL0447 | E1200493-015 | EPA1668A | Coelution of PCB 044, 047, and 065 | 7.7 | ng/kg | JK | U | 22 |
| E1200493 | SL0447 | E1200493-015 | EPA1668A | Coelution of PCB 083 and 099 | 3.93 | ng/kg | JK | U | 22 |
| E1200493 | SL0447 | E1200493-015 | EPA1668A | Coelution of PCB 135 and 151 | 2.21 | ng/kg | JK | U | 22 |
| E1200493 | SL0447 | E1200493-015 | EPA1668A | Coelution of PCB 156 and 157 | 1.3 | ng/kg | JK | U | 22 |
| E1200493 | SL0449 | E1200493-017 | EPA1668A | 2,2',3,3',4,5',6-Heptachlorobiphenyl | 2.32 | ng/kg | JK | U | 22 |
| E1200493 | SL0449 | E1200493-017 | EPA1668A | 2,2',3,4,5',6-Hexachlorobiphenyl | 11.1 | ng/kg | JK | U | 22 |
| E1200493 | SL0449 | E1200493-017 | EPA1668A | 2,2',4,4',5,6'-Hexachlorobiphenyl | 1.68 | ng/kg | JK | U | 22 |
| E1200493 | SL0449 | E1200493-017 | EPA1668A | 2,2',4,5',6-Pentachlorobiphenyl | 2.15 | ng/kg | JK | U | 22 |
| E1200493 | SL0449 | E1200493-017 | EPA1668A | 2,3,3',4,4',5,5',6-Octachlorobiphenyl | 2.64 | ng/kg | JK | U | 22 |
| E1200493 | SL0449 | E1200493-017 | EPA1668A | 2,3,3',4,4',5',6-Heptachlorobiphenyl | 1.61 | ng/kg | JK | U | 22 |
| E1200493 | SL0449 | E1200493-017 | EPA1668A | 2,3,4',5,6-Pentachlorobiphenyl | 12.5 | ng/kg | JK | U | 22 |
| E1200493 | SL0449 | E1200493-017 | EPA1668A | 2,3',4,5-Tetrachlorobiphenyl | 8.61 | ng/kg | JK | U | 22 |
| E1200493 | SL0449 | E1200493-017 | EPA1668A | Coelution of PCB 171 and 173 | 18.2 | ng/kg | JK | U | 22 |
| E1200505 | SL0333 | E1200505-001 | EPA1668A | 2,2',3,3',4,5',6-Heptachlorobiphenyl | 125 | ng/kg | BJ | U | 7 |
| E1200505 | SL0333 | E1200505-001 | EPA1668A | 2,2',3,4,4',5,6-Heptachlorobiphenyl | 32.4 | ng/kg | BJ | U | 7 |
| E1200505 | SL0333 | E1200505-001 | EPA1668A | 2,2',3,4,4',5-Hexachlorobiphenyl | 1060 | ng/kg | B | U | 7 |
| E1200505 | SL0333 | E1200505-001 | EPA1668A | 2,2',4,4',5,6'-Hexachlorobiphenyl | 72.8 | ng/kg | BJ | U | 7 |
| E1200505 | SL0333 | E1200505-001 | EPA1668A | 2,2',4,5',6-Pentachlorobiphenyl | 24.9 | ng/kg | JK | U | 22 |
| E1200505 | SL0333 | E1200505-001 | EPA1668A | Coelution of PCB 139 and 140 | 335 | ng/kg | BJ | U | 7 |
| E1200505 | SL0333 | E1200505-001 | EPA1668A | Coelution of PCB 147 and 149 | 10500 | ng/kg | B | J | 14 |
| E1200505 | SL0334 | E1200505-002 | EPA1668A | 2,2',3,3',4,5',6-Heptachlorobiphenyl | 47.4 | ng/kg | BJ | U | 7 |
| E1200505 | SL0334 | E1200505-002 | EPA1668A | 2,2',3,4,4',5,6-Heptachlorobiphenyl | 14.6 | ng/kg | BJ | U | 7 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| E1200505 | SL0334 | E1200505-002 | EPA1668A | 2,2',3,4,4',5-Hexachlorobiphenyl | 459 | ng/kg | BJ | U | 7 |
| E1200505 | SL0334 | E1200505-002 | EPA1668A | 2,2',3,4',6,6'-Hexachlorobiphenyl | 2.74 | ng/kg | JK | U | 22 |
| E1200505 | SL0334 | E1200505-002 | EPA1668A | 2,2',3,5,6'-Pentachlorobiphenyl | 7.4 | ng/kg | JK | U | 22 |
| E1200505 | SL0334 | E1200505-002 | EPA1668A | 2,2',4,5',6-Pentachlorobiphenyl | 4.69 | ng/kg | JK | U | 22 |
| E1200505 | SL0334 | E1200505-002 | EPA1668A | 2,3',4,5-Tetrachlorobiphenyl | 6.3 | ng/kg | JK | U | 22 |
| E1200505 | SL0334 | E1200505-002 | EPA1668A | 3,3',4-Trichlorobiphenyl | 9.78 | ng/kg | JK | U | 22 |
| E1200505 | SL0334 | E1200505-002 | EPA1668A | 3,4,4',5-Tetrachlorobiphenyl | 3.28 | ng/kg | JK | U | 22 |
| E1200505 | SL0334 | E1200505-002 | EPA1668A | Coelution of PCB 043 and 073 | 3.92 | ng/kg | JK | U | 22 |
| E1200505 | SL0334 | E1200505-002 | EPA1668A | Coelution of PCB 108 and 124 | 62.1 | ng/kg | JK | U | 22 |
| E1200505 | SL0334 | E1200505-002 | EPA1668A | Coelution of PCB 139 and 140 | 127 | ng/kg | BJ | U | 7 |
| E1200505 | SL0336 | E1200505-004 | EPA1668A | 2,2',3,4,6'-Pentachlorobiphenyl | 180 | ng/kg | J | J | 14 |
| E1200505 | SL0336 | E1200505-004 | EPA1668A | 2,3,3',4',5,5'-Hexachlorobiphenyl | 200 | ng/kg | JK | U | 22 |
| E1200505 | SL0336 | E1200505-004 | EPA1668A | 2,3,3',4',5'-Pentachlorobiphenyl | 417 | ng/kg | JK | U | 22 |
| E1200505 | SL0336 | E1200505-004 | EPA1668A | 2,3',4,5'-Tetrachlorobiphenyl | 44.5 | ng/kg | JK | U | 22 |
| E1200505 | SL0336 | E1200505-004 | EPA1668A | 2,3',4,5-Tetrachlorobiphenyl | 51.8 | ng/kg | JK | U | 22 |
| E1200505 | SL0336 | E1200505-004 | EPA1668A | Coelution of PCB 012 and 013 | 6630 | ng/kg | K | U | 22 |
| E1200505 | SL0338 | E1200505-006 | EPA1668A | 2,2',3,3',4,4',6,6'-Octachlorobiphenyl | 49.8 | ng/kg | JK | U | 22 |
| E1200505 | SL0338 | E1200505-006 | EPA1668A | 2,2',3,3',4,6-Hexachlorobiphenyl | 160 | ng/kg | JK | U | 22 |
| E1200505 | SL0338 | E1200505-006 | EPA1668A | 2,2',3,4,4',5-Hexachlorobiphenyl | 369 | ng/kg | JK | U | 22 |
| E1200505 | SL0338 | E1200505-006 | EPA1668A | 2,2',3,4,5,5'-Hexachlorobiphenyl | 1920 | ng/kg | K | U | 22 |
| E1200505 | SL0338 | E1200505-006 | EPA1668A | 2,2',3,4,5',6-Hexachlorobiphenyl | 183 | ng/kg | JK | U | 22 |
| E1200505 | SL0338 | E1200505-006 | EPA1668A | 2,2',3,6,6'-Pentachlorobiphenyl | 73.4 | ng/kg | JK | U | 22 |
| E1200505 | SL0338 | E1200505-006 | EPA1668A | 2,2'-Dichlorobiphenyl | 1550 | ng/kg | K | U | 22 |
| E1200505 | SL0338 | E1200505-006 | EPA1668A | 2,3,3',4,4',5,5',6-Octachlorobiphenyl | 157 | ng/kg | JK | U | 22 |
| E1200505 | SL0338 | E1200505-006 | EPA1668A | 2,3,3',4,4',5,5'-Heptachlorobiphenyl | 126 | ng/kg | JK | U | 22 |
| E1200505 | SL0338 | E1200505-006 | EPA1668A | 2,3,3',4,4',5',6-Heptachlorobiphenyl | 105 | ng/kg | JK | U | 22 |
| E1200505 | SL0338 | E1200505-006 | EPA1668A | 2,3',4,4',5'-Pentachlorobiphenyl | 133 | ng/kg | JK | U | 22 |
| E1200505 | SL0338 | E1200505-006 | EPA1668A | 2,3,4',5-Tetrachlorobiphenyl | 52.7 | ng/kg | JK | U | 22 |
| E1200505 | SL0338 | E1200505-006 | EPA1668A | Coelution of PCB 059, 062, and 075 | 207 | ng/kg | JK | U | 22 |
| E1200505 | SL0338 | E1200505-006 | EPA1668A | Coelution of PCB 085 and 116 | 1310 | ng/kg | K | U | 22 |
| E1200505 | SL0339 | E1200505-007 | EPA1668A | 2,2',3,3',4,5,6,6'-Octachlorobiphenyl | 225 | ng/kg | JK | U | 22 |
| E1200505 | SL0339 | E1200505-007 | EPA1668A | 2,2',3,3',4,5',6-Heptachlorobiphenyl | 154 | ng/kg | JK | U | 22 |
| E1200505 | SL0339 | E1200505-007 | EPA1668A | 2,2',3,3',4,5'-Hexachlorobiphenyl | 533 | ng/kg | JK | U | 22 |
| E1200505 | SL0339 | E1200505-007 | EPA1668A | 2,2',3,3',5,5',6,6'-Octachlorobiphenyl | 346 | ng/kg | JK | U | 22 |
| E1200505 | SL0339 | E1200505-007 | EPA1668A | 2,2',3,4,4',5-Hexachlorobiphenyl | 444 | ng/kg | JK | U | 22 |
| E1200505 | SL0339 | E1200505-007 | EPA1668A | 2,2',3,4'-Tetrachlorobiphenyl | 615 | ng/kg | K | U | 22 |
| E1200505 | SL0339 | E1200505-007 | EPA1668A | 2,2',3,5',6-Pentachlorobiphenyl | 8520 | ng/kg | K | U | 22 |
| E1200505 | SL0339 | E1200505-007 | EPA1668A | 2,2',3,6'-Tetrachlorobiphenyl | 112 | ng/kg | JK | U | 22 |
| E1200505 | SL0339 | E1200505-007 | EPA1668A | 2,2',4,4',5,6'-Hexachlorobiphenyl | 79.3 | ng/kg | JK | U | 22 |
| E1200505 | SL0339 | E1200505-007 | EPA1668A | 2,3,3',4,4',5',6-Heptachlorobiphenyl | 113 | ng/kg | JK | U | 22 |
| E1200505 | SL0339 | E1200505-007 | EPA1668A | 2,3,3',4',5-Pentachlorobiphenyl | 702 | ng/kg | JK | U | 22 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| E1200505 | SL0339 | E1200505-007 | EPA1668A | 2,3',4,4'-Tetrachlorobiphenyl | 2290 | ng/kg | K | U | 22 |
| E1200505 | SL0339 | E1200505-007 | EPA1668A | 2,3',4,5,5'-Pentachlorobiphenyl | 65.1 | ng/kg | JK | U | 22 |
| E1200505 | SL0339 | E1200505-007 | EPA1668A | 3,3',4,5'-Tetrachlorobiphenyl | 154 | ng/kg | JK | U | 22 |
| E1200505 | SL0339 | E1200505-007 | EPA1668A | 3-Chlorobiphenyl | 232 | ng/kg | K | U | 22 |
| E1200505 | SL0339 | E1200505-007 | EPA1668A | Coelution of PCB 026 and 029 | 360 | ng/kg | K | U | 22 |
| E1200505 | SL0339 | E1200505-007 | EPA1668A | Coelution of PCB 045 and 051 | 507 | ng/kg | K | U | 22 |
| E1200505 | SL0339 | E1200505-007 | EPA1668A | Coelution of PCB 093 and 100 | 85.1 | ng/kg | JK | U | 22 |
| E1200505 | SL0339 | E1200505-007 | EPA1668A | Coelution of PCB 147 and 149 | 10700 | ng/kg | | J | 14 |
| E1200505 | SL0340 | E1200505-008 | EPA1668A | 2,2',3,3',4,5,5',6,6'-Nonachlorobiphenyl | 93.1 | ng/kg | JK | U | 22 |
| E1200505 | SL0340 | E1200505-008 | EPA1668A | 2,2',3,3',6-Pentachlorobiphenyl | 532 | ng/kg | JK | U | 22 |
| E1200505 | SL0340 | E1200505-008 | EPA1668A | 2,2',3,4,6'-Pentachlorobiphenyl | 14.4 | ng/kg | JK | U | 22 |
| E1200505 | SL0340 | E1200505-008 | EPA1668A | 2,2',4,5',6-Pentachlorobiphenyl | 15.7 | ng/kg | JK | U | 22 |
| E1200505 | SL0340 | E1200505-008 | EPA1668A | 2,3,3',4,4',5,5',6-Octachlorobiphenyl | 21.3 | ng/kg | JK | U | 22 |
| E1200505 | SL0340 | E1200505-008 | EPA1668A | 2,3,3',4,4',5,5'-Heptachlorobiphenyl | 18 | ng/kg | JK | U | 22 |
| E1200505 | SL0340 | E1200505-008 | EPA1668A | 2,3,3',4,4',5',6-Heptachlorobiphenyl | 20.2 | ng/kg | JK | U | 22 |
| E1200505 | SL0340 | E1200505-008 | EPA1668A | 2,3,3',4,5,5'-Hexachlorobiphenyl | 19.7 | ng/kg | JK | U | 22 |
| E1200505 | SL0340 | E1200505-008 | EPA1668A | 2,3',4,5-Tetrachlorobiphenyl | 8.4 | ng/kg | JK | U | 22 |
| E1200505 | SL0340 | E1200505-008 | EPA1668A | 2,3,4',5-Tetrachlorobiphenyl | 13.1 | ng/kg | JK | U | 22 |
| E1200505 | SL0340 | E1200505-008 | EPA1668A | 2,3',6-Trichlorobiphenyl | 16.8 | ng/kg | JK | U | 22 |
| E1200505 | SL0340 | E1200505-008 | EPA1668A | 3,3',4,5'-Tetrachlorobiphenyl | 21.2 | ng/kg | JK | U | 22 |
| E1200505 | SL0340 | E1200505-008 | EPA1668A | 3-Chlorobiphenyl | 32 | ng/kg | K | U | 22 |
| E1200505 | SL0340 | E1200505-008 | EPA1668A | Coelution of PCB 093 and 100 | 13 | ng/kg | JK | U | 22 |
| E1200505 | FW0003 | E1200505-010 | EPA1668A | 2,2',5,5'-Tetrachlorobiphenyl | 10.1 | pg | BJK | U | 22 |
| E1200505 | SL0441 | E1200505-011 | EPA1668A | 2,2',3,4',5,6,6'-Heptachlorobiphenyl | 3.64 | ng/kg | JK | U | 22 |
| E1200505 | SL0441 | E1200505-011 | EPA1668A | 2,2',3,5,6,6'-Hexachlorobiphenyl | 4.64 | ng/kg | JK | U | 22 |
| E1200505 | SL0441 | E1200505-011 | EPA1668A | 2,2',4,4',5,6'-Hexachlorobiphenyl | 26.2 | ng/kg | JK | U | 22 |
| E1200505 | SL0441 | E1200505-011 | EPA1668A | 2,3,4,4',5-Pentachlorobiphenyl | 94.7 | ng/kg | JK | U | 22 |
| E1200505 | SL0441 | E1200505-011 | EPA1668A | 3,3',4-Trichlorobiphenyl | 43.1 | ng/kg | JK | U | 22 |
| E1200505 | SL0417 | E1200505-012 | EPA1668A | 2,2',3,4,4',5,6'-Heptachlorobiphenyl | 10.7 | ng/kg | JK | U | 22 |
| E1200505 | SL0417 | E1200505-012 | EPA1668A | 2,2',3,5,6,6'-Hexachlorobiphenyl | 4.33 | ng/kg | JK | U | 22 |
| E1200505 | SL0417 | E1200505-012 | EPA1668A | 3,3',4,4',5-Pentachlorobiphenyl | 137 | ng/kg | JK | U | 22 |
| E1200505 | SL0385 | E1200505-015 | EPA1668A | 2,2',3,4,4',5,6-Heptachlorobiphenyl | 89.2 | ng/kg | JK | U | 22 |
| E1200505 | SL0385 | E1200505-015 | EPA1668A | 2,2',4,4',5,6'-Hexachlorobiphenyl | 182 | ng/kg | JK | U | 22 |
| E1200505 | SL0385 | E1200505-015 | EPA1668A | 2,2'-Dichlorobiphenyl | 131 | ng/kg | JK | U | 22 |
| E1200505 | SL0385 | E1200505-015 | EPA1668A | 2,3',4,4',5'-Pentachlorobiphenyl | 315 | ng/kg | JK | U | 22 |
| E1200505 | SL0385 | E1200505-015 | EPA1668A | 2,3',4,5-Tetrachlorobiphenyl | 31 | ng/kg | JK | U | 22 |
| E1200505 | SL0385 | E1200505-015 | EPA1668A | 2,3,4',5-Tetrachlorobiphenyl | 92 | ng/kg | JK | U | 22 |
| E1200505 | SL0385 | E1200505-015 | EPA1668A | Coelution of PCB 012 and 013 | 77.2 | ng/kg | JK | U | 22 |
| E1200505 | SL0397 | E1200505-016 | EPA1668A | 2,3,3',4',5,5'-Hexachlorobiphenyl | 101 | ng/kg | JK | U | 22 |
| E1200505 | SL0397 | E1200505-016 | EPA1668A | 2,3,3',5,5'-Pentachlorobiphenyl | 52.5 | ng/kg | JK | U | 22 |
| E1200505 | SL0397 | E1200505-016 | EPA1668A | 2,5-Dichlorobiphenyl | 964 | ng/kg | K | U | 22 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| E1200505 | SL0397 | E1200505-016 | EPA1668A | 3,4,4',5-Tetrachlorobiphenyl | 16.5 | ng/kg | JK | U | 22 |
| E1200505 | SL0397 | E1200505-016 | EPA1668A | 3-Chlorobiphenyl | 45.3 | ng/kg | K | U | 22 |
| E1200505 | SL0397 | E1200505-016 | EPA1668A | Coelution of PCB 147 and 149 | 13400 | ng/kg | | J | 14 |
| E1200505 | FB0002 | E1200505-019 | EPA1668A | Coelution of PCB 018 and 030 | 12.4 | pg | BJK | U | 22 |
| E1200505 | FW0004 | E1200505-020 | EPA1668A | 2,2',3,3',4,4',5,5',6,6'-Decachlorobiphenyl | 8.6 | pg | JK | U | 22 |
| E1200505 | FW0004 | E1200505-020 | EPA1668A | 2,2',5,5'-Tetrachlorobiphenyl | 7.57 | pg | BJK | U | 22 |
| E1200507 | FW0005 | E1200507-001 | EPA1668A | Coelution of PCB 090, 101, and 113 | 7.93 | pg | BJK | U | 22 |
| E1200507 | FW0005 | E1200507-001 | EPA1668A | Coelution of PCB 110 and 115 | 10.9 | pg | BJ | U | 7 |
| E1200507 | FW0006 | E1200507-002 | EPA1668A | 2,2',3,5',6-Pentachlorobiphenyl | 7.24 | pg | BJ | U | 7 |
| E1200507 | FW0006 | E1200507-002 | EPA1668A | 2,2',5,5'-Tetrachlorobiphenyl | 13.1 | pg | BJ | U | 7 |
| E1200507 | FW0006 | E1200507-002 | EPA1668A | Coelution of PCB 044, 047, and 065 | 15.7 | pg | JK | U | 22 |
| E1200507 | FW0006 | E1200507-002 | EPA1668A | Coelution of PCB 061, 070, 074, and 076 | 5.95 | pg | JK | U | 22 |
| E1200507 | FW0006 | E1200507-002 | EPA1668A | Coelution of PCB 110 and 115 | 4.35 | pg | BJK | U | 22 |
| E1200507 | FW0006 | E1200507-002 | EPA1668A | Coelution of PCB 129, 138, and 163 | 8.88 | pg | JK | U | 22 |
| E1200508 | FW0007 | E1200508-003 | EPA1668A | 2,2',5,5'-Tetrachlorobiphenyl | 14.9 | pg | BJK | U | 22 |
| E1200508 | FW0007 | E1200508-003 | EPA1668A | 2,3',4,4'-Tetrachlorobiphenyl | 5.89 | pg | JK | U | 22 |
| E1200508 | FW0007 | E1200508-003 | EPA1668A | 3,3'-Dichlorobiphenyl | 48.7 | pg | BJK | U | 22 |
| E1200508 | FW0007 | E1200508-003 | EPA1668A | Coelution of PCB 021 and 033 | 6.7 | pg | JK | U | 22 |
| E1200508 | FW0008 | E1200508-004 | EPA1668A | 2,2',3,3',4,4',5,5',6,6'-Decachlorobiphenyl | 12.6 | pg | JK | U | 22 |
| E1200508 | FW0008 | E1200508-004 | EPA1668A | 2,2',3,5',6-Pentachlorobiphenyl | 12.3 | pg | BJK | U | 22 |
| E1200508 | FW0008 | E1200508-004 | EPA1668A | 2,2',5,5'-Tetrachlorobiphenyl | 15 | pg | BJ | U | 7 |
| E1200508 | FW0008 | E1200508-004 | EPA1668A | 3,3'-Dichlorobiphenyl | 51.3 | pg | BJK | U | 22 |
| E1200508 | FW0008 | E1200508-004 | EPA1668A | Coelution of PCB 018 and 030 | 8.08 | pg | BJK | U | 22 |
| E1200508 | FW0008 | E1200508-004 | EPA1668A | Coelution of PCB 061, 070, 074, and 076 | 11.8 | pg | JK | U | 22 |
| E1200508 | FW0008 | E1200508-004 | EPA1668A | Coelution of PCB 090, 101, and 113 | 15.5 | pg | BJ | U | 7 |
| E1200508 | FW0008 | E1200508-004 | EPA1668A | Coelution of PCB 110 and 115 | 11.8 | pg | BJK | U | 22 |
| E1200508 | FW0008 | E1200508-004 | EPA1668A | Coelution of PCB 129, 138, and 163 | 19.1 | pg | JK | U | 22 |
| E1200508 | FW0008 | E1200508-004 | EPA1668A | Coelution of PCB 147 and 149 | 11.9 | pg | JK | U | 22 |
| E1200508 | FW0009 | E1200508-005 | EPA1668A | Coelution of PCB 090, 101, and 113 | 12.1 | pg | BJK | U | 22 |
| E1200508 | FW0009 | E1200508-005 | EPA1668A | Coelution of PCB 129, 138, and 163 | 11.1 | pg | JK | U | 22 |
| E1200572 | SL0347 | E1200572-002 | EPA1668A | 2,2',3,4,6'-Pentachlorobiphenyl | 11.7 | ng/kg | JK | U | 22 |
| E1200572 | SL0347 | E1200572-002 | EPA1668A | 2,3,3',4',5-Pentachlorobiphenyl | 46.3 | ng/kg | JK | U | 22 |
| E1200572 | SL0347 | E1200572-002 | EPA1668A | 2,3,3',4'-Tetrachlorobiphenyl | 175 | ng/kg | J | J | 14 |
| E1200572 | SL0347 | E1200572-002 | EPA1668A | 2,3,4,4',5-Pentachlorobiphenyl | 4.98 | ng/kg | JK | U | 22 |
| E1200572 | SL0347 | E1200572-002 | EPA1668A | 2,3',4,5,5'-Pentachlorobiphenyl | 3.67 | ng/kg | JK | U | 22 |
| E1200572 | SL0347 | E1200572-002 | EPA1668A | 2,3',5,5'-Tetrachlorobiphenyl | 2.31 | ng/kg | JK | U | 22 |
| E1200572 | SL0347 | E1200572-002 | EPA1668A | 2,4'-Dichlorobiphenyl | 101 | ng/kg | JK | U | 22 |
| E1200572 | SL0347 | E1200572-002 | EPA1668A | 3,3',4-Trichlorobiphenyl | 4.33 | ng/kg | JK | U | 22 |
| E1200572 | SL0347 | E1200572-002 | EPA1668A | Coelution of PCB 043 and 073 | 3.87 | ng/kg | JK | U | 22 |
| E1200572 | SL0347 | E1200572-002 | EPA1668A | Coelution of PCB 139 and 140 | 22.3 | ng/kg | JK | U | 22 |
| K1204190 | SJMW001 | K1204190-003 | SW8082_3535 | Aroclor 1254 | 0.086 | ug/L | | J | 13 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| K1204190 | SJMW001 | K1204190-003 | SW8082_3535 | Aroclor 1260 | 0.037 | ug/L | | J | 13 |
| K1204339 | SJMW002 | K1204339-001 | SW8082_3535 | Aroclor 1260 | 0.0039 | ug/L | JP | J | 3 |
| K1204339 | SJMW002DUP1 | K1204339-002 | SW8082_3535 | Aroclor 1260 | 0.007 | ug/L | JP | J | 3 |
| K1204190 | SJMW003 | K1204190-001 | SW8270D_3520C | Benzoic acid | 4.3 | ug/L | J | J | 5B |
| K1204190 | SJMW003 | K1204190-001 | SW8270D_3520C | Diethyl phthalate | 0.032 | ug/L | J | U | 7 |
| K1204190 | SJMW003 | K1204190-001 | SW8270D_3520C | Di-n-butyl phthalate | 0.064 | ug/L | J | U | 7 |
| K1204190 | SJMW001 | K1204190-003 | SW8270D_3520C | 2,4-Dinitrophenol | 0.18 | ug/L | U | UJ | 5B |
| K1204190 | SJMW001 | K1204190-003 | SW8270D_3520C | Benzyl n-butyl phthalate | 0.095 | ug/L | J | U | 7 |
| K1204190 | SJMW001 | K1204190-003 | SW8270D_3520C | Diethyl phthalate | 0.047 | ug/L | J | U | 7 |
| K1204190 | SJMW001 | K1204190-003 | SW8270D_3520C | Di-n-butyl phthalate | 0.12 | ug/L | J | U | 7 |
| K1204190 | SJMW001 | K1204190-003 | SW8270D_3520C | Pentachlorophenol | 0.36 | ug/L | U | UJ | 5B |
| K1204339 | SJMW002 | K1204339-001 | SW8270D_3520C | 2,4-Dinitrophenol | 0.18 | ug/L | U | UJ | 5B |
| K1204339 | SJMW002 | K1204339-001 | SW8270D_3520C | Diethyl phthalate | 0.044 | ug/L | J | U | 7 |
| K1204339 | SJMW002 | K1204339-001 | SW8270D_3520C | Di-n-butyl phthalate | 0.054 | ug/L | J | U | 7 |
| K1204339 | SJMW002 | K1204339-001 | SW8270D_3520C | Pentachlorophenol | 0.36 | ug/L | U | UJ | 5B |
| K1204339 | SJMW002DUP1 | K1204339-002 | SW8270D_3520C | 2,4-Dinitrophenol | 0.18 | ug/L | U | UJ | 5B |
| K1204339 | SJMW002DUP1 | K1204339-002 | SW8270D_3520C | Diethyl phthalate | 0.076 | ug/L | J | U | 7 |
| K1204339 | SJMW002DUP1 | K1204339-002 | SW8270D_3520C | Di-n-butyl phthalate | 0.044 | ug/L | J | U | 7 |
| K1204339 | SJMW002DUP1 | K1204339-002 | SW8270D_3520C | Pentachlorophenol | 0.35 | ug/L | U | UJ | 5B |
| K1204339 | ERB_20120505 | K1204339-003 | SW8270D_3520C | 2,4-Dinitrophenol | 0.19 | ug/L | U | UJ | 5B |
| K1204339 | ERB_20120505 | K1204339-003 | SW8270D_3520C | Benzyl n-butyl phthalate | 0.071 | ug/L | J | U | 7 |
| K1204339 | ERB_20120505 | K1204339-003 | SW8270D_3520C | Diethyl phthalate | 0.1 | ug/L | J | U | 7 |
| K1204339 | ERB_20120505 | K1204339-003 | SW8270D_3520C | Di-n-butyl phthalate | 0.12 | ug/L | J | U | 7 |
| K1204339 | ERB_20120505 | K1204339-003 | SW8270D_3520C | Pentachlorophenol | 0.37 | ug/L | U | UJ | 5B |
| K1204226 | SL0301 | K1204226-001 | SW8270D_3541 | Benzo[b]fluoranthene | 300 | ug/kg | DX | J | 14 |
| K1204226 | SL0301 | K1204226-001 | SW8270D_3541 | Benzo[k]fluoranthene | 8 | ug/kg | UX | R | 14 |
| K1204226 | SL0302 | K1204226-002 | SW8270D_3541 | 4-Nitrophenol | 39 | ug/kg | U | R | 8 |
| K1204226 | SL0302 | K1204226-002 | SW8270D_3541 | Bis(2-chloroisopropyl) ether | 14 | ug/kg | U | UJ | 5B |
| K1204226 | SL0302 | K1204226-002 | SW8270D_3541 | Pentachlorophenol | 27 | ug/kg | U | R | 8 |
| K1204226 | SL0303 | K1204226-003 | SW8270D_3541 | 2,4-Dinitrophenol | 29 | ug/kg | U | UJ | 5B |
| K1204226 | SL0303 | K1204226-003 | SW8270D_3541 | 4-Nitrophenol | 7.7 | ug/kg | U | R | 8 |
| K1204226 | SL0303 | K1204226-003 | SW8270D_3541 | Pentachlorophenol | 5.3 | ug/kg | U | R | 8 |
| K1204226 | SL0305 | K1204226-005 | SW8270D_3541 | 2,4,5-Trichlorophenol | 3 | ug/kg | U | R | 13 |
| K1204226 | SL0305 | K1204226-005 | SW8270D_3541 | 2,4,6-Trichlorophenol | 3 | ug/kg | U | R | 13 |
| K1204226 | SL0305 | K1204226-005 | SW8270D_3541 | 2,4-Dichlorophenol | 2.6 | ug/kg | U | R | 13 |
| K1204226 | SL0305 | K1204226-005 | SW8270D_3541 | 2,4-Dimethylphenol | 6.3 | ug/kg | U | R | 13 |
| K1204226 | SL0305 | K1204226-005 | SW8270D_3541 | 2,4-Dinitrophenol | 29 | ug/kg | U | R | 13 |
| K1204226 | SL0305 | K1204226-005 | SW8270D_3541 | 2-Chlorophenol | 3 | ug/kg | U | R | 13 |
| K1204226 | SL0305 | K1204226-005 | SW8270D_3541 | 2-Methylphenol | 4.1 | ug/kg | U | R | 13 |
| K1204226 | SL0305 | K1204226-005 | SW8270D_3541 | 2-Nitrophenol | 4 | ug/kg | U | R | 13 |
| K1204226 | SL0305 | K1204226-005 | SW8270D_3541 | 4,6-Dinitro-2-methylphenol | 27 | ug/kg | U | R | 13 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| K1204226 | SL0305 | K1204226-005 | SW8270D_3541 | 4-Chloro-3-methylphenol | 2.9 | ug/kg | U | R | 13 |
| K1204226 | SL0305 | K1204226-005 | SW8270D_3541 | 4-Methylphenol | 4.5 | ug/kg | U | R | 13 |
| K1204226 | SL0305 | K1204226-005 | SW8270D_3541 | 4-Nitrophenol | 7.7 | ug/kg | U | R | 13 |
| K1204226 | SL0305 | K1204226-005 | SW8270D_3541 | Benzoic acid | 96 | ug/kg | U | R | 13 |
| K1204226 | SL0305 | K1204226-005 | SW8270D_3541 | Benzyl alcohol | 4.9 | ug/kg | U | R | 13 |
| K1204226 | SL0305 | K1204226-005 | SW8270D_3541 | Pentachlorophenol | 5.3 | ug/kg | U | R | 13 |
| K1204226 | SL0305 | K1204226-005 | SW8270D_3541 | Phenol | 3.1 | ug/kg | U | R | 13 |
| K1204226 | SL0307 | K1204226-007 | SW8270D_3541 | 2,4-Dinitrophenol | 29 | ug/kg | U | UJ | 5B |
| K1204226 | SL0307 | K1204226-007 | SW8270D_3541 | Pentachlorophenol | 5.3 | ug/kg | U | UJ | 5B |
| K1204226 | SL0312 | K1204226-011 | SW8270D_3541 | Bis(2-chloroisopropyl) ether | 14 | ug/kg | U | UJ | 5B |
| K1204226 | SL0313 | K1204226-012 | SW8270D_3541 | Bis(2-chloroisopropyl) ether | 14 | ug/kg | U | UJ | 5B |
| K1204226 | SL0319 | K1204226-018 | SW8270D_3541 | Bis(2-chloroisopropyl) ether | 2.8 | ug/kg | U | UJ | 5B |
| K1204226 | SL0322 | K1204226-020 | SW8270D_3541 | Bis(2-chloroisopropyl) ether | 2.8 | ug/kg | U | UJ | 5B |
| K1204226 | SL0323 | K1204226-021 | SW8270D_3541 | Bis(2-chloroisopropyl) ether | 2.8 | ug/kg | U | UJ | 5B |
| K1204226 | SL0326 | K1204226-024 | SW8270D_3541 | Bis(2-chloroisopropyl) ether | 2.8 | ug/kg | U | UJ | 5B |
| K1204226 | SL0328 | K1204226-026 | SW8270D_3541 | Bis(2-chloroisopropyl) ether | 2.8 | ug/kg | U | UJ | 5B |
| K1204226 | SL0330 | K1204226-028 | SW8270D_3541 | Bis(2-chloroisopropyl) ether | 2.8 | ug/kg | U | UJ | 5B |
| K1204325 | SL0343 | K1204325-003 | SW8270D_3541 | 2,4-Dinitrophenol | 29 | ug/kg | U | UJ | 5B |
| K1204325 | SL0343 | K1204325-003 | SW8270D_3541 | Pentachlorophenol | 5.3 | ug/kg | U | UJ | 5B |
| K1204325 | SL0344 | K1204325-004 | SW8270D_3541 | 2,4-Dinitrophenol | 29 | ug/kg | U | UJ | 5B |
| K1204325 | SL0344 | K1204325-004 | SW8270D_3541 | Pentachlorophenol | 5.3 | ug/kg | U | UJ | 5B |
| K1204325 | SL0352 | K1204325-005 | SW8270D_3541 | Bis(2-chloroisopropyl) ether | 14 | ug/kg | U | UJ | 5B |
| K1204325 | SL0386 | K1204325-007 | SW8270D_3541 | 2,4-Dinitrophenol | 29 | ug/kg | U | UJ | 5B |
| K1204325 | SL0386 | K1204325-007 | SW8270D_3541 | Pentachlorophenol | 5.3 | ug/kg | U | UJ | 5B |
| K1204325 | SL0387 | K1204325-008 | SW8270D_3541 | 2,4-Dinitrophenol | 29 | ug/kg | U | UJ | 5B |
| K1204325 | SL0387 | K1204325-008 | SW8270D_3541 | Pentachlorophenol | 5.3 | ug/kg | U | UJ | 5B |
| K1204325 | SL0404 | K1204325-022 | SW8270D_3541 | 2,4-Dinitrophenol | 29 | ug/kg | U | UJ | 5B |
| K1204325 | SL0404 | K1204325-022 | SW8270D_3541 | Pentachlorophenol | 5.3 | ug/kg | U | UJ | 5B |
| K1204342 | SL0345 | K1204342-003 | SW8270D_3541 | 2,4-Dinitrophenol | 29 | ug/kg | U | UJ | 5B |
| K1204342 | SL0345 | K1204342-003 | SW8270D_3541 | Benzoic acid | 96 | ug/kg | U | UJ | 10 |
| K1204342 | SL0345 | K1204342-003 | SW8270D_3541 | Pentachlorophenol | 5.3 | ug/kg | U | UJ | 5B |
| K1204342 | SL0349 | K1204342-005 | SW8270D_3541 | Benzoic acid | 960 | ug/kg | U | UJ | 10 |
| K1204342 | SL0351 | K1204342-007 | SW8270D_3541 | 2,4-Dinitrophenol | 29 | ug/kg | U | UJ | 5B |
| K1204342 | SL0351 | K1204342-007 | SW8270D_3541 | Benzoic acid | 96 | ug/kg | U | UJ | 10 |
| K1204342 | SL0351 | K1204342-007 | SW8270D_3541 | Pentachlorophenol | 5.3 | ug/kg | U | UJ | 5B |
| K1204356 | SL0353 | K1204356-002 | SW8270D_3541 | 2,4-Dinitrophenol | 29 | ug/kg | U | UJ | 5B |
| K1204356 | SL0353 | K1204356-002 | SW8270D_3541 | Benzoic acid | 96 | ug/kg | U | UJ | 10 |
| K1204356 | SL0353 | K1204356-002 | SW8270D_3541 | Pentachlorophenol | 5.3 | ug/kg | U | UJ | 5B |
| K1204356 | SL0354 | K1204356-003 | SW8270D_3541 | 2,4-Dinitrophenol | 29 | ug/kg | U | UJ | 5B |
| K1204356 | SL0354 | K1204356-003 | SW8270D_3541 | Benzoic acid | 96 | ug/kg | U | UJ | 10 |
| K1204356 | SL0354 | K1204356-003 | SW8270D_3541 | Pentachlorophenol | 5.3 | ug/kg | U | UJ | 5B |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| K1204356 | SL0356 | K1204356-006 | SW8270D_3541 | Benzoic acid | 2400 | ug/kg | U | UJ | 10 |
| K1204356 | SL0356 | K1204356-006 | SW8270D_3541 | Bis(2-chloroisopropyl) ether | 70 | ug/kg | U | UJ | 5B |
| K1204356 | SL0358 | K1204356-008 | SW8270D_3541 | Benzoic acid | 2400 | ug/kg | U | UJ | 10 |
| K1204356 | SL0360 | K1204356-010 | SW8270D_3541 | Benzoic acid | 200 | ug/kg | U | UJ | 10 |
| K1204356 | SL0300 | K1204356-012 | SW8270D_3541 | Benzoic acid | 960 | ug/kg | U | UJ | 10 |
| K1204356 | SL0300 | K1204356-012 | SW8270D_3541 | Bis(2-chloroisopropyl) ether | 28 | ug/kg | U | UJ | 5B |
| K1204356 | SL0311 | K1204356-013 | SW8270D_3541 | Benzoic acid | 480 | ug/kg | U | UJ | 10 |
| K1204356 | SL0311 | K1204356-013 | SW8270D_3541 | Bis(2-chloroisopropyl) ether | 14 | ug/kg | U | UJ | 5B |
| K1204356 | SL0363 | K1204356-014 | SW8270D_3541 | Benzoic acid | 480 | ug/kg | U | UJ | 10 |
| K1204356 | SL0363 | K1204356-014 | SW8270D_3541 | Bis(2-chloroisopropyl) ether | 14 | ug/kg | U | UJ | 5B |
| K1204356 | SL0371 | K1204356-015 | SW8270D_3541 | 2,4-Dinitrophenol | 29 | ug/kg | U | UJ | 5B |
| K1204356 | SL0371 | K1204356-015 | SW8270D_3541 | Benzoic acid | 96 | ug/kg | U | UJ | 10 |
| K1204356 | SL0371 | K1204356-015 | SW8270D_3541 | Pentachlorophenol | 5.3 | ug/kg | U | UJ | 5B |
| K1204356 | SL0321 | K1204356-018 | SW8270D_3541 | Benzoic acid | 200 | ug/kg | U | UJ | 10 |
| K1204356 | SL0321 | K1204356-018 | SW8270D_3541 | Bis(2-chloroisopropyl) ether | 5.6 | ug/kg | U | UJ | 5B |
| K1204356 | SL0364 | K1204356-019 | SW8270D_3541 | Benzoic acid | 960 | ug/kg | U | UJ | 10 |
| K1204356 | SL0364 | K1204356-019 | SW8270D_3541 | Bis(2-chloroisopropyl) ether | 28 | ug/kg | U | UJ | 5B |
| K1204356 | SL0365 | K1204356-020 | SW8270D_3541 | 2,4-Dinitrophenol | 29 | ug/kg | U | UJ | 5B |
| K1204356 | SL0365 | K1204356-020 | SW8270D_3541 | Benzoic acid | 96 | ug/kg | U | UJ | 10 |
| K1204356 | SL0365 | K1204356-020 | SW8270D_3541 | Pentachlorophenol | 5.3 | ug/kg | U | UJ | 5B |
| K1204356 | SL0368 | K1204356-022 | SW8270D_3541 | 2,4,5-Trichlorophenol | 6 | ug/kg | U | UJ | 13 |
| K1204356 | SL0368 | K1204356-022 | SW8270D_3541 | 2,4,6-Trichlorophenol | 6 | ug/kg | U | UJ | 13 |
| K1204356 | SL0368 | K1204356-022 | SW8270D_3541 | 2,4-Dichlorophenol | 5.2 | ug/kg | U | UJ | 13 |
| K1204356 | SL0368 | K1204356-022 | SW8270D_3541 | 2,4-Dimethylphenol | 13 | ug/kg | U | UJ | 13 |
| K1204356 | SL0368 | K1204356-022 | SW8270D_3541 | 2,4-Dinitrophenol | 58 | ug/kg | U | UJ | 13 |
| K1204356 | SL0368 | K1204356-022 | SW8270D_3541 | 2-Chlorophenol | 6 | ug/kg | U | UJ | 13 |
| K1204356 | SL0368 | K1204356-022 | SW8270D_3541 | 2-Methylphenol | 8.2 | ug/kg | U | UJ | 13 |
| K1204356 | SL0368 | K1204356-022 | SW8270D_3541 | 2-Nitrophenol | 8 | ug/kg | U | UJ | 13 |
| K1204356 | SL0368 | K1204356-022 | SW8270D_3541 | 4,6-Dinitro-2-methylphenol | 54 | ug/kg | U | UJ | 13 |
| K1204356 | SL0368 | K1204356-022 | SW8270D_3541 | 4-Chloro-3-methylphenol | 5.8 | ug/kg | U | UJ | 13 |
| K1204356 | SL0368 | K1204356-022 | SW8270D_3541 | 4-Methylphenol | 9 | ug/kg | U | UJ | 13 |
| K1204356 | SL0368 | K1204356-022 | SW8270D_3541 | 4-Nitrophenol | 16 | ug/kg | U | UJ | 13 |
| K1204356 | SL0368 | K1204356-022 | SW8270D_3541 | Benzoic acid | 200 | ug/kg | U | UJ | 13 |
| K1204356 | SL0368 | K1204356-022 | SW8270D_3541 | Benzyl alcohol | 9.8 | ug/kg | U | UJ | 13 |
| K1204356 | SL0368 | K1204356-022 | SW8270D_3541 | Pentachlorophenol | 11 | ug/kg | U | UJ | 13 |
| K1204356 | SL0368 | K1204356-022 | SW8270D_3541 | Phenol | 7 | ug/kg | JD | J | 13 |
| K1204356 | SL0369 | K1204356-023 | SW8270D_3541 | Benzoic acid | 2400 | ug/kg | U | UJ | 10 |
| K1204356 | SL0369 | K1204356-023 | SW8270D_3541 | Bis(2-chloroisopropyl) ether | 70 | ug/kg | U | UJ | 5B |
| K1204356 | SL0332 | K1204356-024 | SW8270D_3541 | Benzo[a]pyrene | 290 | ug/kg | D | J | 9 |
| K1204356 | SL0332 | K1204356-024 | SW8270D_3541 | Benzoic acid | 960 | ug/kg | U | UJ | 10 |
| K1204356 | SL0332 | K1204356-024 | SW8270D_3541 | Bis(2-chloroisopropyl) ether | 28 | ug/kg | U | UJ | 5B |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| K1204356 | SL0332 | K1204356-024 | SW8270D_3541 | Pyrene | 440 | ug/kg | D | J | 9 |
| K1204377 | SL0447 | K1204377-036 | SW8270D_3541 | 2,4-Dinitrophenol | 29 | ug/kg | U | UJ | 5B |
| K1204377 | SL0447 | K1204377-036 | SW8270D_3541 | Pentachlorophenol | 5.3 | ug/kg | U | UJ | 5B |
| K1204452 | SL0338 | K1204452-006 | SW8270D_3541 | Acenaphthylene | 170 | ug/kg | JDX | J | 14 |
| K1204192 | SL0311 | K1204192-001 | SW8260_5035 | 1,1,2,2-Tetrachloroethane | 0.15 | ug/kg | U | UJ | 5B |
| K1204192 | SL0311 | K1204192-001 | SW8260_5035 | Bromomethane | 0.22 | ug/kg | U | UJ | 5B |
| K1204192 | SL0311 | K1204192-001 | SW8260_5035 | Methylene Chloride | 5.1 | ug/kg | J | U | 7 |
| K1204192 | SL0311 | K1204192-001 | SW8260_5035 | Naphthalene | 0.27 | ug/kg | J | U | 7 |
| K1204192 | SL0311 | K1204192-001 | SW8260_5035 | Toluene | 1.6 | ug/kg | J | U | 18 |
| K1204192 | SL0321 | K1204192-002 | SW8260_5035 | 1,1,2,2-Tetrachloroethane | 0.13 | ug/kg | U | UJ | 5B,19 |
| K1204192 | SL0321 | K1204192-002 | SW8260_5035 | 1,2,3-Trichlorobenzene | 0.19 | ug/kg | U | UJ | 19 |
| K1204192 | SL0321 | K1204192-002 | SW8260_5035 | 1,2,3-Trichloropropane | 0.45 | ug/kg | U | UJ | 19 |
| K1204192 | SL0321 | K1204192-002 | SW8260_5035 | 1,2,4-Trichlorobenzene | 0.13 | ug/kg | U | UJ | 19 |
| K1204192 | SL0321 | K1204192-002 | SW8260_5035 | 1,2,4-Trimethylbenzene | 0.054 | ug/kg | U | UJ | 19 |
| K1204192 | SL0321 | K1204192-002 | SW8260_5035 | 1,2-Dibromo-3-chloropropane | 0.4 | ug/kg | U | UJ | 19 |
| K1204192 | SL0321 | K1204192-002 | SW8260_5035 | 1,2-Dichlorobenzene | 0.077 | ug/kg | U | UJ | 19 |
| K1204192 | SL0321 | K1204192-002 | SW8260_5035 | 1,3,5-Trimethylbenzene | 0.092 | ug/kg | U | UJ | 19 |
| K1204192 | SL0321 | K1204192-002 | SW8260_5035 | 1,3-Dichlorobenzene | 0.094 | ug/kg | U | UJ | 19 |
| K1204192 | SL0321 | K1204192-002 | SW8260_5035 | 1,4-Dichlorobenzene | 0.086 | ug/kg | U | UJ | 19 |
| K1204192 | SL0321 | K1204192-002 | SW8260_5035 | 2-Chlorotoluene | 0.12 | ug/kg | U | UJ | 19 |
| K1204192 | SL0321 | K1204192-002 | SW8260_5035 | 4-Chlorotoluene | 0.088 | ug/kg | U | UJ | 19 |
| K1204192 | SL0321 | K1204192-002 | SW8260_5035 | 4-Isopropyl toluene | 0.064 | ug/kg | U | UJ | 19 |
| K1204192 | SL0321 | K1204192-002 | SW8260_5035 | Bromobenzene | 0.088 | ug/kg | U | UJ | 19 |
| K1204192 | SL0321 | K1204192-002 | SW8260_5035 | Bromomethane | 0.42 | ug/kg | J | J | 5B |
| K1204192 | SL0321 | K1204192-002 | SW8260_5035 | Hexachlorobutadiene | 0.4 | ug/kg | U | UJ | 19 |
| K1204192 | SL0321 | K1204192-002 | SW8260_5035 | Methylene Chloride | 4.7 | ug/kg | J | U | 7 |
| K1204192 | SL0321 | K1204192-002 | SW8260_5035 | Naphthalene | 0.2 | ug/kg | J | UJ | 7,19 |
| K1204192 | SL0321 | K1204192-002 | SW8260_5035 | n-Butylbenzene | 0.069 | ug/kg | U | UJ | 19 |
| K1204192 | SL0321 | K1204192-002 | SW8260_5035 | n-Propylbenzene | 0.13 | ug/kg | U | UJ | 19 |
| K1204192 | SL0321 | K1204192-002 | SW8260_5035 | sec-Butylbenzene | 0.074 | ug/kg | U | UJ | 19 |
| K1204192 | SL0321 | K1204192-002 | SW8260_5035 | tert-Butylbenzene | 0.14 | ug/kg | U | UJ | 19 |
| K1204192 | SL0321 | K1204192-002 | SW8260_5035 | Toluene | 1.5 | ug/kg | J | U | 18 |
| K1204192 | Trip Blank-1 47450 | K1204192-003 | SW8260_5035 | Methylene Chloride | 0.14 | ug/L | J | U | 7 |
| K1204192 | Trip Blank-1 47450 | K1204192-003 | SW8260_5035 | Naphthalene | 0.088 | ug/L | U | UJ | 5B |
| K1204190 | SJMW003 | K1204190-001 | SW8260C_5030 | Acetone | 3.8 | ug/L | J | J | 10 |
| K1204190 | SJMW003 | K1204190-001 | SW8260C_5030 | Naphthalene | 0.088 | ug/L | U | UJ | 5B |
| K1204190 | SJMW003 | K1204190-001 | SW8260C_5030 | Toluene | 0.2 | ug/L | J | U | 18 |
| K1204190 | TB_20120503 | K1204190-002 | SW8260C_5030 | Methylene Chloride | 0.14 | ug/L | J | U | 7 |
| K1204190 | TB_20120503 | K1204190-002 | SW8260C_5030 | Naphthalene | 0.088 | ug/L | U | UJ | 5B |
| K1204190 | SJMW001 | K1204190-003 | SW8260C_5030 | 1,2,4-Trichlorobenzene | 0.1 | ug/L | J | U | 7 |
| K1204190 | SJMW001 | K1204190-003 | SW8260C_5030 | Acetone | 17 | ug/L | J | J | 10 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| K1204190 | SJMW001 | K1204190-003 | SW8260C_5030 | Methylene Chloride | 0.21 | ug/L | J | U | 7 |
| K1204190 | SJMW001 | K1204190-003 | SW8260C_5030 | Naphthalene | 0.24 | ug/L | J | UJ | 5B,7 |
| K1204190 | SJMW001 | K1204190-003 | SW8260C_5030 | Toluene | 0.87 | ug/L | | U | 18 |
| K1204339 | SJMW002 | K1204339-001 | SW8260C_5030 | Acetone | 7.7 | ug/L | J | U | 6 |
| K1204339 | SJMW002 | K1204339-001 | SW8260C_5030 | m,p-Xylene | 0.36 | ug/L | J | U | 6 |
| K1204339 | SJMW002 | K1204339-001 | SW8260C_5030 | Toluene | 0.31 | ug/L | J | U | 18 |
| K1204339 | SJMW002DUP1 | K1204339-002 | SW8260C_5030 | Acetone | 8 | ug/L | J | U | 6 |
| K1204339 | SJMW002DUP1 | K1204339-002 | SW8260C_5030 | m,p-Xylene | 0.33 | ug/L | J | U | 6 |
| K1204339 | SJMW002DUP1 | K1204339-002 | SW8260C_5030 | Toluene | 0.34 | ug/L | J | U | 18 |
| K1204339 | ERB_20120505 | K1204339-003 | SW8260C_5030 | Acetone | 5.4 | ug/L | J | J | 5B,10 |
| K1204339 | ERB_20120505 | K1204339-003 | SW8260C_5030 | Methylene Chloride | 1.7 | ug/L | J | U | 7 |
| K1204339 | ERB_20120505 | K1204339-003 | SW8260C_5030 | Toluene | 1.3 | ug/L | | U | 18 |
| K1204339 | TB_20120505 | K1204339-004 | SW8260C_5030 | Methylene Chloride | 0.12 | ug/L | J | U | 7 |
| K1204339 | TB_20120505 | K1204339-004 | SW8260C_5030 | Toluene | 0.67 | ug/L | | U | 18 |
| K1204226 | SL0301 | K1204226-001 | SW8260C_5035 | 1,1,2,2-Tetrachloroethane | 0.2 | ug/kg | U | UJ | 5B |
| K1204226 | SL0301 | K1204226-001 | SW8260C_5035 | Bromomethane | 0.3 | ug/kg | U | UJ | 5B |
| K1204226 | SL0301 | K1204226-001 | SW8260C_5035 | Methylene Chloride | 4.4 | ug/kg | J | U | 7 |
| K1204226 | SL0302 | K1204226-002 | SW8260C_5035 | Acetone | 51 | ug/kg | | U | 7 |
| K1204226 | SL0302 | K1204226-002 | SW8260C_5035 | Bromomethane | 0.34 | ug/kg | U | UJ | 5B |
| K1204226 | SL0302 | K1204226-002 | SW8260C_5035 | Methylene Chloride | 6.1 | ug/kg | J | U | 7 |
| K1204226 | SL0303 | K1204226-003 | SW8260C_5035 | Bromomethane | 0.4 | ug/kg | U | UJ | 5B |
| K1204226 | SL0303 | K1204226-003 | SW8260C_5035 | Methylene Chloride | 7.5 | ug/kg | J | U | 7 |
| K1204226 | SL0305 | K1204226-005 | SW8260C_5035 | Bromomethane | 0.57 | ug/kg | U | UJ | 5B |
| K1204226 | SL0305 | K1204226-005 | SW8260C_5035 | Methylene Chloride | 11 | ug/kg | J | U | 7 |
| K1204226 | SL0307 | K1204226-007 | SW8260C_5035 | Bromomethane | 0.33 | ug/kg | U | UJ | 5B |
| K1204226 | SL0307 | K1204226-007 | SW8260C_5035 | Methylene Chloride | 5.7 | ug/kg | J | U | 7 |
| K1204226 | SL0309 | K1204226-009 | SW8260C_5035 | Bromomethane | 0.25 | ug/kg | U | UJ | 5B |
| K1204226 | SL0309 | K1204226-009 | SW8260C_5035 | Methylene Chloride | 4.9 | ug/kg | J | U | 7 |
| K1204226 | SL0312 | K1204226-011 | SW8260C_5035 | 1,1,2,2-Tetrachloroethane | 0.14 | ug/kg | U | UJ | 5B,19 |
| K1204226 | SL0312 | K1204226-011 | SW8260C_5035 | 1,2,3-Trichlorobenzene | 0.2 | ug/kg | U | UJ | 19 |
| K1204226 | SL0312 | K1204226-011 | SW8260C_5035 | 1,2,3-Trichloropropane | 0.47 | ug/kg | U | UJ | 19 |
| K1204226 | SL0312 | K1204226-011 | SW8260C_5035 | 1,2,4-Trichlorobenzene | 0.14 | ug/kg | U | UJ | 19 |
| K1204226 | SL0312 | K1204226-011 | SW8260C_5035 | 1,2,4-Trimethylbenzene | 0.11 | ug/kg | J | J | 19 |
| K1204226 | SL0312 | K1204226-011 | SW8260C_5035 | 1,2-Dibromo-3-chloropropane | 0.42 | ug/kg | U | UJ | 19 |
| K1204226 | SL0312 | K1204226-011 | SW8260C_5035 | 1,2-Dichlorobenzene | 0.08 | ug/kg | U | UJ | 19 |
| K1204226 | SL0312 | K1204226-011 | SW8260C_5035 | 1,3,5-Trimethylbenzene | 0.095 | ug/kg | U | UJ | 19 |
| K1204226 | SL0312 | K1204226-011 | SW8260C_5035 | 1,3-Dichlorobenzene | 0.097 | ug/kg | U | UJ | 19 |
| K1204226 | SL0312 | K1204226-011 | SW8260C_5035 | 1,4-Dichlorobenzene | 0.089 | ug/kg | U | UJ | 19 |
| K1204226 | SL0312 | K1204226-011 | SW8260C_5035 | 2-Chlorotoluene | 0.13 | ug/kg | U | UJ | 19 |
| K1204226 | SL0312 | K1204226-011 | SW8260C_5035 | 4-Chlorotoluene | 0.091 | ug/kg | U | UJ | 19 |
| K1204226 | SL0312 | K1204226-011 | SW8260C_5035 | 4-Isopropyl toluene | 0.73 | ug/kg | J | J | 19 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| K1204226 | SL0312 | K1204226-011 | SW8260C_5035 | Bromobenzene | 0.091 | ug/kg | U | UJ | 19 |
| K1204226 | SL0312 | K1204226-011 | SW8260C_5035 | Bromomethane | 0.21 | ug/kg | U | UJ | 5B |
| K1204226 | SL0312 | K1204226-011 | SW8260C_5035 | Hexachlorobutadiene | 0.42 | ug/kg | U | UJ | 19 |
| K1204226 | SL0312 | K1204226-011 | SW8260C_5035 | Methylene Chloride | 3.7 | ug/kg | J | U | 7 |
| K1204226 | SL0312 | K1204226-011 | SW8260C_5035 | Naphthalene | 0.31 | ug/kg | J | UJ | 7,19 |
| K1204226 | SL0312 | K1204226-011 | SW8260C_5035 | n-Butylbenzene | 0.072 | ug/kg | U | UJ | 19 |
| K1204226 | SL0312 | K1204226-011 | SW8260C_5035 | n-Propylbenzene | 0.14 | ug/kg | U | UJ | 19 |
| K1204226 | SL0312 | K1204226-011 | SW8260C_5035 | sec-Butylbenzene | 0.077 | ug/kg | U | UJ | 19 |
| K1204226 | SL0312 | K1204226-011 | SW8260C_5035 | tert-Butylbenzene | 0.15 | ug/kg | U | UJ | 19 |
| K1204226 | SL0313 | K1204226-012 | SW8260C_5035 | 1,1,1,2-Tetrachloroethane | 0.11 | ug/kg | U | UJ | 19 |
| K1204226 | SL0313 | K1204226-012 | SW8260C_5035 | 1,1,1-Trichloroethane | 0.11 | ug/kg | U | UJ | 19 |
| K1204226 | SL0313 | K1204226-012 | SW8260C_5035 | 1,1,2,2-Tetrachloroethane | 0.13 | ug/kg | U | UJ | 19 |
| K1204226 | SL0313 | K1204226-012 | SW8260C_5035 | 1,1,2-Trichloroethane | 0.15 | ug/kg | U | UJ | 19 |
| K1204226 | SL0313 | K1204226-012 | SW8260C_5035 | 1,1-Dichloroethane | 0.12 | ug/kg | U | UJ | 19 |
| K1204226 | SL0313 | K1204226-012 | SW8260C_5035 | 1,1-Dichloroethene | 0.25 | ug/kg | U | UJ | 19 |
| K1204226 | SL0313 | K1204226-012 | SW8260C_5035 | 1,1-Dichloropropene | 0.13 | ug/kg | U | UJ | 19 |
| K1204226 | SL0313 | K1204226-012 | SW8260C_5035 | 1,2,3-Trichlorobenzene | 0.19 | ug/kg | U | UJ | 19 |
| K1204226 | SL0313 | K1204226-012 | SW8260C_5035 | 1,2,3-Trichloropropane | 0.45 | ug/kg | U | UJ | 19 |
| K1204226 | SL0313 | K1204226-012 | SW8260C_5035 | 1,2,4-Trichlorobenzene | 0.13 | ug/kg | U | UJ | 19 |
| K1204226 | SL0313 | K1204226-012 | SW8260C_5035 | 1,2,4-Trimethylbenzene | 0.24 | ug/kg | J | J | 19 |
| K1204226 | SL0313 | K1204226-012 | SW8260C_5035 | 1,2-Dibromo-3-chloropropane | 0.4 | ug/kg | U | UJ | 19 |
| K1204226 | SL0313 | K1204226-012 | SW8260C_5035 | 1,2-Dibromoethane | 0.094 | ug/kg | U | UJ | 19 |
| K1204226 | SL0313 | K1204226-012 | SW8260C_5035 | 1,2-Dichlorobenzene | 0.077 | ug/kg | U | UJ | 19 |
| K1204226 | SL0313 | K1204226-012 | SW8260C_5035 | 1,2-Dichloroethane | 0.07 | ug/kg | U | UJ | 19 |
| K1204226 | SL0313 | K1204226-012 | SW8260C_5035 | 1,2-Dichloropropane | 0.13 | ug/kg | U | UJ | 19 |
| K1204226 | SL0313 | K1204226-012 | SW8260C_5035 | 1,3,5-Trimethylbenzene | 0.092 | ug/kg | U | UJ | 19 |
| K1204226 | SL0313 | K1204226-012 | SW8260C_5035 | 1,3-Dichlorobenzene | 0.094 | ug/kg | U | UJ | 19 |
| K1204226 | SL0313 | K1204226-012 | SW8260C_5035 | 1,3-Dichloropropane | 0.12 | ug/kg | U | UJ | 19 |
| K1204226 | SL0313 | K1204226-012 | SW8260C_5035 | 1,4-Dichlorobenzene | 0.086 | ug/kg | U | UJ | 19 |
| K1204226 | SL0313 | K1204226-012 | SW8260C_5035 | 2,2-Dichloropropane | 0.098 | ug/kg | U | UJ | 19 |
| K1204226 | SL0313 | K1204226-012 | SW8260C_5035 | 2-Butanone | 7.5 | ug/kg | J | J | 19 |
| K1204226 | SL0313 | K1204226-012 | SW8260C_5035 | 2-Chlorotoluene | 0.12 | ug/kg | U | UJ | 19 |
| K1204226 | SL0313 | K1204226-012 | SW8260C_5035 | 2-Hexanone | 0.93 | ug/kg | U | UJ | 19 |
| K1204226 | SL0313 | K1204226-012 | SW8260C_5035 | 4-Chlorotoluene | 0.088 | ug/kg | U | UJ | 19 |
| K1204226 | SL0313 | K1204226-012 | SW8260C_5035 | 4-Isopropyl toluene | 0.064 | ug/kg | U | UJ | 19 |
| K1204226 | SL0313 | K1204226-012 | SW8260C_5035 | 4-Methyl-2-pentanone | 1.8 | ug/kg | U | UJ | 19 |
| K1204226 | SL0313 | K1204226-012 | SW8260C_5035 | Acetone | 53 | ug/kg | | UJ | 7,19 |
| K1204226 | SL0313 | K1204226-012 | SW8260C_5035 | Benzene | 3.4 | ug/kg | J | J | 19 |
| K1204226 | SL0313 | K1204226-012 | SW8260C_5035 | Bromobenzene | 0.088 | ug/kg | U | UJ | 19 |
| K1204226 | SL0313 | K1204226-012 | SW8260C_5035 | Bromochloromethane | 0.24 | ug/kg | U | UJ | 19 |
| K1204226 | SL0313 | K1204226-012 | SW8260C_5035 | Bromodichloromethane | 0.16 | ug/kg | U | UJ | 19 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| K1204226 | SL0313 | K1204226-012 | SW8260C_5035 | Bromoform | 0.14 | ug/kg | U | UJ | 19 |
| K1204226 | SL0313 | K1204226-012 | SW8260C_5035 | Bromomethane | 0.2 | ug/kg | U | UJ | 5B,19 |
| K1204226 | SL0313 | K1204226-012 | SW8260C_5035 | Carbon disulfide | 1.1 | ug/kg | J | J | 19 |
| K1204226 | SL0313 | K1204226-012 | SW8260C_5035 | Carbon Tetrachloride | 0.094 | ug/kg | U | UJ | 19 |
| K1204226 | SL0313 | K1204226-012 | SW8260C_5035 | Chlorobenzene | 0.065 | ug/kg | U | UJ | 19 |
| K1204226 | SL0313 | K1204226-012 | SW8260C_5035 | Chloroethane | 0.74 | ug/kg | U | UJ | 19 |
| K1204226 | SL0313 | K1204226-012 | SW8260C_5035 | Chloroform | 0.11 | ug/kg | U | UJ | 19 |
| K1204226 | SL0313 | K1204226-012 | SW8260C_5035 | Chloromethane | 0.18 | ug/kg | U | UJ | 19 |
| K1204226 | SL0313 | K1204226-012 | SW8260C_5035 | cis-1,2-Dichloroethene | 0.12 | ug/kg | U | UJ | 19 |
| K1204226 | SL0313 | K1204226-012 | SW8260C_5035 | cis-1,3-Dichloropropene | 0.13 | ug/kg | U | UJ | 19 |
| K1204226 | SL0313 | K1204226-012 | SW8260C_5035 | Dibromochloromethane | 0.18 | ug/kg | U | UJ | 19 |
| K1204226 | SL0313 | K1204226-012 | SW8260C_5035 | Dibromomethane | 0.28 | ug/kg | U | UJ | 19 |
| K1204226 | SL0313 | K1204226-012 | SW8260C_5035 | Dichlorodifluoromethane | 0.12 | ug/kg | U | UJ | 19 |
| K1204226 | SL0313 | K1204226-012 | SW8260C_5035 | Ethylbenzene | 1.6 | ug/kg | J | J | 19 |
| K1204226 | SL0313 | K1204226-012 | SW8260C_5035 | Hexachlorobutadiene | 0.4 | ug/kg | U | UJ | 19 |
| K1204226 | SL0313 | K1204226-012 | SW8260C_5035 | Isopropylbenzene | 0.081 | ug/kg | U | UJ | 19 |
| K1204226 | SL0313 | K1204226-012 | SW8260C_5035 | m,p-Xylene | 1.1 | ug/kg | J | J | 19 |
| K1204226 | SL0313 | K1204226-012 | SW8260C_5035 | Methylene Chloride | 8.2 | ug/kg | J | UJ | 7,19 |
| K1204226 | SL0313 | K1204226-012 | SW8260C_5035 | Naphthalene | 0.27 | ug/kg | J | UJ | 7,19 |
| K1204226 | SL0313 | K1204226-012 | SW8260C_5035 | n-Butylbenzene | 0.069 | ug/kg | U | UJ | 19 |
| K1204226 | SL0313 | K1204226-012 | SW8260C_5035 | n-Propylbenzene | 0.13 | ug/kg | U | UJ | 19 |
| K1204226 | SL0313 | K1204226-012 | SW8260C_5035 | o-Xylene | 0.51 | ug/kg | J | J | 19 |
| K1204226 | SL0313 | K1204226-012 | SW8260C_5035 | sec-Butylbenzene | 0.074 | ug/kg | U | UJ | 19 |
| K1204226 | SL0313 | K1204226-012 | SW8260C_5035 | Styrene | 0.14 | ug/kg | U | UJ | 19 |
| K1204226 | SL0313 | K1204226-012 | SW8260C_5035 | tert-Butylbenzene | 0.14 | ug/kg | U | UJ | 19 |
| K1204226 | SL0313 | K1204226-012 | SW8260C_5035 | Tetrachloroethene | 0.16 | ug/kg | U | UJ | 19 |
| K1204226 | SL0313 | K1204226-012 | SW8260C_5035 | Toluene | 4.3 | ug/kg | J | J | 19 |
| K1204226 | SL0313 | K1204226-012 | SW8260C_5035 | trans-1,2-Dichloroethene | 0.12 | ug/kg | U | UJ | 19 |
| K1204226 | SL0313 | K1204226-012 | SW8260C_5035 | trans-1,3-Dichloropropene | 0.11 | ug/kg | U | UJ | 19 |
| K1204226 | SL0313 | K1204226-012 | SW8260C_5035 | Trichloroethene | 0.15 | ug/kg | U | UJ | 19 |
| K1204226 | SL0313 | K1204226-012 | SW8260C_5035 | Trichlorofluoromethane | 0.085 | ug/kg | U | UJ | 19 |
| K1204226 | SL0313 | K1204226-012 | SW8260C_5035 | Vinyl Chloride | 0.18 | ug/kg | U | UJ | 19 |
| K1204226 | SL0315 | K1204226-014 | SW8260C_5035 | Acetone | 18 | ug/kg | J | U | 7 |
| K1204226 | SL0315 | K1204226-014 | SW8260C_5035 | Bromomethane | 0.22 | ug/kg | U | UJ | 5B |
| K1204226 | SL0315 | K1204226-014 | SW8260C_5035 | Methylene Chloride | 4.1 | ug/kg | J | U | 7 |
| K1204226 | SL0317 | K1204226-016 | SW8260C_5035 | Acetone | 18 | ug/kg | J | U | 7 |
| K1204226 | SL0317 | K1204226-016 | SW8260C_5035 | Bromomethane | 0.23 | ug/kg | U | UJ | 5B |
| K1204226 | SL0317 | K1204226-016 | SW8260C_5035 | Methylene Chloride | 4.3 | ug/kg | J | U | 7 |
| K1204226 | SL0319 | K1204226-018 | SW8260C_5035 | Acetone | 38 | ug/kg | | U | 7 |
| K1204226 | SL0319 | K1204226-018 | SW8260C_5035 | Bromomethane | 0.23 | ug/kg | U | UJ | 5B |
| K1204226 | SL0319 | K1204226-018 | SW8260C_5035 | Methylene Chloride | 4.7 | ug/kg | J | U | 7 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| K1204226 | SL0322 | K1204226-020 | SW8260C_5035 | 1,1,1,2-Tetrachloroethane | 0.11 | ug/kg | U | UJ | 19 |
| K1204226 | SL0322 | K1204226-020 | SW8260C_5035 | 1,1,1-Trichloroethane | 0.11 | ug/kg | U | UJ | 19 |
| K1204226 | SL0322 | K1204226-020 | SW8260C_5035 | 1,1,2,2-Tetrachloroethane | 0.13 | ug/kg | U | UJ | 19 |
| K1204226 | SL0322 | K1204226-020 | SW8260C_5035 | 1,1,2-Trichloroethane | 0.15 | ug/kg | U | UJ | 19 |
| K1204226 | SL0322 | K1204226-020 | SW8260C_5035 | 1,1-Dichloroethane | 0.12 | ug/kg | U | UJ | 19 |
| K1204226 | SL0322 | K1204226-020 | SW8260C_5035 | 1,1-Dichloroethene | 0.25 | ug/kg | U | UJ | 19 |
| K1204226 | SL0322 | K1204226-020 | SW8260C_5035 | 1,1-Dichloropropene | 0.13 | ug/kg | U | UJ | 19 |
| K1204226 | SL0322 | K1204226-020 | SW8260C_5035 | 1,2,3-Trichlorobenzene | 0.19 | ug/kg | U | UJ | 19 |
| K1204226 | SL0322 | K1204226-020 | SW8260C_5035 | 1,2,3-Trichloropropane | 0.45 | ug/kg | U | UJ | 19 |
| K1204226 | SL0322 | K1204226-020 | SW8260C_5035 | 1,2,4-Trichlorobenzene | 0.13 | ug/kg | U | UJ | 19 |
| K1204226 | SL0322 | K1204226-020 | SW8260C_5035 | 1,2,4-Trimethylbenzene | 0.22 | ug/kg | J | J | 19 |
| K1204226 | SL0322 | K1204226-020 | SW8260C_5035 | 1,2-Dibromo-3-chloropropane | 0.4 | ug/kg | U | UJ | 19 |
| K1204226 | SL0322 | K1204226-020 | SW8260C_5035 | 1,2-Dibromoethane | 0.094 | ug/kg | U | UJ | 19 |
| K1204226 | SL0322 | K1204226-020 | SW8260C_5035 | 1,2-Dichlorobenzene | 0.077 | ug/kg | U | UJ | 19 |
| K1204226 | SL0322 | K1204226-020 | SW8260C_5035 | 1,2-Dichloroethane | 0.07 | ug/kg | U | UJ | 19 |
| K1204226 | SL0322 | K1204226-020 | SW8260C_5035 | 1,2-Dichloropropane | 0.13 | ug/kg | U | UJ | 19 |
| K1204226 | SL0322 | K1204226-020 | SW8260C_5035 | 1,3,5-Trimethylbenzene | 0.092 | ug/kg | U | UJ | 19 |
| K1204226 | SL0322 | K1204226-020 | SW8260C_5035 | 1,3-Dichlorobenzene | 0.094 | ug/kg | U | UJ | 19 |
| K1204226 | SL0322 | K1204226-020 | SW8260C_5035 | 1,3-Dichloropropane | 0.12 | ug/kg | U | UJ | 19 |
| K1204226 | SL0322 | K1204226-020 | SW8260C_5035 | 1,4-Dichlorobenzene | 0.086 | ug/kg | U | UJ | 19 |
| K1204226 | SL0322 | K1204226-020 | SW8260C_5035 | 2,2-Dichloropropane | 0.098 | ug/kg | U | UJ | 19 |
| K1204226 | SL0322 | K1204226-020 | SW8260C_5035 | 2-Butanone | 21 | ug/kg | | J | 19 |
| K1204226 | SL0322 | K1204226-020 | SW8260C_5035 | 2-Chlorotoluene | 0.12 | ug/kg | U | UJ | 19 |
| K1204226 | SL0322 | K1204226-020 | SW8260C_5035 | 2-Hexanone | 0.93 | ug/kg | U | UJ | 19 |
| K1204226 | SL0322 | K1204226-020 | SW8260C_5035 | 4-Chlorotoluene | 0.088 | ug/kg | U | UJ | 19 |
| K1204226 | SL0322 | K1204226-020 | SW8260C_5035 | 4-Isopropyl toluene | 0.23 | ug/kg | J | J | 19 |
| K1204226 | SL0322 | K1204226-020 | SW8260C_5035 | 4-Methyl-2-pentanone | 1.8 | ug/kg | U | UJ | 19 |
| K1204226 | SL0322 | K1204226-020 | SW8260C_5035 | Acetone | 180 | ug/kg | | J | 19 |
| K1204226 | SL0322 | K1204226-020 | SW8260C_5035 | Benzene | 2.9 | ug/kg | J | J | 19 |
| K1204226 | SL0322 | K1204226-020 | SW8260C_5035 | Bromobenzene | 0.088 | ug/kg | U | UJ | 19 |
| K1204226 | SL0322 | K1204226-020 | SW8260C_5035 | Bromochloromethane | 0.24 | ug/kg | U | UJ | 19 |
| K1204226 | SL0322 | K1204226-020 | SW8260C_5035 | Bromodichloromethane | 0.16 | ug/kg | U | UJ | 19 |
| K1204226 | SL0322 | K1204226-020 | SW8260C_5035 | Bromoform | 0.14 | ug/kg | U | UJ | 19 |
| K1204226 | SL0322 | K1204226-020 | SW8260C_5035 | Bromomethane | 0.2 | ug/kg | U | UJ | 5B,19 |
| K1204226 | SL0322 | K1204226-020 | SW8260C_5035 | Carbon disulfide | 2.2 | ug/kg | J | J | 19 |
| K1204226 | SL0322 | K1204226-020 | SW8260C_5035 | Carbon Tetrachloride | 0.094 | ug/kg | U | UJ | 19 |
| K1204226 | SL0322 | K1204226-020 | SW8260C_5035 | Chlorobenzene | 0.065 | ug/kg | U | UJ | 19 |
| K1204226 | SL0322 | K1204226-020 | SW8260C_5035 | Chloroethane | 0.74 | ug/kg | U | UJ | 19 |
| K1204226 | SL0322 | K1204226-020 | SW8260C_5035 | Chloroform | 0.11 | ug/kg | U | UJ | 19 |
| K1204226 | SL0322 | K1204226-020 | SW8260C_5035 | Chloromethane | 0.18 | ug/kg | U | UJ | 19 |
| K1204226 | SL0322 | K1204226-020 | SW8260C_5035 | cis-1,2-Dichloroethene | 0.12 | ug/kg | U | UJ | 19 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| K1204226 | SL0322 | K1204226-020 | SW8260C_5035 | cis-1,3-Dichloropropene | 0.13 | ug/kg | U | UJ | 19 |
| K1204226 | SL0322 | K1204226-020 | SW8260C_5035 | Dibromochloromethane | 0.18 | ug/kg | U | UJ | 19 |
| K1204226 | SL0322 | K1204226-020 | SW8260C_5035 | Dibromomethane | 0.28 | ug/kg | U | UJ | 19 |
| K1204226 | SL0322 | K1204226-020 | SW8260C_5035 | Dichlorodifluoromethane | 0.12 | ug/kg | U | UJ | 19 |
| K1204226 | SL0322 | K1204226-020 | SW8260C_5035 | Ethylbenzene | 0.98 | ug/kg | J | J | 19 |
| K1204226 | SL0322 | K1204226-020 | SW8260C_5035 | Hexachlorobutadiene | 0.4 | ug/kg | U | UJ | 19 |
| K1204226 | SL0322 | K1204226-020 | SW8260C_5035 | Isopropylbenzene | 0.081 | ug/kg | U | UJ | 19 |
| K1204226 | SL0322 | K1204226-020 | SW8260C_5035 | m,p-Xylene | 0.8 | ug/kg | J | J | 19 |
| K1204226 | SL0322 | K1204226-020 | SW8260C_5035 | Methylene Chloride | 7.7 | ug/kg | J | UJ | 7,19 |
| K1204226 | SL0322 | K1204226-020 | SW8260C_5035 | Naphthalene | 0.3 | ug/kg | J | UJ | 7,19 |
| K1204226 | SL0322 | K1204226-020 | SW8260C_5035 | n-Butylbenzene | 0.069 | ug/kg | U | UJ | 19 |
| K1204226 | SL0322 | K1204226-020 | SW8260C_5035 | n-Propylbenzene | 0.13 | ug/kg | U | UJ | 19 |
| K1204226 | SL0322 | K1204226-020 | SW8260C_5035 | o-Xylene | 0.081 | ug/kg | U | UJ | 19 |
| K1204226 | SL0322 | K1204226-020 | SW8260C_5035 | sec-Butylbenzene | 0.074 | ug/kg | U | UJ | 19 |
| K1204226 | SL0322 | K1204226-020 | SW8260C_5035 | Styrene | 0.14 | ug/kg | U | UJ | 19 |
| K1204226 | SL0322 | K1204226-020 | SW8260C_5035 | tert-Butylbenzene | 0.14 | ug/kg | U | UJ | 19 |
| K1204226 | SL0322 | K1204226-020 | SW8260C_5035 | Tetrachloroethene | 0.16 | ug/kg | U | UJ | 19 |
| K1204226 | SL0322 | K1204226-020 | SW8260C_5035 | Toluene | 3.5 | ug/kg | J | J | 19 |
| K1204226 | SL0322 | K1204226-020 | SW8260C_5035 | trans-1,2-Dichloroethene | 0.12 | ug/kg | U | UJ | 19 |
| K1204226 | SL0322 | K1204226-020 | SW8260C_5035 | trans-1,3-Dichloropropene | 0.11 | ug/kg | U | UJ | 19 |
| K1204226 | SL0322 | K1204226-020 | SW8260C_5035 | Trichloroethene | 0.15 | ug/kg | U | UJ | 19 |
| K1204226 | SL0322 | K1204226-020 | SW8260C_5035 | Trichlorofluoromethane | 0.085 | ug/kg | U | UJ | 19 |
| K1204226 | SL0322 | K1204226-020 | SW8260C_5035 | Vinyl Chloride | 0.18 | ug/kg | U | UJ | 19 |
| K1204226 | SL0323 | K1204226-021 | SW8260C_5035 | 1,1,1,2-Tetrachloroethane | 0.12 | ug/kg | U | UJ | 19 |
| K1204226 | SL0323 | K1204226-021 | SW8260C_5035 | 1,1,1-Trichloroethane | 0.12 | ug/kg | U | UJ | 19 |
| K1204226 | SL0323 | K1204226-021 | SW8260C_5035 | 1,1,2,2-Tetrachloroethane | 0.14 | ug/kg | U | UJ | 5B,19 |
| K1204226 | SL0323 | K1204226-021 | SW8260C_5035 | 1,1,2-Trichloroethane | 0.17 | ug/kg | U | UJ | 19 |
| K1204226 | SL0323 | K1204226-021 | SW8260C_5035 | 1,1-Dichloroethane | 0.13 | ug/kg | U | UJ | 19 |
| K1204226 | SL0323 | K1204226-021 | SW8260C_5035 | 1,1-Dichloroethene | 0.27 | ug/kg | U | UJ | 19 |
| K1204226 | SL0323 | K1204226-021 | SW8260C_5035 | 1,1-Dichloropropene | 0.14 | ug/kg | U | UJ | 19 |
| K1204226 | SL0323 | K1204226-021 | SW8260C_5035 | 1,2,3-Trichlorobenzene | 0.21 | ug/kg | U | UJ | 19 |
| K1204226 | SL0323 | K1204226-021 | SW8260C_5035 | 1,2,3-Trichloropropane | 0.49 | ug/kg | U | UJ | 19 |
| K1204226 | SL0323 | K1204226-021 | SW8260C_5035 | 1,2,4-Trichlorobenzene | 0.14 | ug/kg | U | UJ | 19 |
| K1204226 | SL0323 | K1204226-021 | SW8260C_5035 | 1,2,4-Trimethylbenzene | 0.31 | ug/kg | J | J | 19 |
| K1204226 | SL0323 | K1204226-021 | SW8260C_5035 | 1,2-Dibromo-3-chloropropane | 0.43 | ug/kg | U | UJ | 19 |
| K1204226 | SL0323 | K1204226-021 | SW8260C_5035 | 1,2-Dibromoethane | 0.11 | ug/kg | U | UJ | 19 |
| K1204226 | SL0323 | K1204226-021 | SW8260C_5035 | 1,2-Dichlorobenzene | 0.083 | ug/kg | U | UJ | 19 |
| K1204226 | SL0323 | K1204226-021 | SW8260C_5035 | 1,2-Dichloroethane | 0.076 | ug/kg | U | UJ | 19 |
| K1204226 | SL0323 | K1204226-021 | SW8260C_5035 | 1,2-Dichloropropane | 0.14 | ug/kg | U | UJ | 19 |
| K1204226 | SL0323 | K1204226-021 | SW8260C_5035 | 1,3,5-Trimethylbenzene | 0.099 | ug/kg | U | UJ | 19 |
| K1204226 | SL0323 | K1204226-021 | SW8260C_5035 | 1,3-Dichlorobenzene | 0.11 | ug/kg | U | UJ | 19 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| K1204226 | SL0323 | K1204226-021 | SW8260C_5035 | 1,3-Dichloropropane | 0.13 | ug/kg | U | UJ | 19 |
| K1204226 | SL0323 | K1204226-021 | SW8260C_5035 | 1,4-Dichlorobenzene | 0.093 | ug/kg | U | UJ | 19 |
| K1204226 | SL0323 | K1204226-021 | SW8260C_5035 | 2,2-Dichloropropane | 0.11 | ug/kg | U | UJ | 19 |
| K1204226 | SL0323 | K1204226-021 | SW8260C_5035 | 2-Butanone | 8.4 | ug/kg | J | J | 19 |
| K1204226 | SL0323 | K1204226-021 | SW8260C_5035 | 2-Chlorotoluene | 0.13 | ug/kg | U | UJ | 19 |
| K1204226 | SL0323 | K1204226-021 | SW8260C_5035 | 2-Hexanone | 1 | ug/kg | U | UJ | 19 |
| K1204226 | SL0323 | K1204226-021 | SW8260C_5035 | 4-Chlorotoluene | 0.095 | ug/kg | U | UJ | 19 |
| K1204226 | SL0323 | K1204226-021 | SW8260C_5035 | 4-Isopropyl toluene | 0.069 | ug/kg | U | UJ | 19 |
| K1204226 | SL0323 | K1204226-021 | SW8260C_5035 | 4-Methyl-2-pentanone | 2 | ug/kg | U | UJ | 19 |
| K1204226 | SL0323 | K1204226-021 | SW8260C_5035 | Acetone | 82 | ug/kg | | J | 19 |
| K1204226 | SL0323 | K1204226-021 | SW8260C_5035 | Benzene | 4.2 | ug/kg | J | J | 19 |
| K1204226 | SL0323 | K1204226-021 | SW8260C_5035 | Bromobenzene | 0.095 | ug/kg | U | UJ | 19 |
| K1204226 | SL0323 | K1204226-021 | SW8260C_5035 | Bromochloromethane | 0.26 | ug/kg | U | UJ | 19 |
| K1204226 | SL0323 | K1204226-021 | SW8260C_5035 | Bromodichloromethane | 0.18 | ug/kg | U | UJ | 19 |
| K1204226 | SL0323 | K1204226-021 | SW8260C_5035 | Bromoform | 0.16 | ug/kg | U | UJ | 19 |
| K1204226 | SL0323 | K1204226-021 | SW8260C_5035 | Bromomethane | 0.22 | ug/kg | U | UJ | 5B,19 |
| K1204226 | SL0323 | K1204226-021 | SW8260C_5035 | Carbon disulfide | 3.8 | ug/kg | J | J | 19 |
| K1204226 | SL0323 | K1204226-021 | SW8260C_5035 | Carbon Tetrachloride | 0.11 | ug/kg | U | UJ | 19 |
| K1204226 | SL0323 | K1204226-021 | SW8260C_5035 | Chlorobenzene | 0.07 | ug/kg | U | UJ | 19 |
| K1204226 | SL0323 | K1204226-021 | SW8260C_5035 | Chloroethane | 0.8 | ug/kg | U | UJ | 19 |
| K1204226 | SL0323 | K1204226-021 | SW8260C_5035 | Chloroform | 0.12 | ug/kg | U | UJ | 19 |
| K1204226 | SL0323 | K1204226-021 | SW8260C_5035 | Chloromethane | 0.2 | ug/kg | U | UJ | 19 |
| K1204226 | SL0323 | K1204226-021 | SW8260C_5035 | cis-1,2-Dichloroethene | 0.13 | ug/kg | U | UJ | 19 |
| K1204226 | SL0323 | K1204226-021 | SW8260C_5035 | cis-1,3-Dichloropropene | 0.14 | ug/kg | U | UJ | 19 |
| K1204226 | SL0323 | K1204226-021 | SW8260C_5035 | Dibromochloromethane | 0.2 | ug/kg | U | UJ | 19 |
| K1204226 | SL0323 | K1204226-021 | SW8260C_5035 | Dibromomethane | 0.31 | ug/kg | U | UJ | 19 |
| K1204226 | SL0323 | K1204226-021 | SW8260C_5035 | Dichlorodifluoromethane | 0.13 | ug/kg | U | UJ | 19 |
| K1204226 | SL0323 | K1204226-021 | SW8260C_5035 | Ethylbenzene | 1.8 | ug/kg | J | J | 19 |
| K1204226 | SL0323 | K1204226-021 | SW8260C_5035 | Hexachlorobutadiene | 0.43 | ug/kg | U | UJ | 19 |
| K1204226 | SL0323 | K1204226-021 | SW8260C_5035 | Isopropylbenzene | 0.088 | ug/kg | U | UJ | 19 |
| K1204226 | SL0323 | K1204226-021 | SW8260C_5035 | m,p-Xylene | 1.3 | ug/kg | J | J | 19 |
| K1204226 | SL0323 | K1204226-021 | SW8260C_5035 | Methylene Chloride | 4.6 | ug/kg | J | UJ | 7,19 |
| K1204226 | SL0323 | K1204226-021 | SW8260C_5035 | Naphthalene | 0.4 | ug/kg | J | UJ | 7,19 |
| K1204226 | SL0323 | K1204226-021 | SW8260C_5035 | n-Butylbenzene | 0.075 | ug/kg | U | UJ | 19 |
| K1204226 | SL0323 | K1204226-021 | SW8260C_5035 | n-Propylbenzene | 0.14 | ug/kg | U | UJ | 19 |
| K1204226 | SL0323 | K1204226-021 | SW8260C_5035 | o-Xylene | 0.53 | ug/kg | J | J | 19 |
| K1204226 | SL0323 | K1204226-021 | SW8260C_5035 | sec-Butylbenzene | 0.08 | ug/kg | U | UJ | 19 |
| K1204226 | SL0323 | K1204226-021 | SW8260C_5035 | Styrene | 0.16 | ug/kg | U | UJ | 19 |
| K1204226 | SL0323 | K1204226-021 | SW8260C_5035 | tert-Butylbenzene | 0.16 | ug/kg | U | UJ | 19 |
| K1204226 | SL0323 | K1204226-021 | SW8260C_5035 | Tetrachloroethene | 0.18 | ug/kg | U | UJ | 19 |
| K1204226 | SL0323 | K1204226-021 | SW8260C_5035 | Toluene | 5.6 | ug/kg | | J | 19 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| K1204226 | SL0323 | K1204226-021 | SW8260C_5035 | trans-1,2-Dichloroethene | 0.13 | ug/kg | U | UJ | 19 |
| K1204226 | SL0323 | K1204226-021 | SW8260C_5035 | trans-1,3-Dichloropropene | 0.12 | ug/kg | U | UJ | 19 |
| K1204226 | SL0323 | K1204226-021 | SW8260C_5035 | Trichloroethene | 0.17 | ug/kg | U | UJ | 19 |
| K1204226 | SL0323 | K1204226-021 | SW8260C_5035 | Trichlorofluoromethane | 0.092 | ug/kg | U | UJ | 19 |
| K1204226 | SL0323 | K1204226-021 | SW8260C_5035 | Vinyl Chloride | 0.2 | ug/kg | U | UJ | 19 |
| K1204226 | SL0326 | K1204226-024 | SW8260C_5035 | Acetone | 37 | ug/kg | | U | 7 |
| K1204226 | SL0326 | K1204226-024 | SW8260C_5035 | Bromomethane | 0.2 | ug/kg | U | UJ | 5B |
| K1204226 | SL0326 | K1204226-024 | SW8260C_5035 | Methylene Chloride | 5.2 | ug/kg | J | U | 7 |
| K1204226 | SL0328 | K1204226-026 | SW8260C_5035 | Acetone | 37 | ug/kg | | U | 7 |
| K1204226 | SL0328 | K1204226-026 | SW8260C_5035 | Bromomethane | 0.23 | ug/kg | U | UJ | 5B |
| K1204226 | SL0328 | K1204226-026 | SW8260C_5035 | Methylene Chloride | 5.2 | ug/kg | J | U | 7 |
| K1204226 | SL0330 | K1204226-028 | SW8260C_5035 | Acetone | 24 | ug/kg | | U | 7 |
| K1204226 | SL0330 | K1204226-028 | SW8260C_5035 | Bromomethane | 0.21 | ug/kg | U | UJ | 5B |
| K1204226 | SL0330 | K1204226-028 | SW8260C_5035 | Methylene Chloride | 4.3 | ug/kg | J | U | 7 |
| K1204325 | SL0342 | K1204325-002 | SW8260C_5035 | 2-Butanone | 12 | ug/kg | J | U | 7 |
| K1204325 | SL0342 | K1204325-002 | SW8260C_5035 | Bromomethane | 0.2 | ug/kg | U | UJ | 5B |
| K1204325 | SL0342 | K1204325-002 | SW8260C_5035 | Carbon disulfide | 0.96 | ug/kg | J | U | 7 |
| K1204325 | SL0342 | K1204325-002 | SW8260C_5035 | Methylene Chloride | 5.2 | ug/kg | J | U | 7 |
| K1204325 | SL0342 | K1204325-002 | SW8260C_5035 | Naphthalene | 0.34 | ug/kg | J | U | 7 |
| K1204325 | SL0385 | K1204325-006 | SW8260C_5035 | 2-Butanone | 12 | ug/kg | J | U | 7 |
| K1204325 | SL0385 | K1204325-006 | SW8260C_5035 | Acetone | 85 | ug/kg | | U | 7 |
| K1204325 | SL0385 | K1204325-006 | SW8260C_5035 | Bromomethane | 0.2 | ug/kg | U | UJ | 5B |
| K1204325 | SL0385 | K1204325-006 | SW8260C_5035 | Carbon disulfide | 8.9 | ug/kg | | J | 5B |
| K1204325 | SL0385 | K1204325-006 | SW8260C_5035 | Methylene Chloride | 4.8 | ug/kg | J | U | 7 |
| K1204325 | SL0385 | K1204325-006 | SW8260C_5035 | Naphthalene | 0.2 | ug/kg | J | U | 7 |
| K1204325 | SL0386 | K1204325-007 | SW8260C_5035 | 2-Butanone | 12 | ug/kg | J | U | 7 |
| K1204325 | SL0386 | K1204325-007 | SW8260C_5035 | Carbon disulfide | 2.9 | ug/kg | J | J | 5B |
| K1204325 | SL0386 | K1204325-007 | SW8260C_5035 | Methylene Chloride | 4.3 | ug/kg | J | U | 7 |
| K1204325 | SL0386 | K1204325-007 | SW8260C_5035 | Naphthalene | 0.15 | ug/kg | J | U | 7 |
| K1204325 | SL0387 | K1204325-008 | SW8260C_5035 | Carbon disulfide | 83 | ug/kg | | J | 5B |
| K1204325 | SL0387 | K1204325-008 | SW8260C_5035 | Methylene Chloride | 3.2 | ug/kg | J | U | 7 |
| K1204325 | SL0387 | K1204325-008 | SW8260C_5035 | Naphthalene | 0.37 | ug/kg | J | U | 7 |
| K1204325 | SL0390 | K1204325-011 | SW8260C_5035 | Bromomethane | 0.22 | ug/kg | U | UJ | 5B |
| K1204325 | SL0390 | K1204325-011 | SW8260C_5035 | Carbon disulfide | 4.3 | ug/kg | J | J | 5B |
| K1204325 | SL0390 | K1204325-011 | SW8260C_5035 | Methylene Chloride | 4.2 | ug/kg | J | U | 7 |
| K1204325 | SL0392 | K1204325-013 | SW8260C_5035 | Carbon disulfide | 45 | ug/kg | | J | 5B |
| K1204325 | SL0392 | K1204325-013 | SW8260C_5035 | Methylene Chloride | 5.4 | ug/kg | J | U | 7 |
| K1204325 | SL0394 | K1204325-015 | SW8260C_5035 | 1,1,2,2-Tetrachloroethane | 0.25 | ug/kg | U | UJ | 19 |
| K1204325 | SL0394 | K1204325-015 | SW8260C_5035 | 1,2,3-Trichlorobenzene | 0.36 | ug/kg | U | UJ | 19 |
| K1204325 | SL0394 | K1204325-015 | SW8260C_5035 | 1,2,3-Trichloropropane | 0.84 | ug/kg | U | UJ | 19 |
| K1204325 | SL0394 | K1204325-015 | SW8260C_5035 | 1,2,4-Trichlorobenzene | 0.25 | ug/kg | U | UJ | 19 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| K1204325 | SL0394 | K1204325-015 | SW8260C_5035 | 1,2,4-Trimethylbenzene | 1.6 | ug/kg | J | J | 19 |
| K1204325 | SL0394 | K1204325-015 | SW8260C_5035 | 1,2-Dibromo-3-chloropropane | 0.75 | ug/kg | U | UJ | 19 |
| K1204325 | SL0394 | K1204325-015 | SW8260C_5035 | 1,2-Dichlorobenzene | 0.15 | ug/kg | U | UJ | 19 |
| K1204325 | SL0394 | K1204325-015 | SW8260C_5035 | 1,3,5-Trimethylbenzene | 1.3 | ug/kg | J | J | 19 |
| K1204325 | SL0394 | K1204325-015 | SW8260C_5035 | 1,3-Dichlorobenzene | 0.18 | ug/kg | U | UJ | 19 |
| K1204325 | SL0394 | K1204325-015 | SW8260C_5035 | 1,4-Dichlorobenzene | 0.17 | ug/kg | U | UJ | 19 |
| K1204325 | SL0394 | K1204325-015 | SW8260C_5035 | 2-Chlorotoluene | 0.23 | ug/kg | U | UJ | 19 |
| K1204325 | SL0394 | K1204325-015 | SW8260C_5035 | 4-Chlorotoluene | 0.17 | ug/kg | U | UJ | 19 |
| K1204325 | SL0394 | K1204325-015 | SW8260C_5035 | 4-Isopropyl toluene | 15 | ug/kg | J | J | 19 |
| K1204325 | SL0394 | K1204325-015 | SW8260C_5035 | Bromobenzene | 0.17 | ug/kg | U | UJ | 19 |
| K1204325 | SL0394 | K1204325-015 | SW8260C_5035 | Carbon disulfide | 17 | ug/kg | | J | 5B |
| K1204325 | SL0394 | K1204325-015 | SW8260C_5035 | Hexachlorobutadiene | 0.75 | ug/kg | U | UJ | 19 |
| K1204325 | SL0394 | K1204325-015 | SW8260C_5035 | Methylene Chloride | 8.2 | ug/kg | J | U | 7 |
| K1204325 | SL0394 | K1204325-015 | SW8260C_5035 | Naphthalene | 1.2 | ug/kg | J | J | 19 |
| K1204325 | SL0394 | K1204325-015 | SW8260C_5035 | n-Butylbenzene | 0.74 | ug/kg | J | J | 19 |
| K1204325 | SL0394 | K1204325-015 | SW8260C_5035 | n-Propylbenzene | 0.58 | ug/kg | J | J | 19 |
| K1204325 | SL0394 | K1204325-015 | SW8260C_5035 | sec-Butylbenzene | 0.56 | ug/kg | J | J | 19 |
| K1204325 | SL0394 | K1204325-015 | SW8260C_5035 | tert-Butylbenzene | 0.27 | ug/kg | U | UJ | 19 |
| K1204325 | SL0395 | K1204325-016 | SW8260C_5035 | Bromomethane | 0.36 | ug/kg | U | UJ | 5B |
| K1204325 | SL0395 | K1204325-016 | SW8260C_5035 | Carbon disulfide | 22 | ug/kg | | J | 5B |
| K1204325 | SL0395 | K1204325-016 | SW8260C_5035 | Methylene Chloride | 9.4 | ug/kg | J | U | 7 |
| K1204325 | SL0398 | K1204325-018 | SW8260C_5035 | 2-Butanone | 5.1 | ug/kg | J | U | 7 |
| K1204325 | SL0398 | K1204325-018 | SW8260C_5035 | Acetone | 57 | ug/kg | | U | 7 |
| K1204325 | SL0398 | K1204325-018 | SW8260C_5035 | Carbon disulfide | 41 | ug/kg | | J | 5B |
| K1204325 | SL0398 | K1204325-018 | SW8260C_5035 | Methylene Chloride | 4.2 | ug/kg | J | U | 7 |
| K1204325 | SL0398 | K1204325-018 | SW8260C_5035 | Naphthalene | 0.39 | ug/kg | J | U | 7 |
| K1204325 | SL0399 | K1204325-019 | SW8260C_5035 | 2-Butanone | 4.2 | ug/kg | J | U | 7 |
| K1204325 | SL0399 | K1204325-019 | SW8260C_5035 | Acetone | 48 | ug/kg | | U | 7 |
| K1204325 | SL0399 | K1204325-019 | SW8260C_5035 | Carbon disulfide | 30 | ug/kg | | J | 5B |
| K1204325 | SL0399 | K1204325-019 | SW8260C_5035 | Methylene Chloride | 4.7 | ug/kg | J | U | 7 |
| K1204325 | SL0399 | K1204325-019 | SW8260C_5035 | Naphthalene | 0.37 | ug/kg | J | U | 7 |
| K1204325 | SL0400 | K1204325-020 | SW8260C_5035 | 2-Butanone | 5.7 | ug/kg | J | U | 7 |
| K1204325 | SL0400 | K1204325-020 | SW8260C_5035 | Acetone | 62 | ug/kg | | U | 7 |
| K1204325 | SL0400 | K1204325-020 | SW8260C_5035 | Bromomethane | 0.2 | ug/kg | U | UJ | 5B |
| K1204325 | SL0400 | K1204325-020 | SW8260C_5035 | Carbon disulfide | 9 | ug/kg | | J | 5B |
| K1204325 | SL0400 | K1204325-020 | SW8260C_5035 | Methylene Chloride | 4.2 | ug/kg | J | U | 7 |
| K1204325 | SL0400 | K1204325-020 | SW8260C_5035 | Naphthalene | 0.24 | ug/kg | J | U | 7 |
| K1204325 | SL0402 | K1204325-021 | SW8260C_5035 | 2-Butanone | 2.2 | ug/kg | J | U | 7 |
| K1204325 | SL0402 | K1204325-021 | SW8260C_5035 | Acetone | 26 | ug/kg | | U | 7 |
| K1204325 | SL0402 | K1204325-021 | SW8260C_5035 | Bromomethane | 0.21 | ug/kg | U | UJ | 5B |
| K1204325 | SL0402 | K1204325-021 | SW8260C_5035 | Carbon disulfide | 0.76 | ug/kg | J | U | 7 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| K1204325 | SL0402 | K1204325-021 | SW8260C_5035 | Methylene Chloride | 3 | ug/kg | J | U | 7 |
| K1204325 | SL0404 | K1204325-022 | SW8260C_5035 | 2-Butanone | 2.8 | ug/kg | J | U | 7 |
| K1204325 | SL0404 | K1204325-022 | SW8260C_5035 | Acetone | 23 | ug/kg | | U | 7 |
| K1204325 | SL0404 | K1204325-022 | SW8260C_5035 | Bromomethane | 0.21 | ug/kg | U | UJ | 5B |
| K1204325 | SL0404 | K1204325-022 | SW8260C_5035 | Carbon disulfide | 2 | ug/kg | J | J | 5B |
| K1204325 | SL0404 | K1204325-022 | SW8260C_5035 | Methylene Chloride | 3.2 | ug/kg | J | U | 7 |
| K1204325 | SL0406 | K1204325-026 | SW8260C_5035 | 2-Butanone | 4.9 | ug/kg | J | U | 7 |
| K1204325 | SL0406 | K1204325-026 | SW8260C_5035 | Acetone | 30 | ug/kg | | U | 7 |
| K1204325 | SL0406 | K1204325-026 | SW8260C_5035 | Bromomethane | 0.2 | ug/kg | U | UJ | 5B |
| K1204325 | SL0406 | K1204325-026 | SW8260C_5035 | Carbon disulfide | 1.3 | ug/kg | J | J | 5B |
| K1204325 | SL0406 | K1204325-026 | SW8260C_5035 | Methylene Chloride | 2.5 | ug/kg | J | U | 7 |
| K1204325 | SL0406 | K1204325-026 | SW8260C_5035 | Naphthalene | 0.49 | ug/kg | J | U | 7 |
| K1204325 | TB5 | K1204325-027 | SW8260C_5035 | Hexachlorobutadiene | 0.11 | ug/L | U | UJ | 5B |
| K1204325 | TB6 | K1204325-028 | SW8260C_5035 | Hexachlorobutadiene | 0.11 | ug/L | U | UJ | 5B |
| K1204342 | SL0343 | K1204342-001 | SW8260C_5035 | 1,1,2,2-Tetrachloroethane | 0.18 | ug/kg | U | UJ | 19 |
| K1204342 | SL0343 | K1204342-001 | SW8260C_5035 | 1,2,3-Trichlorobenzene | 0.26 | ug/kg | U | UJ | 19 |
| K1204342 | SL0343 | K1204342-001 | SW8260C_5035 | 1,2,3-Trichloropropane | 0.61 | ug/kg | U | UJ | 19 |
| K1204342 | SL0343 | K1204342-001 | SW8260C_5035 | 1,2,4-Trichlorobenzene | 0.18 | ug/kg | U | UJ | 19 |
| K1204342 | SL0343 | K1204342-001 | SW8260C_5035 | 1,2,4-Trimethylbenzene | 0.91 | ug/kg | J | J | 19 |
| K1204342 | SL0343 | K1204342-001 | SW8260C_5035 | 1,2-Dibromo-3-chloropropane | 0.54 | ug/kg | U | UJ | 19 |
| K1204342 | SL0343 | K1204342-001 | SW8260C_5035 | 1,2-Dichlorobenzene | 0.11 | ug/kg | U | UJ | 19 |
| K1204342 | SL0343 | K1204342-001 | SW8260C_5035 | 1,3,5-Trimethylbenzene | 0.32 | ug/kg | J | J | 19 |
| K1204342 | SL0343 | K1204342-001 | SW8260C_5035 | 1,3-Dichlorobenzene | 0.13 | ug/kg | U | UJ | 19 |
| K1204342 | SL0343 | K1204342-001 | SW8260C_5035 | 1,4-Dichlorobenzene | 0.12 | ug/kg | U | UJ | 19 |
| K1204342 | SL0343 | K1204342-001 | SW8260C_5035 | 2-Chlorotoluene | 0.17 | ug/kg | U | UJ | 19 |
| K1204342 | SL0343 | K1204342-001 | SW8260C_5035 | 4-Chlorotoluene | 0.12 | ug/kg | U | UJ | 19 |
| K1204342 | SL0343 | K1204342-001 | SW8260C_5035 | 4-Isopropyl toluene | 0.23 | ug/kg | J | J | 19 |
| K1204342 | SL0343 | K1204342-001 | SW8260C_5035 | Bromobenzene | 0.12 | ug/kg | U | UJ | 19 |
| K1204342 | SL0343 | K1204342-001 | SW8260C_5035 | Bromomethane | 0.27 | ug/kg | U | UJ | 5B |
| K1204342 | SL0343 | K1204342-001 | SW8260C_5035 | Hexachlorobutadiene | 0.54 | ug/kg | U | UJ | 19 |
| K1204342 | SL0343 | K1204342-001 | SW8260C_5035 | Methylene Chloride | 7.4 | ug/kg | J | U | 7 |
| K1204342 | SL0343 | K1204342-001 | SW8260C_5035 | Naphthalene | 0.94 | ug/kg | J | UJ | 7,19 |
| K1204342 | SL0343 | K1204342-001 | SW8260C_5035 | n-Butylbenzene | 0.24 | ug/kg | J | J | 19 |
| K1204342 | SL0343 | K1204342-001 | SW8260C_5035 | n-Propylbenzene | 0.36 | ug/kg | J | J | 19 |
| K1204342 | SL0343 | K1204342-001 | SW8260C_5035 | sec-Butylbenzene | 0.1 | ug/kg | U | UJ | 19 |
| K1204342 | SL0343 | K1204342-001 | SW8260C_5035 | tert-Butylbenzene | 0.19 | ug/kg | U | UJ | 19 |
| K1204342 | SL0344 | K1204342-002 | SW8260C_5035 | Bromomethane | 0.25 | ug/kg | U | UJ | 5B |
| K1204342 | SL0344 | K1204342-002 | SW8260C_5035 | Methylene Chloride | 4.2 | ug/kg | J | U | 7 |
| K1204342 | SL0344 | K1204342-002 | SW8260C_5035 | Naphthalene | 0.55 | ug/kg | J | U | 7 |
| K1204342 | SL0345 | K1204342-003 | SW8260C_5035 | Acetone | 110 | ug/kg | | U | 7 |
| K1204342 | SL0345 | K1204342-003 | SW8260C_5035 | Bromomethane | 0.2 | ug/kg | U | UJ | 5B |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| K1204342 | SL0345 | K1204342-003 | SW8260C_5035 | Carbon disulfide | 0.59 | ug/kg | J | U | 7 |
| K1204342 | SL0345 | K1204342-003 | SW8260C_5035 | Methylene Chloride | 4.1 | ug/kg | J | U | 7 |
| K1204342 | SL0345 | K1204342-003 | SW8260C_5035 | Naphthalene | 0.17 | ug/kg | J | U | 7 |
| K1204342 | SL0349 | K1204342-005 | SW8260C_5035 | Bromomethane | 0.28 | ug/kg | U | UJ | 5B |
| K1204342 | SL0349 | K1204342-005 | SW8260C_5035 | Carbon disulfide | 6.6 | ug/kg | J | U | 7 |
| K1204342 | SL0349 | K1204342-005 | SW8260C_5035 | Methylene Chloride | 4.7 | ug/kg | J | U | 7 |
| K1204342 | SL0349 | K1204342-005 | SW8260C_5035 | Naphthalene | 0.36 | ug/kg | J | U | 7 |
| K1204356 | SL0353 | K1204356-002 | SW8260C_5035 | 1,1,1-Trichloroethane | 0.19 | ug/kg | U | UJ | 19 |
| K1204356 | SL0353 | K1204356-002 | SW8260C_5035 | 1,1,2,2-Tetrachloroethane | 0.23 | ug/kg | U | UJ | 19 |
| K1204356 | SL0353 | K1204356-002 | SW8260C_5035 | 1,1-Dichloroethane | 0.21 | ug/kg | U | UJ | 19 |
| K1204356 | SL0353 | K1204356-002 | SW8260C_5035 | 1,1-Dichloroethene | 0.43 | ug/kg | U | UJ | 19 |
| K1204356 | SL0353 | K1204356-002 | SW8260C_5035 | 1,1-Dichloropropene | 0.23 | ug/kg | U | UJ | 19 |
| K1204356 | SL0353 | K1204356-002 | SW8260C_5035 | 1,2,3-Trichlorobenzene | 0.33 | ug/kg | U | UJ | 19 |
| K1204356 | SL0353 | K1204356-002 | SW8260C_5035 | 1,2,3-Trichloropropane | 0.78 | ug/kg | U | UJ | 19 |
| K1204356 | SL0353 | K1204356-002 | SW8260C_5035 | 1,2,4-Trichlorobenzene | 0.23 | ug/kg | U | UJ | 19 |
| K1204356 | SL0353 | K1204356-002 | SW8260C_5035 | 1,2,4-Trimethylbenzene | 3.8 | ug/kg | J | J | 19 |
| K1204356 | SL0353 | K1204356-002 | SW8260C_5035 | 1,2-Dibromo-3-chloropropane | 0.69 | ug/kg | U | UJ | 19 |
| K1204356 | SL0353 | K1204356-002 | SW8260C_5035 | 1,2-Dichlorobenzene | 0.14 | ug/kg | U | UJ | 19 |
| K1204356 | SL0353 | K1204356-002 | SW8260C_5035 | 1,2-Dichloroethane | 0.13 | ug/kg | U | UJ | 19 |
| K1204356 | SL0353 | K1204356-002 | SW8260C_5035 | 1,2-Dichloropropane | 0.23 | ug/kg | U | UJ | 19 |
| K1204356 | SL0353 | K1204356-002 | SW8260C_5035 | 1,3,5-Trimethylbenzene | 1.3 | ug/kg | J | J | 19 |
| K1204356 | SL0353 | K1204356-002 | SW8260C_5035 | 1,3-Dichlorobenzene | 0.17 | ug/kg | U | UJ | 19 |
| K1204356 | SL0353 | K1204356-002 | SW8260C_5035 | 1,4-Dichlorobenzene | 0.15 | ug/kg | U | UJ | 19 |
| K1204356 | SL0353 | K1204356-002 | SW8260C_5035 | 2,2-Dichloropropane | 0.17 | ug/kg | U | UJ | 19 |
| K1204356 | SL0353 | K1204356-002 | SW8260C_5035 | 2-Butanone | 32 | ug/kg | J | J | 19 |
| K1204356 | SL0353 | K1204356-002 | SW8260C_5035 | 2-Chlorotoluene | 1.1 | ug/kg | Ui | UJ | 19 |
| K1204356 | SL0353 | K1204356-002 | SW8260C_5035 | 4-Chlorotoluene | 0.16 | ug/kg | U | UJ | 19 |
| K1204356 | SL0353 | K1204356-002 | SW8260C_5035 | 4-Isopropyl toluene | 0.33 | ug/kg | J | J | 19 |
| K1204356 | SL0353 | K1204356-002 | SW8260C_5035 | 4-Methyl-2-pentanone | 3.1 | ug/kg | U | UJ | 19 |
| K1204356 | SL0353 | K1204356-002 | SW8260C_5035 | Acetone | 110 | ug/kg | | J | 19 |
| K1204356 | SL0353 | K1204356-002 | SW8260C_5035 | Benzene | 73 | ug/kg | | J | 19 |
| K1204356 | SL0353 | K1204356-002 | SW8260C_5035 | Bromobenzene | 0.16 | ug/kg | U | UJ | 19 |
| K1204356 | SL0353 | K1204356-002 | SW8260C_5035 | Bromochloromethane | 0.42 | ug/kg | U | UJ | 19 |
| K1204356 | SL0353 | K1204356-002 | SW8260C_5035 | Bromodichloromethane | 0.28 | ug/kg | U | UJ | 19 |
| K1204356 | SL0353 | K1204356-002 | SW8260C_5035 | Bromomethane | 0.35 | ug/kg | U | UJ | 5B,19 |
| K1204356 | SL0353 | K1204356-002 | SW8260C_5035 | Carbon disulfide | 11 | ug/kg | | J | 19 |
| K1204356 | SL0353 | K1204356-002 | SW8260C_5035 | Carbon Tetrachloride | 0.17 | ug/kg | U | UJ | 19 |
| K1204356 | SL0353 | K1204356-002 | SW8260C_5035 | Chloroethane | 1.3 | ug/kg | U | UJ | 19 |
| K1204356 | SL0353 | K1204356-002 | SW8260C_5035 | Chloroform | 0.19 | ug/kg | U | UJ | 19 |
| K1204356 | SL0353 | K1204356-002 | SW8260C_5035 | Chloromethane | 0.31 | ug/kg | U | UJ | 19 |
| K1204356 | SL0353 | K1204356-002 | SW8260C_5035 | cis-1,2-Dichloroethene | 0.21 | ug/kg | U | UJ | 19 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| K1204356 | SL0353 | K1204356-002 | SW8260C_5035 | cis-1,3-Dichloropropene | 0.23 | ug/kg | U | UJ | 19 |
| K1204356 | SL0353 | K1204356-002 | SW8260C_5035 | Dibromomethane | 0.49 | ug/kg | U | UJ | 19 |
| K1204356 | SL0353 | K1204356-002 | SW8260C_5035 | Dichlorodifluoromethane | 0.21 | ug/kg | U | UJ | 19 |
| K1204356 | SL0353 | K1204356-002 | SW8260C_5035 | Hexachlorobutadiene | 0.69 | ug/kg | U | UJ | 19 |
| K1204356 | SL0353 | K1204356-002 | SW8260C_5035 | Methylene Chloride | 13 | ug/kg | J | UJ | 7,19 |
| K1204356 | SL0353 | K1204356-002 | SW8260C_5035 | Naphthalene | 8.2 | ug/kg | J | J | 19 |
| K1204356 | SL0353 | K1204356-002 | SW8260C_5035 | n-Butylbenzene | 0.96 | ug/kg | J | J | 19 |
| K1204356 | SL0353 | K1204356-002 | SW8260C_5035 | n-Propylbenzene | 2.5 | ug/kg | J | J | 19 |
| K1204356 | SL0353 | K1204356-002 | SW8260C_5035 | sec-Butylbenzene | 0.33 | ug/kg | J | J | 19 |
| K1204356 | SL0353 | K1204356-002 | SW8260C_5035 | tert-Butylbenzene | 0.25 | ug/kg | U | UJ | 19 |
| K1204356 | SL0353 | K1204356-002 | SW8260C_5035 | Toluene | 110 | ug/kg | | J | 19 |
| K1204356 | SL0353 | K1204356-002 | SW8260C_5035 | trans-1,2-Dichloroethene | 0.21 | ug/kg | U | UJ | 19 |
| K1204356 | SL0353 | K1204356-002 | SW8260C_5035 | Trichloroethene | 0.26 | ug/kg | U | UJ | 19 |
| K1204356 | SL0353 | K1204356-002 | SW8260C_5035 | Trichlorofluoromethane | 0.15 | ug/kg | U | UJ | 19 |
| K1204356 | SL0353 | K1204356-002 | SW8260C_5035 | Vinyl Chloride | 0.31 | ug/kg | U | UJ | 19 |
| K1204356 | SL0354 | K1204356-003 | SW8260C_5035 | Bromomethane | 0.32 | ug/kg | U | UJ | 5B |
| K1204356 | SL0354 | K1204356-003 | SW8260C_5035 | Methylene Chloride | 9.7 | ug/kg | J | U | 7 |
| K1204356 | SL0352 | K1204356-005 | SW8260C_5035 | 1,1,2,2-Tetrachloroethane | 0.24 | ug/kg | U | UJ | 5B |
| K1204356 | SL0352 | K1204356-005 | SW8260C_5035 | Acetone | 58 | ug/kg | | U | 7 |
| K1204356 | SL0352 | K1204356-005 | SW8260C_5035 | Bromomethane | 0.59 | ug/kg | J | J | 5B |
| K1204356 | SL0352 | K1204356-005 | SW8260C_5035 | Methylene Chloride | 6.4 | ug/kg | J | U | 7 |
| K1204356 | SL0352 | K1204356-005 | SW8260C_5035 | Naphthalene | 0.57 | ug/kg | J | U | 7 |
| K1204356 | SL0356 | K1204356-006 | SW8260C_5035 | 1,1,2,2-Tetrachloroethane | 0.33 | ug/kg | U | UJ | 19 |
| K1204356 | SL0356 | K1204356-006 | SW8260C_5035 | 1,2,3-Trichlorobenzene | 0.49 | ug/kg | U | UJ | 19 |
| K1204356 | SL0356 | K1204356-006 | SW8260C_5035 | 1,2,3-Trichloropropane | 1.2 | ug/kg | U | UJ | 19 |
| K1204356 | SL0356 | K1204356-006 | SW8260C_5035 | 1,2,4-Trichlorobenzene | 0.33 | ug/kg | U | UJ | 19 |
| K1204356 | SL0356 | K1204356-006 | SW8260C_5035 | 1,2,4-Trimethylbenzene | 1.5 | ug/kg | J | J | 19 |
| K1204356 | SL0356 | K1204356-006 | SW8260C_5035 | 1,2-Dibromo-3-chloropropane | 1.1 | ug/kg | U | UJ | 19 |
| K1204356 | SL0356 | K1204356-006 | SW8260C_5035 | 1,2-Dichlorobenzene | 0.2 | ug/kg | U | UJ | 19 |
| K1204356 | SL0356 | K1204356-006 | SW8260C_5035 | 1,3,5-Trimethylbenzene | 1.1 | ug/kg | J | J | 19 |
| K1204356 | SL0356 | K1204356-006 | SW8260C_5035 | 1,3-Dichlorobenzene | 0.24 | ug/kg | U | UJ | 19 |
| K1204356 | SL0356 | K1204356-006 | SW8260C_5035 | 1,4-Dichlorobenzene | 4.5 | ug/kg | J | J | 19 |
| K1204356 | SL0356 | K1204356-006 | SW8260C_5035 | 2-Chlorotoluene | 0.31 | ug/kg | U | UJ | 19 |
| K1204356 | SL0356 | K1204356-006 | SW8260C_5035 | 4-Chlorotoluene | 0.23 | ug/kg | U | UJ | 19 |
| K1204356 | SL0356 | K1204356-006 | SW8260C_5035 | 4-Isopropyl toluene | 0.89 | ug/kg | J | J | 19 |
| K1204356 | SL0356 | K1204356-006 | SW8260C_5035 | Bromobenzene | 0.23 | ug/kg | U | UJ | 19 |
| K1204356 | SL0356 | K1204356-006 | SW8260C_5035 | Bromomethane | 0.51 | ug/kg | U | UJ | 5B |
| K1204356 | SL0356 | K1204356-006 | SW8260C_5035 | Carbon disulfide | 18 | ug/kg | | J | 5B |
| K1204356 | SL0356 | K1204356-006 | SW8260C_5035 | Hexachlorobutadiene | 1.1 | ug/kg | U | UJ | 19 |
| K1204356 | SL0356 | K1204356-006 | SW8260C_5035 | Methylene Chloride | 13 | ug/kg | J | U | 7 |
| K1204356 | SL0356 | K1204356-006 | SW8260C_5035 | Naphthalene | 2.9 | ug/kg | J | J | 19 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| K1204356 | SL0356 | K1204356-006 | SW8260C_5035 | n-Butylbenzene | 0.18 | ug/kg | U | UJ | 19 |
| K1204356 | SL0356 | K1204356-006 | SW8260C_5035 | n-Propylbenzene | 0.33 | ug/kg | U | UJ | 19 |
| K1204356 | SL0356 | K1204356-006 | SW8260C_5035 | sec-Butylbenzene | 0.91 | ug/kg | J | J | 19 |
| K1204356 | SL0356 | K1204356-006 | SW8260C_5035 | tert-Butylbenzene | 2.8 | ug/kg | J | J | 19 |
| K1204356 | SL0358 | K1204356-008 | SW8260C_5035 | 1,1,2,2-Tetrachloroethane | 0.23 | ug/kg | U | UJ | 5B |
| K1204356 | SL0358 | K1204356-008 | SW8260C_5035 | Bromomethane | 0.35 | ug/kg | U | UJ | 5B |
| K1204356 | SL0358 | K1204356-008 | SW8260C_5035 | Methylene Chloride | 4.9 | ug/kg | J | U | 7 |
| K1204356 | SL0360 | K1204356-010 | SW8260C_5035 | 1,1,2,2-Tetrachloroethane | 0.15 | ug/kg | U | UJ | 5B |
| K1204356 | SL0360 | K1204356-010 | SW8260C_5035 | Acetone | 41 | ug/kg | | U | 7 |
| K1204356 | SL0360 | K1204356-010 | SW8260C_5035 | Bromomethane | 0.23 | ug/kg | U | UJ | 5B |
| K1204356 | SL0360 | K1204356-010 | SW8260C_5035 | Methylene Chloride | 2.6 | ug/kg | J | U | 7 |
| K1204356 | SL0360 | K1204356-010 | SW8260C_5035 | Naphthalene | 0.42 | ug/kg | J | U | 7 |
| K1204356 | SL0300 | K1204356-012 | SW8260C_5035 | 1,1,2,2-Tetrachloroethane | 0.14 | ug/kg | U | UJ | 5B,19 |
| K1204356 | SL0300 | K1204356-012 | SW8260C_5035 | 1,2,3-Trichlorobenzene | 0.2 | ug/kg | U | UJ | 19 |
| K1204356 | SL0300 | K1204356-012 | SW8260C_5035 | 1,2,3-Trichloropropane | 0.46 | ug/kg | U | UJ | 19 |
| K1204356 | SL0300 | K1204356-012 | SW8260C_5035 | 1,2,4-Trichlorobenzene | 0.14 | ug/kg | U | UJ | 19 |
| K1204356 | SL0300 | K1204356-012 | SW8260C_5035 | 1,2,4-Trimethylbenzene | 0.93 | ug/kg | J | J | 19 |
| K1204356 | SL0300 | K1204356-012 | SW8260C_5035 | 1,2-Dibromo-3-chloropropane | 0.41 | ug/kg | U | UJ | 19 |
| K1204356 | SL0300 | K1204356-012 | SW8260C_5035 | 1,2-Dichlorobenzene | 0.079 | ug/kg | U | UJ | 19 |
| K1204356 | SL0300 | K1204356-012 | SW8260C_5035 | 1,3,5-Trimethylbenzene | 0.42 | ug/kg | J | J | 19 |
| K1204356 | SL0300 | K1204356-012 | SW8260C_5035 | 1,3-Dichlorobenzene | 0.096 | ug/kg | U | UJ | 19 |
| K1204356 | SL0300 | K1204356-012 | SW8260C_5035 | 1,4-Dichlorobenzene | 0.088 | ug/kg | U | UJ | 19 |
| K1204356 | SL0300 | K1204356-012 | SW8260C_5035 | 2-Chlorotoluene | 0.13 | ug/kg | U | UJ | 19 |
| K1204356 | SL0300 | K1204356-012 | SW8260C_5035 | 4-Chlorotoluene | 0.09 | ug/kg | U | UJ | 19 |
| K1204356 | SL0300 | K1204356-012 | SW8260C_5035 | 4-Isopropyl toluene | 0.066 | ug/kg | U | UJ | 19 |
| K1204356 | SL0300 | K1204356-012 | SW8260C_5035 | Bromobenzene | 0.09 | ug/kg | U | UJ | 19 |
| K1204356 | SL0300 | K1204356-012 | SW8260C_5035 | Bromomethane | 0.21 | ug/kg | U | UJ | 5B |
| K1204356 | SL0300 | K1204356-012 | SW8260C_5035 | Hexachlorobutadiene | 0.41 | ug/kg | U | UJ | 19 |
| K1204356 | SL0300 | K1204356-012 | SW8260C_5035 | Methylene Chloride | 3.6 | ug/kg | J | U | 7 |
| K1204356 | SL0300 | K1204356-012 | SW8260C_5035 | Naphthalene | 1.7 | ug/kg | J | J | 19 |
| K1204356 | SL0300 | K1204356-012 | SW8260C_5035 | n-Butylbenzene | 0.32 | ug/kg | J | J | 19 |
| K1204356 | SL0300 | K1204356-012 | SW8260C_5035 | n-Propylbenzene | 0.38 | ug/kg | J | J | 19 |
| K1204356 | SL0300 | K1204356-012 | SW8260C_5035 | sec-Butylbenzene | 0.076 | ug/kg | U | UJ | 19 |
| K1204356 | SL0300 | K1204356-012 | SW8260C_5035 | tert-Butylbenzene | 0.15 | ug/kg | U | UJ | 19 |
| K1204356 | SL0363 | K1204356-014 | SW8260C_5035 | 1,1,2,2-Tetrachloroethane | 0.16 | ug/kg | U | UJ | 5B |
| K1204356 | SL0363 | K1204356-014 | SW8260C_5035 | Bromomethane | 0.25 | ug/kg | U | UJ | 5B |
| K1204356 | SL0363 | K1204356-014 | SW8260C_5035 | Methylene Chloride | 3.1 | ug/kg | J | U | 7 |
| K1204356 | SL0363 | K1204356-014 | SW8260C_5035 | Naphthalene | 0.55 | ug/kg | J | U | 7 |
| K1204356 | SL0371 | K1204356-015 | SW8260C_5035 | 1,1,2,2-Tetrachloroethane | 0.13 | ug/kg | U | UJ | 5B |
| K1204356 | SL0371 | K1204356-015 | SW8260C_5035 | Acetone | 51 | ug/kg | | U | 7 |
| K1204356 | SL0371 | K1204356-015 | SW8260C_5035 | Bromomethane | 0.2 | ug/kg | U | UJ | 5B |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| K1204356 | SL0371 | K1204356-015 | SW8260C_5035 | Methylene Chloride | 2.2 | ug/kg | J | U | 7 |
| K1204356 | SL0364 | K1204356-019 | SW8260C_5035 | 1,1,2,2-Tetrachloroethane | 0.13 | ug/kg | U | UJ | 5B |
| K1204356 | SL0364 | K1204356-019 | SW8260C_5035 | Acetone | 35 | ug/kg | | U | 7 |
| K1204356 | SL0364 | K1204356-019 | SW8260C_5035 | Bromomethane | 0.2 | ug/kg | U | UJ | 5B |
| K1204356 | SL0364 | K1204356-019 | SW8260C_5035 | Methylene Chloride | 1.8 | ug/kg | J | U | 7 |
| K1204356 | SL0364 | K1204356-019 | SW8260C_5035 | Naphthalene | 0.36 | ug/kg | J | U | 7 |
| K1204356 | SL0365 | K1204356-020 | SW8260C_5035 | 2-Butanone | 11 | ug/kg | J | U | 7 |
| K1204356 | SL0365 | K1204356-020 | SW8260C_5035 | Acetone | 87 | ug/kg | | U | 7 |
| K1204356 | SL0365 | K1204356-020 | SW8260C_5035 | Bromomethane | 0.25 | ug/kg | U | UJ | 5B |
| K1204356 | SL0365 | K1204356-020 | SW8260C_5035 | Carbon disulfide | 6.2 | ug/kg | J | J | 5B |
| K1204356 | SL0365 | K1204356-020 | SW8260C_5035 | Methylene Chloride | 5.2 | ug/kg | J | U | 7 |
| K1204356 | SL0365 | K1204356-020 | SW8260C_5035 | Naphthalene | 0.8 | ug/kg | J | U | 7 |
| K1204356 | SL0369 | K1204356-023 | SW8260C_5035 | 2-Butanone | 20 | ug/kg | J | U | 7 |
| K1204356 | SL0369 | K1204356-023 | SW8260C_5035 | Bromomethane | 0.36 | ug/kg | U | UJ | 5B |
| K1204356 | SL0369 | K1204356-023 | SW8260C_5035 | Carbon disulfide | 7.4 | ug/kg | J | J | 5B |
| K1204356 | SL0369 | K1204356-023 | SW8260C_5035 | Methylene Chloride | 6.3 | ug/kg | J | U | 7 |
| K1204356 | SL0332 | K1204356-024 | SW8260C_5035 | Carbon disulfide | 20 | ug/kg | | J | 5B |
| K1204356 | SL0332 | K1204356-024 | SW8260C_5035 | Methylene Chloride | 4.3 | ug/kg | J | U | 7 |
| K1204356 | SL0381 | K1204356-032 | SW8260C_5035 | Bromomethane | 0.02 | mg/kg | U | UJ | 5B |
| K1204356 | SL0381 | K1204356-032 | SW8260C_5035 | Methylene Chloride | 0.072 | mg/kg | J | U | 7 |
| K1204356 | SL0383 | K1204356-034 | SW8260C_5035 | 2-Butanone | 7.8 | ug/kg | J | U | 7 |
| K1204356 | SL0383 | K1204356-034 | SW8260C_5035 | Acetone | 53 | ug/kg | | U | 7 |
| K1204356 | SL0383 | K1204356-034 | SW8260C_5035 | Bromomethane | 0.3 | ug/kg | U | UJ | 5B |
| K1204356 | SL0383 | K1204356-034 | SW8260C_5035 | Carbon disulfide | 8.4 | ug/kg | | J | 5B |
| K1204356 | SL0383 | K1204356-034 | SW8260C_5035 | Methylene Chloride | 4.2 | ug/kg | J | U | 7 |
| K1204377 | SL0417 | K1204377-009 | SW8260C_5035 | 1,1,2,2-Tetrachloroethane | 0.17 | ug/kg | U | UJ | 19 |
| K1204377 | SL0417 | K1204377-009 | SW8260C_5035 | 1,2,3-Trichlorobenzene | 0.24 | ug/kg | U | UJ | 19 |
| K1204377 | SL0417 | K1204377-009 | SW8260C_5035 | 1,2,3-Trichloropropane | 0.57 | ug/kg | U | UJ | 19 |
| K1204377 | SL0417 | K1204377-009 | SW8260C_5035 | 1,2,4-Trichlorobenzene | 0.17 | ug/kg | U | UJ | 19 |
| K1204377 | SL0417 | K1204377-009 | SW8260C_5035 | 1,2,4-Trimethylbenzene | 1 | ug/kg | J | J | 19 |
| K1204377 | SL0417 | K1204377-009 | SW8260C_5035 | 1,2-Dibromo-3-chloropropane | 0.5 | ug/kg | U | UJ | 19 |
| K1204377 | SL0417 | K1204377-009 | SW8260C_5035 | 1,2-Dichlorobenzene | 0.096 | ug/kg | U | UJ | 19 |
| K1204377 | SL0417 | K1204377-009 | SW8260C_5035 | 1,3,5-Trimethylbenzene | 0.46 | ug/kg | J | J | 19 |
| K1204377 | SL0417 | K1204377-009 | SW8260C_5035 | 1,3-Dichlorobenzene | 0.12 | ug/kg | U | UJ | 19 |
| K1204377 | SL0417 | K1204377-009 | SW8260C_5035 | 1,4-Dichlorobenzene | 0.11 | ug/kg | U | UJ | 19 |
| K1204377 | SL0417 | K1204377-009 | SW8260C_5035 | 2-Chlorotoluene | 0.15 | ug/kg | U | UJ | 19 |
| K1204377 | SL0417 | K1204377-009 | SW8260C_5035 | 4-Chlorotoluene | 0.11 | ug/kg | U | UJ | 19 |
| K1204377 | SL0417 | K1204377-009 | SW8260C_5035 | 4-Isopropyl toluene | 0.08 | ug/kg | U | UJ | 19 |
| K1204377 | SL0417 | K1204377-009 | SW8260C_5035 | Bromobenzene | 0.11 | ug/kg | U | UJ | 19 |
| K1204377 | SL0417 | K1204377-009 | SW8260C_5035 | Bromomethane | 0.25 | ug/kg | U | UJ | 5B |
| K1204377 | SL0417 | K1204377-009 | SW8260C_5035 | Carbon disulfide | 15 | ug/kg | | J | 5B |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| K1204377 | SL0417 | K1204377-009 | SW8260C_5035 | Hexachlorobutadiene | 0.5 | ug/kg | U | UJ | 19 |
| K1204377 | SL0417 | K1204377-009 | SW8260C_5035 | Methylene Chloride | 6.7 | ug/kg | J | U | 7 |
| K1204377 | SL0417 | K1204377-009 | SW8260C_5035 | Naphthalene | 1.9 | ug/kg | J | J | 19 |
| K1204377 | SL0417 | K1204377-009 | SW8260C_5035 | n-Butylbenzene | 0.086 | ug/kg | U | UJ | 19 |
| K1204377 | SL0417 | K1204377-009 | SW8260C_5035 | n-Propylbenzene | 0.61 | ug/kg | J | J | 19 |
| K1204377 | SL0417 | K1204377-009 | SW8260C_5035 | sec-Butylbenzene | 0.093 | ug/kg | U | UJ | 19 |
| K1204377 | SL0417 | K1204377-009 | SW8260C_5035 | tert-Butylbenzene | 0.18 | ug/kg | U | UJ | 19 |
| K1204377 | SL0418 | K1204377-010 | SW8260C_5035 | 1,1,2,2-Tetrachloroethane | 0.16 | ug/kg | U | UJ | 19 |
| K1204377 | SL0418 | K1204377-010 | SW8260C_5035 | 1,2,3-Trichlorobenzene | 0.23 | ug/kg | U | UJ | 19 |
| K1204377 | SL0418 | K1204377-010 | SW8260C_5035 | 1,2,3-Trichloropropane | 0.54 | ug/kg | U | UJ | 19 |
| K1204377 | SL0418 | K1204377-010 | SW8260C_5035 | 1,2,4-Trichlorobenzene | 0.16 | ug/kg | U | UJ | 19 |
| K1204377 | SL0418 | K1204377-010 | SW8260C_5035 | 1,2,4-Trimethylbenzene | 1.5 | ug/kg | J | J | 19 |
| K1204377 | SL0418 | K1204377-010 | SW8260C_5035 | 1,2-Dibromo-3-chloropropane | 0.48 | ug/kg | U | UJ | 19 |
| K1204377 | SL0418 | K1204377-010 | SW8260C_5035 | 1,2-Dichlorobenzene | 0.092 | ug/kg | U | UJ | 19 |
| K1204377 | SL0418 | K1204377-010 | SW8260C_5035 | 1,3,5-Trimethylbenzene | 0.51 | ug/kg | J | J | 19 |
| K1204377 | SL0418 | K1204377-010 | SW8260C_5035 | 1,3-Dichlorobenzene | 0.12 | ug/kg | U | UJ | 19 |
| K1204377 | SL0418 | K1204377-010 | SW8260C_5035 | 1,4-Dichlorobenzene | 0.11 | ug/kg | U | UJ | 19 |
| K1204377 | SL0418 | K1204377-010 | SW8260C_5035 | 2-Chlorotoluene | 0.15 | ug/kg | U | UJ | 19 |
| K1204377 | SL0418 | K1204377-010 | SW8260C_5035 | 4-Chlorotoluene | 0.11 | ug/kg | U | UJ | 19 |
| K1204377 | SL0418 | K1204377-010 | SW8260C_5035 | 4-Isopropyl toluene | 0.077 | ug/kg | U | UJ | 19 |
| K1204377 | SL0418 | K1204377-010 | SW8260C_5035 | Bromobenzene | 0.11 | ug/kg | U | UJ | 19 |
| K1204377 | SL0418 | K1204377-010 | SW8260C_5035 | Bromomethane | 0.24 | ug/kg | U | UJ | 5B |
| K1204377 | SL0418 | K1204377-010 | SW8260C_5035 | Carbon disulfide | 14 | ug/kg | | J | 5B |
| K1204377 | SL0418 | K1204377-010 | SW8260C_5035 | Hexachlorobutadiene | 0.48 | ug/kg | U | UJ | 19 |
| K1204377 | SL0418 | K1204377-010 | SW8260C_5035 | Methylene Chloride | 6.8 | ug/kg | J | U | 7 |
| K1204377 | SL0418 | K1204377-010 | SW8260C_5035 | Naphthalene | 2.5 | ug/kg | J | J | 19 |
| K1204377 | SL0418 | K1204377-010 | SW8260C_5035 | n-Butylbenzene | 0.29 | ug/kg | J | J | 19 |
| K1204377 | SL0418 | K1204377-010 | SW8260C_5035 | n-Propylbenzene | 0.71 | ug/kg | J | J | 19 |
| K1204377 | SL0418 | K1204377-010 | SW8260C_5035 | sec-Butylbenzene | 0.089 | ug/kg | U | UJ | 19 |
| K1204377 | SL0418 | K1204377-010 | SW8260C_5035 | tert-Butylbenzene | 0.17 | ug/kg | U | UJ | 19 |
| K1204377 | SL0419 | K1204377-011 | SW8260C_5035 | Acetone | 62 | ug/kg | | U | 7 |
| K1204377 | SL0419 | K1204377-011 | SW8260C_5035 | Carbon disulfide | 5.7 | ug/kg | | J | 5B |
| K1204377 | SL0419 | K1204377-011 | SW8260C_5035 | Methylene Chloride | 3.3 | ug/kg | J | U | 7 |
| K1204377 | SL0421 | K1204377-013 | SW8260C_5035 | Bromomethane | 0.41 | ug/kg | U | UJ | 5B |
| K1204377 | SL0421 | K1204377-013 | SW8260C_5035 | Methylene Chloride | 6.3 | ug/kg | J | U | 7 |
| K1204377 | SL0423 | K1204377-015 | SW8260C_5035 | 1,1,2,2-Tetrachloroethane | 0.34 | ug/kg | U | UJ | 19 |
| K1204377 | SL0423 | K1204377-015 | SW8260C_5035 | 1,2,3-Trichlorobenzene | 0.5 | ug/kg | U | UJ | 19 |
| K1204377 | SL0423 | K1204377-015 | SW8260C_5035 | 1,2,3-Trichloropropane | 1.2 | ug/kg | U | UJ | 19 |
| K1204377 | SL0423 | K1204377-015 | SW8260C_5035 | 1,2,4-Trichlorobenzene | 0.34 | ug/kg | U | UJ | 19 |
| K1204377 | SL0423 | K1204377-015 | SW8260C_5035 | 1,2,4-Trimethylbenzene | 2.6 | ug/kg | J | J | 19 |
| K1204377 | SL0423 | K1204377-015 | SW8260C_5035 | 1,2-Dibromo-3-chloropropane | 1.1 | ug/kg | U | UJ | 19 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| K1204377 | SL0423 | K1204377-015 | SW8260C_5035 | 1,2-Dichlorobenzene | 0.21 | ug/kg | U | UJ | 19 |
| K1204377 | SL0423 | K1204377-015 | SW8260C_5035 | 1,3,5-Trimethylbenzene | 2.4 | ug/kg | J | J | 19 |
| K1204377 | SL0423 | K1204377-015 | SW8260C_5035 | 1,3-Dichlorobenzene | 0.25 | ug/kg | U | UJ | 19 |
| K1204377 | SL0423 | K1204377-015 | SW8260C_5035 | 1,4-Dichlorobenzene | 0.23 | ug/kg | U | UJ | 19 |
| K1204377 | SL0423 | K1204377-015 | SW8260C_5035 | 2-Chlorotoluene | 0.89 | ug/kg | Ui | UJ | 19 |
| K1204377 | SL0423 | K1204377-015 | SW8260C_5035 | 4-Chlorotoluene | 0.23 | ug/kg | U | UJ | 19 |
| K1204377 | SL0423 | K1204377-015 | SW8260C_5035 | 4-Isopropyl toluene | 29 | ug/kg | J | J | 19 |
| K1204377 | SL0423 | K1204377-015 | SW8260C_5035 | Bromobenzene | 0.23 | ug/kg | U | UJ | 19 |
| K1204377 | SL0423 | K1204377-015 | SW8260C_5035 | Carbon disulfide | 50 | ug/kg | | J | 5B |
| K1204377 | SL0423 | K1204377-015 | SW8260C_5035 | Hexachlorobutadiene | 1.1 | ug/kg | U | UJ | 19 |
| K1204377 | SL0423 | K1204377-015 | SW8260C_5035 | Methylene Chloride | 11 | ug/kg | J | U | 7 |
| K1204377 | SL0423 | K1204377-015 | SW8260C_5035 | Naphthalene | 0.34 | ug/kg | U | UJ | 19 |
| K1204377 | SL0423 | K1204377-015 | SW8260C_5035 | n-Butylbenzene | 0.18 | ug/kg | U | UJ | 19 |
| K1204377 | SL0423 | K1204377-015 | SW8260C_5035 | n-Propylbenzene | 0.34 | ug/kg | U | UJ | 19 |
| K1204377 | SL0423 | K1204377-015 | SW8260C_5035 | sec-Butylbenzene | 0.2 | ug/kg | U | UJ | 19 |
| K1204377 | SL0423 | K1204377-015 | SW8260C_5035 | tert-Butylbenzene | 0.37 | ug/kg | U | UJ | 19 |
| K1204377 | SL0425 | K1204377-016 | SW8260C_5035 | 1,2-Dichlorobenzene | 0.56 | ug/kg | J | U | 7 |
| K1204377 | SL0425 | K1204377-016 | SW8260C_5035 | Acetone | 99 | ug/kg | | U | 7 |
| K1204377 | SL0425 | K1204377-016 | SW8260C_5035 | Bromomethane | 0.36 | ug/kg | U | UJ | 5B |
| K1204377 | SL0425 | K1204377-016 | SW8260C_5035 | Methylene Chloride | 5 | ug/kg | J | U | 7 |
| K1204377 | SL0426 | K1204377-017 | SW8260C_5035 | 1,4-Dichlorobenzene | 0.16 | ug/kg | J | U | 7 |
| K1204377 | SL0426 | K1204377-017 | SW8260C_5035 | Bromomethane | 0.35 | ug/kg | U | UJ | 5B |
| K1204377 | SL0426 | K1204377-017 | SW8260C_5035 | Methylene Chloride | 4.8 | ug/kg | J | U | 7 |
| K1204377 | SL0426 | K1204377-017 | SW8260C_5035 | Naphthalene | 0.47 | ug/kg | J | U | 7 |
| K1204377 | SL0427 | K1204377-018 | SW8260C_5035 | 1,4-Dichlorobenzene | 0.27 | ug/kg | J | U | 7 |
| K1204377 | SL0427 | K1204377-018 | SW8260C_5035 | Acetone | 110 | ug/kg | | U | 7 |
| K1204377 | SL0427 | K1204377-018 | SW8260C_5035 | Bromomethane | 0.36 | ug/kg | U | UJ | 5B |
| K1204377 | SL0427 | K1204377-018 | SW8260C_5035 | Methylene Chloride | 4.7 | ug/kg | J | U | 7 |
| K1204377 | SL0427 | K1204377-018 | SW8260C_5035 | Naphthalene | 0.32 | ug/kg | J | U | 7 |
| K1204377 | SL0434 | K1204377-024 | SW8260C_5035 | 2-Butanone | 6 | ug/kg | J | U | 7 |
| K1204377 | SL0434 | K1204377-024 | SW8260C_5035 | Acetone | 40 | ug/kg | | U | 7 |
| K1204377 | SL0434 | K1204377-024 | SW8260C_5035 | Bromomethane | 0.27 | ug/kg | U | UJ | 5B |
| K1204377 | SL0434 | K1204377-024 | SW8260C_5035 | Methylene Chloride | 3.1 | ug/kg | J | U | 7 |
| K1204377 | SL0436 | K1204377-025 | SW8260C_5035 | 2-Butanone | 5.4 | ug/kg | J | U | 7 |
| K1204377 | SL0436 | K1204377-025 | SW8260C_5035 | Acetone | 32 | ug/kg | | U | 7 |
| K1204377 | SL0436 | K1204377-025 | SW8260C_5035 | Bromomethane | 0.23 | ug/kg | U | UJ | 5B |
| K1204377 | SL0436 | K1204377-025 | SW8260C_5035 | Methylene Chloride | 3.1 | ug/kg | J | U | 7 |
| K1204377 | SL0436 | K1204377-025 | SW8260C_5035 | Naphthalene | 0.28 | ug/kg | J | U | 7 |
| K1204377 | SL0437 | K1204377-026 | SW8260C_5035 | 1,3-Dichlorobenzene | 0.27 | ug/kg | J | J | 13 |
| K1204377 | SL0437 | K1204377-026 | SW8260C_5035 | 1,4-Dichlorobenzene | 0.37 | ug/kg | J | U | 7 |
| K1204377 | SL0437 | K1204377-026 | SW8260C_5035 | 2-Butanone | 17 | ug/kg | J | U | 7 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| K1204377 | SL0437 | K1204377-026 | SW8260C_5035 | 4-Isopropyl toluene | 24 | ug/kg | | J | 13 |
| K1204377 | SL0437 | K1204377-026 | SW8260C_5035 | Acetone | 73 | ug/kg | | U | 7 |
| K1204377 | SL0437 | K1204377-026 | SW8260C_5035 | Benzene | 0.41 | ug/kg | J | J | 13 |
| K1204377 | SL0437 | K1204377-026 | SW8260C_5035 | Bromomethane | 0.23 | ug/kg | U | UJ | 5B |
| K1204377 | SL0437 | K1204377-026 | SW8260C_5035 | Carbon disulfide | 41 | ug/kg | | J | 13 |
| K1204377 | SL0437 | K1204377-026 | SW8260C_5035 | Methylene Chloride | 3.7 | ug/kg | J | U | 7 |
| K1204377 | SL0437 | K1204377-026 | SW8260C_5035 | o-Xylene | 0.73 | ug/kg | J | J | 13 |
| K1204377 | SL0437 | K1204377-026 | SW8260C_5035 | Toluene | 0.76 | ug/kg | J | J | 13 |
| K1204377 | SL0438 | K1204377-027 | SW8260C_5035 | 1,2-Dichlorobenzene | 0.2 | ug/kg | J | U | 7 |
| K1204377 | SL0438 | K1204377-027 | SW8260C_5035 | 1,4-Dichlorobenzene | 0.3 | ug/kg | J | U | 7 |
| K1204377 | SL0438 | K1204377-027 | SW8260C_5035 | Acetone | 53 | ug/kg | | U | 7 |
| K1204377 | SL0438 | K1204377-027 | SW8260C_5035 | Benzene | 0.38 | ug/kg | J | U | 7 |
| K1204377 | SL0438 | K1204377-027 | SW8260C_5035 | Bromomethane | 0.28 | ug/kg | U | UJ | 5B |
| K1204377 | SL0438 | K1204377-027 | SW8260C_5035 | Methylene Chloride | 3.6 | ug/kg | J | U | 7 |
| K1204377 | SL0441 | K1204377-030 | SW8260C_5035 | Acetone | 110 | ug/kg | | U | 7 |
| K1204377 | SL0441 | K1204377-030 | SW8260C_5035 | Bromomethane | 2.5 | ug/kg | J | J | 5B |
| K1204377 | SL0441 | K1204377-030 | SW8260C_5035 | Methylene Chloride | 4.7 | ug/kg | J | U | 7 |
| K1204377 | SL0442 | K1204377-031 | SW8260C_5035 | Acetone | 120 | ug/kg | | U | 7 |
| K1204377 | SL0442 | K1204377-031 | SW8260C_5035 | Bromomethane | 2.3 | ug/kg | J | J | 5B |
| K1204377 | SL0442 | K1204377-031 | SW8260C_5035 | Methylene Chloride | 3.3 | ug/kg | J | U | 7 |
| K1204377 | SL0443 | K1204377-032 | SW8260C_5035 | 2-Butanone | 17 | ug/kg | J | U | 7 |
| K1204377 | SL0443 | K1204377-032 | SW8260C_5035 | Acetone | 74 | ug/kg | | U | 7 |
| K1204377 | SL0443 | K1204377-032 | SW8260C_5035 | Bromomethane | 0.29 | ug/kg | J | J | 5B |
| K1204377 | SL0443 | K1204377-032 | SW8260C_5035 | Methylene Chloride | 3.3 | ug/kg | J | U | 7 |
| K1204377 | SL0445 | K1204377-034 | SW8260C_5035 | Carbon disulfide | 23 | ug/kg | | J | 5B |
| K1204377 | SL0445 | K1204377-034 | SW8260C_5035 | Methylene Chloride | 5.9 | ug/kg | J | U | 7 |
| K1204377 | SL0447 | K1204377-036 | SW8260C_5035 | 2-Butanone | 4.4 | ug/kg | J | U | 7 |
| K1204377 | SL0447 | K1204377-036 | SW8260C_5035 | Acetone | 23 | ug/kg | | U | 7 |
| K1204377 | SL0447 | K1204377-036 | SW8260C_5035 | Bromomethane | 0.2 | ug/kg | U | UJ | 5B |
| K1204377 | SL0447 | K1204377-036 | SW8260C_5035 | Methylene Chloride | 2.2 | ug/kg | J | U | 7 |
| K1204377 | SL0447 | K1204377-036 | SW8260C_5035 | Naphthalene | 0.2 | ug/kg | J | U | 7 |
| K1204377 | SL0449 | K1204377-038 | SW8260C_5035 | Acetone | 49 | ug/kg | | U | 7 |
| K1204377 | SL0449 | K1204377-038 | SW8260C_5035 | Bromomethane | 0.35 | ug/kg | J | J | 5B |
| K1204377 | SL0449 | K1204377-038 | SW8260C_5035 | Carbon disulfide | 14 | ug/kg | | J | 5B |
| K1204377 | SL0449 | K1204377-038 | SW8260C_5035 | Methylene Chloride | 5.1 | ug/kg | J | U | 7 |
| K1204377 | TB1 | K1204377-040 | SW8260C_5035 | Hexachlorobutadiene | 0.11 | ug/L | U | UJ | 5B |
| K1204377 | TB2 | K1204377-041 | SW8260C_5035 | Hexachlorobutadiene | 0.11 | ug/L | U | UJ | 5B |
| K1204449 | SL0347 | K1204449-023 | SW8260C_5035 | 2-Butanone | 5 | ug/kg | J | U | 7 |
| K1204449 | SL0347 | K1204449-023 | SW8260C_5035 | Acetone | 44 | ug/kg | | U | 7 |
| K1204449 | SL0347 | K1204449-023 | SW8260C_5035 | Bromomethane | 0.2 | ug/kg | U | UJ | 5B |
| K1204449 | SL0347 | K1204449-023 | SW8260C_5035 | Carbon disulfide | 0.46 | ug/kg | J | U | 7 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| K1204449 | SL0347 | K1204449-023 | SW8260C_5035 | Methylene Chloride | 2.5 | ug/kg | J | U | 7 |
| K1204449 | SL0351 | K1204449-027 | SW8260C_5035 | Bromomethane | 0.24 | ug/kg | U | UJ | 5B |
| K1204449 | SL0351 | K1204449-027 | SW8260C_5035 | Carbon disulfide | 4.8 | ug/kg | J | U | 7 |
| K1204449 | SL0351 | K1204449-027 | SW8260C_5035 | Methylene Chloride | 2.2 | ug/kg | J | U | 7 |
| K1204452 | SL0333 | K1204452-001 | SW8260C_5035 | Acetone | 71 | ug/kg | | U | 7 |
| K1204452 | SL0333 | K1204452-001 | SW8260C_5035 | Bromomethane | 0.22 | ug/kg | U | UJ | 5B |
| K1204452 | SL0333 | K1204452-001 | SW8260C_5035 | Carbon disulfide | 23 | ug/kg | | J | 5B |
| K1204452 | SL0333 | K1204452-001 | SW8260C_5035 | Methylene Chloride | 4 | ug/kg | J | U | 7 |
| K1204452 | SL0333 | K1204452-001 | SW8260C_5035 | Naphthalene | 0.35 | ug/kg | J | U | 7 |
| K1204452 | SL0334 | K1204452-002 | SW8260C_5035 | Acetone | 100 | ug/kg | | U | 7 |
| K1204452 | SL0334 | K1204452-002 | SW8260C_5035 | Bromomethane | 0.24 | ug/kg | U | UJ | 5B |
| K1204452 | SL0334 | K1204452-002 | SW8260C_5035 | Carbon disulfide | 25 | ug/kg | | J | 5B |
| K1204452 | SL0334 | K1204452-002 | SW8260C_5035 | Methylene Chloride | 4.8 | ug/kg | J | U | 7 |
| K1204452 | SL0334 | K1204452-002 | SW8260C_5035 | Naphthalene | 0.26 | ug/kg | J | U | 7 |
| K1204452 | SL0336 | K1204452-004 | SW8260C_5035 | 1,1,1,2-Tetrachloroethane | 0.25 | ug/kg | U | UJ | 19 |
| K1204452 | SL0336 | K1204452-004 | SW8260C_5035 | 1,1,2,2-Tetrachloroethane | 0.3 | ug/kg | U | UJ | 19 |
| K1204452 | SL0336 | K1204452-004 | SW8260C_5035 | 1,1,2-Trichloroethane | 0.34 | ug/kg | U | UJ | 19 |
| K1204452 | SL0336 | K1204452-004 | SW8260C_5035 | 1,2,3-Trichlorobenzene | 0.43 | ug/kg | U | UJ | 19 |
| K1204452 | SL0336 | K1204452-004 | SW8260C_5035 | 1,2,3-Trichloropropane | 1.1 | ug/kg | U | UJ | 19 |
| K1204452 | SL0336 | K1204452-004 | SW8260C_5035 | 1,2,4-Trichlorobenzene | 0.3 | ug/kg | U | UJ | 19 |
| K1204452 | SL0336 | K1204452-004 | SW8260C_5035 | 1,2,4-Trimethylbenzene | 6.5 | ug/kg | J | J | 19 |
| K1204452 | SL0336 | K1204452-004 | SW8260C_5035 | 1,2-Dibromo-3-chloropropane | 0.9 | ug/kg | U | UJ | 19 |
| K1204452 | SL0336 | K1204452-004 | SW8260C_5035 | 1,2-Dibromoethane | 0.22 | ug/kg | U | UJ | 19 |
| K1204452 | SL0336 | K1204452-004 | SW8260C_5035 | 1,2-Dichlorobenzene | 0.18 | ug/kg | U | UJ | 19 |
| K1204452 | SL0336 | K1204452-004 | SW8260C_5035 | 1,3,5-Trimethylbenzene | 3.5 | ug/kg | J | J | 19 |
| K1204452 | SL0336 | K1204452-004 | SW8260C_5035 | 1,3-Dichlorobenzene | 0.22 | ug/kg | U | UJ | 19 |
| K1204452 | SL0336 | K1204452-004 | SW8260C_5035 | 1,3-Dichloropropane | 0.27 | ug/kg | U | UJ | 19 |
| K1204452 | SL0336 | K1204452-004 | SW8260C_5035 | 1,4-Dichlorobenzene | 0.2 | ug/kg | U | UJ | 19 |
| K1204452 | SL0336 | K1204452-004 | SW8260C_5035 | 2-Chlorotoluene | 1.5 | ug/kg | Ui | UJ | 19 |
| K1204452 | SL0336 | K1204452-004 | SW8260C_5035 | 2-Hexanone | 2.1 | ug/kg | U | UJ | 19 |
| K1204452 | SL0336 | K1204452-004 | SW8260C_5035 | 4-Chlorotoluene | 0.2 | ug/kg | U | UJ | 19 |
| K1204452 | SL0336 | K1204452-004 | SW8260C_5035 | 4-Isopropyl toluene | 35 | ug/kg | J | J | 19 |
| K1204452 | SL0336 | K1204452-004 | SW8260C_5035 | Bromobenzene | 0.2 | ug/kg | U | UJ | 19 |
| K1204452 | SL0336 | K1204452-004 | SW8260C_5035 | Bromoform | 0.32 | ug/kg | U | UJ | 19 |
| K1204452 | SL0336 | K1204452-004 | SW8260C_5035 | Bromomethane | 0.45 | ug/kg | U | UJ | 5B |
| K1204452 | SL0336 | K1204452-004 | SW8260C_5035 | Carbon disulfide | 23 | ug/kg | | J | 5B |
| K1204452 | SL0336 | K1204452-004 | SW8260C_5035 | Chlorobenzene | 0.15 | ug/kg | U | UJ | 19 |
| K1204452 | SL0336 | K1204452-004 | SW8260C_5035 | Dibromochloromethane | 0.41 | ug/kg | U | UJ | 19 |
| K1204452 | SL0336 | K1204452-004 | SW8260C_5035 | Ethylbenzene | 1.4 | ug/kg | J | J | 19 |
| K1204452 | SL0336 | K1204452-004 | SW8260C_5035 | Hexachlorobutadiene | 0.9 | ug/kg | U | UJ | 19 |
| K1204452 | SL0336 | K1204452-004 | SW8260C_5035 | Isopropylbenzene | 1.7 | ug/kg | J | J | 19 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| K1204452 | SL0336 | K1204452-004 | SW8260C_5035 | m,p-Xylene | 9.4 | ug/kg | J | J | 19 |
| K1204452 | SL0336 | K1204452-004 | SW8260C_5035 | Methylene Chloride | 12 | ug/kg | J | U | 7 |
| K1204452 | SL0336 | K1204452-004 | SW8260C_5035 | Naphthalene | 1.9 | ug/kg | J | J | 19 |
| K1204452 | SL0336 | K1204452-004 | SW8260C_5035 | n-Butylbenzene | 1.3 | ug/kg | Ui | UJ | 19 |
| K1204452 | SL0336 | K1204452-004 | SW8260C_5035 | n-Propylbenzene | 1.3 | ug/kg | J | J | 19 |
| K1204452 | SL0336 | K1204452-004 | SW8260C_5035 | o-Xylene | 5.7 | ug/kg | J | J | 19 |
| K1204452 | SL0336 | K1204452-004 | SW8260C_5035 | sec-Butylbenzene | 1.3 | ug/kg | J | J | 19 |
| K1204452 | SL0336 | K1204452-004 | SW8260C_5035 | Styrene | 0.32 | ug/kg | U | UJ | 19 |
| K1204452 | SL0336 | K1204452-004 | SW8260C_5035 | tert-Butylbenzene | 0.32 | ug/kg | U | UJ | 19 |
| K1204452 | SL0336 | K1204452-004 | SW8260C_5035 | Tetrachloroethene | 0.36 | ug/kg | U | UJ | 19 |
| K1204452 | SL0336 | K1204452-004 | SW8260C_5035 | trans-1,3-Dichloropropene | 0.25 | ug/kg | U | UJ | 19 |
| K1204452 | SL0338 | K1204452-006 | SW8260C_5035 | Bromomethane | 0.2 | ug/kg | U | UJ | 5B |
| K1204452 | SL0338 | K1204452-006 | SW8260C_5035 | Carbon disulfide | 36 | ug/kg | | J | 5B |
| K1204452 | SL0338 | K1204452-006 | SW8260C_5035 | Methylene Chloride | 4.4 | ug/kg | J | U | 7 |
| K1204452 | SL0340 | K1204452-008 | SW8260C_5035 | Carbon disulfide | 8.8 | ug/kg | | J | 5B |
| K1204452 | SL0340 | K1204452-008 | SW8260C_5035 | Methylene Chloride | 3.8 | ug/kg | J | U | 7 |
| K1204452 | TB1 | K1204452-034 | SW8260C_5035 | Bromomethane | 0.1 | ug/L | U | UJ | 5B |
| K1204452 | TB1 | K1204452-034 | SW8260C_5035 | Naphthalene | 0.088 | ug/L | U | UJ | 5B |
| K1204452 | TB4 | K1204452-035 | SW8260C_5035 | Bromomethane | 0.1 | ug/L | U | UJ | 5B |
| K1204452 | TB4 | K1204452-035 | SW8260C_5035 | Naphthalene | 0.088 | ug/L | U | UJ | 5B |

EcoChem, INC.
Environmental Data Quality

# DATA VALIDATION REPORT

## SAN JACINTO RIVER WASTE PITS
## SPME Fiber Sample Study

**Prepared for:**

Integral Consulting, Inc.
1205 West Bay Dr. NW
Olympia, Washington 98502

**Prepared by:**

EcoChem, Inc.
1011 Western Ave. Suite 1011
Seattle, WA 98104

EcoChem Project: C22130-17

September 10, 2012

**Approved for Release**

Melissa Swanson

## Basis for Data Validation

This report summarizes the results of validation (Stages 2B & 4) performed on the solid-phase microextraction (SPME) fiber sample and quality control (QC) sample data for the San Jacinto River SPME Fiber Sample Study. Field sample ID, laboratory sample ID and requested analyses, compiled by laboratory, are provided in the **Sample Index**. Laboratory batch ID numbers and associated level of validation are provided at the beginning of each technical section.

Samples were analyzed by ALS Environmental, Houston, Texas. The analytical methods and EcoChem project chemists are listed below.

| Analysis | Method of Analysis | Primary Review | Secondary Review |
|---|---|---|---|
| Dioxin & Furan Compounds | EPA 1613B | Kurt Larsen | Melissa Swanson |
| | | Melissa Swanson | Christina Frans |

The data were reviewed using guidance and quality control criteria documented in the analytical methods and the following project and guidance documents:

- *Sampling and Analysis Plan: TCRA Cap Porewater Assessment, San Jacinto River Waste Pits Superfund Site* (Integral/Anchor QEA, May 2012)
- *USEPA National Functional Guidelines for Chlorinated Dioxin/Furan Data Review* (USEPA, September 2011)

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

Data qualifier definitions, reason codes, and validation criteria are included as **Appendix A**. The qualified data summary table is included as **Appendix B.** Data Validation Worksheets and the associated communication records will be kept on file at EcoChem, Inc. A qualified laboratory electronic data deliverable (EDD) was also submitted with this report.

# Sample Index
## San Jacinto River Waste Pits - SPME Fiber Samples

| SDG | Sample ID | Laboratory ID | Native 2378s | PRC 2378s |
|---|---|---|---|---|
| E1200583 | Caulk Blank | E1200583-001 | ✓ | |
| E1200583 | Rinse Blank | E1200583-002 | ✓ | |
| E1200583 | PRC Test | E1200583-003 | | ✓ |
| E1200583 | Fiber Blank | E1200583-004 | ✓ | |
| E1200641 | rinse blank 2 | E1200641-002 | ✓ | |
| E1200641 | PRC intial 1 | E1200641-003 | | ✓ |
| E1200641 | PRC intial 2 | E1200641-004 | | ✓ |
| E1200641 | PRC intial 3 | E1200641-005 | | ✓ |
| E1200641 | Deploy EnvmntBlank 1 | E1200641-008 | ✓ | |
| E1200761 | SJC-PRC-6 | E1200761-001 | | ✓ |
| E1200980 | SP0001 | E1200980-001 | ✓ | |
| E1200980 | SP0002 | E1200980-002 | ✓ | |
| E1200980 | SP0003 | E1200980-003 | ✓ | |
| E1200980 | SP0004 | E1200980-004 | | ✓ |
| E1200980 | SP0005 | E1200980-005 | | ✓ |
| E1200980 | SP0006 | E1200980-006 | | ✓ |
| E1200980 | SP0007 | E1200980-007 | ✓ | |
| E1200980 | SP0008 | E1200980-008 | ✓ | |
| E1200980 | SP0009 | E1200980-009 | ✓ | |
| E1200980 | SP0010 | E1200980-010 | ✓ | |
| E1200980 | SP0011 | E1200980-011 | ✓ | |
| E1200980 | SP0012 | E1200980-012 | ✓ | |
| E1200980 | SP0013 | E1200980-013 | ✓ | |
| E1200980 | SP0014 | E1200980-014 | ✓ | |
| E1200980 | SP0015 | E1200980-015 | ✓ | |
| E1200980 | SP0016 | E1200980-016 | ✓ | |
| E1200980 | SP0017 | E1200980-017 | ✓ | |
| E1200980 | SP0018 | E1200980-018 | ✓ | |
| E1200980 | SP0019 | E1200980-019 | ✓ | |
| E1200980 | SP0020 | E1200980-020 | ✓ | |
| E1200981 | SP0021 | E1200981-001 | ✓ | |
| E1200981 | SP0022 | E1200981-002 | ✓ | |
| E1200981 | SP0023 | E1200981-003 | ✓ | |
| E1200981 | SP0024 | E1200981-004 | ✓ | |
| E1200981 | SP0025 | E1200981-005 | ✓ | |
| E1200981 | SP0026 | E1200981-006 | ✓ | |
| E1200981 | SP0027 | E1200981-007 | | ✓ |
| E1200981 | SP0028 | E1200981-008 | | ✓ |
| E1200981 | SP0029 | E1200981-009 | | ✓ |
| E1200981 | SP0030 | E1200981-010 | ✓ | |
| E1200981 | SP0031 | E1200981-011 | ✓ | |
| E1200981 | SP0032 | E1200981-012 | ✓ | |
| E1200981 | SP0033 | E1200981-013 | ✓ | |
| E1200981 | SP0034 | E1200981-014 | ✓ | |
| E1200981 | SP0035 | E1200981-015 | ✓ | |

## Sample Index
## San Jacinto River Waste Pits - SPME Fiber Samples

| SDG | Sample ID | Laboratory ID | Native 2378s | PRC 2378s |
|---|---|---|---|---|
| E1200981 | SP0036 | E1200981-016 | ✓ | |
| E1200981 | SP0037 | E1200981-017 | ✓ | |
| E1200981 | SP0038 | E1200981-018 | ✓ | |
| E1200981 | SP0039 | E1200981-019 | ✓ | |
| E1200981 | SP0040 | E1200981-020 | ✓ | |
| E1200982 | SP0041 | E1200982-001 | ✓ | |
| E1200982 | SP0042 | E1200982-002 | | ✓ |
| E1200982 | SP0043 | E1200982-003 | | ✓ |
| E1200982 | SP0044 | E1200982-004 | | ✓ |
| E1200982 | SP0045 | E1200982-005 | | ✓ |
| E1200982 | SP0046 | E1200982-006 | ✓ | |
| E1200982 | SP0047 | E1200982-007 | ✓ | |
| E1200982 | SP0048 | E1200982-008 | ✓ | |
| E1200982 | SP0049 | E1200982-009 | ✓ | |
| E1200982 | SP0050 | E1200982-010 | ✓ | |
| E1200982 | SP0051 | E1200982-011 | ✓ | |
| E1200982 | SP0052 | E1200982-012 | ✓ | |
| E1200982 | SP0053 | E1200982-013 | ✓ | |
| E1200982 | SP0054 | E1200982-014 | ✓ | |
| E1200982 | SP0055 | E1200982-015 | ✓ | |
| E1200982 | SP0056 | E1200982-016 | ✓ | |
| E1200982 | SP0057 | E1200982-017 | ✓ | |
| E1200982 | SP0058 | E1200982-018 | ✓ | |
| E1200982 | SP0059 | E1200982-019 | ✓ | |
| E1200982 | SP0060 | E1200982-020 | ✓ | |
| E1200983 | SP0061 | E1200983-001 | ✓ | |
| E1200983 | SP0062 | E1200983-002 | | ✓ |
| E1200983 | SP0063 | E1200983-003 | | ✓ |
| E1200983 | SP0064 | E1200983-004 | | ✓ |
| E1200983 | PRC intial 4 | E1200983-005 | | ✓ |
| E1200983 | PRC intial 5 | E1200983-006 | | ✓ |

# DATA VALIDATION REPORT
# San Jacinto River Waste Pits
# SPME Fiber Samples
# Dioxin/Furan Compounds by EPA 1613B

This report documents the review of analytical data from the analyses of SPME fiber samples and the associated laboratory quality control (QC) samples. ALS Environmental, Houston, Texas, analyzed the samples. Refer to the **Sample Index** for a complete list of samples.

| SDG | Number of Native 2378 Samples | Number of PRC Samples | Validation Level |
|---|---|---|---|
| E1200583 | 3 Field Blanks | 1 Fiber | Stage 2B |
| E1200641 | 2 Field Blanks | 3 Fibers | Stage 2B |
| E1200761 | | 1 Fiber | Stage 2B |
| E1200980 | 17 Fibers | 3 Fibers | Stage 4 |
| E1200981 | 17 Fibers | 3 Fibers | Stage 2B |
| E1200982 | 16 Fibers | 4 Fibers | Stage 2B |
| E1200983 | 1 Fiber | 5 Fibers | Stage 2B |

## I. DATA PACKAGE COMPLETENESS

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

## II. EDD TO HARDCOPY VERIFICATION

Ten percent (10%) of the results in the laboratory electronic data deliverable (EDD) were verified by comparison to the hardcopy laboratory data package. No errors were noted.

***SDG E1200761 (PRC):*** For Sample SJC-PRC-6, the EDD is populated with "Y,*" in the lab flag field. In this sample 13C12-2,3,7,8-TCDD and 13C12-2,3,7,8-TCDF are the target analytes, this lab flag is used when these analytes are used to measure labeled compound recovery and are not applicable to the results as reported. Beyond noting this inconsistency, no further action was taken.

## III. TECHNICAL DATA VALIDATION

The QC requirements that were reviewed are listed in the following table.

| | | | |
|---|---|---|---|
| **1** | Sample Receipt, Preservation, and Holding Times | **1** | Matrix Spike/Matrix Spike Duplicate (MS/MSD) |
| | GC/MS Instrument Performance Check | **1** | Laboratory Control Samples (LCS/LCSD) |
| | Initial Calibration (ICAL) | **1** | Field Replicates |
| | Calibration Verification (CVER) | | Target Analyte List |
| | Isomer Specificity | | Reported Results |
| **1** | Laboratory Blanks | **2** | Compound Identification |
| **1** | Field Blanks | **1** | Calculation Verification (EPA Stage 4 only) |
| **2** | Labeled Compound Recovery | | |

[1] ***Quality control results are discussed below, but no data were qualified.***
[2] ***Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed below.***

### Sample Receipt, Preservation, and Holding Times

The validation guidance documents state that sample shipping coolers should arrive at the laboratory within the advisory temperature range of 2° to 6°C.

***SDG E1200583:*** The laboratory received the sample cooler with a temperature of 21°C, which is greater than advisory range. The laboratory contacted the client who authorized the analyses to proceed. This outlier did not impact data quality; therefore, no data were qualified.

***SDG E1200641:*** The laboratory received the sample cooler with a temperature of 0°C, which is less than advisory range. This outlier did not impact data quality; therefore, no data were qualified

***SDG E1200761:*** The laboratory received the sample cooler with a temperature noted as ambient, which is greater than advisory range. This outlier did not impact data quality; therefore, no data were qualified.

The laboratory did not complete the ”received by” section on the chain-of-custody record (COC). No further action was taken.

***SDGs E1200980, E1200981, & E1200982:*** The laboratory received one of the sample coolers with a temperature greater than advisory range, at 9°C. There was insufficient time for the samples and cooler to achieve a lower temperature as the laboratory received the samples within six hours of collection. These temperature outliers did not impact data quality and no qualifiers were assigned.

***SDG E1200983:*** The laboratory received one sample cooler with a temperature greater than advisory range, at 9°C. There was insufficient time for the samples and cooler to achieve a lower temperature as the laboratory received the samples within six hours of collection. Another cooler was received with a temperature less than advisory range, at 0°C. These temperature outliers did not impact data quality and no qualifiers were assigned.

## Laboratory Blanks

Method blanks were analyzed at the appropriate frequency for native 2,3,7,8-TCDD and 2,3,7,8-TCDF only. No target analytes were detected in any method blanks.

## Field Blanks

***SDG E1200583:*** Three field blanks, Caulk Blank, Rinse Blank, and Fiber Blank, were submitted with this SDG. No target analytes were detected in these blanks.

***SDG E1200641:*** Two field blanks, Rinse Blank 2 and Deployment Environmental Blank 1, were submitted with this SDG. No target analytes were detected in these blanks.

## Labeled Compound Recovery

Two types of field samples were analyzed; non-impregnated sample fibers for native 2,3,7,8-TCDD and 2,3,7,8-TCDF and performance reference compound (PRC) impregnated fibers for 13C-2,3,7,8-TCDD and 13C-2,3,7,8-TCDF. For the PRC samples, 37Cl-2,3,7,8-TCDD was used as the labeled compound for the accuracy measurement.

The labeled compound values were evaluated using the laboratory control limits. If the labeled compound recovery outlier value indicates high bias, positive results for the associated compounds are estimated (J-13); whereas outlier values indicating low bias, positive results and reporting limits for the associated compounds are estimated (J/UJ-13). If the labeled compound recovery outlier value is less than 10%, indicating very low bias, positive results for the associated compounds are estimated (J-13) and reporting limits are rejected (R-13).

***SDG E1200980 (PRC):*** The percent recovery (%R) value for 37Cl-2,3,7,8-TCDD was less than the lower control limit in Sample SP0006. Both results in this sample were estimated (J -13).

***SDG E1200980 (Native):*** The %R value 37Cl-2,3,7,8-TCDD in Sample SP0007 was less than the lower control limit. This compound is a clean-up standard; no data were qualified for this QC result.

***SDG E1200981 (PRC):*** The %R value for 37Cl-2,3,7,8-TCDD was less than the lower control limit in Sample SP0027. The results in this sample were estimated (J/UJ-13).

***SDG E1200981 (Native):*** The %R values for 13C-2,3,7,8-TCDD and 13C-2,3,7,8-TCDF were less than the lower control limit in Samples SP0035, SP0037, and SP0038. The reporting limits for 2,3,7,8-TCDD and 2,3,7,8-TCDF in these samples were estimated (UJ-13).

The %R values for 13C-2,3,7,8-TCDF were less than the lower control limit in Samples SP0026 and SP0040. The reporting limits for 2,3,7,8-TCDF in these samples were estimated (UJ-13).

The %R values were less than the lower control limit for 13C-2,3,7,8-TCDD in Samples SP0036 and SP0039. The reporting limits for 2,3,7,8-TCDD in these samples were estimated (UJ-13). The %R values for 13C-2,3,7,8-TCDF in these samples were less than 10%. The reporting limits for 2,3,7,8-TCDF in these samples were rejected (R-13).

The %R values 37Cl-2,3,7,8-TCDD in eight samples were less than the lower control limit. This compound is a clean-up standard; no data were qualified for this QC result.

***SDG E1200982 (PRC):*** The %R value for 37Cl-2,3,7,8-TCDD was less than the lower control limit in Sample SP0045. The results in this sample were estimated (J/UJ-13).

***SDG E1200982 (Native):*** The %R values for 13C-2,3,7,8-TCDD and 13C-2,3,7,8-TCDF were less than the lower control limit in Samples SP0046, SP0048, SP0050, SP0052, SP0055, and SP0056. The reporting limits for 2,3,7,8-TCDD and 2,3,7,8-TCDF in these samples were estimated (UJ-13).

The %R values were less than the lower control limit for 13C-2,3,7,8-TCDD in Samples SP0041, SP0054, SP0057, SP0059, and SP0060. The reporting limits for 2,3,7,8-TCDD in these samples were estimated (UJ-13). The %R values for 13C-2,3,7,8-TCDF in these samples were less than 10%. The reporting limits for 2,3,7,8-TCDF in these samples were rejected (R-13).

The %R values were less than 10% for 13C-2,3,7,8-TCDD and 13C-2,3,7,8-TCDF in Samples SP0047, SP0049, SP0051, SP0053, and SP0058. The reporting limits for 2,3,7,8-TCDD and 2,3,7,8-TCDF in these samples were rejected (R-13).

The %R values 37Cl-2,3,7,8-TCDD in 15 samples were less than the lower control limit. This compound is a clean-up standard; no data were qualified for this QC result.

***SDG E1200983 (PRC):*** The %R values for 37Cl-2,3,7,8-TCDD was less than the lower control limit in Samples SP0062 and PRC Initial 5. The results in these samples were estimated (J-13).

## Matrix Spike/Matrix Spike Duplicate

Matrix spike/matrix spike duplicate (MS/MSD) samples were not analyzed. Accuracy and precision for native 2,3,7,8-TCDD and 2,3,7,8-TCDF were evaluated using the laboratory control sample/laboratory control sample duplicate (LCS/LCSD).

## Laboratory Control Sample

Accuracy and precision for native 2,3,7,8-TCDD and 2,3,7,8-TCDF were evaluated using the LCS/LCSD. Accuracy for PRC samples was measured using the 37Cl-2378-TCDD %R value. Laboratory precision was not measured for PRC samples.

***SDGs E1200980, E1200981, E1200982,& E1200983:*** Native 2,3,7,8-TCDD and 2,3,7,8-TCDF were not spiked into the LCS/LCSD pair associated with the PRC samples. The %R values for these analytes were reported as zero (0 %R), which was expected.

## Field Replicates

The following acceptance criteria were used to evaluate precision: the relative percent difference (RPD) value control limit is 50% for results greater than 5x the reporting limit (RL). The absolute difference between the sample and replicate must be less than the RL for results less than 5x the RL. No data were qualified based on field replicate precision outliers. Data users should consider the impact of field precision outliers on the reported results. With the exceptions noted below, field precision was acceptable.

***SDG E1200980:*** Three sets of field replicates were submitted, SP0007& SP0010, SP0008 & SP0011, and SP0009 & SP0012. There were no positive results for any of these samples.

***SDG E1200982:*** Three sets of field replicates were submitted, SP0059 & SP0053, SP0060 & SP0054, and SP0061 & SP0055. Sample SP0061 was submitted with SDG E1200983. There were no positive results for Samples SP0059 & SP0053 or SP0060 & SP0054.

### Compound Identification

The laboratory assigned K-flags to results where a peak was detected but did not meet ion ratio quantitation criteria. The reported values cannot be considered as positive identifications for these analytes. These results were considered potential false positives or estimated maximum possible concentrations (EMPC) and were qualified as not detected (U-22) at the reported values. Laboratory blank values flagged "K" were considered as non-detects.

All positive results for 2,3,7,8-TCDF were confirmed on a DB-225 column as required by the method. The 2,3,7,8-TCDF results from the DB-5 column were qualified do-not-report (DNR-11) in favor of the results from the DB-225 column, except for the SDG noted below where only the result from the DB-225 column was reported in the EDD.

### Calculation Verification

***SDG E1200980:*** Several results were verified by recalculation from the raw data. No calculation or transcription errors were noted.

## IV. OVERALL ASSESSMENT

As determined by this evaluation, the laboratory followed the specified analytical method. With the exceptions noted above, accuracy was acceptable as demonstrated by labeled compound and LCS/LCSD %R values. Precision was also acceptable as demonstrated by the LCS/LCSD and field replicate RPD values.

Data were qualified as not detected due to ion ratio criteria outliers. Data were estimated based on labeled compound recovery outliers.

Data were rejected (R) based on very low labeled compound recovery outliers. Data were flagged as do-not-report (DNR) to indicate which result (from multiple reported analyses) should not be used. Data that has been qualified R or flagged DNR should not be used for any purpose.

All other data, as qualified, are acceptable for use.

EcoChem, INC.
Environmental Data Quality

# APPENDIX A

# DATA QUALIFIER DEFINITIONS, REASON CODES, AND CRITERIA TABLES

# DATA VALIDATION QUALIFIER CODES
# Based on National Functional Guidelines

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

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

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

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

# DATA QUALIFIER REASON CODES

| | |
|---|---|
| 1 | Holding Time/Sample Preservation |
| 2 | Chromatographic pattern in sample does not match pattern of calibration standard. |
| 3 | Compound Confirmation |
| 4 | Tentatively Identified Compound (TIC) (associated with NJ only) |
| 5A | Calibration (initial) |
| 5B | Calibration (continuing) |
| 6 | Field Blank Contamination |
| 7 | Lab Blank Contamination (e.g., method blank, instrument, etc.) |
| 8 | Matrix Spike(MS & MSD) Recoveries |
| 9 | Precision (all replicates) |
| 10 | Laboratory Control Sample Recoveries |
| 11 | A more appropriate result is reported (associated with “R” and “DNR” only) |
| 12 | Reference Material |
| 13 | Surrogate Spike Recoveries (a.k.a., labeled compounds & recovery standards) |
| 14 | Other (define in validation report) |
| 15 | GFAA Post Digestion Spike Recoveries |
| 16 | ICP Serial Dilution % Difference |
| 17 | ICP Interference Check Standard Recovery |
| 18 | Trip Blank Contamination |
| 19 | Internal Standard Performance (e.g., area, retention time, recovery) |
| 20 | Linear Range Exceeded |
| 21 | Potential False Positives |
| 22 | Elevated Detection Limit Due to Interference (i.e., laboratory, chemical and/or matrix) |

# EcoChem Validation Guidelines for Dioxin/Furan Analysis by HRMS
## (Based on EPA Reg. 10 SOP, Rev. 2, 1996 & EPA SW-846, Methods 1613b and 8290)

| VALIDATION QC ELEMENT | ACCEPTANCE CRITERIA | ACTION | REASON CODE |
|---|---|---|---|
| Cooler/Storage Temperature | Waters/Solids < 4°C<br>Tissues <-10°C | EcoChem PJ, see TM-05 | 1 |
| Holding Time | Extraction - Water: 30 days from collection<br>*Note:* Under CWA, SDWA, and RCRA the HT for H2O is 7 days*<br>Extraction - Soil: 30 days from collection<br>Analysis: 40 days from extraction | J(+)/UJ(-) if ext > 30 days<br>J(+)/UJ(-) if analysis > 40 Days<br>EcoChem PJ, see TM-05 | 1 |
| Mass Resolution | >=10,000 resolving power at m/z 304.9824<br>Exact mass of m/z 380.9760 w/in 5 ppm of theoretical value (380.97410 to 380.97790) .<br>Analyzed prior to ICAL and at the start and end of each 12 hr. shift | R(+/-) if not met | 14 |
| Window Defining Mix and Column Performance Mix | Window defining mixture/Isomer specificity std run before ICAL and CCAL<br>Valley < 25% (valley = (x/y)*100%)<br>x = ht. of TCDD<br>y = baseline to bottom of valley<br>For all isomers eluting near 2378-TCDD/TCDF isomers (TCDD only for 8290) | J(+) if valley > 25% | 5A (ICAL)<br>5B (CCAL |
| Initial Calibration | Minimum of five standards<br>%RSD < 20% for native compounds<br>%RSD <30% for labeled compounds<br>(%RSD <35% for labeled compounds under 1613b) | J(+) natives if %RSD > 20% | 5A |
| | Abs. RT of $^{13}C_{12}$-1234-TCDD<br>>25 min on DB5<br>>15 min on DB-225 | EcoChem PJ, see TM-05 | |
| | Ion Abundance ratios within QC limits<br>(Table 8 of method 8290)<br>(Table 9 of method 1613B) | EcoChem PJ, see TM-05 | |
| | S/N ratio > 10 for all native and labeled compounds in CS1 std. | If <10, elevate Det. Limit or R(-) | |



Copyright 2007 EcoChem, Inc.

# EcoChem Validation Guidelines for Dioxin/Furan Analysis by HRMS
## (Based on EPA Reg. 10 SOP, Rev. 2, 1996 & EPA SW-846, Methods 1613b and 8290)

| VALIDATION QC ELEMENT | ACCEPTANCE CRITERIA | ACTION | REASON CODE |
|---|---|---|---|
| Continuing Calibration | Analyzed at the start and end of each 12 hour shift.<br>%D+/-20% for native compounds<br>%D +/-30% for labeled compounds<br>(Must meet limits in Table 6, Method 1613B)<br>(If %Ds in the closing CCAL are w/in 25%/35% the avg RF from the two CCAL may be used to calculate samples per Method 8290, Section 8.3.2.4) | Do not qualify labeled compounds. Narrate in report for labeled compound %D outliers.<br>For native compound %D outliers:<br>8290: J(+)/UJ(-) if %D = 20% - 75%<br>J(+)/R(-) if %D > 75%<br>1613: J(+)/UJ(-) if %D is outside Table 6 limits<br>J(+)/R(-) if %D is +/- 75% of Table 6 limit | 5B |
| | Abs. RT of $^{13}C_{12}$-1234-TCDD and $^{13}C12$-123789-HxCDD +/- 15 sec of ICAL. | EcoChem PJ, see ICAL section of TM-05 | |
| | RRT of all other compounds must meet Table 2 of 1613B. | EcoChem PJ, see TM-05 | |
| | Ion Abundance ratios within QC limits<br>(Table 8 of method 8290)<br>(Table 9 of method 1613B) | EcoChem PJ, see TM-05 | |
| | S/N ratio > 10 | If <10, elevate Det. Limit or R(-) | |
| Method Blank | One per matrix per batch<br>No positive results | If sample result <5X action level, qualify U at reported value. | 7 |
| Field Blanks (Not Required) | No positive results | If sample result <5X action level, qualify U at reported value. | 6 |
| LCS / OPR | Concentrations must meet limits in Table 6, Method 1613B or lab limits. | J(+) if %R > UCL<br>J(+)/UJ(-) if %R < LCL<br>J(+)/R(-) using PJ if %R <<LCL (< 10%) | 10 |
| MS/MSD (recovery) | May not analyze MS/MSD<br>%R should meet lab limits. | Qualify parent only unless other QC indicates systematic problems:<br>J(+) if both %R > UCL<br>J(+)/UJ(-) if both %R < LCL<br>J(+)/R(-) if both %R < 10%<br>PJ if only one %R outlier | 8 |
| MS/MSD (RPD) | May not analyze MS/MSD<br>RPD < 20% | J(+) in parent sample if RPD > CL | 9 |



Copyright 2007 EcoChem, Inc.

# EcoChem Validation Guidelines for Dioxin/Furan Analysis by HRMS
## (Based on EPA Reg. 10 SOP, Rev. 2, 1996 & EPA SW-846, Methods 1613b and 8290)

| VALIDATION QC ELEMENT | ACCEPTANCE CRITERIA | ACTION | REASON CODE |
|---|---|---|---|
| Lab Duplicate | RPD <25% if present. | J(+)/UJ(-) if outside limts | 9 |
| Labeled Compounds / Internal Standards | *Method 8290:* %R = 40% - 135% in all samples<br>*Method 1613B:* %R must meet limits specified in Table 7, Method 1613 | J(+)/UJ(-) if %R = 10% to LCL<br>J(+) if %R > UCL<br>J(+)/R(-) if %R < 10% | 13 |
| Quantitation/ Identification | Ions for analyte, IS, and rec. std. must max w/in 2 sec.<br>S/N >2.5<br>IA ratios meet limits in Table 9 of 1613B or Table 8 of 8290<br>RRTs w/in limits in Table 2 of 1613B | If RT criteria not met, use PJ (see TM-05)<br>If S/N criteria not met, J(+).<br>if unlabelled ion abundance not met, change to EMPC<br>If labelled ion abundance not met, J(+). | 21 |
| EMPC (estimated maximum possible concentration) | If quantitation idenfication criteria are not met, laboratory should report an EMPC value. | If laboratory correctly reported an EMPC value, qualify with U to indicate that the value is a detection limit. | 14 |
| Interferences | PCDF interferences from PCDPE | If both detected, change PCDF result to EMPC | 14 |
| Second Column Confirmation | All 2378-TCDF hits must be confirmed on a DB-225 (or equiv) column. All QC specs in this table must be met for the confirmation analysis. | Report lower of the two values.<br>If not performed use PJ (see TM-05). | 3 |
| Field Duplicates | Use QAPP limits. If no QAPP:<br>Solids: RPD <50%<br>OR absolute diff. < 2X RL (for results < 5X RL)<br>Aqueous: RPD <35%<br>OR absolute diff. < 1X RL (for results < 5X RL) | Narrate and qualify if required by project (EcoChem PJ) | 9 |
| Two analyses for one sample | Report only one result per analyte | "DNR" results that should not be used | 11 |



Copyright 2007 EcoChem, Inc.

EcoChem, INC.
Environmental Data Quality

# APPENDIX B
# QUALIFIED DATA SUMMARY TABLE

## Qualified Data Summary Table
## San Jacinto River Waste Pits - SPME Fiber Samples

| SDG | Sample ID | Laboratory ID | Method | Analyte | Result | Units | Lab Qualifier | Validation Qualifier | Validation Reason |
|---|---|---|---|---|---|---|---|---|---|
| E1200980 | SP0006 | E1200980-006 | EPA1613B | 13C12-2,3,7,8-Tetrachlorodibenzo-p-furan | 28.1 | pg | | J | 13 |
| E1200980 | SP0006 | E1200980-006 | EPA1613B | 13C12-2,3,7,8-Tetrachlorodibenzo-p-dioxin | 51 | pg | | J | 13 |
| E1200981 | SP0021 | E1200981-001 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 2.08 | pg | CJ | DNR | 11 |
| E1200981 | SP0024 | E1200981-004 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 4.9 | pg | CJ | DNR | 11 |
| E1200981 | SP0025 | E1200981-005 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 3.14 | pg | JK | U | 22 |
| E1200981 | SP0025 | E1200981-005 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 10.8 | pg | CJ | DNR | 11 |
| E1200981 | SP0026 | E1200981-006 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 1.51 | pg | U | UJ | 13 |
| E1200981 | SP0026 | E1200981-006 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 13.4 | pg | CJ | DNR | 11 |
| E1200981 | SP0027 | E1200981-007 | EPA1613B | 13C12-2,3,7,8-Tetrachlorodibenzo-p-dioxin | 33.9 | pg | | J | 13 |
| E1200981 | SP0027 | E1200981-007 | EPA1613B | 13C12-2,3,7,8-Tetrachlorodibenzo-p-furan | 12.5 | pg | | J | 13 |
| E1200981 | SP0035 | E1200981-015 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 2.07 | pg | U | UJ | 13 |
| E1200981 | SP0035 | E1200981-015 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 2.8 | pg | U | UJ | 13 |
| E1200981 | SP0036 | E1200981-016 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 2.28 | pg | U | UJ | 13 |
| E1200981 | SP0036 | E1200981-016 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 2.27 | pg | U | R | 13 |
| E1200981 | SP0037 | E1200981-017 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 1.58 | pg | U | UJ | 13 |
| E1200981 | SP0037 | E1200981-017 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 1.38 | pg | U | UJ | 13 |
| E1200981 | SP0038 | E1200981-018 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 1.77 | pg | U | UJ | 13 |
| E1200981 | SP0038 | E1200981-018 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 1.86 | pg | U | UJ | 13 |
| E1200981 | SP0039 | E1200981-019 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 2.27 | pg | U | UJ | 13 |
| E1200981 | SP0039 | E1200981-019 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 2.51 | pg | U | R | 13 |
| E1200981 | SP0040 | E1200981-020 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 1.6 | pg | CJ | DNR | 11 |
| E1200981 | SP0040 | E1200981-020 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 3.96 | pg | U | UJ | 13 |
| E1200982 | SP0041 | E1200982-001 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 2.86 | pg | U | UJ | 13 |
| E1200982 | SP0041 | E1200982-001 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 2.09 | pg | U | R | 13 |
| E1200982 | SP0045 | E1200982-005 | EPA1613B | 13C12-2,3,7,8-Tetrachlorodibenzo-p-furan | 3.7 | pg | | J | 13 |
| E1200982 | SP0045 | E1200982-005 | EPA1613B | 13C12-2,3,7,8-Tetrachlorodibenzo-p-dioxin | 0 | pg | | UJ | 13 |
| E1200982 | SP0046 | E1200982-006 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 1.83 | pg | U | UJ | 13 |
| E1200982 | SP0046 | E1200982-006 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 2.01 | pg | U | UJ | 13 |
| E1200982 | SP0047 | E1200982-007 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 5.03 | pg | U | R | 13 |
| E1200982 | SP0047 | E1200982-007 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 3.72 | pg | U | R | 13 |
| E1200982 | SP0048 | E1200982-008 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 1.3 | pg | U | UJ | 13 |
| E1200982 | SP0048 | E1200982-008 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 1.86 | pg | U | UJ | 13 |
| E1200982 | SP0049 | E1200982-009 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 5.98 | pg | U | R | 13 |
| E1200982 | SP0049 | E1200982-009 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 8.35 | pg | U | R | 13 |
| E1200982 | SP0050 | E1200982-010 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 2.24 | pg | U | UJ | 13 |
| E1200982 | SP0050 | E1200982-010 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 2.24 | pg | U | UJ | 13 |
| E1200982 | SP0051 | E1200982-011 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 4.61 | pg | U | R | 13 |
| E1200982 | SP0051 | E1200982-011 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 9.56 | pg | U | R | 13 |

## Qualified Data Summary Table
## San Jacinto River Waste Pits - SPME Fiber Samples

| SDG | Sample ID | Laboratory ID | Method | Analyte | Result | Units | Lab Qualifier | Validation Qualifier | Validation Reason |
|---|---|---|---|---|---|---|---|---|---|
| E1200982 | SP0052 | E1200982-012 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 3.42 | pg | U | UJ | 13 |
| E1200982 | SP0052 | E1200982-012 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 3.77 | pg | U | UJ | 13 |
| E1200982 | SP0053 | E1200982-013 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 8.47 | pg | U | R | 13 |
| E1200982 | SP0053 | E1200982-013 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 6.55 | pg | U | R | 13 |
| E1200982 | SP0054 | E1200982-014 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 4.2 | pg | U | UJ | 13 |
| E1200982 | SP0054 | E1200982-014 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 3 | pg | U | R | 13 |
| E1200982 | SP0055 | E1200982-015 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 3.52 | pg | U | UJ | 13 |
| E1200982 | SP0055 | E1200982-015 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 2.61 | pg | U | UJ | 13 |
| E1200982 | SP0056 | E1200982-016 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 3.09 | pg | U | UJ | 13 |
| E1200982 | SP0056 | E1200982-016 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 2.59 | pg | U | UJ | 13 |
| E1200982 | SP0057 | E1200982-017 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 3.98 | pg | U | UJ | 13 |
| E1200982 | SP0057 | E1200982-017 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 3.69 | pg | U | R | 13 |
| E1200982 | SP0058 | E1200982-018 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 4.1 | pg | U | R | 13 |
| E1200982 | SP0058 | E1200982-018 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 5.61 | pg | U | R | 13 |
| E1200982 | SP0059 | E1200982-019 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 3.6 | pg | U | R | 13 |
| E1200982 | SP0059 | E1200982-019 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 3.62 | pg | U | UJ | 13 |
| E1200982 | SP0060 | E1200982-020 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 2.53 | pg | U | UJ | 13 |
| E1200982 | SP0060 | E1200982-020 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 3.07 | pg | U | R | 13 |
| E1200983 | SP0061 | E1200983-001 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 5.03 | pg | CJ | DNR | 11 |
| E1200983 | SP0061 | E1200983-001 | EPA1613B | 2,3,7,8-Tetrachlorodibenzo-p-furan | 5.32 | pg | JK | U | 22 |
| E1200983 | SP0062 | E1200983-002 | EPA1613B | 13C12-2,3,7,8-Tetrachlorodibenzo-p-dioxin | 50.4 | pg | | J | 13 |
| E1200983 | SP0062 | E1200983-002 | EPA1613B | 13C12-2,3,7,8-Tetrachlorodibenzo-p-furan | 16.6 | pg | | J | 13 |
| E1200983 | PRC initial 5 | E1200983-006 | EPA1613B | 13C12-2,3,7,8-Tetrachlorodibenzo-p-furan | 144 | pg | | J | 13 |
| E1200983 | PRC initial 5 | E1200983-006 | EPA1613B | 13C12-2,3,7,8-Tetrachlorodibenzo-p-dioxin | 166 | pg | | J | 13 |

Integral Consulting Inc.
1205 West Bay Drive NW
Olympia, WA 98502

telephone: 360.705.3534
facsimile: 360.705.3669
www.integral-corp.com

# MEMORANDUM

| | |
|---|---|
| **To:** | File |
| **From:** | Craig Hutchings |
| **Date:** | July 24, 2012 |
| **Subject:** | Data Quality Assessment – Kirby Marine Terminal Sediment Samples |
| **Project No.:** | C643-1401 |

This memorandum documents the data quality assessment of the dioxin and furan data from six sediment samples analyzed by ALS Environmental Laboratories of Burlington, Ontario, using EPA Method 1613B (USEPA 1994). The samples were collected to characterize sediment material planned for dredging at the Kirby Marine Terminal on the San Jacinto River in Channelview, Texas, by ATC Associates Inc. (ATC), and the data were presented in a sampling and analysis report prepared by ATC (ATC 2011).

The samples received a Level II (Stage 2A) validation, which included a review of data package completeness, sample receipt and holding times, and all laboratory summary forms of quality control. The data validation was based upon criteria described in U.S. Environmental Protection Agency's (EPA's) functional guidelines for chlorinated dioxin and furan data review (USEPA 2011) and the referenced analytical methods. The quality assurance and quality control (QA/QC) parameters reviewed are discussed below.

The samples reviewed are summarized in Table 1. Qualifiers resulting from the validation process were entered into the project database. A reason code indicating the reason for qualification was also entered into the database. The definitions of the data qualifiers used are provided in Table 2 and descriptions of the reason codes used are provided in Table 3. For example, if a data point was estimated due to a laboratory duplicate precision outlier, the qualifier "J" and the reason code "Rep" would be entered into the database, indicated as J - Rep in the discussion of findings below.

### Data Package Completeness

The data package was complete and included a summary of sample results, laboratory quality control samples, and the sample chain-of-custody form.

### Sample Receipt and Holding Time

Samples were received with complete chain-of-custody forms and in good condition. The samples were received by the laboratory at 1.9°C, below the lower control limit of 2°C. The samples were not frozen and no qualifiers were assigned on this basis. All analyses were conducted within the holding time of one year specified in EPA method 1613B (USEPA 1994).

### Laboratory Blank

Octachlorinated dibenzo-p-dioxin (OCDD) was detected in the laboratory blank at a concentration less than the method reporting limit (MRL). All samples contained OCDD at concentrations above the MRL and much greater than 10 times the concentration detected in the laboratory blank; no results were qualified based on laboratory blank.

### Labeled Compound Recovery

Labeled compounds were added to all samples and all percent recoveries were within the control limits specified in EPA Method 1613B (USEPA 1994).

### Ongoing Precision and Recovery Standard

The percent recoveries of all analytes in the ongoing precision and recovery standard were within the control limits specified in EPA Method 1613B (USEPA 1994).

### Laboratory Duplicate

The laboratory performed a duplicate on Sample 01 East Surface. Criteria for laboratory duplicates are not specified in EPA Method 1613B (USEPA 1994) or the EPA's functional guidelines for chlorinated dioxin and furan data review (USEPA 2011). The duplicate was evaluated using the control limit of a relative percent difference (RPD) of less than 25% specified in EPA Method 8290A (USEPA 2007). The RPDs for two dioxin compounds, five furan compounds and six homolog groups were greater than 25% and the results for these analytes were estimated (J – Rep) in the parent sample and duplicate.

Qualifiers were not assigned when one or both results were less than the MRL.

## Analytical Method and Reporting Limits

The chain of custody requested EPA Method 8290 (USEPA 2007); however, the samples were analyzed by EPA Method 1613B. Both methods are listed as acceptable in the October 21, 2009 public announcement (USEPA et.al. 2009), which presented information regarding this sampling effort, and as the laboratory performing the analyses possessed the required National Environmental Laboratory Accreditation Program certification, no data was qualified on this basis.

Target MRLs were not specified, the reported MRLs are consistent with the methodologies used and the intended uses of the data.

The laboratory flagged several results R to indicate that the method specified ion abundance ratio criteria were not met. These results were qualified as not detected (U – IAR).

2,3,7,8-Tetrachlordibenzofuran was detected in all samples; however, the method specified second column confirmation for this analyte was not performed. All 2,3,7,8-tetrachlordibenzofuran results were estimated (J – Conf).

## Overall Assessment

A total of 175 results were reported. Of these, 49 (39%) results were qualified. Twenty-six results were estimated (J) based on laboratory duplicate RPD outliers, 7 results were estimated (J) due to lack of second column confirmation, and 16 results were qualified as not detected (U) due to ion abundance ratio outliers. No data were rejected for any reason. Completeness was 100%. A summary of all qualified results is presented in Table 4.

All data, as qualified, are acceptable for use.

## References

ATC. 2011. Report of Sediment Sampling and Analysis, Kirby Marine Terminal San Jacinto River Channelview, Texas. Prepared for Orion Construction, LP. ATC Associates Inc. May 27, 2011.

USEPA. 1994. Method 1613, Tetra- through Octa-chlorinated Dioxins and Furans by Isotope Dilution HRGC/HRMS. U.S. Environmental Protection Agency, Office of Water, Washington, DC. October 1994.

USEPA. 2007. SW-846: Test Methods for Evaluating Solid Wastes Physical/Chemical Methods, Method 8290A, Polychlorinated Dibenzo-p-Dioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by High-Resolution Gas Chromatography/High Resolution Mass Spectrometry (HRGC/HRMS), Revision 1. U.S. Environmental Protection Agency, Washington, DC. February 2007.

USEPA Region 6, U.S. Army Corps of Engineers, Galveston District, and Texas Commission on Environmental Quality. 2009. San Jacinto Waste Pits Public Announcement October 21, 2009.

USEPA. 2011. USEPA Contract Laboratory Program (CL) Functional Guidelines for Chlorinated Dibenzo-p-Dioxins (CDDs) and Chlorinated Dibenzofurans Data Review. OSWER 9240.1-53. EPA 540-R-11-016. U.S. Environmental Protection Agency, Office of Emergency and Remedial Response, Washington, DC. September 2011.

Table 1. Samples Reviewed

| Sample | Laboratory ID |
|---|---|
| Sample 01 East Surface | L998110-1 |
| Sample 01 East 15' | L998110-2 |
| Sample 02 Center Surface | L998110-3 |
| Sample 02 Center 15' | L998110-4 |
| Sample 03 West Surface | L998110-5 |
| Sample 03 West 15' | L998110-6 |

Table 2. Definition of Data Qualifiers

| Data Qualifier | Definition |
|---|---|
| J | Estimated . The associated numerical value is an estimated value. |
| U | Not Detected. The analyte is considered to be not detected at the reported value. |

Table 3. Definition of Data Validation Reason Codes

| Reason Code | Definition |
|---|---|
| CONF | Compound confirmation |
| IAR | Ion bundance ratio |
| REP | Replication ( laboratory duplicate RPD) |

Table 4. Summary of Qualified Data

| Sample | Analyte | Result | Lab Qualifier | DV Qualifier | DV Qualifier Reason | Units |
|---|---|---|---|---|---|---|
| Sample 01 East Surface | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin | 103 | | J | Rep | pg/g |
| Sample 01 East Surface | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-furan | 16.6 | | J | Rep | pg/g |
| Sample 01 East Surface | 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin | 1.7 | M,R | U | IAR | pg/g |
| Sample 01 East Surface | 1,2,3,4,7,8,9-Heptachlorodibenzo-p-furan | 1.42 | M | J | Rep | pg/g |
| Sample 01 East Surface | 2,3,7,8-Tetrachlorodibenzo-p-furan | 29.3 | M | J | Conf | pg/g |
| Sample 01 East Surface | 1,2,3,4,7,8-Hexachlorodibenzo-p-furan | 2.26 | M | J | Rep | pg/g |
| Sample 01 East Surface | 2,3,4,7,8-Pentachlorodibenzo-p-furan | 1.58 | M | J | Rep | pg/g |
| Sample 01 East Surface | Heptachlorodibenzo-p-dioxin (Total) | 275 | | J | Rep | pg/g |
| Sample 01 East Surface | Heptachlorodibenzo-p-furan (Total) | 63.6 | | J | Rep | pg/g |
| Sample 01 East Surface | Hexachlorodibenzo-p-dioxin (Total) | 17.1 | | J | Rep | pg/g |
| Sample 01 East Surface | Hexachlorodibenzo-p-furan (Total) | 20.2 | | J | Rep | pg/g |
| Sample 01 East Surface | Octachlorodibenzo-p-dioxin | 1780 | | J | Rep | pg/g |
| Sample 01 East Surface | Octachlorodibenzo-p-furan | 104 | | J | Rep | pg/g |
| Sample 01 East Surface | Pentachlorodibenzo-p-dioxin (Total) | 6.14 | | J | Rep | pg/g |
| Sample 01 East Surface | Pentachlorodibenzo-p-furan (Total) | 10.8 | | J | Rep | pg/g |
| Sample 01 East 15' | 2,3,7,8-Tetrachlorodibenzo-p-furan | 258 | | J | Conf | pg/g |
| Sample 02 Center Surface | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin | 0.79 | M,J,R | U | IAR | pg/g |
| Sample 02 Center Surface | 1,2,3,4,7,8-Hexachlorodibenzo-p-furan | 2.3 | M,R | U | IAR | pg/g |
| Sample 02 Center Surface | 1,2,3,6,7,8-Hexachlorodibenzo-p-furan | 1.05 | M,R | U | IAR | pg/g |
| Sample 02 Center Surface | 1,2,3,7,8,9-Hexachlorodibenzo-p-furan | 0.38 | M,J,R | U | IAR | pg/g |
| Sample 02 Center Surface | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin | 0.63 | M,J,R | U | IAR | pg/g |
| Sample 02 Center Surface | 2,3,7,8-Tetrachlorodibenzo-p-furan | 52 | M | J | Conf | pg/g |
| Sample 02 Center 15' | 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin | 4.4 | M,R | U | IAR | pg/g |
| Sample 02 Center 15' | 1,2,3,7,8,9-Hexachlorodibenzo-p-furan | 0.61 | M,J,R | U | IAR | pg/g |
| Sample 02 Center 15' | 2,3,7,8-Tetrachlorodibenzo-p-furan | 149 | | J | Conf | pg/g |
| Sample 03 West Surface | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin | 1 | M,R | U | IAR | pg/g |
| Sample 03 West Surface | 2,3,7,8-Tetrachlorodibenzo-p-furan | 173 | | J | Conf | pg/g |
| Sample 03 West 15' | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin | 0.54 | M,J,R | U | IAR | pg/g |
| Sample 03 West 15' | 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin | 0.85 | M,R | U | IAR | pg/g |
| Sample 03 West 15' | 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin | 1.7 | R | U | IAR | pg/g |
| Sample 03 West 15' | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin | 0.26 | M,J,R | U | IAR | pg/g |
| Sample 03 West 15' | 2,3,4,7,8-Pentachlorodibenzo-p-furan | 0.093 | M,J,R | U | IAR | pg/g |
| Sample 03 West 15' | 2,3,7,8-Tetrachlorodibenzo-p-furan | 2.32 | M | J | Conf | pg/g |
| Sample 01 East Surface Duplicate | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin | 43.5 | | J | Rep | pg/g |
| Sample 01 East Surface Duplicate | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-furan | 7.52 | M | J | Rep | pg/g |
| Sample 01 East Surface Duplicate | 1,2,3,4,7,8,9-Heptachlorodibenzo-p-furan | 0.952 | M | J | Rep | pg/g |
| Sample 01 East Surface Duplicate | 1,2,3,4,7,8-Hexachlorodibenzo-p-furan | 1.7 | | J | Rep | pg/g |
| Sample 01 East Surface Duplicate | 2,3,4,7,8-Pentachlorodibenzo-p-furan | 1.14 | M | J | Rep | pg/g |
| Sample 01 East Surface Duplicate | Heptachlorodibenzo-p-dioxin (Total) | 139 | | J | Rep | pg/g |
| Sample 01 East Surface Duplicate | Heptachlorodibenzo-p-furan (Total) | 18.5 | | J | Rep | pg/g |
| Sample 01 East Surface Duplicate | Hexachlorodibenzo-p-dioxin (Total) | 9.16 | | J | Rep | pg/g |
| Sample 01 East Surface Duplicate | 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin | 1.1 | M,R | U | IAR | pg/g |
| Sample 01 East Surface Duplicate | 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin | 1.1 | M,R | U | IAR | pg/g |
| Sample 01 East Surface Duplicate | Hexachlorodibenzo-p-furan (Total) | 8.24 | | J | Rep | pg/g |
| Sample 01 East Surface Duplicate | 2,3,7,8-Tetrachlorodibenzo-p-furan | 27.6 | M | J | Conf | pg/g |
| Sample 01 East Surface Duplicate | Octachlorodibenzo-p-dioxin | 1050 | | J | Rep | pg/g |
| Sample 01 East Surface Duplicate | Octachlorodibenzo-p-furan | 60 | | J | Rep | pg/g |
| Sample 01 East Surface Duplicate | Pentachlorodibenzo-p-dioxin (Total) | 3.52 | | J | Rep | pg/g |
| Sample 01 East Surface Duplicate | Pentachlorodibenzo-p-furan (Total) | 7.2 | | J | Rep | pg/g |

Notes:
Lab Qualifiers
J = Indicates that a target analyte was detected below the calibration range.
M = Indicates that a peak has been manually integrated.
R = Indicates that the ion abundance ratio for this compound did not meet the acceptance criterion.

DV Qualifiers
J = Estimated. The associated numerical value is an estimated value.
U = Not Detected. The analyte is considered to be not detected at the reported value.

DV Qualifier Reason
CONF = Compound confirmation
IAR = Ion bundance ratio
REP = Replication ( laboratory duplicate RPD)

# APPENDIX B
# BIOTA–SEDIMENT ACCUMULATION FACTORS

# TABLE OF CONTENTS


1 INTRODUCTION ..... B1-1
1.1 Background ..... B1-2
1.2 Objectives ..... B1-3
2 CHEMICALS SELECTED FOR CALCULATION OF BSAFS ..... B2-1
3 METHODS ..... B3-1
3.1 Calculation of Tissue Concentrations ..... B3-1
3.2 Calculation of Sediment Concentrations ..... B3-2
3.2.1 Crab and Catfish $C_S$ – FCA SWACs ..... B3-2
3.2.1.1 Sediment Data Selected ..... B3-3
3.2.1.2 GIS Generation of Thiessen Polygons ..... B3-3
3.2.1.3 Surface Area-Weighted Average Concentration Calculation ..... B3-4
3.2.2 Clam $C_S$ –Transect-Vicinity Sediment Mean Concentrations ..... B3-5
4 RESULTS ..... B4-1
5 REFERENCES ..... B5-1


## List of Tables


Table B-1 Results of Univariate Correlation (tau-b) for Individual Dioxin and Furan Congeners in Sediment and Crab Edible Tissue
Table B-2 Results of Univariate Correlation (tau-b) for Individual Dioxin and Furan Congeners in Sediment and Catfish Fillet
Table B-3 Correlation Statistics between Clam Edible Tissue and Surface Sediment
Table B-4 Concentrations of Each Dioxin and Furan Congener in Edible Crab and Catfish Fillet Tissues Used in BSAF Calculations
Table B-5 BSAFs Calculated for Each Dioxin and Furan Congener in Clam Tissue for which Significant Bivariate Correlations Occurred
Table B-6 Polygon Areas for Calculation of SWACs Used in Calculation of BSAFs
Table B-7 SWACs for Calculation of BSAFs for Individual Dioxin and Furan Congeners in FCA 1, FCA 2, and FCA 3

Table B-8 BSAFs Calculated for Each Dioxin and Furan Congener in Crab and Catfish Tissue for which Significant Bivariate Correlations Occurred

## List of Figures

Figure B-1 Scatterplot of Edible Blue Crab Tissue vs. Surface Sediment Concentrations of 1,2,3,6,7,8-HxCDD

Figure B-2 Illustration of Thiessen Polygon Refinement

## List of Acronyms and Abbreviations

| Abbreviation | Definition |
|---|---|
| BSAF | biota–sediment accumulation factor |
| COPC | chemical of potential concern |
| FCA | fish collection area |
| HpCDD | heptachlorodibenzo-*p*-dioxin |
| HpCDF | heptachlorodibenzfuran |
| HxCDD | hexachlorodibenzo-*p*-dioxin |
| HxCDF | hexachlorodibenzofuran |
| OCDD | octachlorodibenzo-*p*-dioxin |
| OCDF | octachlorodibenzofuran |
| PeCDD | pentachlorodibenzo-*p*-dioxin |
| PeCDF | pentachlorodibenzofuran |
| PSCR | Preliminary Site Characterization Report |
| PCB | polychlorinated biphenyl |
| RI | remedial investigation |
| SE | standard error |
| SWAC | surface area-weighted average concentration |
| TCDD | tetrachlorodibenzo-*p*- dioxin |
| TCDF | tetrachlorodibenzofuran |
| TCEQ | Texas Commission on Environmental Quality |
| TCRA | time critical removal action |
| TDSHS | Texas Department of State Health Services |
| TEF | toxicity equivalency factor |
| TEQ | toxicity equivalent |

| | |
|---|---|
| $TEQ_{DF.M}$ | TEQ concentration for dioxin and furan congeners calculated using mammalian TEFs |
| TMDL | Total Maximum Daily Load |
| USEPA | U.S. Environmental Protection Agency |

# 1 INTRODUCTION

U.S. Environmental Protection Agency (USEPA) comment 20 on the Preliminary Site Characterization Report (PSCR) (Integral and Anchor QEA 2012) requires calculation of biota–sediment accumulation factors (BSAFs) specifically for this Remedial Investigation (RI), citing guidance from the Texas Risk Reduction Program. This appendix satisfies that requirement. In comment 20, USEPA cites the use of the BSAF in deriving acceptable sediment concentrations "to be protective of human consumption of edible fish and shellfish." Therefore, this appendix addresses only those chemicals for which a seafood ingestion pathway results in risks considered unacceptable under USEPA guidelines. For human receptors, these chemicals include dioxins and furans and polychlorinated biphenyls (PCBs); and for ecological receptors, only dioxins and furans are relevant.

However, BSAFs for PCBs are not presented. Data for PCBs in sediment collected for this RI are limited because PCBs were considered secondary chemicals of potential concern (COPCs) at the time that the sediment study was designed (Integral and Anchor QEA 2010), and because of subsequent decisions in the COPC Technical Memorandum (COPC Tech Memo, Integral 2011). As a result, the spatial extent of data for PCBs in sediment is substantially less than that of dioxins and furans. Moreover, data for PCBs in sediments from within USEPA's Preliminary Site Perimeter consist of concentrations of Aroclors, which were only detected once in sediments, or concentrations of only the 12 dioxin-like PCB congeners. For all but three dioxin-like PCB congeners, sediment concentrations correlate statistically with concentrations of 2,3,7,8-tetrachlorodibenzo-*p*-dioxin (TCDD) and 2,3,7,8-tetrachloro-dibenzofuran (TCDF) in sediment (see Table 6 of the COPC Tech Memo, Integral 2011), and therefore, any cleanup for dioxins and furans would be expected to also address these PCBs. For these reasons, BSAFs for PCBs are not needed and were not calculated.

Although mercury in catfish contributed to potential risks associated with the area addressed by the baseline human health risk assessment, BSAFs for mercury are not presented. Mercury BSAFs were not calculated because the mercury hazard associated with background exposure to methylmercury in catfish fillets was similar to or higher than the mercury hazard within USEPA's Preliminary Site Perimeter, indicating that any exposures from within USEPA's Preliminary Site Perimeter are not contributing risks due to methylmercury.

## 1.1 Background

As described in the Technical Memorandum on Bioaccumulation Modeling (Bioaccumulation Tech Memo; Integral 2010), ratios are the simplest possible representation of the relationship between chemical concentrations in sediment and in tissue. Ratios are calculated as the concentration in the tissue of interest, divided by the concentration in a single exposure medium, which may be sediment, water, or food. Examples of commonly used ratios are the bioconcentration factor (tissue/water), the BSAF (tissue/sediment), and the biomagnification factor (tissue/prey). Underlying their use is the assumption of a strictly proportional relationship between concentrations in the two media.

Although ratios are widely used, the assumption of proportionality is rarely demonstrated to be justified, even though the assumption could be evaluated using statistical analyses in all but the smallest datasets. For example, using data from the Texas Commission on Environmental Quality (TCEQ) Total Maximum Daily Load (TMDL) program for dioxins, the concentration of 1,2,3,6,7,8-HxCDD in sediment can be plotted against the concentration of this congener in crab tissue in a scatterplot (Figure B-1). Figure B-1 clearly illustrates that there is not a linear relationship between the two variables. Correlation analysis for this dataset using Kendall's tau-b indicates that the data are not significantly correlated (Table B-1). However, one could calculate a ratio for each co-located pair, or a ratio of one mean to the other, or several other possible ratios. Those ratios will not reliably predict the edible blue crab tissue concentration of 1,2,3,6,7,8-hexachlorodibenzo-*p*-dioxin (HxCDD) when multiplied by a concentration of this congener in sediment. What Figure B-1 demonstrates is that edible blue crab tissue concentration of this chemical cannot be predicted from sediment alone; without further analysis and incorporation of additional variables, there is no way to predict 1,2,3,6,7,8-HxCDD in edible crab tissue. Those multivariate approaches that have been tried (Integral 2010; Dean et al. 2009) have also found that environmental variables explain very little of the variation in tissue concentrations of most dioxin and furan congeners.

The Bioaccumulation Tech Memo provides many more examples of this—i.e., where scatterplots of sediment-tissue data pairs using data for dioxins and furans in sediment and

tissue collected regionally indicate no correlation between concentrations of any of the congeners in these two media, and that any relationship between them does not have a zero intercept. In fact, the assumptions of the BSAF are not met by any of the datasets made up of co-located pairs of sediment and tissue chemistry. Therefore, although simple to calculate and understand, ratios tend to oversimplify complex phenomena, and incorporate several key assumptions that should be tested before the ratios are used to derive sediment preliminary remediation goals or support remedial decisions or risk analyses.

Regression analysis of concentrations in tissue and sediment, or between different tissue types (e.g., a consumer and its prey), is a straightforward method using well-established statistical procedures. It can be considered to be a generalization of the ratio method: ratios are equivalent to regression equations with the intercept forced to zero. Use of BSAFs to predict chemical concentrations in tissue from those in sediment is only appropriate when a regression analysis yields a statistically significant linear regression equation using sediment concentration as the independent variable and tissue concentration as the dependent variable, and when the analysis results in a regression model with a zero intercept. In this case, the slope of the line is equivalent to the BSAF. Multiplied by a concentration in sediment, such a BSAF would result in an approximation of the concentration of the same chemical in tissue.

## 1.2 Objectives

The objective of this appendix is to meet the requirement of USEPA's comment 20 on the draft PSCR (see Appendix I of that document for the comments). This appendix presents BSAFs only for dioxins and furans.

## 2 CHEMICALS SELECTED FOR CALCULATION OF BSAFS

The Bioaccumulation Tech Memo (Integral 2010) presents the results of bivariate correlation analyses for all seventeen 2,3,7,8-substituted dioxin and furan congeners using data from throughout the Houston Ship Channel-Galveston Bay area for sediment, edible crab, and catfish fillet generated by the TCEQ TMDL program for dioxins (University of Houston and Parsons 2006), and using tissue data generated by the Texas Department of State Health Services (TDSHS 2005). Very few bivariate correlations were found, and the strongest correlations (highest tau-b values) were for the tetrachlorinated compounds in both edible crab and catfish fillet (Tables B-1 and B-2). Most were poorly correlated and non-significant. For catfish fillets, one of the five significant correlations (octachlorodibenzofuran [OCDF]) was negative.

At the request of USEPA (in comment 21 on the PSCR, see Appendix I of that document), the PSCR also presents correlation statistics for edible crab, catfish fillet, and clam tissue, including bivariate correlations for toxic equivalents (TEQs) calculated using mammalian toxicity equivalency factors (TEFs) ($TEQ_{DF,M}$), despite technical concerns with this approach described by Integral (2010). Correlation statistics using $TEQ_{DF,M}$ were derived using only data collected for the RI, a much smaller dataset than that of the TMDL program. For crab, the correlation using $TEQ_{DF,M}$ concentrations was significant and is shown in Table B-1; for catfish, this correlation was not significant, and is not presented. For clams, only the RI dataset provides relevant information for correlation analysis. Complete results of the bivariate correlation analysis for clams presented in the PSCR are presented in Table B-3; congeners with significant correlations, as well as the result of the correlation analysis using $TEQ_{DF,M}$, are shown.

These analyses identify the congeners for which a two-way correlation is possible, and those for which it is not. Results were used to select those dioxin and furan congeners for which BSAFs were calculated, i.e., those congeners for which a significant correlation was found. The congeners include:

- Edible crab (Table B-1):
  - 2,3,7,8-TCDD
  - 1,2,3,4,6,7,8-heptachlorodibenzo-*p*-dioxin (HpCDD)

  - octachlorodibenzo-*p*-dioxin (OCDD)
  - 2,3,7,8-TCDF
  - 1,2,3,7,8-pentachlorodibenzofuran (PeCDF)
  - 2,3,4,7,8-PeCDF
  - 1,2,3,6,7,8-hexachlorodibenzofuran (HxCDF)
  - $TEQ_{DF,M}$
- Catfish fillet (Table B-2):
  - 2,3,7,8-TCDD
  - 1,2,3,7,8-pentachlorodibenzo-*p*-dioxin (PeCDD)
  - 2,3,7,8-TCDF
  - 2,3,4,7,8-PeCDF
  - OCDF
- Whole clams (Table B-3):
  - 2,3,7,8-TCDD
  - 1,2,3,4,6,7,8-HpCDD
  - 2,3,7,8-TCDF
  - $TEQ_{DF,M}$.

Using aggregate variables (i.e., $TEQ_{DF,M}$) in this sort of statistical evaluation is problematic, because the application of TEFs to congener concentrations to derive the TEQ simply amplifies the importance of the TEF, and does not reflect a better understanding of biological phenomena. TEF is applicable to understanding toxicity, not bioaccumulation. Moreover, all 17 congeners have different properties, and statistical comparison using TEQ concentrations obscures the individual chemical behaviors, uptake rates, elimination rates, bioavailability and other controls on tissue concentrations (Integral 2010). However, the relationships based on $TEQ_{DF,M}$ are notable because the lack of significant relationships for many of the seventeen 2,3,7,8-substituted congeners in the different tissue types means that results are insufficient to be used to estimate complete TEQ concentrations using BSAFs. Although this issue is addressed for clam and edible crab, it cannot be resolved for catfish.

# 3 METHODS

A BSAF is calculated using the following equation:

$$BSAF = C_T \div C_S \qquad \text{Eq. 3-1}$$

where:

BSAF = biota sediment accumulation factor (kg dw sediment/kg ww tissue)

$C_T$ = concentration of chemical in tissue (ng chem/kg ww tissue)

$C_S$ = concentration of chemical in sediment (ng chem/kg dw sediment)

Calculation of BSAFs for this appendix was performed using only those data generated for the RI, which are part of the baseline dataset, and only data for the area within USEPA's Preliminary Site Perimeter (background samples were not used). The approach used to calculate the BSAFs recognizes the limited spatial resolution of the tissue samples. Specifically, tissue data collected for the RI were collected as composites of several individuals within broad areas of the area within USEPA's Preliminary Site Perimeter consisting of fish collection areas (FCAs) for crab and catfish, or of transects for clams. Each composite sample was not spatially referenced, so BSAFs cannot be calculated using sediment concentrations at individual sediment locations or using individual tissue concentrations. The greatest spatial refinement of tissue data is at the level of the FCA or transect. Therefore, for crab and catfish, surface area-weighted average concentrations (SWACs) of each congener in each FCA were calculated for use in the denominator of the equation ($C_S$). For clams, $C_S$ was determined using the average concentration of sediment from the four stations closest to a given transect. Methods and results for calculating each term in the equation are presented below.

## 3.1 Calculation of Tissue Concentrations

For the $C_T$ term in the calculation, the mean, the mean plus the standard error on the mean (SE), and the mean minus the SE were calculated for each set of composite tissue samples within each FCA or along each transect. This is necessary to capture the variation in the tissue data for each congener. Results of those calculations for edible crab and catfish fillets are shown in Table B-4; results for clam tissue are given in Table B-5.

## 3.2 Calculation of Sediment Concentrations

Because tissue data for catfish and crab are not spatially referenced within FCAs, calculation of BSAFs for these tissue types requires that one number be used to represent the sediment concentration. Because sediment samples were not evenly spaced across the FCAs, SWACs were calculated to serve as the denominator for catfish fillet and edible crab BSAFs.

Clams were collected in localized areas, and as a result, sediment samples nearby are the most appropriate representation of their exposures. For clam BSAF calculations, the mean and SE concentration for each congener in the four sediment samples nearest the transect were used as the denominator. Detailed methods are described below.

### *3.2.1 Crab and Catfish $C_S$ – FCA SWACs*

For the $C_S$ term in Equation 3-1 and to maximize the spatial resolution of the BSAFs for crab and catfish, congener-specific SWACs were required for each FCA. Catfish fillet and edible crab tissue samples were collected for the RI in 2010, prior to implementation of the time critical removal action (TCRA), and represent the baseline condition. Sediment samples were also collected in 2010 (with a few minor exceptions) to represent baseline (pre-TCRA) conditions. Temporal correspondence of these data is appropriate for calculation of BSAFs. SWACs were therefore calculated from the baseline sediment dataset for the area within USEPA's Preliminary Site Perimeter, which represents the pre-TCRA condition, thereby corresponding to the tissue dataset used.

To calculate the BSAF for crab and catfish tissue in each FCA, FCA-specific SWACs were first calculated using Thiessen polygons. A Thiessen polygon is defined as the area around a sampling location that includes all points in space that are closer to that sampling location than they are to any other sampling location. The polygon-specific percent of the FCA area described by each Thiessen polygon provides a factor that can be used to weight the concentration of the subject chemical at the sampling location that the polygon represents. These weighted values are then summed to generate the FCA-specific SWAC for that chemical.

In this way, for each sampling station, the chemical concentration is weighted by percent of the area represented by the polygon; these values are then summed to generate the FCA-specific SWAC for that chemical. Area-weighting of surface sediment concentrations using Thiessen polygons is a well-established method of accounting for different spatial sampling densities within and across sampling programs.

#### *3.2.1.1 Sediment Data Selected*

For this evaluation, Thiessen polygons were generated using the RI surface sediment sampling locations. To do this, those samples with an upper depth of 0 cm were included in the polygon calculations. The lower depths of these surface sediment chemistry data are typically 6 inches, but can reach up to 12 inches. Also, within the 1966 perimeter of the impoundments north of I-10, sampling sites were located in some areas that were not typically subtidal or were barely intertidal. These sites would not come into contact with the water during regular tidal cycles, and were therefore excluded from SWAC calculations because fish and crabs would not regularly be exposed to them. These sampling locations were all at least 50 feet inland from the shoreline.

Also, five pairs of co-located grab/core samples were present from the RI sediment study: SJNE008, SJNE023, SJNE028, SJNE041, and SJNE043. These were plotted as single points, because multiple Thiessen polygons cannot be calculated for co-located points. In these cases, concentration data were always sourced from the grab samples rather than the core samples; grab samples include material from 0 to 6 inches below the surface, whereas core samples include material from 0 to 12 inches below the surface. In all cases where sampling sites were proximal but not co-located, separate Thiessen polygons were derived.

#### *3.2.1.2 GIS Generation of Thiessen Polygons*

Locations at which surface sediment concentrations for each dioxin and furan congener were available were plotted using the northing and easting coordinates, and projected into the North American Datum 1983 State Plane Texas South Central Zone, FIPS 4204 Feet coordinate system.

For baseline sediment conditions, Thiessen polygons were created separately for FCA 1, FCA 2, and FCA 3. In each case, qualifying sampling locations that fell within the given FCA boundary were used to generate the set of polygons. Once the polygons were created, they were clipped to the shoreline boundary, which removed those portions of the Thiessen polygons located in upland areas, and were clipped at USEPA's Preliminary Site Perimeter. Final editing of the Thiessen polygons was performed to ensure that they were not separated by land masses. In some cases, land in the form of an island or peninsula divided post-clipped polygons. In these instances, polygons were trimmed, merged, or otherwise edited so that they were attributed to the nearest point forming a contiguous, discrete polygon that would reflect reasonable continuity in actual exposure areas of fish or crabs. This eliminated situations in which a small region of water was attributed to a sampling site located on the other side of an upland land mass (Figure B-2). After all clipping and editing were completed, the final areas of each polygon were calculated in the local projection and exported for SWAC calculation (Table B-6).

#### *3.2.1.3 Surface Area-Weighted Average Concentration Calculation*

The exported Thiessen polygon areas were combined with a database of the dioxin and furan congener concentrations for each sampling location. To calculate the SWAC for each scenario, the following equation was used:

$$SWAC = \sum (\text{Area of station-specific polygon/Area FCA}) \times \text{Station-specific congener concentration} \qquad \text{Eq. 3-2}$$

Each polygon had a unique congener concentration available for multiplication by the fraction of the total area represented by that sample. Once the multiplication was complete for all sampling locations in each FCA, the resulting set of values for each congener was then summed, yielding the SWAC for that congener. Repeating the process for each FCA ultimately produced a SWAC for each congener for each of the three FCAs (Table B-7).

### 3.2.2 Clam $C_S$ –Transect-Vicinity Sediment Mean Concentrations

Unlike crab and catfish tissue samples, clam tissue samples were collected from discrete transects within the FCAs, rather than from locations throughout each FCA. Consequently, an FCA-specific SWAC is not appropriate for the BSAF $C_S$ term for clam tissue. Mean sediment concentrations in the vicinity of each clam collection transect were previously calculated in the PSCR (see Table 6-56 of that document; Integral and Anchor QEA 2012): mean sediment concentration was determined from the four surface sediment stations closest to any given transect. These sediment means serve as the $C_S$ term for clam-tissue BSAF calculation (Table B-5).

# 4 RESULTS

BSAFs were calculated for each tissue type, as described by Equation 3-1. BSAFs for crab and catfish tissue are provided in Table B-8; BSAFs for clam tissue are given in Table B-5. As discussed in Section 3.1, the $C_T$ term was calculated as the mean and as the mean plus or minus the standard error to capture the variation in the tissue data for each congener. A BSAF was calculated using the appropriate SWAC or transect sediment mean for the full range of $C_T$ terms for each congener in each tissue type.

BSAFs for each chemical in each tissue type show significant variation, up to 3 orders of magnitude, depending on the location of the samples (e.g., clams at Transect 3 versus Transect 1, Table B-5). This is consistent with the absence of correlation between tissue concentrations and sediment concentrations for any of these congeners. Even for those congeners with significant (if weak) correlations, the slope of the line is very small (i.e., the BSAF), meaning that a substantial increase in sediment concentrations does not generate a substantial increase in tissue concentrations. The variability in the BSAFs calculated with these data—particularly the high variability in BSAFs for clams, which have the strongest sediment-tissue correlations in the RI dataset—indicates that use of BSAFs to predict tissue concentrations from sediment concentrations, or to back calculate "acceptable" sediment concentrations from tissue concentrations, will generate unreliable results.

# 5 REFERENCES


Dean, K.E., M.P. Suarez, H.S. Rifai, R.M. Palachek, and L. Koenig, 2009. Bioaccumulation of polychlorinated dibenzodioxins and dibenzofurans in catfish and crabs along an estuarine salinity and contamination gradient. *Environ. Toxicol. Chem.* 28(11):2307–2317.

Integral, 2010. Technical Memorandum on Bioaccumulation Modeling, San Jacinto River Waste Pits Superfund Site. Prepared for McGinnes Industrial Maintenance Corporation, International Paper Company, and U.S. Environmental Protection Agency, Region 6. Integral Consulting Inc., Seattle, WA. September.

Integral, 2011. COPC Technical Memorandum, San Jacinto River Waste Pits Superfund Site. Prepared for McGinnes Industrial Maintenance Corporation, International Paper Company, and U.S. Environmental Protection Agency, Region 6. Integral Consulting Inc., Seattle, WA. May.

Integral and Anchor QEA, 2010. Sampling and Analysis Plan: Sediment Study. San Jacinto River Waste Pits Superfund Site. Prepared for McGinnes Industrial Maintenance Corporation, International Paper Company, and U.S. Environmental Protection Agency, Region 6. Integral Consulting Inc., Seattle, WA. April.

Integral and Anchor QEA, 2012. Preliminary Site Characterization Report, San Jacinto River Waste Pits Superfund Site. Prepared for McGinnes Industrial Maintenance Corporation, International Paper Company, and U.S. Environmental Protection Agency, Region 6. Anchor QEA, LLC, Ocean Springs, MS, and Integral Consulting Inc., Seattle, WA. February.

TDSHS, 2005. Characterization of Potential Health Risks Associated with Consumption of Fish or Blue Crabs from the Houston Ship Channel, the San Jacinto River (Tidal Portions, Tabbs Bay, and Upper Galveston Bay). Texas Department of State Health Services, Seafood and Aquatic Life Group, Policy, Standards, and Quality Assurance Unit and Regulatory Services Division, Austin, TX.

University of Houston and Parsons, 2006. Total Maximum Daily Loads for Dioxins in the Houston Ship Channel. Contract No. 582-6-70860, Work Order No. 582-6-70860-02. Quarterly report No. 3. Prepared in cooperation with the Texas Commission on Environmental Quality and the U.S. Environmental Protection Agency. University of

Houston and Parsons Water & Infrastructure. Available at: http://www.tceq.state.tx.us/assets/public/implementation/water/tmdl/26hscdioxin/26-all-data-compiled-q3-fy06.pdf.

# TABLES

**Table B-1**

**Results of Univariate Correlation (tau-b) for Individual Dioxin and Furan Congeners in Sediment and Crab Edible Tissue**

| Analyte | tau-b | *p* -Value |
|---|---|---|
| 2,3,7,8-TCDD | 0.434 | **< 0.001** |
| 1,2,3,7,8-PeCDD | 0.0401 | 0.447 |
| 1,2,3,4,7,8-HxCDD | 0.0450 | 0.393 |
| 1,2,3,6,7,8-HxCDD | 0.0517 | 0.329 |
| 1,2,3,7,8,9-HxCDD | -0.00204 | 0.970 |
| 1,2,3,4,6,7,8-HpCDD | 0.168 | **0.00162** |
| OCDD | 0.149 | **0.00507** |
| 2,3,7,8-TCDF | 0.465 | **< 0.001** |
| 1,2,3,7,8-PeCDF | 0.255 | **< 0.001** |
| 2,3,4,7,8-PeCDF | 0.282 | **< 0.001** |
| 1,2,3,4,7,8-HxCDF | 0.141 | 0.00748 |
| 1,2,3,6,7,8-HxCDF | 0.165 | **0.00181** |
| 1,2,3,7,8,9-HxCDF | 0.0405 | 0.443 |
| 2,3,4,6,7,8-HxCDF | 0.0677 | 0.199 |
| 1,2,3,4,6,7,8-HpCDF | 0.0605 | 0.253 |
| 1,2,3,4,7,8,9-HpCDF | 0.0638 | 0.227 |
| OCDF | 0.0149 | 0.780 |
| $TEQ_{DF,M}$ [a, b] | 1.00 | **0.0894** |

**Notes**

*p* values ≤ 0.10 are in boldface type.

HpCDD – heptachlorodibenzo-*p* - dioxin
HpCDF – heptachlorodibenzofuran
HxCDD – hexachlorodibenzo-*p* - dioxin
HxCDF – hexachlorodibenzofuran
OCDD – octachlorodibenzo-*p* -dioxin
OCDF – octachlorodibenzofuran
PeCDD – pentachlorodibenzo-*p* -dioxin
PeCDF – pentachlorodibenzofuran
TCDD – tetrachlorodibenzo-*p* - dioxin
TCDF – tetrachlorodibenzofuran

a - This result was first presented in the PSCR (Integral and Anchor QEA 2012) and uses only the baseline RI data set. Results for individual congeners in this table were presented in the Bioaccumulation Tech Memo (Integral 2010), and use data generated by the TMDL program.

b - $TEQ_{DF,M}$ (ND=1/2DL) = Toxicity equivalent for 2,3,7,8-tetrachlorinated dibenzo-p-dioxin (TCDD) calculated using dioxins and furans and mammalian toxicity equivalency factors (van den Berg et al. 2006) with nondetects set at one-half the detection limit.

**Table B-2**

**Results of Univariate Correlation (tau-b) for Individual Dioxin and Furan Congeners in Sediment and Catfish Fillet**

| Analyte | tau-b | *p* -Value |
|---|---|---|
| 2,3,7,8-TCDD | 0.449 | **< 0.001** |
| 1,2,3,7,8-PeCDD | 0.144 | **0.0295** |
| 1,2,3,4,7,8-HxCDD | 0.0603 | 0.362 |
| 1,2,3,6,7,8-HxCDD | -0.0627 | 0.345 |
| 1,2,3,7,8,9-HxCDD | -0.0405 | 0.542 |
| 1,2,3,4,6,7,8-HpCDD | 0.0295 | 0.658 |
| OCDD | 0.0469 | 0.482 |
| 2,3,7,8-TCDF | 0.299 | **< 0.001** |
| 1,2,3,7,8-PeCDF | 0.0192 | 0.771 |
| 2,3,4,7,8-PeCDF | 0.193 | **0.00360** |
| 1,2,3,4,7,8-HxCDF | 0.0435 | 0.506 |
| 1,2,3,6,7,8-HxCDF | 0.0245 | 0.711 |
| 1,2,3,7,8,9-HxCDF | -0.0782 | 0.233 |
| 2,3,4,6,7,8-HxCDF | 0.00280 | 0.968 |
| 1,2,3,4,6,7,8-HpCDF | -0.0467 | 0.476 |
| 1,2,3,4,7,8,9-HpCDF | -0.0506 | 0.440 |
| OCDF | -0.191 | **0.00402** |

**Notes**

*p* values ≤ 0.10 are in boldface type.

HpCDD – heptachlorodibenzo-*p* - dioxin
HpCDF – heptachlorodibenzofuran
HxCDD – hexachlorodibenzo-*p* - dioxin
HxCDF – hexachlorodibenzofuran
OCDD – octachlorodibenzo-*p* -dioxin
OCDF – octachlorodibenzofuran
PeCDD – pentachlorodibenzo-*p* -dioxin
PeCDF – pentachlorodibenzofuran
TCDD – tetrachlorodibenzo-*p* - dioxin
TCDF – tetrachlorodibenzofuran

**Table B-3**
**Correlation Statistics between Clam Edible Tissue and Surface Sediment**

| Analyte | Wet Weight Tissue vs. Dry Weight Sediment | |
|---|---|---|
| | Tau | P |
| 2,3,7,8-TCDD | 0.667 | **0.0382** |
| 1,2,3,7,8-PeCDD | 0.00 | 1.00 |
| 1,2,3,4,7,8-HxCDD | 0.00 | 1.00 |
| 1,2,3,6,7,8-HxCDD | -0.286 | 0.356 |
| 1,2,3,7,8,9-HxCDD | -0.238 | 0.449 |
| 1,2,3,4,6,7,8-HpCDD | -0.619 | **0.0715** |
| OCDD | -0.143 | 0.764 |
| 2,3,7,8-TCDF | 0.714 | **0.0355** |
| 1,2,3,7,8-PeCDF | 0.190 | 0.588 |
| 2,3,4,7,8-PeCDF | 0.286 | 0.334 |
| 1,2,3,4,7,8-HxCDF | 0.0952 | 0.861 |
| 1,2,3,6,7,8-HxCDF | 0.190 | 0.597 |
| 1,2,3,7,8,9-HxCDF | 0.00 | 1.00 |
| 2,3,4,6,7,8-HxCDF | -0.238 | 0.454 |
| 1,2,3,4,6,7,8-HpCDF | -0.286 | 0.356 |
| 1,2,3,4,7,8,9-HpCDF | -0.0476 | 1.00 |
| OCDF | 0.00 | 1.00 |
| $TEQ_{DF,M}$ [a, b] | 0.714 | **0.0355** |

**Notes**

P values ≤ 0.10 are in boldface type.

HpCDD – heptachlorodibenzo-*p* - dioxin
HpCDF – heptachlorodibenzofuran
HxCDD – hexachlorodibenzo-*p* - dioxin
HxCDF – hexachlorodibenzofuran
OCDD – octachlorodibenzo-*p* -dioxin
OCDF – octachlorodibenzofuran
PeCDD – pentachlorodibenzo-*p* -dioxin
PeCDF – pentachlorodibenzofuran
TCDD – tetrachlorodibenzo-*p* - dioxin
TCDF – tetrachlorodibenzofuran

a - This result was first presented in the PSCR (Integral and Anchor QEA 2012) and uses only the baseline RI data set. Results for individual congeners in this table were presented in the Bioaccumulation Tech Memo (Integral 2010), and use data generated by the TMDL program.

b - $TEQ_{DF,M}$ (ND=1/2DL) = Toxicity equivalent for 2,3,7,8-tetrachlorinated dibenzo-p-dioxin (TCDD) calculated using dioxins and furans and mammalian toxicity equivalency factors (van den Berg et al. 2006) with nondetects set at one-half the detection limit.

**Table B-4**

**Concentrations of Each Dioxin and Furan Congener[a] in Edible Crab and Catfish Fillet Tissues Used in BSAF Calculations**

| Analyte | Crab Edible Tissue (ng/kg ww) | | | Catfish Fillet (ng/kg ww) | | |
|---|---|---|---|---|---|---|
| | Mean | Mean + SE | Mean - SE | Mean | Mean + SE | Mean - SE |
| **Fish Collection Area 1** | | | | | | |
| 2,3,7,8-TCDD | 0.523 | 0.668 | 0.377 | 2.77 | 3.27 | 2.27 |
| 1,2,3,7,8-PeCDD | -- | -- | -- | 0.0630 | 0.0829 | 0.0430 |
| 1,2,3,4,6,7,8-HpCDD | 0.134 | 0.163 | 0.105 | -- | -- | -- |
| OCDD | 0.645 | 0.870 | 0.420 | -- | -- | -- |
| 2,3,7,8-TCDF | 1.39 | 1.69 | 1.08 | 0.319 | 0.415 | 0.223 |
| 1,2,3,7,8-PeCDF | 0.0289 | 0.0312 | 0.0266 | -- | -- | -- |
| 2,3,4,7,8-PeCDF | 0.0276 | 0.0296 | 0.0256 | 0.111 | 0.146 | 0.0755 |
| 1,2,3,6,7,8-HxCDF | 0.0442 | 0.0590 | 0.0293 | -- | -- | -- |
| OCDF | -- | -- | -- | 0.0494 | 0.0577 | 0.0410 |
| $TEQ_{DF,M}$[b] | 0.739 | 0.918 | 0.561 | -- | -- | -- |
| **Fish Collection Area 2** | | | | | | |
| 2,3,7,8-TCDD | 0.126 | 0.163 | 0.0894 | 3.60 | 3.94 | 3.27 |
| 1,2,3,7,8-PeCDD | -- | -- | -- | 0.0978 | 0.120 | 0.0755 |
| 1,2,3,4,6,7,8-HpCDD | 0.0347 | 0.0426 | 0.0267 | -- | -- | -- |
| OCDD | 0.329 | 0.442 | 0.215 | -- | -- | -- |
| 2,3,7,8-TCDF | 0.504 | 0.611 | 0.397 | 0.779 | 0.888 | 0.670 |
| 1,2,3,7,8-PeCDF | 0.0258 | 0.0275 | 0.0241 | -- | -- | -- |
| 2,3,4,7,8-PeCDF | 0.0257 | 0.0273 | 0.0240 | 0.157 | 0.186 | 0.128 |
| 1,2,3,6,7,8-HxCDF | 0.0181 | 0.0191 | 0.0171 | -- | -- | -- |
| OCDF | -- | -- | -- | 0.0357 | 0.0393 | 0.0320 |
| $TEQ_{DF,M}$[b] | 0.230 | 0.274 | 0.185 | -- | -- | -- |

**Table B-4**

**Concentrations of Each Dioxin and Furan Congener[a] in Edible Crab and Catfish Fillet Tissues Used in BSAF Calculations**

| Analyte | Crab Edible Tissue (ng/kg ww) | | | Catfish Fillet (ng/kg ww) | | |
|---|---|---|---|---|---|---|
| | Mean | Mean + SE | Mean - SE | Mean | Mean + SE | Mean - SE |
| **Fish Collection Area 3** | | | | | | |
| 2,3,7,8-TCDD | 0.0608 | 0.0716 | 0.0500 | 2.97 | 3.30 | 2.64 |
| 1,2,3,7,8-PeCDD | -- | -- | -- | 0.1299 | 0.1671 | 0.0928 |
| 1,2,3,4,6,7,8-HpCDD | 0.0282 | 0.0316 | 0.0247 | -- | -- | -- |
| OCDD | 0.0962 | 0.109 | 0.0837 | -- | -- | -- |
| 2,3,7,8-TCDF | 0.238 | 0.314 | 0.163 | 0.579 | 0.693 | 0.465 |
| 1,2,3,7,8-PeCDF | 0.0309 | 0.0337 | 0.0282 | -- | -- | -- |
| 2,3,4,7,8-PeCDF | 0.0295 | 0.0320 | 0.0270 | 0.158 | 0.197 | 0.120 |
| 1,2,3,6,7,8-HxCDF | 0.0197 | 0.0221 | 0.0174 | -- | -- | -- |
| OCDF | -- | -- | -- | 0.0573 | 0.0810 | 0.0336 |
| $TEQ_{DF,M}$[b] | 0.146 | 0.164 | 0.127 | -- | -- | -- |

**Notes**

-- = For this congener, no statisitcally significant correlation was found for this tissue type with sediment.

HpCDD – heptachlorodibenzo-*p* - dioxin
HpCDF – heptachlorodibenzofuran
HxCDD – hexachlorodibenzo-*p* - dioxin
HxCDF – hexachlorodibenzofuran
OCDD – octachlorodibenzo-*p* -dioxin
OCDF – octachlorodibenzofuran
PeCDD – pentachlorodibenzo-*p* -dioxin
PeCDF – pentachlorodibenzofuran
TCDD – tetrachlorodibenzo-*p* - dioxin
TCDF – tetrachlorodibenzofuran

a - Congeners not shown did not have statistically significant bivariate correlations in the TCEQ's TMDL data set (catfish and crab).

b - $TEQ_{DF,M}$ (ND=1/2DL) = Toxicity equivalent for 2,3,7,8-tetrachlorinated dibenzo-p-dioxin (TCDD) calculated using dioxins and furans and mammalian toxicity equivalency factors (van den Berg et al. 2006) with nondetects set at one-half the detection limit.

**Table B-5**
**BSAFs Calculated for Each Dioxin and Furan Congener in Clam Tissue for which Significant Bivariate Correlations Occurred**

| Analyte | Mean Concentration in Edible Clam Tissue [a] (ng/kg, wet weight) | | Mean + SE (ng/kg, wet weight) | Mean - SE (ng/kg, wet weight) | Mean Concentration in Sediment [a] (ng/kg, dry weight) | | BSAF (kg dw sed/kg ww tissue) | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Mean | Mean + SE | Mean - SE |
| **TRANSECT 1** | | | | | | | | | |
| 2,3,7,8-TCDD | 1.19 | J | 1.40 | 0.977 | 0.790 | J | 1.51 | 1.78 | 1.24 |
| 1,2,3,7,8-PeCDD | 0.0303 | U | | | 0.0390 | J | | | |
| 1,2,3,4,7,8-HxCDD | 0.0255 | U | | | 0.0878 | J | | | |
| 1,2,3,6,7,8-HxCDD | 0.0317 | U | | | 0.198 | J | | | |
| 1,2,3,7,8,9-HxCDD | 0.0278 | U | | | 0.260 | J | | | |
| 1,2,3,4,6,7,8-HpCDD | 0.734 | J | 0.929 | 0.540 | 6.69 | | 0.110 | 0.139 | 0.0807 |
| OCDD | 6.51 | | | | 244 | | | | |
| 2,3,7,8-TCDF | 4.31 | J | 4.95 | 3.67 | 3.11 | | 1.39 | 1.59 | 1.18 |
| 1,2,3,7,8-PeCDF | 0.0287 | U | | | 0.0930 | J | | | |
| 2,3,4,7,8-PeCDF | 0.0347 | U | | | 0.0255 | J | | | |
| 1,2,3,4,7,8-HxCDF | 0.0315 | U | | | 0.128 | J | | | |
| 1,2,3,6,7,8-HxCDF | 0.0303 | U | | | 0.0501 | J | | | |
| 1,2,3,7,8,9-HxCDF | 0.0494 | U | | | 0.0645 | U | | | |
| 2,3,4,6,7,8-HxCDF | 0.0359 | U | | | 0.0396 | J | | | |
| 1,2,3,4,6,7,8-HpCDF | 0.0356 | U | | | 0.595 | | | | |
| 1,2,3,4,7,8,9-HpCDF | 0.0497 | U | | | 0.0431 | J | | | |
| OCDF | 0.0690 | U | | | 6.81 | | | | |
| $TEQ_{DF,M}$ [b] | 1.70 | | 1.95 | 1.44 | 1.38 | | 1.23 | 1.41 | 1.05 |
| **TRANSECT 3** | | | | | | | | | |
| 2,3,7,8-TCDD | 12.0 | | 13.9 | 10.1 | 8,280 | | 0.00145 | 0.00168 | 0.00122 |
| 1,2,3,7,8-PeCDD | 0.0275 | U | | | 109 | J | | | |
| 1,2,3,4,7,8-HxCDD | 0.0387 | U | | | 24.0 | J | | | |
| 1,2,3,6,7,8-HxCDD | 0.0463 | U | | | 18.5 | J | | | |
| 1,2,3,7,8,9-HxCDD | 0.0412 | U | | | 56.3 | J | | | |
| 1,2,3,4,6,7,8-HpCDD | 0.231 | J | 0.288 | 0.173 | 93.6 | J | 0.00247 | 0.00308 | 0.00185 |
| OCDD | 3.56 | | | | 346 | J | | | |
| 2,3,7,8-TCDF | 65.1 | | 74.1 | 56.2 | 34,800 | | 0.00187 | 0.00213 | 0.00161 |
| 1,2,3,7,8-PeCDF | 0.341 | J | | | 517 | J | | | |
| 2,3,4,7,8-PeCDF | 0.486 | J | | | 424 | J | | | |
| 1,2,3,4,7,8-HxCDF | 0.260 | J | | | 638 | J | | | |
| 1,2,3,6,7,8-HxCDF | 0.0657 | J | | | 175 | J | | | |
| 1,2,3,7,8,9-HxCDF | 0.0349 | U | | | 106 | J | | | |
| 2,3,4,6,7,8-HxCDF | 0.0252 | U | | | 96.0 | J | | | |
| 1,2,3,4,6,7,8-HpCDF | 0.0356 | U | | | 193 | J | | | |
| 1,2,3,4,7,8,9-HpCDF | 0.0487 | U | | | 91.9 | J | | | |
| OCDF | 0.0383 | U | | | 256 | J | | | |
| $TEQ_{DF,M}$ [b] | 18.7 | | 21.6 | 15.9 | 12,100 | | 0.00155 | 0.00179 | 0.00131 |

**Table B-5**
**BSAFs Calculated for Each Dioxin and Furan Congener in Clam Tissue for which Significant Bivariate Correlations Occurred**

| Analyte | Mean Concentration in Edible Clam Tissue [a] (ng/kg, wet weight) | | Mean + SE (ng/kg, wet weight) | Mean - SE (ng/kg, wet weight) | Mean Concentration in Sediment [a] (ng/kg, dry weight) | | BSAF (kg dw sed/kg ww tissue) | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Mean | Mean + SE | Mean - SE |
| **TRANSECT 4** | | | | | | | | | |
| 2,3,7,8-TCDD | 1.11 | J | 1.41 | 0.807 | 0.530 | U | 2.09 | 2.66 | 1.52 |
| 1,2,3,7,8-PeCDD | 0.0380 | U | | | 0.0315 | U | | | |
| 1,2,3,4,7,8-HxCDD | 0.0383 | U | | | 0.0565 | U | | | |
| 1,2,3,6,7,8-HxCDD | 0.180 | J | | | 0.0750 | U | | | |
| 1,2,3,7,8,9-HxCDD | 0.124 | J | | | 0.0865 | U | | | |
| 1,2,3,4,6,7,8-HpCDD | 5.44 | J | 10.6 | 0.273 | 4.02 | | 1.35 | 2.64 | 0.0680 |
| OCDD | 39.6 | | | | 130 | | | | |
| 2,3,7,8-TCDF | 6.25 | | 7.45 | 5.06 | 2.81 | | 2.22 | 2.65 | 1.80 |
| 1,2,3,7,8-PeCDF | 0.104 | J | | | 0.0348 | U | | | |
| 2,3,4,7,8-PeCDF | 0.0583 | U | | | 0.0354 | U | | | |
| 1,2,3,4,7,8-HxCDF | 0.293 | J | | | 0.116 | J | | | |
| 1,2,3,6,7,8-HxCDF | 0.158 | J | | | 0.0637 | J | | | |
| 1,2,3,7,8,9-HxCDF | 0.0606 | U | | | 0.0388 | U | | | |
| 2,3,4,6,7,8-HxCDF | 0.146 | J | | | 0.0287 | J | | | |
| 1,2,3,4,6,7,8-HpCDF | 2.07 | J | | | 0.339 | J | | | |
| 1,2,3,4,7,8,9-HpCDF | 0.263 | J | | | 0.0565 | U | | | |
| OCDF | 9.14 | J | | | 3.80 | | | | |
| $TEQ_{DF,M}$ [b] | 1.99 | | 2.50 | 1.47 | 0.799 | | 2.49 | 3.13 | 1.83 |
| **TRANSECT 5** | | | | | | | | | |
| 2,3,7,8-TCDD | 1.89 | | 2.12 | 1.65 | 3.89 | J | 0.486 | 0.545 | 0.424 |
| 1,2,3,7,8-PeCDD | 0.0246 | U | | | 0.0730 | U | | | |
| 1,2,3,4,7,8-HxCDD | 0.0394 | U | | | 0.0704 | J | | | |
| 1,2,3,6,7,8-HxCDD | 0.0474 | U | | | 0.174 | J | | | |
| 1,2,3,7,8,9-HxCDD | 0.0422 | U | | | 0.151 | J | | | |
| 1,2,3,4,6,7,8-HpCDD | 0.354 | J | 0.40 | 0.31 | 5.41 | | 0.0654 | 0.0737 | 0.0571 |
| OCDD | 2.76 | J | | | 141 | | | | |
| 2,3,7,8-TCDF | 9.77 | | 11.0 | 8.55 | 15.7 | | 0.622 | 0.699 | 0.545 |
| 1,2,3,7,8-PeCDF | 0.0351 | U | | | 0.342 | J | | | |
| 2,3,4,7,8-PeCDF | 0.0344 | U | | | 0.208 | J | | | |
| 1,2,3,4,7,8-HxCDF | 0.0196 | U | | | 0.440 | J | | | |
| 1,2,3,6,7,8-HxCDF | 0.0183 | U | | | 0.130 | J | | | |
| 1,2,3,7,8,9-HxCDF | 0.0307 | U | | | 0.0725 | U | | | |
| 2,3,4,6,7,8-HxCDF | 0.0217 | U | | | 0.0412 | U | | | |
| 1,2,3,4,6,7,8-HpCDF | 0.0288 | U | | | 0.443 | J | | | |
| 1,2,3,4,7,8,9-HpCDF | 0.0420 | U | | | 0.110 | U | | | |
| OCDF | 0.0522 | U | | | 1.24 | J | | | |
| $TEQ_{DF,M}$ [b] | 2.93 | | 3.28 | 2.57 | 5.78 | | 0.507 | 0.567 | 0.445 |

**Table B-5**
**BSAFs Calculated for Each Dioxin and Furan Congener in Clam Tissue for which Significant Bivariate Correlations Occurred**

| Analyte | Mean Concentration in Edible Clam Tissue [a] (ng/kg, wet weight) | | Mean + SE (ng/kg, wet weight) | Mean - SE (ng/kg, wet weight) | Mean Concentration in Sediment [a] (ng/kg, dry weight) | | BSAF (kg dw sed/kg ww tissue) | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Mean | Mean + SE | Mean - SE |
| **TRANSECT 6** | | | | | | | | | |
| 2,3,7,8-TCDD | 0.479 | J | 0.621 | 0.336 | 2.02 | U | 0.237 | 0.308 | 0.166 |
| 1,2,3,7,8-PeCDD | 0.0532 | U | | | 0.118 | U | | | |
| 1,2,3,4,7,8-HxCDD | 0.0517 | U | | | 0.269 | U | | | |
| 1,2,3,6,7,8-HxCDD | 0.0669 | U | | | 0.170 | J | | | |
| 1,2,3,7,8,9-HxCDD | 0.0550 | U | | | 0.301 | U | | | |
| 1,2,3,4,6,7,8-HpCDD | 0.314 | J | 0.375 | 0.252 | 7.60 | | 0.0413 | 0.0493 | 0.0332 |
| OCDD | 3.70 | | | | 245 | | | | |
| 2,3,7,8-TCDF | 2.47 | | 2.90 | 2.03 | 4.03 | J | 0.613 | 0.720 | 0.504 |
| 1,2,3,7,8-PeCDF | 0.0459 | U | | | 0.196 | U | | | |
| 2,3,4,7,8-PeCDF | 0.0436 | U | | | 0.194 | U | | | |
| 1,2,3,4,7,8-HxCDF | 0.0528 | U | | | 0.403 | J | | | |
| 1,2,3,6,7,8-HxCDF | 0.0495 | U | | | 0.145 | J | | | |
| 1,2,3,7,8,9-HxCDF | 0.0686 | U | | | 0.685 | U | | | |
| 2,3,4,6,7,8-HxCDF | 0.0567 | U | | | 0.132 | J | | | |
| 1,2,3,4,6,7,8-HpCDF | 0.0443 | U | | | 0.757 | J | | | |
| 1,2,3,4,7,8,9-HpCDF | 0.0588 | U | | | 0.880 | U | | | |
| OCDF | 0.115 | U | | | 3.71 | J | | | |
| $TEQ_{DF,M}$ [b] | 0.838 | | 1.03 | 0.646 | 1.31 | | 0.640 | 0.786 | 0.493 |

**Notes**

J = estimated
U = undetected

HpCDD – heptachlorodibenzo-*p* - dioxin
HpCDF – heptachlorodibenzofuran
HxCDD – hexachlorodibenzo-*p* - dioxin
HxCDF – hexachlorodibenzofuran
OCDD – octachlorodibenzo-*p* -dioxin
OCDF – octachlorodibenzofuran
PeCDD – pentachlorodibenzo-*p* -dioxin
PeCDF – pentachlorodibenzofuran
TCDD – tetrachlorodibenzo-*p* - dioxin
TCDF – tetrachlorodibenzofuran

a - Mean calculation includes detected and nondetected values. Nondetected values were set at one-half the detection limit.
b - $TEQ_{DF,M}$ (ND=1/2DL) = Toxicity equivalent for 2,3,7,8-tetrachlorinated dibenzo-p-dioxin (TCDD) calculated using dioxins and furans and mammalian toxicity equivalency factors (van den Berg et al. 2006) with nondetects set at one-half the detection limit.

**Table B-6**
**Polygon Areas for Calculation of SWACs used in Calculation of BSAFs**

| Sampling Location ID | Fractional Area[a] |
|---|---|
| **Fish Collection Area 1** | |
| SJSH003 | 0.1336% |
| SJSH004 | 0.3846% |
| SJSD001 | 0.1327% |
| SJSD002 | 0.6435% |
| SJSD003 | 0.2313% |
| SJSD004 | 0.2048% |
| SAMPLE 01-East | 1.8161% |
| SAMPLE 02-Center | 1.6756% |
| SAMPLE 03-West | 3.2232% |
| SJNE001 | 4.7923% |
| SJNE002 | 6.2312% |
| SJNE003 | 8.3222% |
| SJNE004 | 7.1947% |
| SJNE005 | 3.7802% |
| SJNE006 | 8.9047% |
| SJNE007_Core | 4.1314% |
| SJNE007_Grab | 1.6732% |
| SJNE008_Grab | 8.2760% |
| SJNE009 | 3.2789% |
| SJNE010 | 2.1179% |
| SJNE011 | 3.1753% |
| SJNE012_Core | 1.2711% |
| SJNE012_Grab | 1.2925% |
| SJNE013 | 7.0134% |
| SJNE014 | 2.3071% |
| SJNE015 | 2.2191% |
| SJNE016 | 5.1004% |
| SJNE017 | 2.2960% |
| SJNE018 | 1.4529% |
| SJNE019 | 0.8777% |
| SJSH001 | 2.2428% |
| SJSH002 | 0.3904% |
| SJSH005 | 0.7076% |
| SJSH012 | 0.3814% |
| SJSH014 | 0.4011% |
| SJSH056 | 0.3506% |
| SJSH057 | 0.2362% |
| SJSH058 | 1.1364% |

**Table B-6**
**Polygon Areas for Calculation of SWACs used in Calculation of BSAFs**

| Sampling Location ID | Fractional Area[a] |
|---|---|
| **Fish Collection Area 2** | |
| TCEQ2009_Point#3 | 0.2289% |
| TCEQ2009_Point#4 | 0.3951% |
| TCEQ2009_Point#5 | 0.4278% |
| SJA3 | 0.3920% |
| SJA4 | 0.4344% |
| SJA5 | 0.9706% |
| SJB1 | 0.1668% |
| SJB2 | 0.1007% |
| SJB3 | 0.2682% |
| SJB4 | 0.3628% |
| SJB5 | 1.2841% |
| SJC1 | 0.1852% |
| SJC2 | 0.3267% |
| SJC3 | 0.3329% |
| SJC4 | 0.5151% |
| SJC5 | 1.2826% |
| SJD1 | 0.2554% |
| SJD2 | 0.2949% |
| SJD3 | 0.2281% |
| SJD4 | 0.3281% |
| SJD5 | 1.2233% |
| SJE1 | 0.3561% |
| SJE2 | 0.1511% |
| SJE3 | 0.4863% |
| SJE4 | 0.4277% |
| SJE5 | 0.6708% |
| SJGB004 | 0.5856% |
| SJGB005 | 0.2534% |
| SJGB007 | 0.5480% |
| SJGB008 | 0.1450% |
| SJGB013 | 0.2525% |
| SJGB014 | 0.3204% |
| SJGB015 | 0.3120% |
| SJGB016 | 0.1970% |
| SJGB017 | 0.6085% |
| SJNE020 | 2.0736% |
| SJNE021 | 2.8631% |
| SJNE022-1 | 0.1199% |
| SJNE022-2 | 0.0960% |
| SJNE022-3 | 0.1391% |
| SJNE023_Grab | 1.7192% |

**Table B-6**
**Polygon Areas for Calculation of SWACs used in Calculation of BSAFs**

| Sampling Location ID | Fractional Area[a] |
|---|---|
| SJNE024 | 3.3836% |
| SJNE025 | 2.9677% |
| SJNE026_Core | 0.9042% |
| SJNE026_Grab | 1.1196% |
| SJNE027 | 0.6496% |
| SJNE028_Grab | 0.5794% |
| SJNE029_Core | 1.7670% |
| SJNE029_Grab | 1.5030% |
| SJNE030_Core | 1.4386% |
| SJNE030_Grab | 1.1708% |
| SJNE031 | 3.6374% |
| SJNE032_Core | 1.2072% |
| SJNE032_Grab | 0.5691% |
| SJNE033_Core | 1.2537% |
| SJNE033_Grab | 1.5010% |
| SJNE034 | 2.6110% |
| SJNE035_Core | 2.0030% |
| SJNE035_Grab | 1.4804% |
| SJNE036 | 1.4034% |
| SJNE037 | 3.2184% |
| SJNE039 | 1.8053% |
| SJNE040 | 3.4470% |
| SJNE041_Grab | 3.7829% |
| SJNE042 | 3.4199% |
| SJNE043_Grab | 3.4398% |
| SJNE044 | 3.4489% |
| SJNE045 | 4.0060% |
| SJNE046 | 3.9388% |
| SJNE050_Core | 1.6886% |
| SJNE050_Grab | 1.0196% |
| SJNE051 | 4.5304% |
| SJSH008 | 0.2091% |
| SJSH009 | 0.0001% |
| SJSH010 | 0.0865% |
| SJSH017 | 0.8643% |
| SJSH019 | 0.5237% |
| SJSH021 | 0.3886% |
| SJSH023 | 0.3462% |
| SJSH025 | 0.1433% |
| SJSH027 | 0.2389% |
| SJSH029 | 0.2048% |
| SJSH031 | 0.1771% |

**Table B-6**
**Polygon Areas for Calculation of SWACs used in Calculation of BSAFs**

| Sampling Location ID | Fractional Area[a] |
|---|---|
| SJSH033 | 0.1828% |
| SJSH035 | 0.4629% |
| SJSH059 | 1.3966% |
| SJSH060 | 1.0577% |
| SJSH061 | 2.4931% |
| **Fish Collection Area 3** | |
| SJNE038 | 10.1752% |
| SJNE047 | 5.0688% |
| SJNE048 | 3.4675% |
| SJNE049 | 2.7352% |
| SJNE052 | 14.3184% |
| SJNE053 | 7.4103% |
| SJNE054 | 7.4150% |
| SJNE055 | 8.1701% |
| SJNE056 | 6.0148% |
| SJNE057 | 12.4427% |
| SJNE058 | 13.4992% |
| SJNE059 | 6.7931% |
| SJSH036 | 0.0281% |
| SJSH038 | 1.4215% |
| SJSH040 | 0.1279% |
| SJSH042 | 0.2842% |
| SJSH044 | 0.6280% |

**Notes**

a - Fractional areas represent the area of a Thiessen polygon for a given sampling location divided by the sum of the areas of all Thiessen polygons in the FCA considered.

**Table B-7**
**SWACs for Calculation of BSAFs for Individual Dioxin and Furan Congeners in FCA 1, FCA 2, and FCA 3**

| | Surface Area-Weighted Average Concentrations (SWAC) (ng/kg) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Sampling Location ID** | **2,3,7,8-TCDD** | **1,2,3,7,8-PeCDD** | **1,2,3,4,6,7,8-HpCDD** | **OCDD** | **2,3,7,8-TCDF** | **1,2,3,7,8-PeCDF** | **2,3,4,7,8-PeCDF** | **1,2,3,6,7,8-HxCDF** | **OCDF** |
| **Fish Collection Area 1** | | | | | | | | | |
| SJSH003 | 0.00191 | <0.001 | 0.0220 | 0.801 | 0.00634 | <0.001 | <0.001 | <0.001 | 0.0168 |
| SJSH004 | 0.00226 | <0.001 | 0.0373 | 1.35 | 0.00781 | <0.001 | <0.001 | <0.001 | 0.0269 |
| SJSD001 | 0.0166 | <0.001 | 0.0782 | 2.23 | 0.0547 | 0.00154 | 0.00124 | 0.00120 | 0.0925 |
| SJSD002 | 0.0187 | <0.001 | 0.0882 | 2.63 | 0.0641 | 0.00184 | 0.00193 | <0.001 | 0.102 |
| SJSD003 | 0.0177 | <0.001 | 0.0777 | 2.19 | 0.0641 | 0.00194 | 0.00144 | 0.00136 | 0.0985 |
| SJSD004 | 0.0112 | <0.001 | 0.0487 | 1.06 | 0.0340 | <0.001 | <0.001 | <0.001 | 0.0707 |
| SAMPLE 01-East | 0.193 | 0.00843 | 1.33 | 25.7 | 0.517 | 0.0170 | 0.0247 | 0.0161 | 1.49 |
| SAMPLE 02-Center | 0.345 | 0.0106 | 1.32 | 43.1 | 0.871 | 0.0245 | 0.0265 | 0.0176 | 1.81 |
| SAMPLE 03-West | 1.64 | 0.0332 | 3.42 | 124 | 5.58 | 0.121 | 0.117 | 0.0683 | 4.42 |
| SJNE001 | 0.0939 | 0.00757 | 0.599 | 21.5 | 0.642 | 0.00537 | 0.00551 | 0.00323 | 1.00 |
| SJNE002 | 0.00872 | 0.00129 | 0.0642 | 1.21 | 0.0860 | <0.001 | <0.001 | <0.001 | 0.0785 |
| SJNE003 | 0.107 | 0.00278 | 0.395 | 10.7 | 0.348 | 0.00189 | 0.00191 | 0.00795 | 0.619 |
| SJNE004 | 0.251 | 0.00399 | 1.45 | 54.7 | 1.27 | 0.0377 | 0.0291 | 0.00849 | 2.27 |
| SJNE005 | 0.0469 | 0.00155 | 0.397 | 15.3 | 0.215 | 0.00374 | 0.00150 | 0.00169 | 0.972 |
| SJNE006 | 3.12 | 0.00980 | 4.21 | 128 | 13.3 | 0.0926 | 0.169 | 0.127 | 8.53 |
| SJNE007_Core | 0.0863 | 0.00133 | 0.320 | 7.44 | 0.233 | 0.00146 | 0.00148 | 0.00562 | 1.35 |
| SJNE007_Grab | 0.566 | 0.00527 | 0.233 | 7.91 | 2.31 | 0.0387 | 0.0318 | 0.00780 | 0.184 |
| SJNE008_Grab | 2.71 | 0.0409 | 4.19 | 126 | 11.4 | 0.276 | 0.180 | 0.270 | 5.53 |
| SJNE009 | 0.0278 | <0.001 | 0.141 | 3.77 | 0.0882 | 0.00115 | 0.00111 | <0.001 | 0.136 |
| SJNE010 | 0.282 | 0.00229 | 0.661 | 18.4 | 1.08 | 0.0126 | 0.0181 | 0.00451 | 0.932 |
| SJNE011 | 0.327 | 0.00262 | 1.80 | 38.7 | 1.31 | 0.0265 | 0.0196 | 0.0145 | 2.02 |
| SJNE012_Core | 0.0525 | <0.001 | 0.330 | 9.72 | 0.137 | 0.00372 | 0.00183 | 0.00175 | 0.591 |
| SJNE012_Grab | 0.0140 | <0.001 | 0.0946 | 2.44 | 0.0436 | <0.001 | <0.001 | <0.001 | 0.0635 |
| SJNE013 | 0.0254 | 0.00159 | 0.290 | 7.93 | 0.204 | 0.00178 | 0.00208 | 0.00212 | 0.370 |
| SJNE014 | 0.0519 | 0.00181 | 0.311 | 9.04 | 0.344 | 0.00227 | 0.00224 | 0.00172 | 0.395 |
| SJNE015 | 0.0533 | 0.00139 | 0.546 | 17.0 | 0.179 | 0.00630 | <0.001 | 0.00226 | 0.384 |
| SJNE016 | 0.158 | 0.00136 | 0.653 | 17.0 | 0.447 | 0.0132 | 0.00135 | 0.00372 | 1.05 |
| SJNE017 | 0.225 | 0.00210 | 0.517 | 15.3 | 1.06 | 0.0200 | 0.0177 | 0.00990 | 0.907 |
| SJNE018 | 0.0478 | <0.001 | 0.169 | 4.00 | 0.122 | 0.00157 | <0.001 | <0.001 | 0.272 |
| SJNE019 | 0.0437 | <0.001 | 0.151 | 3.88 | 0.108 | 0.00128 | 0.00271 | 0.00211 | 0.240 |
| SJSH001 | 0.00682 | 0.00172 | 0.0554 | 2.33 | 0.0375 | <0.001 | <0.001 | <0.001 | 0.0505 |
| SJSH002 | 0.00308 | <0.001 | 0.0299 | 0.956 | 0.0107 | <0.001 | <0.001 | <0.001 | 0.0289 |
| SJSH005 | 0.00241 | <0.001 | 0.0870 | 2.93 | 0.0117 | <0.001 | <0.001 | 0.00150 | 0.0241 |
| SJSH012 | 0.00290 | <0.001 | 0.156 | 2.55 | 0.00877 | 0.00127 | 0.00290 | 0.00374 | 0.165 |
| SJSH014 | <0.001 | <0.001 | 0.0277 | 0.276 | <0.001 | <0.001 | <0.001 | <0.001 | 0.0208 |
| SJSH056 | 0.00189 | <0.001 | 0.0212 | 0.817 | 0.00736 | <0.001 | <0.001 | <0.001 | 0.0189 |
| SJSH057 | 0.00361 | <0.001 | 0.0250 | 0.928 | 0.0140 | <0.001 | <0.001 | <0.001 | 0.0288 |
| SJSH058 | 0.0158 | <0.001 | 0.142 | 4.75 | 0.0841 | <0.001 | <0.001 | <0.001 | 0.186 |
| Total SWAC | 10.6 | 0.148 | 24.5 | 739 | 42.3 | 0.722 | 0.669 | 0.590 | 36.5 |

**Table B-7**
**SWACs for Calculation of BSAFs for Individual Dioxin and Furan Congeners in FCA 1, FCA 2, and FCA 3**

| | Surface Area-Weighted Average Concentrations (SWAC) (ng/kg) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Sampling Location ID** | **2,3,7,8-TCDD** | **1,2,3,7,8-PeCDD** | **1,2,3,4,6,7,8-HpCDD** | **OCDD** | **2,3,7,8-TCDF** | **1,2,3,7,8-PeCDF** | **2,3,4,7,8-PeCDF** | **1,2,3,6,7,8-HxCDF** | **OCDF** |
| **Fish Collection Area 2** | | | | | | | | | |
| TCEQ2009_Point#3 | 1.56 | 0.298 | 0.504 | 0.378 | 6.18 | 0.263 | 0.401 | 0.217 | 1.13 |
| TCEQ2009_Point#4 | 0.0593 | 0.00134 | 0.126 | 3.95 | 0.194 | 0.00514 | 0.00514 | 0.00202 | 0.0632 |
| TCEQ2009_Point#5 | 1.54 | 0.0171 | 0.556 | 19.7 | 5.56 | 0.137 | 0.120 | 0.0556 | 0.471 |
| SJA3 | 0.138 | 0.00179 | 0.0619 | 2.09 | 0.463 | 0.0111 | 0.00784 | 0.00502 | 0.0714 |
| SJA4 | 0.268 | 0.00338 | 0.139 | 4.91 | 0.882 | 0.0220 | 0.0170 | 0.00547 | 0.175 |
| SJA5 | 0.354 | 0.00459 | 0.282 | 9.43 | 1.16 | 0.0256 | 0.0214 | 0.0130 | 0.313 |
| SJB1 | 25.7 | 0.222 | 0.484 | 8.12 | 68.7 | 2.50 | 1.65 | 1.22 | 1.08 |
| SJB2 | 0.271 | 0.00268 | 0.0692 | 2.25 | 0.904 | 0.0500 | 0.0257 | 0.0200 | 0.0868 |
| SJB3 | 0.175 | 0.00251 | 0.138 | 4.80 | 0.590 | 0.0138 | 0.0104 | 0.00681 | 0.180 |
| SJB4 | 0.114 | <0.001 | 0.0729 | 2.45 | 0.370 | 0.00900 | 0.00653 | 0.00414 | 0.117 |
| SJB5 | 0.180 | 0.00326 | 0.316 | 13.1 | 0.589 | 0.0168 | 0.0128 | 0.00878 | 0.266 |
| SJC1 | 18.0 | 0.168 | 0.139 | 2.63 | 66.5 | 1.36 | 1.14 | 0.524 | 0.428 |
| SJC2 | 0.0177 | <0.001 | 0.0954 | 2.66 | 0.0595 | 0.00220 | <0.001 | <0.001 | 0.0119 |
| SJC3 | 0.0219 | <0.001 | 0.0646 | 2.35 | 0.0719 | 0.00256 | 0.00183 | <0.001 | 0.0702 |
| SJC4 | 0.0623 | <0.001 | 0.186 | 6.90 | 0.235 | 0.00283 | 0.00536 | 0.00162 | <0.001 |
| SJC5 | 0.119 | 0.00313 | 0.493 | 19.2 | 0.436 | 0.00562 | 0.00850 | 0.00776 | 0.504 |
| SJD1 | 1.41 | 0.0132 | 0.131 | 4.06 | 4.60 | 0.106 | 0.0787 | 0.0406 | 0.209 |
| SJD2 | 0.0410 | 0.00109 | 0.109 | 3.98 | 0.142 | 0.00330 | 0.00110 | 0.00187 | 0.0528 |
| SJD3 | 0.0725 | 0.00111 | 0.131 | 4.24 | 0.184 | 0.00376 | 0.00358 | 0.00173 | 0.153 |
| SJD4 | 0.0413 | <0.001 | 0.104 | 3.64 | 0.139 | 0.00310 | 0.00302 | 0.00151 | 0.135 |
| SJD5 | 0.170 | 0.00350 | 0.581 | 19.8 | 0.526 | 0.0170 | 0.0120 | 0.00942 | 0.734 |
| SJE1 | 3.63 | 0.0296 | 0.0808 | 2.26 | 12.8 | 0.261 | 0.213 | 0.0844 | 0.130 |
| SJE2 | 0.544 | 0.00419 | 0.0497 | 1.36 | 2.07 | 0.0307 | 0.0289 | 0.00969 | 0.0576 |
| SJE3 | 0.0797 | <0.001 | 0.0754 | 2.35 | 0.322 | 0.00618 | 0.00430 | 0.00222 | 0.0372 |
| SJE4 | 0.0101 | <0.001 | 0.249 | 7.78 | 0.0513 | <0.001 | <0.001 | 0.00117 | 0.0132 |
| SJE5 | 0.00548 | <0.001 | 0.390 | 15.1 | 0.0140 | <0.001 | <0.001 | <0.001 | 0.0163 |
| SJGB004 | 0.0441 | <0.001 | 0.222 | 8.55 | 0.227 | 0.00362 | 0.00311 | <0.001 | 0.0627 |
| SJGB005 | 0.0168 | <0.001 | 0.0484 | 1.60 | 0.0694 | 0.00193 | <0.001 | <0.001 | 0.0451 |
| SJGB007 | 3.53 | 0.0358 | 0.0964 | 2.61 | 8.33 | 0.307 | 0.210 | 0.0910 | 0.379 |
| SJGB008 | 0.161 | 0.00165 | 0.0114 | 0.376 | 0.925 | 0.0132 | 0.0106 | 0.00622 | 0.0184 |
| SJGB013 | 10.8 | 0.0823 | 0.419 | 5.23 | 16.4 | 0.823 | 0.576 | 0.331 | 0.278 |
| SJGB014 | 68.9 | 0.561 | 0.0836 | 0.756 | 304 | 3.40 | 2.93 | 0.801 | 0.548 |
| SJGB015 | 0.00101 | <0.001 | 0.0749 | 2.14 | 0.00568 | <0.001 | <0.001 | <0.001 | 0.00615 |
| SJGB016 | 5.26 | 0.0410 | 0.0685 | 1.25 | 13.0 | 0.741 | 0.358 | 0.355 | 0.203 |
| SJGB017 | 0.00500 | <0.001 | 0.153 | 5.38 | 0.0157 | <0.001 | <0.001 | <0.001 | 0.00147 |
| SJNE020 | 0.261 | 0.00123 | 1.02 | 28.6 | 0.871 | 0.0294 | 0.0161 | 0.0174 | 2.28 |
| SJNE021 | 0.138 | 0.00210 | 0.813 | 23.2 | 0.515 | 0.0140 | 0.00278 | 0.0114 | 1.64 |
| SJNE022-1 | 0.151 | 0.00122 | 0.00121 | 0.0308 | 0.510 | 0.0139 | 0.00927 | 0.00968 | 0.0108 |
| SJNE022-2 | 1.54 | 0.00979 | 0.0269 | 0.624 | 4.73 | 0.170 | 0.0998 | 0.0605 | 0.0470 |

**Table B-7**
**SWACs for Calculation of BSAFs for Individual Dioxin and Furan Congeners in FCA 1, FCA 2, and FCA 3**

| | Surface Area-Weighted Average Concentrations (SWAC) (ng/kg) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Sampling Location ID** | **2,3,7,8-TCDD** | **1,2,3,7,8-PeCDD** | **1,2,3,4,6,7,8-HpCDD** | **OCDD** | **2,3,7,8-TCDF** | **1,2,3,7,8-PeCDF** | **2,3,4,7,8-PeCDF** | **1,2,3,6,7,8-HxCDF** | **OCDF** |
| SJNE022-3 | 2.45 | 0.0185 | 0.0252 | 0.408 | 5.83 | 0.269 | 0.145 | 0.115 | 0.0719 |
| SJNE023_Grab | 0.157 | <0.001 | 0.407 | 10.3 | 0.559 | 0.00433 | 0.00827 | 0.00593 | 0.320 |
| SJNE024 | 0.00758 | 0.00230 | 0.0843 | 2.63 | 0.0538 | <0.001 | <0.001 | 0.00105 | 0.0426 |
| SJNE025 | 0.457 | 0.00475 | 1.99 | 60.2 | 1.57 | 0.0180 | 0.0421 | 0.0295 | 2.89 |
| SJNE026_Core | 0.437 | 0.00670 | 0.250 | 9.49 | 1.75 | 0.0409 | 0.0285 | 0.0117 | 0.341 |
| SJNE026_Grab | 0.0140 | <0.001 | 0.0159 | 1.12 | 0.0958 | <0.001 | <0.001 | <0.001 | 0.0275 |
| SJNE027 | 0.0641 | <0.001 | 0.0444 | 1.57 | 0.235 | 0.00566 | 0.00409 | 0.00197 | 0.0414 |
| SJNE028_Grab | 0.0231 | <0.001 | 0.0742 | 2.37 | 0.0707 | 0.00194 | <0.001 | <0.001 | 0.0263 |
| SJNE029_Core | 0.00226 | 0.00164 | 0.134 | 6.52 | 0.00240 | 0.00121 | 0.00112 | <0.001 | <0.001 |
| SJNE029_Grab | 0.0262 | 0.00192 | 0.153 | 7.30 | 0.0977 | 0.00139 | 0.00126 | 0.00159 | 0.125 |
| SJNE030_Core | 0.00268 | <0.001 | 0.171 | 8.53 | 0.0114 | <0.001 | <0.001 | <0.001 | 0.0141 |
| SJNE030_Grab | 0.00329 | <0.001 | 0.146 | 4.89 | 0.0299 | <0.001 | <0.001 | <0.001 | 0.0290 |
| SJNE031 | 0.0280 | 0.00104 | 0.352 | 9.35 | 0.235 | 0.00778 | 0.00198 | 0.00553 | 0.407 |
| SJNE032_Core | 1.63 | 0.00634 | 0.211 | 7.85 | 6.99 | 0.132 | 0.0937 | 0.0268 | 0.226 |
| SJNE032_Grab | 0.632 | 0.00466 | 0.228 | 6.77 | 2.06 | 0.0440 | 0.0332 | 0.00899 | 0.259 |
| SJNE033_Core | 0.145 | 0.00547 | 0.490 | 16.7 | 0.545 | 0.0158 | 0.00471 | 0.00252 | 0.297 |
| SJNE033_Grab | 0.263 | 0.00434 | 0.557 | 18.2 | 0.704 | 0.0182 | 0.0156 | 0.00447 | 1.20 |
| SJNE034 | 0.0979 | <0.001 | 0.433 | 18.4 | 0.266 | 0.00109 | 0.00100 | 0.00150 | 0.195 |
| SJNE035_Core | 0.0117 | 0.00665 | 1.43 | 85.9 | 0.0300 | 0.00137 | 0.00222 | 0.00186 | 0.0397 |
| SJNE035_Grab | 0.0693 | <0.001 | 0.219 | 8.29 | 0.175 | 0.00108 | 0.00110 | 0.00151 | 0.272 |
| SJNE036 | 0.00693 | <0.001 | 0.0639 | 1.99 | 0.0472 | <0.001 | <0.001 | 0.00108 | 0.0623 |
| SJNE037 | 0.171 | 0.00248 | 0.882 | 24.5 | 0.637 | 0.0209 | 0.0128 | 0.00560 | 1.28 |
| SJNE039 | 0.325 | 0.00127 | 1.13 | 39.9 | 1.10 | 0.0352 | 0.0119 | 0.0191 | 1.22 |
| SJNE040 | 0.631 | 0.00188 | 1.45 | 50.0 | 1.98 | 0.0507 | 0.0400 | 0.0162 | 1.38 |
| SJNE041_Grab | 3.45 | 0.0147 | 1.23 | 39.7 | 9.72 | 0.255 | 0.180 | 0.127 | 0.719 |
| SJNE042 | 0.315 | 0.00162 | 1.04 | 39.0 | 1.11 | 0.0445 | 0.0246 | 0.00616 | 1.22 |
| SJNE043_Grab | 0.0537 | 0.00122 | 0.216 | 8.53 | 0.178 | <0.001 | <0.001 | 0.00129 | 0.194 |
| SJNE044 | 0.0528 | 0.00278 | 0.762 | 32.3 | 0.362 | 0.00274 | 0.00266 | 0.00552 | 0.700 |
| SJNE045 | 0.0212 | <0.001 | 0.231 | 7.45 | 0.166 | <0.001 | <0.001 | 0.00517 | 0.241 |
| SJNE046 | 0.185 | 0.00240 | 1.08 | 30.1 | 0.642 | 0.00859 | 0.0141 | 0.0151 | 1.79 |
| SJNE050_Core | 0.257 | 0.00505 | 1.26 | 58.3 | 0.930 | 0.0317 | 0.0214 | 0.0148 | 1.54 |
| SJNE050_Grab | 0.00137 | <0.001 | 0.0185 | 0.673 | 0.0462 | <0.001 | <0.001 | <0.001 | 0.00845 |
| SJNE051 | 0.0281 | 0.00462 | 0.383 | 13.8 | 0.223 | 0.00390 | 0.00399 | 0.00306 | 0.369 |
| SJSH008 | 0.0114 | <0.001 | 0.00805 | 0.280 | 0.0556 | 0.00116 | <0.001 | <0.001 | 0.00452 |
| SJSH009 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| SJSH010 | 0.00776 | <0.001 | 0.0101 | 0.255 | 0.0386 | <0.001 | <0.001 | <0.001 | 0.00482 |
| SJSH017 | 0.0402 | <0.001 | 0.0754 | 1.92 | 0.150 | 0.00169 | 0.00128 | 0.00145 | 0.0302 |
| SJSH019 | 0.0203 | <0.001 | 0.0219 | 0.519 | 0.0765 | 0.00206 | <0.001 | <0.001 | 0.00312 |
| SJSH021 | 0.0249 | <0.001 | 0.0299 | 0.855 | 0.0979 | 0.00273 | 0.00184 | 0.00101 | 0.00284 |
| SJSH023 | 0.00215 | <0.001 | 0.00353 | 0.0796 | 0.0198 | <0.001 | <0.001 | <0.001 | <0.001 |
| SJSH025 | 0.00333 | <0.001 | 0.0139 | 0.221 | 0.0139 | <0.001 | <0.001 | <0.001 | 0.00677 |

**Table B-7**
**SWACs for Calculation of BSAFs for Individual Dioxin and Furan Congeners in FCA 1, FCA 2, and FCA 3**

| | Surface Area-Weighted Average Concentrations (SWAC) (ng/kg) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Sampling Location ID** | **2,3,7,8-TCDD** | **1,2,3,7,8-PeCDD** | **1,2,3,4,6,7,8-HpCDD** | **OCDD** | **2,3,7,8-TCDF** | **1,2,3,7,8-PeCDF** | **2,3,4,7,8-PeCDF** | **1,2,3,6,7,8-HxCDF** | **OCDF** |
| SJSH027 | <0.001 | <0.001 | 0.0211 | 0.566 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| SJSH029 | <0.001 | <0.001 | 0.00739 | 0.139 | 0.00270 | <0.001 | <0.001 | <0.001 | 0.00190 |
| SJSH031 | <0.001 | <0.001 | 0.00301 | 0.156 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| SJSH033 | 0.00150 | <0.001 | 0.00755 | 0.203 | 0.0165 | <0.001 | <0.001 | <0.001 | 0.00504 |
| SJSH035 | 0.0323 | <0.001 | 0.0359 | 1.04 | 0.153 | 0.00358 | 0.00168 | 0.00114 | 0.0130 |
| SJSH059 | 0.00268 | <0.001 | 0.0295 | 1.00 | 0.0258 | <0.001 | <0.001 | <0.001 | 0.0247 |
| SJSH060 | 0.00237 | <0.001 | 0.0384 | 1.29 | 0.0200 | <0.001 | <0.001 | <0.001 | 0.0314 |
| SJSH061 | 0.0109 | <0.001 | 0.133 | 4.74 | 0.0815 | <0.001 | <0.001 | <0.001 | 0.108 |
| Total SWAC | 157 | 1.63 | 26.3 | 896 | 563 | 11.4 | 8.72 | 4.38 | 29.8 |
| **Fish Collection Area 3** | | | | | | | | | |
| SJNE038 | 0.206 | 0.0119 | 1.84 | 61.3 | 1.55 | 0.0199 | 0.0197 | 0.0360 | 0.580 |
| SJNE047 | 0.239 | 0.00352 | 1.08 | 36.6 | 0.852 | 0.00342 | 0.00340 | 0.0206 | 1.11 |
| SJNE048 | 0.298 | 0.00171 | 1.08 | 38.8 | 0.974 | 0.0197 | 0.0103 | 0.00933 | 1.10 |
| SJNE049 | 0.258 | 0.00243 | 1.03 | 38.6 | 0.284 | 0.0106 | 0.0174 | 0.0156 | 1.16 |
| SJNE052 | 0.422 | 0.00692 | 3.49 | 112 | 1.34 | 0.0484 | 0.0389 | 0.0156 | 2.49 |
| SJNE053 | 0.376 | 0.00271 | 2.59 | 103 | 1.24 | 0.0417 | 0.0160 | 0.0136 | 2.89 |
| SJNE054 | 0.0156 | 0.00209 | 4.39 | 153 | 0.127 | 0.00173 | 0.00168 | 0.00460 | 0.271 |
| SJNE055 | 0.627 | 0.0113 | 3.24 | 120 | 2.00 | 0.0332 | 0.0113 | 0.0539 | 3.91 |
| SJNE056 | 0.0166 | 0.00224 | 0.314 | 10.0 | 0.121 | 0.00269 | 0.00245 | 0.00186 | 0.192 |
| SJNE057 | 0.0279 | 0.00336 | 0.913 | 32.6 | 0.212 | 0.00499 | 0.00493 | 0.00409 | 0.432 |
| SJNE058 | 1.33 | 0.0232 | 11.5 | 408 | 4.62 | 0.0165 | 0.0155 | 0.0431 | 11.3 |
| SJNE059 | 0.221 | 0.00404 | 2.19 | 75.4 | 0.727 | 0.0256 | 0.00353 | 0.0181 | 1.57 |
| SJSH036 | <0.001 | <0.001 | 0.00238 | 0.0604 | <0.001 | <0.001 | <0.001 | <0.001 | 0.00242 |
| SJSH038 | <0.001 | <0.001 | 0.125 | 2.59 | 0.00355 | <0.001 | <0.001 | <0.001 | 0.123 |
| SJSH040 | <0.001 | <0.001 | 0.00356 | 0.0496 | <0.001 | <0.001 | <0.001 | <0.001 | 0.0143 |
| SJSH042 | <0.001 | <0.001 | 0.00830 | 0.387 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| SJSH044 | <0.001 | <0.001 | 0.00578 | 0.178 | <0.001 | <0.001 | <0.001 | <0.001 | 0.00167 |
| Total SWAC | 4.04 | 0.0761 | 33.8 | 1190 | 14.1 | 0.229 | 0.146 | 0.238 | 27.1 |

**Notes**

HpCDD – heptachlorodibenzo-*p* - dioxin
HpCDF – heptachlorodibenzofuran
HxCDD – hexachlorodibenzo-*p* - dioxin
HxCDF – hexachlorodibenzofuran
OCDD – octachlorodibenzo-*p* -dioxin
OCDF – octachlorodibenzofuran
PeCDD – pentachlorodibenzo-*p* -dioxin
PeCDF – pentachlorodibenzofuran
TCDD – tetrachlorodibenzo-*p* - dioxin
TCDF – tetrachlorodibenzofuran

**Table B-8**

**BSAFs Calculated for Each Dioxin and Furan Congener[a] in Crab and Catfish Tissue for which Significant Bivariate Correlations Occurred**

| Analyte | Crab Edible Tissue (kg dw sed/kg ww tissue) | | | Catfish Fillet (kg dw sed/kg ww tissue) | | |
|---|---|---|---|---|---|---|
| | Mean | Mean + SE | Mean - SE | Mean | Mean + SE | Mean - SE |
| **Fish Collection Area 1** | | | | | | |
| 2,3,7,8-TCDD | 0.0493 | 0.0630 | 0.0356 | 0.261 | 0.308 | 0.214 |
| 1,2,3,7,8-PeCDD | -- | -- | -- | 0.425 | 0.560 | 0.291 |
| 1,2,3,4,6,7,8-HpCDD | 0.00546 | 0.00666 | 0.00427 | -- | -- | -- |
| OCDD | 0.000872 | 0.00118 | 0.000568 | -- | -- | -- |
| 2,3,7,8-TCDF | 0.0328 | 0.0400 | 0.0256 | 0.00754 | 0.00981 | 0.00527 |
| 1,2,3,7,8-PeCDF | 0.0400 | 0.0432 | 0.0369 | -- | -- | -- |
| 2,3,4,7,8-PeCDF | 0.0412 | 0.0442 | 0.0382 | 0.165 | 0.218 | 0.113 |
| 1,2,3,6,7,8-HxCDF | 0.0748 | 0.1000 | 0.0497 | -- | -- | -- |
| OCDF | -- | -- | -- | 0.00135 | 0.00158 | 0.00112 |
| $TEQ_{DF,M}$[b] | 0.0458 | 0.0569 | 0.0348 | -- | -- | -- |
| **Fish Collection Area 2** | | | | | | |
| 2,3,7,8-TCDD | 0.000802 | 0.00104 | 0.000570 | 0.0229 | 0.0251 | 0.0208 |
| 1,2,3,7,8-PeCDD | -- | -- | -- | 0.0600 | 0.0737 | 0.0463 |
| 1,2,3,4,6,7,8-HpCDD | 0.00132 | 0.00162 | 0.00102 | -- | -- | -- |
| OCDD | 0.000367 | 0.000494 | 0.000240 | -- | -- | -- |
| 2,3,7,8-TCDF | 0.000895 | 0.00108 | 0.000706 | 0.00138 | 0.00158 | 0.00119 |
| 1,2,3,7,8-PeCDF | 0.00226 | 0.00241 | 0.00211 | -- | -- | -- |
| 2,3,4,7,8-PeCDF | 0.00294 | 0.00313 | 0.00275 | 0.0180 | 0.0213 | 0.0146 |
| 1,2,3,6,7,8-HxCDF | 0.00413 | 0.00435 | 0.00390 | -- | -- | -- |
| OCDF | -- | -- | -- | 0.00120 | 0.00132 | 0.00107 |
| $TEQ_{DF,M}$[b] | 0.00104 | 0.00124 | 0.000836 | -- | -- | -- |

**Table B-8**

**BSAFs Calculated for Each Dioxin and Furan Congener[a] in Crab and Catfish Tissue for which Significant Bivariate Correlations Occurred**

| Analyte | Crab Edible Tissue (kg dw sed/kg ww tissue) | | | Catfish Fillet (kg dw sed/kg ww tissue) | | |
|---|---|---|---|---|---|---|
| | Mean | Mean + SE | Mean - SE | Mean | Mean + SE | Mean - SE |
| **Fish Collection Area 3** | | | | | | |
| 2,3,7,8-TCDD | 0.0151 | 0.0177 | 0.0124 | 0.735 | 0.818 | 0.653 |
| 1,2,3,7,8-PeCDD | -- | -- | -- | 1.71 | 2.20 | 1.22 |
| 1,2,3,4,6,7,8-HpCDD | 0.000833 | 0.000936 | 0.000730 | -- | -- | -- |
| OCDD | 0.0000809 | 0.0000913 | 0.0000704 | -- | -- | -- |
| 2,3,7,8-TCDF | 0.0169 | 0.0223 | 0.0115 | 0.0411 | 0.0492 | 0.0330 |
| 1,2,3,7,8-PeCDF | 0.135 | 0.147 | 0.123 | -- | -- | -- |
| 2,3,4,7,8-PeCDF | 0.202 | 0.219 | 0.185 | 1.08 | 1.35 | 0.822 |
| 1,2,3,6,7,8-HxCDF | 0.0829 | 0.0929 | 0.0730 | -- | -- | -- |
| OCDF | -- | -- | -- | 0.00211 | 0.00299 | 0.00124 |
| $TEQ_{DF,M}$[b] | 0.0220 | 0.0247 | 0.0192 | -- | -- | -- |

**Notes**

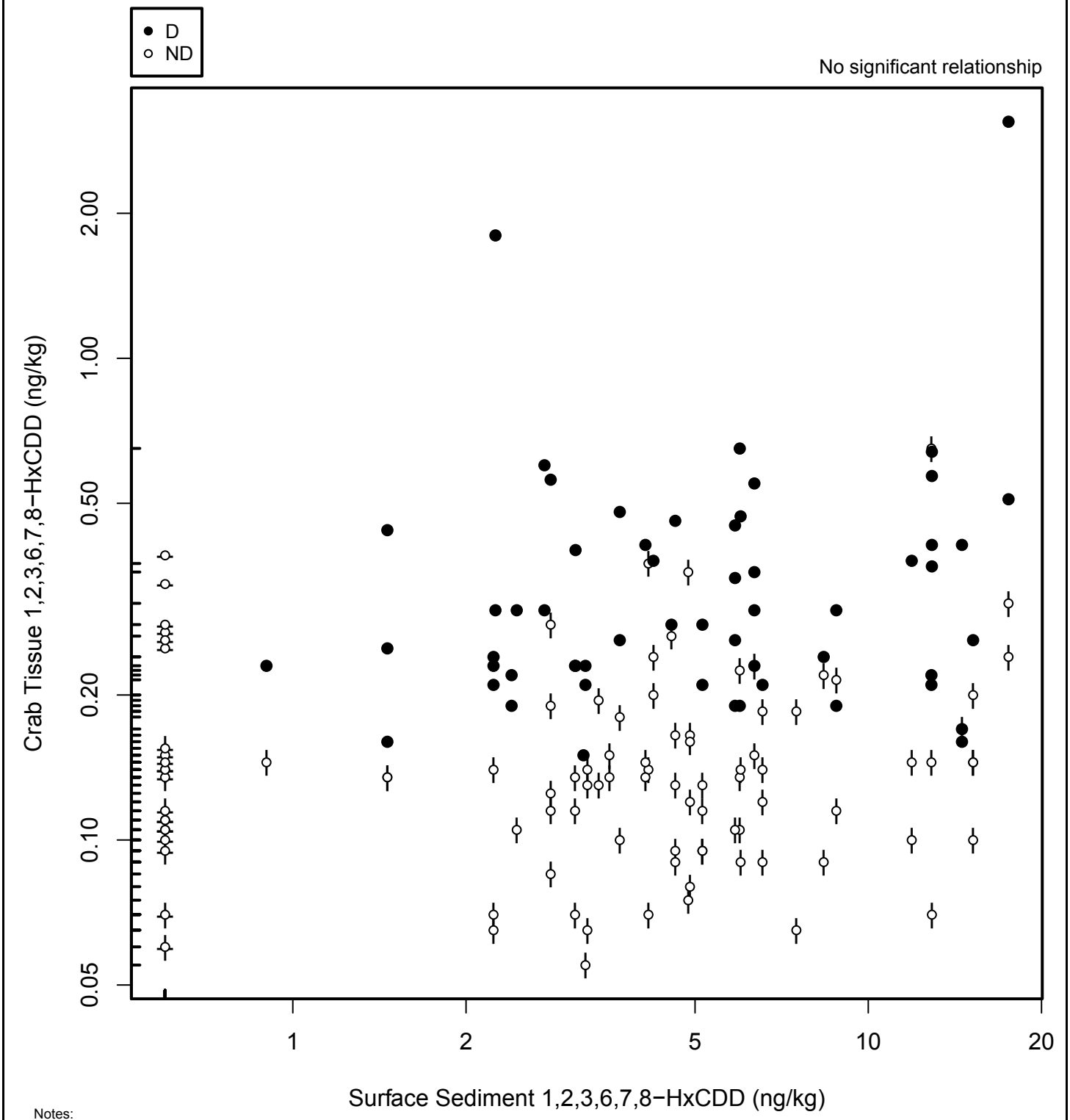
-- For this congener, no statisitcally significant correlation was found for this tissue type with sediment.

HpCDD – heptachlorodibenzo-*p* - dioxin
HpCDF – heptachlorodibenzofuran
HxCDD – hexachlorodibenzo-*p* - dioxin
HxCDF – hexachlorodibenzofuran
OCDD – octachlorodibenzo-*p* -dioxin
OCDF – octachlorodibenzofuran
PeCDD – pentachlorodibenzo-*p* -dioxin
PeCDF – pentachlorodibenzofuran
TCDD – tetrachlorodibenzo-*p* - dioxin
TCDF – tetrachlorodibenzofuran

a - Congeners not shown did not have statistically significant bivariate correlations in the TCEQ's TMDL dataset (catfish fillet and edible crab).

b - $TEQ_{DF,M}$ (ND=1/2DL) = Toxicity equivalent for 2,3,7,8-tetrachlorinated dibenzo-p-dioxin (TCDD) calculated using dioxins and furans and mammalian toxicity equivalency factors (van den Berg et al. 2006) with nondetects set at one-half the detection limit.

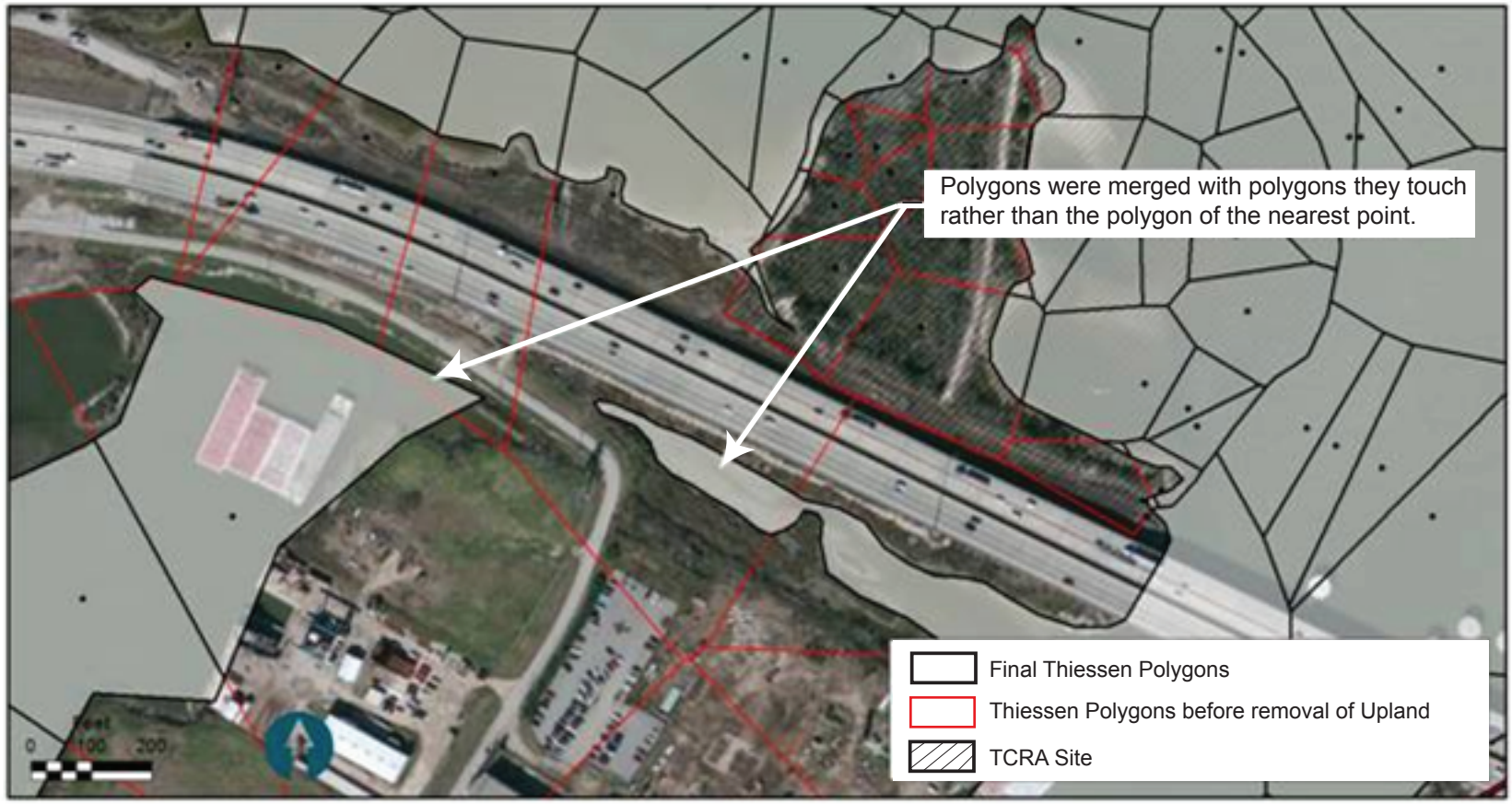
# FIGURES




Notes:
D = detected
ND = nondetected; ½ detection limit used
Surface sediment concentrations represent averages of samples within 100 m of each crab sample.
Inward ticks correspond to NDs in the x or y dimensions, as applicable.
Vertical or horizontal symbols represent the axis where data are censored. Censored Kendall's correlation statistic shown at top.

ANCHOR QEA integral consulting inc.

**Figure B-1**
Scatterplot of Edible Blue Crab Tissue vs. Surface Sediment Concentrations of 1,2,3,6,7,8−HxCDD
Draft Remedial Investigation Report
San Jacinto River Waste Pits Superfund Site




ANCHOR QEA

integral consulting inc.

**Figure B-2**
Illustration of Thiessen Polygon Refinement
Draft Remedial Investigation Report
San Jacinto River Waste Pits Superfund Site

# APPENDIX C
# SUMMARY STATISTICS TABLES
# SAN JACINTO RIVER WASTE PITS
# SUPERFUND SITE

**Table C-1**
**Summary Statistics for PCB Congener and Aroclor Concentrations in Area 4 Surface Soil Samples**

| Analyte | Units | Number of Samples | Number of Detected Measurements | Detection Frequency | Minimum | Maximum | Mean[a] |
|---|---|---|---|---|---|---|---|
| **Area 4** | | | | | | | |
| Aroclor 1016 | µg/kg | 10 | 0 | 0% | 1.1 | 5.0 | 1.45 |
| Aroclor 1221 | µg/kg | 10 | 0 | 0% | 1.1 | 3.0 | 1.24 |
| Aroclor 1232 | µg/kg | 10 | 0 | 0% | 1.1 | 1.1 | 1.05 |
| Aroclor 1242 | µg/kg | 10 | 1 | 10% | 25 | 25 | 3.45 |
| Aroclor 1248 | µg/kg | 10 | 0 | 0% | 1.1 | 9.0 | 1.85 |
| Aroclor 1254 | µg/kg | 10 | 2 | 20% | 27 | 66 | 11.3 |
| Aroclor 1260 | µg/kg | 10 | 6 | 60% | 2.1 | 57 | 15.7 |
| Aroclor 1262 | µg/kg | 10 | 0 | 0% | 1.1 | 1.7 | 1.11 |
| Aroclor 1268 | µg/kg | 10 | 0 | 0% | 1.1 | 1.1 | 1.05 |
| PCB001 | ng/kg | 11 | 11 | 100% | 17.1 | 762 | 199 |
| PCB002 | ng/kg | 11 | 7 | 64% | 0.81 | 96.8 | 27.1 |
| PCB003 | ng/kg | 11 | 11 | 100% | 10 | 437 | 146 |
| PCB004 | ng/kg | 11 | 4 | 36% | 5.6 | 8,160 | 1,090 |
| PCB005 | ng/kg | 11 | 1 | 9% | 3.41 | 150 | 43.6 |
| PCB006 | ng/kg | 11 | 6 | 55% | 3.04 | 3,640 | 484 |
| PCB007 | ng/kg | 11 | 3 | 27% | 3.1 | 135 | 57.9 |
| PCB008 | ng/kg | 11 | 7 | 64% | 7.4 | 8,390 | 1,500 |
| PCB009 | ng/kg | 11 | 3 | 27% | 3.05 | 482 | 102 |
| PCB010 | ng/kg | 11 | 3 | 27% | 3.41 | 389 | 69.0 |
| PCB011 | ng/kg | 11 | 3 | 27% | 10.4 | 124 | 56.9 |
| PCB012+013 | ng/kg | 11 | 4 | 36% | 3.02 | 772 | 147 |
| PCB014 | ng/kg | 11 | 0 | 0% | 2.9 | 128 | 34.4 |
| PCB015 | ng/kg | 11 | 9 | 82% | 37 | 11,100 | 2,220 |
| PCB016 | ng/kg | 11 | 8 | 73% | 1.14 | 7,010 | 1,280 |
| PCB017 | ng/kg | 11 | 10 | 91% | 6.87 | 9,640 | 1,500 |
| PCB018+030 | ng/kg | 11 | 11 | 100% | 10.3 | 17,100 | 2,690 |
| PCB019 | ng/kg | 11 | 9 | 82% | 4.12 | 2,070 | 437 |

**Table C-1**
**Summary Statistics for PCB Congener and Aroclor Concentrations in Area 4 Surface Soil Samples**

| Analyte | Units | Number of Samples | Number of Detected Measurements | Detection Frequency | Minimum | Maximum | Mean[a] |
|---|---|---|---|---|---|---|---|
| PCB020+028 | ng/kg | 11 | 11 | 100% | 24.3 | 23,200 | 4,500 |
| PCB021+033 | ng/kg | 11 | 10 | 91% | 3.39 | 8,900 | 1,850 |
| PCB022 | ng/kg | 11 | 10 | 91% | 5.76 | 7,250 | 1,490 |
| PCB023 | ng/kg | 11 | 0 | 0% | 0.76 | 66 | 11.5 |
| PCB024 | ng/kg | 11 | 2 | 18% | 0.695 | 3,190 | 297 |
| PCB025 | ng/kg | 11 | 8 | 73% | 1.17 | 1,380 | 284 |
| PCB026+029 | ng/kg | 11 | 9 | 82% | 3.44 | 3,510 | 678 |
| PCB027 | ng/kg | 11 | 7 | 64% | 0.825 | 1,130 | 213 |
| PCB031 | ng/kg | 11 | 11 | 100% | 14.6 | 15,700 | 3,420 |
| PCB032 | ng/kg | 11 | 10 | 91% | 2.47 | 3,440 | 779 |
| PCB034 | ng/kg | 11 | 0 | 0% | 0.725 | 61.5 | 10.8 |
| PCB035 | ng/kg | 11 | 3 | 27% | 0.67 | 600 | 67.5 |
| PCB036 | ng/kg | 11 | 0 | 0% | 0.64 | 52.5 | 9.40 |
| PCB037 | ng/kg | 11 | 11 | 100% | 13.8 | 11,200 | 1,810 |
| PCB038 | ng/kg | 11 | 0 | 0% | 0.68 | 56.5 | 10.1 |
| PCB039 | ng/kg | 11 | 2 | 18% | 0.665 | 54.5 | 10.9 |
| PCB040+041+071 | ng/kg | 11 | 11 | 100% | 18.4 | 8,830 | 1,760 |
| PCB042 | ng/kg | 11 | 10 | 91% | 8.6 | 4,020 | 794 |
| PCB043+073 | ng/kg | 11 | 6 | 55% | 0.58 | 503 | 96.5 |
| PCB044+047+065 | ng/kg | 11 | 11 | 100% | 56.8 | 11,700 | 3,110 |
| PCB045+051 | ng/kg | 11 | 11 | 100% | 14.5 | 3,710 | 811 |
| PCB046 | ng/kg | 11 | 8 | 73% | 0.795 | 1,390 | 286 |
| PCB048 | ng/kg | 11 | 8 | 73% | 1.38 | 2,780 | 543 |
| PCB049+069 | ng/kg | 11 | 11 | 100% | 28.8 | 6,730 | 1,770 |
| PCB050+053 | ng/kg | 11 | 11 | 100% | 11.1 | 2,580 | 652 |
| PCB052 | ng/kg | 11 | 11 | 100% | 74.7 | 12,300 | 3,860 |
| PCB054 | ng/kg | 11 | 4 | 36% | 0.74 | 93.6 | 24.7 |
| PCB055 | ng/kg | 11 | 1 | 9% | 0.477 | 36.5 | 4.82 |

**Table C-1**
**Summary Statistics for PCB Congener and Aroclor Concentrations in Area 4 Surface Soil Samples**

| Analyte | Units | Number of Samples | Number of Detected Measurements | Detection Frequency | Minimum | Maximum | Mean[a] |
|---|---|---|---|---|---|---|---|
| PCB056 | ng/kg | 11 | 11 | 100% | 13.4 | 8,740 | 1,410 |
| PCB057 | ng/kg | 11 | 3 | 27% | 0.442 | 88.7 | 14.0 |
| PCB058 | ng/kg | 11 | 0 | 0% | 0.48 | 6.25 | 1.89 |
| PCB059+062+075 | ng/kg | 11 | 10 | 91% | 2.88 | 1,410 | 297 |
| PCB060 | ng/kg | 11 | 11 | 100% | 6.04 | 5,620 | 824 |
| PCB061+070+2m | ng/kg | 11 | 11 | 100% | 65.6 | 19,600 | 4,620 |
| PCB063 | ng/kg | 11 | 7 | 64% | 0.442 | 757 | 108 |
| PCB064 | ng/kg | 11 | 11 | 100% | 14.8 | 7,440 | 1,430 |
| PCB066 | ng/kg | 11 | 10 | 91% | 35.3 | 17,400 | 2,810 |
| PCB067 | ng/kg | 11 | 5 | 45% | 0.433 | 548 | 69.8 |
| PCB068 | ng/kg | 11 | 3 | 27% | 0.42 | 77.9 | 11.9 |
| PCB072 | ng/kg | 11 | 3 | 27% | 0.414 | 88 | 16.4 |
| PCB077 | ng/kg | 11 | 11 | 100% | 14.6 | 3,350 | 510 |
| PCB078 | ng/kg | 11 | 0 | 0% | 0.457 | 6.5 | 2.29 |
| PCB079 | ng/kg | 11 | 7 | 64% | 0.635 | 215 | 55.3 |
| PCB080 | ng/kg | 11 | 0 | 0% | 0.426 | 6 | 2.14 |
| PCB081 | ng/kg | 11 | 4 | 36% | 0.615 | 316 | 34.8 |
| PCB082 | ng/kg | 11 | 11 | 100% | 20.9 | 1,900 | 653 |
| PCB083+099 | ng/kg | 11 | 11 | 100% | 87.8 | 11,200 | 3,040 |
| PCB084 | ng/kg | 11 | 11 | 100% | 56.4 | 5,570 | 1,630 |
| PCB085+116 | ng/kg | 11 | 10 | 91% | 21.4 | 3,830 | 1,130 |
| PCB086+087+4ma | ng/kg | 11 | 11 | 100% | 119 | 12,700 | 3,840 |
| PCB088+091 | ng/kg | 11 | 11 | 100% | 25.8 | 3,290 | 1,020 |
| PCB089 | ng/kg | 11 | 7 | 64% | 1.06 | 222 | 62.8 |
| PCB090+101+113 | ng/kg | 11 | 11 | 100% | 170 | 20,000 | 5,490 |
| PCB092 | ng/kg | 11 | 11 | 100% | 30.9 | 3,690 | 1,100 |
| PCB093+100 | ng/kg | 11 | 7 | 64% | 0.99 | 382 | 74.2 |
| PCB094 | ng/kg | 11 | 6 | 55% | 1.08 | 198 | 48.6 |

**Table C-1**
**Summary Statistics for PCB Congener and Aroclor Concentrations in Area 4 Surface Soil Samples**

| Analyte | Units | Number of Samples | Number of Detected Measurements | Detection Frequency | Minimum | Maximum | Mean[a] |
|---|---|---|---|---|---|---|---|
| PCB095 | ng/kg | 11 | 11 | 100% | 144 | 14,900 | 4,450 |
| PCB096 | ng/kg | 11 | 6 | 55% | 0.76 | 139 | 53.7 |
| PCB098+102 | ng/kg | 11 | 8 | 73% | 4.79 | 499 | 184 |
| PCB103 | ng/kg | 11 | 5 | 45% | 0.855 | 145 | 36.2 |
| PCB104 | ng/kg | 11 | 0 | 0% | 0.83 | 5.3 | 1.92 |
| PCB105 | ng/kg | 11 | 11 | 100% | 91 | 12,200 | 3,110 |
| PCB106 | ng/kg | 11 | 1 | 9% | 0.426 | 74 | 23.7 |
| PCB107 | ng/kg | 11 | 9 | 82% | 16 | 1,940 | 481 |
| PCB108+124 | ng/kg | 11 | 10 | 91% | 3.48 | 896 | 231 |
| PCB110+115 | ng/kg | 11 | 11 | 100% | 232 | 25,400 | 7,680 |
| PCB111 | ng/kg | 11 | 0 | 0% | 0.438 | 26.2 | 4.05 |
| PCB112 | ng/kg | 11 | 0 | 0% | 0.454 | 7.4 | 2.40 |
| PCB114 | ng/kg | 11 | 7 | 64% | 2.17 | 607 | 154 |
| PCB117 | ng/kg | 11 | 5 | 45% | 2.35 | 935 | 170 |
| PCB118 | ng/kg | 11 | 11 | 100% | 193 | 28,600 | 6,870 |
| PCB120 | ng/kg | 11 | 4 | 36% | 0.397 | 76.1 | 12.1 |
| PCB121 | ng/kg | 11 | 0 | 0% | 0.43 | 6.85 | 2.31 |
| PCB122 | ng/kg | 11 | 5 | 45% | 0.483 | 262 | 77.1 |
| PCB123 | ng/kg | 11 | 7 | 64% | 2.21 | 268 | 89.3 |
| PCB126 | ng/kg | 11 | 2 | 18% | 0.965 | 102 | 33.8 |
| PCB127 | ng/kg | 11 | 0 | 0% | 0.444 | 79.5 | 20.7 |
| PCB128+166 | ng/kg | 11 | 11 | 100% | 108 | 6,820 | 2,040 |
| PCB129+138+163 | ng/kg | 11 | 11 | 100% | 877 | 39,100 | 11,900 |
| PCB130 | ng/kg | 11 | 11 | 100% | 36.9 | 2,290 | 715 |
| PCB131 | ng/kg | 11 | 11 | 100% | 3.69 | 360 | 109 |
| PCB132 | ng/kg | 11 | 11 | 100% | 117 | 9,620 | 3,080 |
| PCB133 | ng/kg | 11 | 11 | 100% | 11.4 | 522 | 154 |
| PCB134 | ng/kg | 11 | 10 | 91% | 16.9 | 1,330 | 426 |

**Table C-1**
**Summary Statistics for PCB Congener and Aroclor Concentrations in Area 4 Surface Soil Samples**

| Analyte | Units | Number of Samples | Number of Detected Measurements | Detection Frequency | Minimum | Maximum | Mean[a] |
|---|---|---|---|---|---|---|---|
| PCB135+151 | ng/kg | 11 | 11 | 100% | 104 | 6,570 | 2,310 |
| PCB136 | ng/kg | 11 | 11 | 100% | 33.4 | 2,510 | 868 |
| PCB137 | ng/kg | 11 | 9 | 82% | 30.8 | 3,260 | 737 |
| PCB139+140 | ng/kg | 11 | 10 | 91% | 4.46 | 692 | 195 |
| PCB141 | ng/kg | 11 | 11 | 100% | 51.1 | 4,220 | 1,340 |
| PCB142 | ng/kg | 11 | 0 | 0% | 0.61 | 16.1 | 5.37 |
| PCB143 | ng/kg | 11 | 0 | 0% | 0.545 | 15.4 | 5.22 |
| PCB144 | ng/kg | 11 | 11 | 100% | 10.4 | 716 | 237 |
| PCB145 | ng/kg | 11 | 0 | 0% | 0.272 | 4.86 | 1.40 |
| PCB146 | ng/kg | 11 | 11 | 100% | 94.7 | 4,360 | 1,420 |
| PCB147+149 | ng/kg | 11 | 11 | 100% | 263 | 17,700 | 6,050 |
| PCB148 | ng/kg | 11 | 5 | 45% | 0.336 | 76.1 | 13.3 |
| PCB150 | ng/kg | 11 | 6 | 55% | 0.256 | 46.2 | 11.3 |
| PCB152 | ng/kg | 11 | 3 | 27% | 0.254 | 46.2 | 9.83 |
| PCB153+168 | ng/kg | 11 | 11 | 100% | 480 | 22,900 | 6,820 |
| PCB154 | ng/kg | 11 | 8 | 73% | 1.94 | 221 | 46.6 |
| PCB155 | ng/kg | 11 | 0 | 0% | 0.322 | 3.04 | 1.20 |
| PCB156+157 | ng/kg | 11 | 11 | 100% | 89.8 | 6,450 | 1,610 |
| PCB158 | ng/kg | 11 | 11 | 100% | 76.4 | 3,790 | 1,160 |
| PCB159 | ng/kg | 11 | 7 | 64% | 1.7 | 119 | 44.5 |
| PCB160 | ng/kg | 11 | 0 | 0% | 0.442 | 12.5 | 4.03 |
| PCB161 | ng/kg | 11 | 0 | 0% | 0.407 | 10.8 | 3.58 |
| PCB162 | ng/kg | 11 | 9 | 82% | 2.01 | 236 | 64.2 |
| PCB164 | ng/kg | 11 | 11 | 100% | 28.3 | 2,050 | 735 |
| PCB165 | ng/kg | 11 | 0 | 0% | 0.454 | 12 | 4.00 |
| PCB167 | ng/kg | 11 | 11 | 100% | 41.4 | 2,030 | 556 |
| PCB169 | ng/kg | 11 | 2 | 18% | 0.795 | 10.8 | 4.92 |
| PCB170 | ng/kg | 11 | 11 | 100% | 353 | 5,560 | 2,320 |

**Table C-1**
**Summary Statistics for PCB Congener and Aroclor Concentrations in Area 4 Surface Soil Samples**

| Analyte | Units | Number of Samples | Number of Detected Measurements | Detection Frequency | Minimum | Maximum | Mean[a] |
|---|---|---|---|---|---|---|---|
| PCB171+173 | ng/kg | 11 | 11 | 100% | 97.6 | 1,570 | 654 |
| PCB172 | ng/kg | 11 | 11 | 100% | 64.2 | 857 | 388 |
| PCB174 | ng/kg | 11 | 11 | 100% | 213 | 4,750 | 1,920 |
| PCB175 | ng/kg | 11 | 11 | 100% | 9.28 | 200 | 74.7 |
| PCB176 | ng/kg | 11 | 11 | 100% | 18.9 | 578 | 202 |
| PCB177 | ng/kg | 11 | 11 | 100% | 192 | 2,540 | 1,190 |
| PCB178 | ng/kg | 11 | 11 | 100% | 58.8 | 968 | 415 |
| PCB179 | ng/kg | 11 | 11 | 100% | 87.1 | 1,990 | 708 |
| PCB180+193 | ng/kg | 11 | 11 | 100% | 670 | 9,750 | 4,660 |
| PCB181 | ng/kg | 11 | 4 | 36% | 0.76 | 110 | 22.6 |
| PCB182 | ng/kg | 11 | 4 | 36% | 0.241 | 42.4 | 10.5 |
| PCB183 | ng/kg | 11 | 11 | 100% | 182 | 3,660 | 1,310 |
| PCB184 | ng/kg | 11 | 0 | 0% | 0.169 | 2.47 | 0.943 |
| PCB185 | ng/kg | 11 | 0 | 0% | 0.82 | 8 | 2.83 |
| PCB186 | ng/kg | 11 | 0 | 0% | 0.186 | 2.74 | 1.04 |
| PCB187 | ng/kg | 11 | 11 | 100% | 380 | 6,620 | 2,630 |
| PCB188 | ng/kg | 11 | 2 | 18% | 0.25 | 25.2 | 4.33 |
| PCB189 | ng/kg | 11 | 10 | 91% | 14.5 | 284 | 111 |
| PCB190 | ng/kg | 11 | 11 | 100% | 71 | 1,060 | 469 |
| PCB191 | ng/kg | 11 | 9 | 82% | 7.75 | 232 | 86.4 |
| PCB192 | ng/kg | 11 | 0 | 0% | 0.645 | 5.8 | 2.32 |
| PCB194 | ng/kg | 11 | 11 | 100% | 157 | 2,880 | 1,190 |
| PCB195 | ng/kg | 11 | 11 | 100% | 63.8 | 985 | 442 |
| PCB196 | ng/kg | 11 | 11 | 100% | 76.3 | 1,690 | 557 |
| PCB197 | ng/kg | 11 | 7 | 64% | 0.252 | 129 | 34.3 |
| PCB198+199 | ng/kg | 11 | 11 | 100% | 157 | 4,390 | 1,450 |
| PCB200 | ng/kg | 11 | 11 | 100% | 11.7 | 460 | 148 |
| PCB201 | ng/kg | 11 | 11 | 100% | 15.5 | 532 | 147 |

**Table C-1**
**Summary Statistics for PCB Congener and Aroclor Concentrations in Area 4 Surface Soil Samples**

| Analyte | Units | Number of Samples | Number of Detected Measurements | Detection Frequency | Minimum | Maximum | Mean[a] |
|---|---|---|---|---|---|---|---|
| PCB202 | ng/kg | 11 | 11 | 100% | 27 | 1,080 | 314 |
| PCB203 | ng/kg | 11 | 11 | 100% | 91.9 | 2,900 | 925 |
| PCB204 | ng/kg | 11 | 0 | 0% | 0.254 | 1.98 | 0.969 |
| PCB205 | ng/kg | 11 | 10 | 91% | 6.05 | 168 | 75.9 |
| PCB206 | ng/kg | 11 | 10 | 91% | 1.9 | 2,860 | 883 |
| PCB207 | ng/kg | 11 | 11 | 100% | 11.7 | 326 | 93.3 |
| PCB208 | ng/kg | 11 | 11 | 100% | 16.7 | 698 | 214 |
| PCB209 | ng/kg | 11 | 11 | 100% | 232 | 2,010 | 730 |
| Total PCBs Congeners | ng/kg | 11 | 11 | 100% | 5,790 | 276,000 | 99,500 |
| $TEQ_{P,M}$ | ng/kg | 11 | 11 | 100% | 0.206 | 12 | 3.97 |

**Notes**

PCB = polychlorinated biphenyl

$TEQ_{P,M}$ (ND=1/2DL) = Toxicity equivalent for dioxin-like PCBs (Table 2-14) calculated using mammalian toxicity equivalency factors (van den Berg et al. 2006) with nondetects set at one-half the detection limit.

a - Mean calculations include detected and nondetected values. Nondetected values were set to one-half the detection limit.

**Table C-2**
**Summary Statistics for PCB Congener and Aroclor Concentrations in Area 4 Subsurface Soil Samples**

| Analyte | Units | Number of Samples | Number of Detected Measurements | Detection Frequency | Minimum | Maximum | Mean[a] |
|---|---|---|---|---|---|---|---|
| **Area 4** | | | | | | | |
| Aroclor 1016 | ug/kg | 62 | 0 | 0% | 1.05 | 145 | 21.5 |
| Aroclor 1221 | ug/kg | 62 | 0 | 0% | 1.05 | 435 | 35.3 |
| Aroclor 1232 | ug/kg | 62 | 0 | 0% | 1.05 | 265 | 27.7 |
| Aroclor 1242 | ug/kg | 62 | 6 | 10% | 1.05 | 210 | 34.8 |
| Aroclor 1248 | ug/kg | 62 | 0 | 0% | 1.05 | 130 | 18.6 |
| Aroclor 1254 | ug/kg | 62 | 20 | 32% | 1.05 | 630 | 44.2 |
| Aroclor 1260 | ug/kg | 62 | 22 | 35% | 1.05 | 200 | 25.4 |
| Aroclor 1262 | ug/kg | 62 | 0 | 0% | 1.05 | 32 | 4.93 |
| Aroclor 1268 | ug/kg | 62 | 0 | 0% | 1.05 | 39.5 | 3.30 |
| Total PCBs (Aroclor sum) | ug/kg | 62 | 34 | 55% | 1.05 | 630 | 81.9 |
| PCB001 | ng/kg | 64 | 57 | 89% | 0.505 | 888,000 | 23,800 |
| PCB002 | ng/kg | 64 | 35 | 55% | 0.38 | 2,450 | 125 |
| PCB003 | ng/kg | 64 | 47 | 73% | 0.545 | 338,000 | 9,900 |
| PCB004 | ng/kg | 64 | 34 | 53% | 5.20 | 219,000 | 5,820 |
| PCB005 | ng/kg | 64 | 1 | 2% | 2.25 | 479 | 31.1 |
| PCB006 | ng/kg | 64 | 25 | 39% | 2.00 | 31,700 | 1,140 |
| PCB007 | ng/kg | 64 | 20 | 31% | 2.06 | 20,900 | 609 |
| PCB008 | ng/kg | 64 | 48 | 75% | 2.02 | 1,060,000 | 26,700 |
| PCB009 | ng/kg | 64 | 20 | 31% | 1.96 | 19,500 | 597 |
| PCB010 | ng/kg | 64 | 10 | 16% | 1.3 | 5,430 | 179 |
| PCB011 | ng/kg | 64 | 13 | 20% | 2.06 | 5,280 | 124 |
| PCB012+013 | ng/kg | 64 | 22 | 34% | 1.98 | 6,330 | 366 |
| PCB014 | ng/kg | 64 | 0 | 0% | 1.87 | 408 | 25.7 |
| PCB015 | ng/kg | 64 | 52 | 81% | 2.78 | 3,030,000 | 77,300 |
| PCB016 | ng/kg | 64 | 39 | 61% | 1.03 | 22,700 | 1,300 |
| PCB017 | ng/kg | 64 | 46 | 72% | 0.97 | 26,300 | 1,280 |
| PCB018+030 | ng/kg | 64 | 51 | 80% | 1.5 | 45,200 | 2,130 |

**Table C-2**
**Summary Statistics for PCB Congener and Aroclor Concentrations in Area 4 Subsurface Soil Samples**

| Analyte | Units | Number of Samples | Number of Detected Measurements | Detection Frequency | Minimum | Maximum | Mean[a] |
|---|---|---|---|---|---|---|---|
| PCB019 | ng/kg | 64 | 38 | 59% | 0.81 | 6,570 | 386 |
| PCB020+028 | ng/kg | 64 | 58 | 91% | 0.855 | 77,100 | 5,220 |
| PCB021+033 | ng/kg | 64 | 50 | 78% | 0.68 | 39,300 | 1,890 |
| PCB022 | ng/kg | 64 | 52 | 81% | 0.805 | 29,000 | 1,330 |
| PCB023 | ng/kg | 64 | 1 | 2% | 0.454 | 152 | 8.73 |
| PCB024 | ng/kg | 64 | 9 | 14% | 0.402 | 1,730 | 58.6 |
| PCB025 | ng/kg | 64 | 36 | 56% | 0.379 | 7,300 | 302 |
| PCB026+029 | ng/kg | 64 | 45 | 70% | 0.66 | 14,800 | 701 |
| PCB027 | ng/kg | 64 | 34 | 53% | 0.384 | 3,950 | 211 |
| PCB031 | ng/kg | 64 | 56 | 88% | 0.71 | 59,300 | 3,280 |
| PCB032 | ng/kg | 64 | 51 | 80% | 0.496 | 15,900 | 895 |
| PCB034 | ng/kg | 64 | 2 | 3% | 0.416 | 195 | 11.0 |
| PCB035 | ng/kg | 64 | 19 | 30% | 0.38 | 1,550 | 44.4 |
| PCB036 | ng/kg | 64 | 2 | 3% | 0.375 | 133 | 8.02 |
| PCB037 | ng/kg | 64 | 51 | 80% | 0.965 | 20,900 | 1,740 |
| PCB038 | ng/kg | 64 | 1 | 2% | 0.395 | 152 | 9.83 |
| PCB039 | ng/kg | 64 | 3 | 5% | 0.383 | 142 | 9.17 |
| PCB040+041+071 | ng/kg | 64 | 51 | 80% | 0.685 | 20,500 | 1,580 |
| PCB042 | ng/kg | 64 | 48 | 75% | 0.725 | 10,700 | 857 |
| PCB043+073 | ng/kg | 64 | 18 | 28% | 0.505 | 1,480 | 67.8 |
| PCB044+047+065 | ng/kg | 64 | 52 | 81% | 0.92 | 40,600 | 3,520 |
| PCB045+051 | ng/kg | 64 | 45 | 70% | 0.74 | 10,300 | 947 |
| PCB046 | ng/kg | 64 | 38 | 59% | 0.71 | 3,600 | 309 |
| PCB048 | ng/kg | 64 | 40 | 63% | 0.675 | 9,450 | 544 |
| PCB049+069 | ng/kg | 64 | 54 | 84% | 0.735 | 25,400 | 2,140 |
| PCB050+053 | ng/kg | 64 | 47 | 73% | 0.715 | 8,770 | 790 |
| PCB052 | ng/kg | 64 | 52 | 81% | 2.37 | 64,900 | 5,230 |
| PCB054 | ng/kg | 64 | 20 | 31% | 0.235 | 1,150 | 36.2 |

**Table C-2**
**Summary Statistics for PCB Congener and Aroclor Concentrations in Area 4 Subsurface Soil Samples**

| Analyte | Units | Number of Samples | Number of Detected Measurements | Detection Frequency | Minimum | Maximum | Mean[a] |
|---|---|---|---|---|---|---|---|
| PCB055 | ng/kg | 64 | 4 | 6% | 0.347 | 6,110 | 167 |
| PCB056 | ng/kg | 64 | 50 | 78% | 0.62 | 18,600 | 1,400 |
| PCB057 | ng/kg | 64 | 4 | 6% | 0.316 | 744 | 17.8 |
| PCB058 | ng/kg | 64 | 1 | 2% | 0.342 | 47.9 | 3.00 |
| PCB059+062+075 | ng/kg | 64 | 40 | 63% | 0.438 | 3,870 | 294 |
| PCB060 | ng/kg | 64 | 45 | 70% | 0.49 | 10,700 | 624 |
| PCB061+070+074+076 | ng/kg | 64 | 57 | 89% | 1.63 | 47,000 | 4,500 |
| PCB063 | ng/kg | 64 | 32 | 50% | 0.383 | 1,120 | 70.0 |
| PCB064 | ng/kg | 64 | 55 | 86% | 0.545 | 15,500 | 1,320 |
| PCB066 | ng/kg | 64 | 57 | 89% | 0.67 | 22,000 | 1,750 |
| PCB067 | ng/kg | 64 | 26 | 41% | 0.375 | 1,060 | 59.8 |
| PCB068 | ng/kg | 64 | 12 | 19% | 0.382 | 568 | 22.4 |
| PCB072 | ng/kg | 64 | 20 | 31% | 0.35 | 477 | 32.8 |
| PCB077 | ng/kg | 64 | 46 | 72% | 0.39 | 4,980 | 431 |
| PCB078 | ng/kg | 64 | 2 | 3% | 0.292 | 484 | 16.2 |
| PCB079 | ng/kg | 64 | 25 | 39% | 0.265 | 481 | 51.7 |
| PCB080 | ng/kg | 64 | 3 | 5% | 0.274 | 298 | 12.6 |
| PCB081 | ng/kg | 64 | 11 | 17% | 0.425 | 205 | 16.6 |
| PCB082 | ng/kg | 64 | 51 | 80% | 0.356 | 9,880 | 959 |
| PCB083+099 | ng/kg | 64 | 57 | 89% | 1.07 | 49,900 | 4,700 |
| PCB084 | ng/kg | 64 | 55 | 86% | 0.9 | 22,400 | 2,260 |
| PCB085+116 | ng/kg | 64 | 48 | 75% | 0.505 | 13,000 | 1,380 |
| PCB086+087+097+109+119 +125 | ng/kg | 64 | 60 | 94% | 0.935 | 65,700 | 5,930 |
| PCB088+091 | ng/kg | 64 | 52 | 81% | 0.615 | 9,790 | 1,270 |
| PCB089 | ng/kg | 64 | 27 | 42% | 0.362 | 579 | 47.6 |
| PCB090+101+113 | ng/kg | 64 | 62 | 97% | 1.85 | 170,000 | 10,600 |
| PCB092 | ng/kg | 64 | 55 | 86% | 0.735 | 24,800 | 1,880 |

**Table C-2**
**Summary Statistics for PCB Congener and Aroclor Concentrations in Area 4 Subsurface Soil Samples**

| Analyte | Units | Number of Samples | Number of Detected Measurements | Detection Frequency | Minimum | Maximum | Mean[a] |
|---|---|---|---|---|---|---|---|
| PCB093+100 | ng/kg | 64 | 18 | 28% | 0.328 | 1,110 | 71.2 |
| PCB094 | ng/kg | 64 | 20 | 31% | 0.37 | 1,050 | 47.4 |
| PCB095 | ng/kg | 64 | 57 | 89% | 2.29 | 111,000 | 7,930 |
| PCB096 | ng/kg | 64 | 31 | 48% | 0.254 | 567 | 62.6 |
| PCB098+102 | ng/kg | 64 | 38 | 59% | 0.349 | 2,170 | 222 |
| PCB103 | ng/kg | 64 | 17 | 27% | 0.288 | 801 | 62.2 |
| PCB104 | ng/kg | 64 | 3 | 5% | 0.382 | 41.5 | 2.90 |
| PCB105 | ng/kg | 64 | 58 | 91% | 0.71 | 33,200 | 3,690 |
| PCB106 | ng/kg | 64 | 1 | 2% | 0.336 | 212 | 15.2 |
| PCB107 | ng/kg | 64 | 49 | 77% | 0.332 | 6,640 | 666 |
| PCB108+124 | ng/kg | 64 | 37 | 58% | 0.355 | 3,160 | 328 |
| PCB110+115 | ng/kg | 64 | 61 | 95% | 2.08 | 124,000 | 11,800 |
| PCB111 | ng/kg | 64 | 1 | 2% | 0.228 | 214 | 6.18 |
| PCB112 | ng/kg | 64 | 0 | 0% | 0.233 | 226 | 5.78 |
| PCB114 | ng/kg | 64 | 26 | 41% | 0.355 | 1,280 | 136 |
| PCB117 | ng/kg | 64 | 21 | 33% | 0.312 | 2,200 | 140 |
| PCB118 | ng/kg | 64 | 61 | 95% | 0.715 | 98,700 | 9,450 |
| PCB120 | ng/kg | 64 | 10 | 16% | 0.21 | 2,730 | 87.0 |
| PCB121 | ng/kg | 64 | 1 | 2% | 0.234 | 244 | 6.82 |
| PCB122 | ng/kg | 64 | 12 | 19% | 0.364 | 725 | 58.3 |
| PCB123 | ng/kg | 64 | 32 | 50% | 0.372 | 963 | 117 |
| PCB126 | ng/kg | 64 | 2 | 3% | 0.456 | 224 | 17.9 |
| PCB127 | ng/kg | 64 | 0 | 0% | 0.336 | 165 | 12.3 |
| PCB128+166 | ng/kg | 64 | 56 | 88% | 0.333 | 28,100 | 2,350 |
| PCB129+138+163 | ng/kg | 64 | 61 | 95% | 1.14 | 409,000 | 23,200 |
| PCB130 | ng/kg | 64 | 49 | 77% | 0.432 | 9,690 | 961 |
| PCB131 | ng/kg | 64 | 34 | 53% | 0.43 | 3,600 | 213 |
| PCB132 | ng/kg | 64 | 59 | 92% | 0.77 | 103,000 | 7,090 |

**Table C-2**
**Summary Statistics for PCB Congener and Aroclor Concentrations in Area 4 Subsurface Soil Samples**

| Analyte | Units | Number of Samples | Number of Detected Measurements | Detection Frequency | Minimum | Maximum | Mean[a] |
|---|---|---|---|---|---|---|---|
| PCB133 | ng/kg | 64 | 39 | 61% | 0.391 | 3,500 | 242 |
| PCB134 | ng/kg | 64 | 47 | 73% | 0.51 | 12,000 | 853 |
| PCB135+151 | ng/kg | 64 | 58 | 91% | 0.635 | 161,000 | 8,180 |
| PCB136 | ng/kg | 64 | 57 | 89% | 0.25 | 51,800 | 2,810 |
| PCB137 | ng/kg | 64 | 41 | 64% | 0.39 | 4,970 | 509 |
| PCB139+140 | ng/kg | 64 | 40 | 63% | 0.362 | 3,160 | 235 |
| PCB141 | ng/kg | 64 | 55 | 86% | 0.675 | 105,000 | 4,910 |
| PCB142 | ng/kg | 64 | 0 | 0% | 0.392 | 3,590 | 63.4 |
| PCB143 | ng/kg | 64 | 0 | 0% | 0.354 | 3,360 | 59.4 |
| PCB144 | ng/kg | 64 | 47 | 73% | 0.249 | 18,200 | 890 |
| PCB145 | ng/kg | 64 | 1 | 2% | 0.202 | 31.2 | 1.91 |
| PCB146 | ng/kg | 64 | 55 | 86% | 0.55 | 48,300 | 2,960 |
| PCB147+149 | ng/kg | 64 | 63 | 98% | 1.21 | 371,000 | 19,300 |
| PCB148 | ng/kg | 64 | 10 | 16% | 0.248 | 184 | 10.1 |
| PCB150 | ng/kg | 64 | 17 | 27% | 0.196 | 194 | 12.6 |
| PCB152 | ng/kg | 64 | 12 | 19% | 0.188 | 174 | 7.96 |
| PCB153+168 | ng/kg | 64 | 62 | 97% | 0.945 | 386,000 | 19,400 |
| PCB154 | ng/kg | 64 | 29 | 45% | 0.228 | 1,030 | 68.9 |
| PCB155 | ng/kg | 64 | 0 | 0% | 0.273 | 31.4 | 1.80 |
| PCB156+157 | ng/kg | 64 | 53 | 83% | 0.65 | 32,600 | 2,250 |
| PCB158 | ng/kg | 64 | 56 | 88% | 0.295 | 27,800 | 1,980 |
| PCB159 | ng/kg | 64 | 25 | 39% | 0.268 | 4,140 | 159 |
| PCB160 | ng/kg | 64 | 0 | 0% | 0.302 | 2,520 | 44.8 |
| PCB161 | ng/kg | 64 | 0 | 0% | 0.271 | 2,320 | 41.1 |
| PCB162 | ng/kg | 64 | 25 | 39% | 0.28 | 1,450 | 74.3 |
| PCB164 | ng/kg | 64 | 52 | 81% | 0.299 | 22,600 | 1,470 |
| PCB165 | ng/kg | 64 | 0 | 0% | 0.308 | 2,680 | 47.4 |
| PCB167 | ng/kg | 64 | 52 | 81% | 0.282 | 7,870 | 702 |

**Table C-2**
**Summary Statistics for PCB Congener and Aroclor Concentrations in Area 4 Subsurface Soil Samples**

| Analyte | Units | Number of Samples | Number of Detected Measurements | Detection Frequency | Minimum | Maximum | Mean[a] |
|---|---|---|---|---|---|---|---|
| PCB169 | ng/kg | 64 | 3 | 5% | 0.31 | 213 | 9.27 |
| PCB170 | ng/kg | 64 | 58 | 91% | 0.755 | 180,000 | 7,620 |
| PCB171+173 | ng/kg | 64 | 53 | 83% | 0.54 | 53,300 | 2,520 |
| PCB172 | ng/kg | 64 | 49 | 77% | 0.53 | 29,500 | 1,350 |
| PCB174 | ng/kg | 64 | 56 | 88% | 0.695 | 216,000 | 9,160 |
| PCB175 | ng/kg | 64 | 37 | 58% | 0.232 | 8,430 | 344 |
| PCB176 | ng/kg | 64 | 51 | 80% | 0.182 | 23,000 | 1,040 |
| PCB177 | ng/kg | 64 | 56 | 88% | 0.655 | 98,700 | 4,560 |
| PCB178 | ng/kg | 64 | 51 | 80% | 0.25 | 32,400 | 1,450 |
| PCB179 | ng/kg | 64 | 55 | 86% | 0.317 | 70,100 | 3,310 |
| PCB180+193 | ng/kg | 64 | 60 | 94% | 0.75 | 550,000 | 20,200 |
| PCB181 | ng/kg | 64 | 21 | 33% | 0.49 | 621 | 34.2 |
| PCB182 | ng/kg | 64 | 10 | 16% | 0.239 | 52,000 | 819 |
| PCB183 | ng/kg | 64 | 55 | 86% | 0.615 | 113,000 | 5,320 |
| PCB184 | ng/kg | 64 | 0 | 0% | 0.173 | 12.6 | 1.10 |
| PCB185 | ng/kg | 64 | 0 | 0% | 0.53 | 125 | 7.62 |
| PCB186 | ng/kg | 64 | 0 | 0% | 0.194 | 14.4 | 1.22 |
| PCB187 | ng/kg | 64 | 58 | 91% | 0.515 | 132,000 | 5,610 |
| PCB188 | ng/kg | 64 | 2 | 3% | 0.234 | 50.0 | 2.98 |
| PCB189 | ng/kg | 64 | 42 | 66% | 0.424 | 6,660 | 299 |
| PCB190 | ng/kg | 64 | 53 | 83% | 0.51 | 36,900 | 1,510 |
| PCB191 | ng/kg | 64 | 38 | 59% | 0.384 | 7,260 | 305 |
| PCB192 | ng/kg | 64 | 0 | 0% | 0.416 | 116 | 6.63 |
| PCB194 | ng/kg | 64 | 54 | 84% | 0.447 | 91,400 | 3,600 |
| PCB195 | ng/kg | 64 | 50 | 78% | 0.448 | 37,400 | 1,520 |
| PCB196 | ng/kg | 64 | 54 | 84% | 0.414 | 48,600 | 2,090 |
| PCB197 | ng/kg | 64 | 8 | 13% | 0.284 | 1,290 | 43.9 |
| PCB198+199 | ng/kg | 64 | 54 | 84% | 0.42 | 88,700 | 4,130 |

**Table C-2**
**Summary Statistics for PCB Congener and Aroclor Concentrations in Area 4 Subsurface Soil Samples**

| Analyte | Units | Number of Samples | Number of Detected Measurements | Detection Frequency | Minimum | Maximum | Mean[a] |
|---|---|---|---|---|---|---|---|
| PCB200 | ng/kg | 64 | 47 | 73% | 0.279 | 12,800 | 591 |
| PCB201 | ng/kg | 64 | 46 | 72% | 0.266 | 9,910 | 513 |
| PCB202 | ng/kg | 64 | 50 | 78% | 0.35 | 15,200 | 747 |
| PCB203 | ng/kg | 64 | 55 | 86% | 0.404 | 58,300 | 2,610 |
| PCB204 | ng/kg | 64 | 2 | 3% | 0.269 | 26.9 | 1.97 |
| PCB205 | ng/kg | 64 | 39 | 61% | 0.395 | 5,650 | 240 |
| PCB206 | ng/kg | 64 | 50 | 78% | 0.705 | 22,300 | 1,430 |
| PCB207 | ng/kg | 64 | 46 | 72% | 0.402 | 2,600 | 181 |
| PCB208 | ng/kg | 64 | 47 | 73% | 0.401 | 4,520 | 343 |
| PCB209 | ng/kg | 64 | 58 | 91% | 1.05 | 248,000 | 14,100 |
| Total PCBs Congeners | ng/kg | 64 | 64 | 100% | 251 | 6,590,000 | 457,000 |
| $TEQ_{P,M}$ | ng/kg | 64 | 61 | 95% | 0.058 | 34.6 | 2.77 |

**Notes**

PCB = polychlorinated biphenyl

$TEQ_{P,M}$ (ND=1/2DL) = Toxicity equivalent for dioxin-like PCBs (Table 2-14) calculated using mammalian toxicity equivalency factors (van den Berg et al. 2006) with nondetects set at one-half the detection limit.

a - Mean calculations include detected and nondetected values. Nondetected values were set to one-half the detection limit.

**Table C-3**
**Summary Statistics for Concentrations of Metals in Surface Soil Samples[a]**

| Analyte | Units | Number of Samples | Number of Detected Measurements | Detection Frequency | Detected Data | | All Data |
|---|---|---|---|---|---|---|---|
| | | | | | Minimum | Maximum | Mean[b] |
| **Area 1** | | | | | | | |
| Aluminum | mg/kg | 18 | 18 | 100% | 426 | 29,400 | 8,160 |
| Arsenic | mg/kg | 21 | 21 | 100% | 0.27 | 9.36 | 2.61 |
| Barium | mg/kg | 18 | 18 | 100% | 6.5 | 1,960 | 265 |
| Cadmium | mg/kg | 21 | 19 | 90% | 0.018 | 1.73 | 0.263 |
| Chromium | mg/kg | 21 | 21 | 100% | 0.63 | 45.8 | 10.7 |
| Cobalt | mg/kg | 18 | 17 | 94% | 1.75 | 40.1 | 6.07 |
| Copper | mg/kg | 21 | 21 | 100% | 0.8 | 121 | 18.6 |
| Lead | mg/kg | 21 | 18 | 86% | 3.3 | 119 | 32.0 |
| Magnesium | mg/kg | 18 | 18 | 100% | 94.3 | 12,000 | 2,910 |
| Manganese | mg/kg | 18 | 18 | 100% | 1.96 | 395 | 199 |
| Nickel | mg/kg | 21 | 20 | 95% | 1.3 | 96 | 13.3 |
| Thallium | mg/kg | 21 | 17 | 81% | 0.013 | 10.5 | 0.765 |
| Vanadium | mg/kg | 18 | 18 | 100% | 0.8 | 114 | 24.5 |
| Zinc | mg/kg | 21 | 21 | 100% | 0.7 | 328 | 81.4 |
| **Area 2** | | | | | | | |
| Aluminum | mg/kg | 12 | 12 | 100% | 1,400 | 9,070 | 4,800 |
| Arsenic | mg/kg | 12 | 12 | 100% | 1.36 | 3.90 | 2.47 |
| Barium | mg/kg | 12 | 12 | 100% | 26.6 | 255 | 129 |
| Cadmium | mg/kg | 12 | 11 | 92% | 0.0400 | 0.440 | 0.205 |
| Chromium | mg/kg | 12 | 12 | 100% | 4.60 | 61.7 | 14.3 |
| Cobalt | mg/kg | 12 | 12 | 100% | 1.80 | 32.2 | 5.90 |
| Copper | mg/kg | 12 | 12 | 100% | 4.80 | 39.5 | 14.3 |
| Lead | mg/kg | 12 | 12 | 100% | 7.10 | 273 | 84.6 |
| Magnesium | mg/kg | 12 | 12 | 100% | 656 | 3,000 | 1,730 |
| Manganese | mg/kg | 12 | 12 | 100% | 86.9 | 970 | 274 |
| Nickel | mg/kg | 12 | 12 | 100% | 2.51 | 11.9 | 6.855 |
| Thallium | mg/kg | 12 | 0 | 0% | NA | NA | 0.208 |

**Table C-3**
**Summary Statistics for Concentrations of Metals in Surface Soil Samples[a]**

| Analyte | Units | Number of Samples | Number of Detected Measurements | Detection Frequency | Detected Data | | All Data |
|---|---|---|---|---|---|---|---|
| | | | | | Minimum | Maximum | Mean[b] |
| Vanadium | mg/kg | 12 | 12 | 100% | 5.80 | 33.4 | 17.6 |
| Zinc | mg/kg | 12 | 12 | 100% | 15.7 | 188 | 93.4 |
| **Area 3** | | | | | | | |
| Aluminum | mg/kg | 9 | 9 | 100% | 2,360 | 9,180 | 5,390 |
| Arsenic | mg/kg | 9 | 9 | 100% | 0.730 | 2.35 | 1.48 |
| Barium | mg/kg | 9 | 9 | 100% | 14.4 | 209 | 92.0 |
| Cadmium | mg/kg | 9 | 9 | 100% | 0.0165 | 1.60 | 0.614 |
| Chromium | mg/kg | 9 | 9 | 100% | 3.51 | 12.6 | 7.05 |
| Cobalt | mg/kg | 9 | 9 | 100% | 1.22 | 3.60 | 2.59 |
| Copper | mg/kg | 9 | 9 | 100% | 2.61 | 59.2 | 22.2 |
| Lead | mg/kg | 9 | 9 | 100% | 4.10 | 65.5 | 26.5 |
| Magnesium | mg/kg | 9 | 9 | 100% | 525 | 2,610 | 1,620 |
| Manganese | mg/kg | 9 | 9 | 100% | 26.2 | 609 | 238 |
| Nickel | mg/kg | 9 | 9 | 100% | 1.39 | 14.4 | 6.89 |
| Thallium | mg/kg | 9 | 9 | 100% | 0.0310 | 15.9 | 7.22 |
| Vanadium | mg/kg | 9 | 9 | 100% | 3.50 | 14.6 | 9.71 |
| Zinc | mg/kg | 9 | 9 | 100% | 5.30 | 228 | 93.7 |
| **Area 4** | | | | | | | |
| Aluminum | mg/kg | 22 | 22 | 100% | 1,120 | 11,400 | 6,660 |
| Arsenic | mg/kg | 22 | 22 | 100% | 1.42 | 390 | 30.7 |
| Barium | mg/kg | 22 | 22 | 100% | 53.3 | 840 | 239 |
| Cadmium | mg/kg | 22 | 22 | 100% | 0.1 | 6.96 | 0.973 |
| Chromium | mg/kg | 22 | 22 | 100% | 4.16 | 86.3 | 29.4 |
| Cobalt | mg/kg | 22 | 22 | 100% | 2.1 | 67.3 | 11.1 |
| Copper | mg/kg | 22 | 22 | 100% | 6.9 | 1,990 | 204 |
| Lead | mg/kg | 22 | 22 | 100% | 10.6 | 896 | 119 |
| Magnesium | mg/kg | 22 | 22 | 100% | 1,180 | 14,900 | 3,500 |
| Manganese | mg/kg | 22 | 22 | 100% | 46.2 | 10,500 | 1,240 |

**Table C-3**
**Summary Statistics for Concentrations of Metals in Surface Soil Samples[a]**

| Analyte | Units | Number of Samples | Number of Detected Measurements | Detection Frequency | Detected Data | | All Data |
|---|---|---|---|---|---|---|---|
| | | | | | Minimum | Maximum | Mean[b] |
| Mercury | mg/kg | 22 | 22 | 100% | 0.013 | 0.628 | 0.0762 |
| Nickel | mg/kg | 22 | 22 | 100% | 3.2 | 71.1 | 21.2 |
| Thallium | mg/kg | 22 | 12 | 55% | 0.2 | 9.8 | 2.73 |
| Vanadium | mg/kg | 22 | 22 | 100% | 8.9 | 110 | 24.0 |
| Zinc | mg/kg | 22 | 22 | 100% | 39.9 | 8,050 | 1,100 |

**Notes**

NA = not applicable, no detected values

a - Summary statistics for mercury in Areas 1, 2, and 3 are provided in the RI Report main document.

b - Mean calculations include detected and nondetected values. Nondetected values were set to one-half the detection limit.

**Table C-4**
**Summary Statistics for Concentrations of Metals other than Mercury in Subsurface Soil Samples[a]**

| Analyte | Units | Number of Samples | Number of Detected Measurements | Detection Frequency | Detected Data | | All Data |
|---|---|---|---|---|---|---|---|
| | | | | | Minimum | Maximum | Mean[b] |
| **Area 1** | | | | | | | |
| Aluminum | mg/kg | 26 | 26 | 100% | 663 | 19,800 | 6,330 |
| Arsenic | mg/kg | 29 | 29 | 100% | 0.54 | 11.1 | 2.38 |
| Barium | mg/kg | 26 | 26 | 100% | 11.2 | 1,270 | 165 |
| Cadmium | mg/kg | 29 | 25 | 86% | 0.027 | 1.1 | 0.208 |
| Chromium | mg/kg | 29 | 29 | 100% | 1.51 | 30.8 | 8.74 |
| Cobalt | mg/kg | 26 | 26 | 100% | 0.7 | 9.3 | 3.63 |
| Copper | mg/kg | 29 | 29 | 100% | 0.9 | 117 | 14.7 |
| Lead | mg/kg | 29 | 24 | 83% | 3 | 354 | 38.8 |
| Magnesium | mg/kg | 26 | 26 | 100% | 210 | 12,200 | 2,420 |
| Manganese | mg/kg | 26 | 26 | 100% | 5.19 | 510 | 189 |
| Nickel | mg/kg | 29 | 29 | 100% | 0.6 | 33.9 | 8.33 |
| Thallium | mg/kg | 29 | 27 | 93% | 0.023 | 5.55 | 0.520 |
| Vanadium | mg/kg | 26 | 26 | 100% | 1.3 | 68.5 | 19.6 |
| Zinc | mg/kg | 29 | 29 | 100% | 1.5 | 340 | 75.5 |
| **Area 2** | | | | | | | |
| Aluminum | mg/kg | 2 | 2 | 100% | 2,240 | 4,710 | 3,480 |
| Arsenic | mg/kg | 2 | 2 | 100% | 1.62 | 2.90 | 2.26 |
| Barium | mg/kg | 2 | 2 | 100% | 42.9 | 64.0 | 53.5 |
| Cadmium | mg/kg | 2 | 1 | 50% | 0.0700 | 0.0700 | 0.0475 |
| Chromium | mg/kg | 2 | 2 | 100% | 3.80 | 4.90 | 4.35 |
| Cobalt | mg/kg | 2 | 2 | 100% | 2.20 | 3.70 | 2.95 |
| Copper | mg/kg | 2 | 2 | 100% | 3.80 | 4.50 | 4.15 |
| Lead | mg/kg | 2 | 2 | 100% | 9.50 | 19.0 | 14.3 |
| Magnesium | mg/kg | 2 | 2 | 100% | 1,110 | 1,500 | 1,310 |
| Manganese | mg/kg | 2 | 2 | 100% | 73.7 | 182 | 128 |
| Nickel | mg/kg | 2 | 2 | 100% | 3.18 | 4.52 | 3.85 |
| Thallium | mg/kg | 2 | 0 | 0% | NA | NA | 0.225 |

**Table C-4**
**Summary Statistics for Concentrations of Metals other than Mercury in Subsurface Soil Samples[a]**

| Analyte | Units | Number of Samples | Number of Detected Measurements | Detection Frequency | Detected Data | | All Data |
|---|---|---|---|---|---|---|---|
| | | | | | Minimum | Maximum | Mean[b] |
| Vanadium | mg/kg | 2 | 2 | 100% | 9.10 | 12.3 | 10.7 |
| Zinc | mg/kg | 2 | 2 | 100% | 7.90 | 40.1 | 24.0 |
| **Area 3** | | | | | | | |
| Aluminum | mg/kg | 9 | 9 | 100% | 2,630 | 10,200 | 6,540 |
| Arsenic | mg/kg | 9 | 9 | 100% | 0.670 | 2.82 | 1.80 |
| Barium | mg/kg | 9 | 9 | 100% | 13.8 | 296 | 161 |
| Cadmium | mg/kg | 9 | 9 | 100% | 0.0250 | 2.05 | 0.984 |
| Chromium | mg/kg | 9 | 9 | 100% | 1.77 | 22.1 | 10.9 |
| Cobalt | mg/kg | 9 | 9 | 100% | 1.17 | 4.25 | 2.98 |
| Copper | mg/kg | 9 | 9 | 100% | 1.72 | 89.9 | 39.4 |
| Lead | mg/kg | 9 | 9 | 100% | 4.10 | 81.4 | 44.8 |
| Magnesium | mg/kg | 9 | 9 | 100% | 527 | 2,700 | 1,890 |
| Manganese | mg/kg | 9 | 9 | 100% | 23.0 | 2,550 | 704 |
| Nickel | mg/kg | 9 | 9 | 100% | 1.32 | 17.6 | 9.91 |
| Thallium | mg/kg | 9 | 8 | 89% | 0.0530 | 22.5 | 9.31 |
| Vanadium | mg/kg | 9 | 9 | 100% | 3.64 | 14.8 | 10.5 |
| Zinc | mg/kg | 9 | 9 | 100% | 6.3 | 300 | 139 |
| **Area 4** | | | | | | | |
| Aluminum | mg/kg | 116 | 116 | 100% | 975 | 17,900 | 7,940 |
| Arsenic | mg/kg | 116 | 116 | 100% | 0.420 | 244 | 11.0 |
| Barium | mg/kg | 116 | 116 | 100% | 7.00 | 2,280 | 249 |
| Cadmium | mg/kg | 116 | 99 | 85% | 0.0420 | 6.43 | 0.656 |
| Chromium | mg/kg | 116 | 116 | 100% | 1.46 | 325 | 32.2 |
| Cobalt | mg/kg | 116 | 116 | 100% | 1.40 | 52.4 | 7.01 |
| Copper | mg/kg | 116 | 116 | 100% | 1.30 | 1,640 | 95.6 |
| Lead | mg/kg | 116 | 116 | 100% | 3.00 | 748 | 95.1 |
| Magnesium | mg/kg | 115 | 115 | 100% | 476 | 13,400 | 3,010 |
| Manganese | mg/kg | 116 | 116 | 100% | 15.9 | 33,500 | 1,100 |

**Table C-4**
**Summary Statistics for Concentrations of Metals other than Mercury in Subsurface Soil Samples[a]**

| Analyte | Units | Number of Samples | Number of Detected Measurements | Detection Frequency | Detected Data | | All Data |
|---|---|---|---|---|---|---|---|
| | | | | | Minimum | Maximum | Mean[b] |
| Mercury | mg/kg | 116 | 114 | 98% | 0.003 | 2.81 | 0.372 |
| Nickel | mg/kg | 116 | 116 | 100% | 1.40 | 596 | 26.2 |
| Thallium | mg/kg | 116 | 42 | 36% | 0.450 | 14.0 | 2.07 |
| Vanadium | mg/kg | 116 | 116 | 100% | 2.80 | 60.7 | 20.4 |
| Zinc | mg/kg | 116 | 116 | 100% | 4.60 | 6620 | 503 |

**Notes**

NA = not applicable, no detected values

a - Summary statistics for mercury in Areas 1, 2, and 3 are provided in the RI Report main document.

b - Mean calculations include detected and nondetected values. Nondetected values were set to one-half the detection limit.

**Table C-5**
**Summary Statistics for SVOC Concentrations in Surface Soil Samples, Dry Weight**

| Analyte | Units | Number of Samples | Number of Detected Measurements | Detection Frequency | Detected Data | | All Data |
|---|---|---|---|---|---|---|---|
| | | | | | Minimum | Maximum | Mean[a] |
| **Area 1** | | | | | | | |
| Bis(2-ethylhexyl)phthalate | µg/kg | 21 | 10 | 48% | 7.4 | 990 | 97.8 |
| Hexachlorobenzene | µg/kg | 3 | 0 | 0% | NA | NA | 2.40 |
| Phenol | µg/kg | 3 | 0 | 0% | NA | NA | 4.00 |
| **Area 2** | | | | | | | |
| Bis(2-ethylhexyl)phthalate | µg/kg | 12 | 12 | 100% | 19 | 140 | 75.5 |
| Carbazole | µg/kg | 12 | 6 | 50% | 17 | 210 | 32.8 |
| Hexachlorobenzene | µg/kg | 12 | 0 | 0% | NA | NA | 7.63 |
| Phenol | µg/kg | 12 | 0 | 0% | NA | NA | 10.1 |
| **Area 3** | | | | | | | |
| Bis(2-ethylhexyl)phthalate | µg/kg | 9 | 8 | 89% | 24 | 1,600 | 312 |
| **Area 4** | | | | | | | |
| 1,2-Dichlorobenzene [b] | µg/kg | 20 | 0 | 0% | NA | NA | 0.0457 |
| 1,3-Dichlorobenzene [b] | µg/kg | 20 | 0 | 0% | NA | NA | 0.0574 |
| 1,4-Dichlorobenzene [b] | µg/kg | 20 | 0 | 0% | NA | NA | 0.0520 |
| 2,4-Dichlorophenol | µg/kg | 21 | 0 | 0% | NA | NA | 4.22 |
| 1,2,3-Trichlorobenzene [b] | µg/kg | 20 | 0 | 0% | NA | NA | 0.115 |
| 1,2,4-Trichlorobenzene [b] | µg/kg | 20 | 0 | 0% | NA | NA | 0.0790 |
| 2,4,5-Trichlorophenol | µg/kg | 21 | 0 | 0% | NA | NA | 4.96 |
| 2,4,6-Trichlorophenol | µg/kg | 21 | 0 | 0% | NA | NA | 4.94 |
| 2,3,4,6-Tetrachlorophenol | µg/kg | 10 | 0 | 0% | NA | NA | 0.930 |
| Bis(2-ethylhexyl)phthalate | µg/kg | 21 | 20 | 95% | 24 | 3500 | 444 |
| Carbazole | µg/kg | 21 | 13 | 62% | 4.3 | 48 | 17.1 |
| Chloroform [b] | µg/kg | 20 | 1 | 5% | 0.48 | 0.48 | 0.0878 |

**Table C-5**
**Summary Statistics for SVOC Concentrations in Surface Soil Samples, Dry Weight**

| Analyte | Units | Number of Samples | Number of Detected Measurements | Detection Frequency | Detected Data | | All Data |
|---|---|---|---|---|---|---|---|
| | | | | | Minimum | Maximum | Mean[a] |
| Hexachlorobenzene | µg/kg | 21 | 1 | 5% | 2.4 | 2.4 | 5.47 |
| Pentachlorophenol | µg/kg | 21 | 0 | 0% | NA | NA | 13.4 |
| Phenol | µg/kg | 21 | 3 | 14% | 4.3 | 6.4 | 6.20 |

**Notes**

NA = not applicable, no detected values
SVOC = semivolatile organic compound

a - Mean calculations include detected and nondetected values. Nondetected values were set to one-half the detection limit.
b - Volatile organic compound.

**Table C-6**
**Summary Statistics for SVOC Concentrations in Subsurface Soil Samples, Dry Weight**

| Analyte | Units | Number of Samples | Number of Detected Measurements | Detection Frequency | Detected Data | | All Data |
|---|---|---|---|---|---|---|---|
| | | | | | Minimum | Maximum | Mean[a] |
| **Area 1** | | | | | | | |
| Bis(2-ethylhexyl)phthalate | µg/kg | 29 | 12 | 41% | 9.5 | 4,700 | 296 |
| Hexachlorobenzene | µg/kg | 3 | 0 | 0% | NA | NA | 4.2 |
| Phenol | µg/kg | 3 | 0 | 0% | NA | NA | 7.00 |
| **Area 2** | | | | | | | |
| Bis(2-ethylhexyl)phthalate | µg/kg | 2 | 1 | 50% | 100 | 100 | 54.8 |
| Carbazole | µg/kg | 2 | 1 | 50% | 59 | 59 | 32.5 |
| Hexachlorobenzene | µg/kg | 2 | 0 | 0% | NA | NA | 7.50 |
| Phenol | µg/kg | 2 | 0 | 0% | NA | NA | 10.0 |
| **Area 3** | | | | | | | |
| Bis(2-ethylhexyl)phthalate | µg/kg | 9 | 9 | 100% | 9.20 | 630 | 264 |
| **Area 4** | | | | | | | |
| 1,2-Dichlorobenzene [b] | µg/kg | 124 | 17 | 14% | 0.390 | 94.0 | 2.03 |
| 1,3-Dichlorobenzene [b] | µg/kg | 124 | 26 | 21% | 0.200 | 330 | 13.1 |
| 1,4-Dichlorobenzene [b] | µg/kg | 124 | 22 | 18% | 0.220 | 50.0 | 2.18 |
| 2,4-Dichlorophenol | µg/kg | 115 | 0 | 0% | NA | NA | 5.61 |
| 1,2,3-Trichlorobenzene [b] | µg/kg | 124 | 0 | 0% | NA | NA | 0.274 |
| 1,2,4-Trichlorobenzene [b] | µg/kg | 124 | 5 | 4% | 0.470 | 18.0 | 0.684 |
| 2,4,5-Trichloropenol | µg/kg | 115 | 0 | 0% | NA | NA | 7.21 |
| 2,4,6-Trichlorophenol | µg/kg | 115 | 0 | 0% | NA | NA | 7.08 |
| 2,3,4,6-Tetrachlorophenol | µg/kg | 62 | 0 | 0% | NA | NA | 4.21 |
| Bis(2-ethylhexyl)phthalate | µg/kg | 116 | 69 | 59% | 8.10 | 26,000 | 624 |
| Carbazole | µg/kg | 114 | 34 | 30% | 1.70 | 240 | 15.6 |
| Chloroform [b] | µg/kg | 124 | 15 | 12% | 0.230 | 100 | 2.31 |

**Table C-6**
**Summary Statistics for SVOC Concentrations in Subsurface Soil Samples, Dry Weight**

| Analyte | Units | Number of Samples | Number of Detected Measurements | Detection Frequency | Detected Data | | All Data |
|---|---|---|---|---|---|---|---|
| | | | | | Minimum | Maximum | Mean[a] |
| Hexachlorobenzene | µg/kg | 114 | 2 | 2% | 2.50 | 9.80 | 7.61 |
| Pentachlorophenol | µg/kg | 114 | 0 | 0% | NA | NA | 40.5 |
| Phenol | µg/kg | 115 | 14 | 12% | 2.30 | 180 | 13.9 |

**Notes**

NA = not applicable, no detected values
SVOC = seimivolatile organic compound

a - Mean calculations include detected and nondetected values. Nondetected values were set to one-half the detection limit.
b - volatile organic compound

**Table C-7**

**Summary Statistics for OC-Normalized [a] Concentrations of Dioxins and Furans in Surface Sediment Samples**

| Analyte | Units | Number of Samples | Number of Detected Measurements | Detection Frequency | Detected Data | | All Data |
|---|---|---|---|---|---|---|---|
| | | | | | Minimum | Maximum | Mean[b] |
| 2,3,7,8-TCDD | ng/kg | 152 | 112 | 74% | 16.6 | 360,000 | 13,700 |
| 1,2,3,7,8-PeCDD | ng/kg | 152 | 41 | 27% | 9.45 | 3,370 | 121 |
| 1,2,3,4,7,8-HxCDD | ng/kg | 152 | 48 | 32% | 3.9 | 64 | 18.3 |
| 1,2,3,6,7,8-HxCDD | ng/kg | 152 | 88 | 58% | 8.22 | 330 | 61.1 |
| 1,2,3,7,8,9-HxCDD | ng/kg | 152 | 86 | 57% | 6.79 | 346 | 64.0 |
| 1,2,3,4,6,7,8-HpCDD | ng/kg | 152 | 150 | 99% | 82.4 | 10,600 | 2,420 |
| OCDD | ng/kg | 152 | 152 | 100% | 1,660 | 279,000 | 73,800 |
| 2,3,7,8-TCDF | ng/kg | 152 | 146 | 96% | 42.7 | 1,330,000 | 42,200 |
| 1,2,3,7,8-PeCDF | ng/kg | 152 | 81 | 53% | 10.1 | 354,000 | 3,490 |
| 2,3,4,7,8-PeCDF | ng/kg | 152 | 75 | 49% | 3.16 | 134,000 | 1,670 |
| 1,2,3,4,7,8-HxCDF | ng/kg | 152 | 105 | 69% | 3.9 | 385,000 | 4,510 |
| 1,2,3,6,7,8-HxCDF | ng/kg | 152 | 81 | 53% | 2.65 | 71,500 | 954 |
| 1,2,3,7,8,9-HxCDF | ng/kg | 152 | 21 | 14% | 8.92 | 3,220 | 48.4 |
| 2,3,4,6,7,8-HxCDF | ng/kg | 152 | 47 | 31% | 6.87 | 19,100 | 194 |
| 1,2,3,4,6,7,8-HpCDF | ng/kg | 152 | 133 | 88% | 8.08 | 39,900 | 1,070 |
| 1,2,3,4,7,8,9-HpCDF | ng/kg | 152 | 53 | 35% | 7.17 | 13,100 | 317 |
| OCDF | ng/kg | 152 | 140 | 92% | 56.4 | 16,500 | 2,750 |
| $TEQ_{DF,M}$ | ng/kg | 152 | 152 | 100% | 12.2 | 510,000 | 19,300 |

**Notes**

OC = organic carbon

$TEQ_{DF,M}$ (ND=1/2DL) = Toxicity equivalent for 2,3,7,8-tetrachlorinated dibenzo-p-dioxin (TCDD) calculated using dioxins and furans and mammalian toxicity equivalency factors (van den Berg et al. 2006) with nondetects set at one-half the detection limit.

a - Only samples with total organic carbon data are presented. Total organic carbon content was not available for samples collected by URS (2010).

b - Mean calculations include detected and nondetected values. Nondetected values were set to one-half the detection limit.

**Table C-8**
**Summary Statistics for OC-Normalized Concentrations of Dioxins and Furans in Subsurface Sediment Samples**

| Analyte | Units | Number of Samples | Number of Detected Measurements | Detection Frequency | Detected Data | | All Data |
|---|---|---|---|---|---|---|---|
| | | | | | Minimum | Maximum | Mean[a] |
| 2,3,7,8-TCDD | ng/kg | 132 | 71 | 54% | 39 | 204,000 | 12,300 |
| 1,2,3,7,8-PeCDD | ng/kg | 132 | 49 | 37% | 10.6 | 1,400 | 103 |
| 1,2,3,4,7,8-HxCDD | ng/kg | 132 | 49 | 37% | 6.47 | 124 | 22.8 |
| 1,2,3,6,7,8-HxCDD | ng/kg | 132 | 85 | 64% | 8.17 | 354 | 68.0 |
| 1,2,3,7,8,9-HxCDD | ng/kg | 132 | 92 | 70% | 10.7 | 425 | 89.8 |
| 1,2,3,4,6,7,8-HpCDD | ng/kg | 132 | 131 | 99% | 210 | 12,400 | 2,580 |
| OCDD | ng/kg | 132 | 132 | 100% | 5,530 | 543,000 | 78,300 |
| 2,3,7,8-TCDF | ng/kg | 132 | 95 | 72% | 17.4 | 547,000 | 35,300 |
| 1,2,3,7,8-PeCDF | ng/kg | 132 | 53 | 40% | 19.6 | 38,200 | 1,350 |
| 2,3,4,7,8-PeCDF | ng/kg | 132 | 56 | 42% | 10.7 | 15,700 | 749 |
| 1,2,3,4,7,8-HxCDF | ng/kg | 132 | 69 | 52% | 7.63 | 76,300 | 2,250 |
| 1,2,3,6,7,8-HxCDF | ng/kg | 132 | 67 | 51% | 4.33 | 17,600 | 536 |
| 1,2,3,7,8,9-HxCDF | ng/kg | 132 | 20 | 15% | 5.32 | 938 | 29.3 |
| 2,3,4,6,7,8-HxCDF | ng/kg | 132 | 37 | 28% | 5.67 | 2,360 | 80.0 |
| 1,2,3,4,6,7,8-HpCDF | ng/kg | 132 | 72 | 55% | 7.4 | 14,800 | 789 |
| 1,2,3,4,7,8,9-HpCDF | ng/kg | 132 | 49 | 37% | 10.4 | 5,590 | 221 |
| OCDF | ng/kg | 132 | 81 | 61% | 15 | 72,700 | 3,360 |
| $TEQ_{DF,M}$ | ng/kg | 132 | 132 | 100% | 11 | 262,000 | 16,500 |

**Notes**

OC = organic carbon

$TEQ_{DF,M}$ (ND=1/2DL) = Toxicity equivalent for 2,3,7,8-tetrachlorinated dibenzo-p-dioxin (TCDD) calculated using dioxins and furans and mammalian toxicity equivalency factors (van den Berg et al. 2006) with nondetects set at one-half the detection limit.

a - Mean calculations include detected and nondetected values. Nondetected values were set to one-half the detection limit.

**Table C-9**
**Summary Statistics for OC-Normalized Concentrations of PCBs in Surface Sediment Samples**

| Analyte | Units | Number of Samples | Number of Detected Measurements | Detection Frequency | Detected Data | | All Data |
|---|---|---|---|---|---|---|---|
| | | | | | Minimum | Maximum | Mean[a] |
| Aroclor 1016 | µg/kg | 27 | 0 | 0% | NA | NA | 13,600 |
| Aroclor 1221 | µg/kg | 27 | 0 | 0% | NA | NA | 21,400 |
| Aroclor 1232 | µg/kg | 27 | 0 | 0% | NA | NA | 18,600 |
| Aroclor 1242 | µg/kg | 27 | 0 | 0% | NA | NA | 15,600 |
| Aroclor 1248 | µg/kg | 27 | 0 | 0% | NA | NA | 7,520 |
| Aroclor 1254 | µg/kg | 27 | 0 | 0% | NA | NA | 5,040 |
| Aroclor 1260 | µg/kg | 27 | 0 | 0% | NA | NA | 4,830 |
| Aroclor 1262 | µg/kg | 27 | 0 | 0% | NA | NA | 3,510 |
| Aroclor 1268 | µg/kg | 27 | 0 | 0% | NA | NA | 1,890 |
| PCB077 | ng/kg | 31 | 19 | 61% | 1,120 | 76,900 | 7,530 |
| PCB081 | ng/kg | 31 | 6 | 19% | 235 | 916 | 355 |
| PCB105 | ng/kg | 31 | 27 | 87% | 472 | 571,000 | 146,000 |
| PCB114 | ng/kg | 31 | 19 | 61% | 570 | 54,500 | 8,940 |
| PCB118 | ng/kg | 31 | 26 | 84% | 4,050 | 1,630,000 | 375,000 |
| PCB123 | ng/kg | 31 | 19 | 61% | 442 | 29,600 | 5,730 |
| PCB126 | ng/kg | 31 | 4 | 13% | 743 | 8,780 | 762 |
| PCB156+157 | ng/kg | 31 | 26 | 84% | 313 | 361,000 | 63,900 |
| PCB167 | ng/kg | 31 | 22 | 71% | 97.5 | 105,000 | 19,200 |
| PCB169 | ng/kg | 31 | 1 | 3% | 742 | 742 | 288 |
| PCB189 | ng/kg | 31 | 14 | 45% | 791 | 14,200 | 2,920 |
| $TEQ_P$ | ng/kg | 31 | 30 | 97% | 4.9 | 970 | 104 |

**Notes**

NA = not applicable, no detected values

OC = organic carbon

PCB = polychlorinated biphenyl

$TEQ_{P,M}$ (ND=1/2DL) = TCDD toxicity equivalent calculated using dioxin-like PCBs and mammalian toxicity equivalency factors (van den Berg et al. 2006) with nondetects set at one-half the detection limit.

a - Mean calculations include detected and nondetected values. Nondetected values were set to one-half the detection limit.

**Table C-10**
**Summary Statistics for OC-Normalized Concentrations of PCBs in Subsurface Sediment Samples**

| Analyte | Units | Number of Samples | Number of Detected Measurements | Detection Frequency | Detected Data | | All Data |
|---|---|---|---|---|---|---|---|
| | | | | | Minimum | Maximum | Mean[a] |
| Aroclor 1016 | µg/kg | 32 | 0 | 0% | NA | NA | 28,300 |
| Aroclor 1221 | µg/kg | 32 | 0 | 0% | NA | NA | 46,000 |
| Aroclor 1232 | µg/kg | 32 | 0 | 0% | NA | NA | 45,400 |
| Aroclor 1242 | µg/kg | 32 | 0 | 0% | NA | NA | 31,000 |
| Aroclor 1248 | µg/kg | 32 | 0 | 0% | NA | NA | 12,100 |
| Aroclor 1254 | µg/kg | 32 | 1 | 3% | 79,400 | 79,400 | 6,480 |
| Aroclor 1260 | µg/kg | 32 | 0 | 0% | NA | NA | 5,250 |
| Aroclor 1262 | µg/kg | 32 | 0 | 0% | NA | NA | 2,660 |
| Aroclor 1268 | µg/kg | 32 | 0 | 0% | NA | NA | 2,470 |
| Total PCBs (Aroclor sum) | ng/kg | 32 | 1 | 3% | 79,400 | 79,400 | 49,300 |
| PCB077 | ng/kg | 40 | 21 | 53% | 1,070 | 17,500 | 3,830 |
| PCB081 | ng/kg | 40 | 5 | 13% | 356 | 773 | 264 |
| PCB105 | ng/kg | 40 | 29 | 73% | 147 | 591,000 | 99,200 |
| PCB114 | ng/kg | 40 | 18 | 45% | 212 | 31,900 | 5,310 |
| PCB118 | ng/kg | 40 | 26 | 65% | 7,710 | 1,350,000 | 246,000 |
| PCB123 | ng/kg | 40 | 17 | 43% | 1,260 | 17,000 | 3,200 |
| PCB126 | ng/kg | 40 | 5 | 13% | 271 | 1,380 | 363 |
| PCB156+157 | ng/kg | 40 | 27 | 68% | 1,290 | 245,000 | 41,700 |
| PCB167 | ng/kg | 40 | 24 | 60% | 1,180 | 71,200 | 12,600 |
| PCB169 | ng/kg | 40 | 0 | 0% | NA | NA | 478 |
| PCB189 | ng/kg | 40 | 15 | 38% | 1,230 | 15,900 | 2,340 |
| $TEQ_{P,M}$ | ng/kg | 40 | 32 | 80% | 4.24 | 308 | 64.8 |

**Notes**

NA = not applicable, no detected values

OC = organic carbon

PCB = polychlorinated biphenyl

$TEQ_{P,M}$ (ND=1/2DL) = TCDD toxicity equivalent calculated using dioxin-like PCBs and mammalian toxicity equivalency factors (van den Berg et al. 2006) with nondetects set at one-half the detection limit.

a - Mean calculations include detected and nondetected values. Nondetected values were set to one-half the detection limit.

**Table C-11**
**Summary Statistics for Additional Metals Concentrations in Surface Sediment Samples, Dry Weight**

| Analyte | Units | Number of Samples | Number of Detected Measurements | Detection Frequency | Detected Data | | All Data |
|---|---|---|---|---|---|---|---|
| | | | | | Minimum | Maximum | Mean[a] |
| Aluminum | mg/kg | 124 | 124 | 100% | 209 | 14300 | 5220 |
| Arsenic | mg/kg | 124 | 124 | 100% | 0.100 | 7.73 | 2.18 |
| Barium | mg/kg | 124 | 124 | 100% | 1.60 | 283 | 63.0 |
| Cadmium | mg/kg | 124 | 81 | 65% | 0.0400 | 1.85 | 0.397 |
| Chromium | mg/kg | 124 | 123 | 99% | 0.550 | 35.7 | 8.27 |
| Cobalt | mg/kg | 124 | 121 | 98% | 0.400 | 13.6 | 4.02 |
| Copper | mg/kg | 124 | 111 | 90% | 0.800 | 110 | 12.7 |
| Lead | mg/kg | 124 | 106 | 85% | 3.60 | 115 | 13.4 |
| Magnesium | mg/kg | 124 | 124 | 100% | 83.8 | 6800 | 2420 |
| Manganese | mg/kg | 124 | 124 | 100% | 1.60 | 1480 | 234 |
| Nickel | mg/kg | 124 | 118 | 95% | 0.425 | 17.8 | 6.05 |
| Thallium | mg/kg | 124 | 5 | 4% | 3.42 | 20.7 | 1.70 |
| Vanadium | mg/kg | 124 | 120 | 97% | 0.800 | 30.6 | 11.8 |
| Zinc | mg/kg | 124 | 124 | 100% | 1.90 | 305 | 52.3 |

**Notes**

a - Mean calculations include detected and nondetected values. Nondetected values were set to one-half the detection limit.

**Table C-12**
**Summary Statistics for Metal Concentrations in Subsurface Sediment Samples, Dry Weight**

| Analyte | Units | Number of Samples | Number of Detected Measurements | Detection Frequency | Detected Data | | All Data |
|---|---|---|---|---|---|---|---|
| | | | | | Minimum | Maximum | Mean[a] |
| Aluminum | mg/kg | 132 | 132 | 100% | 280 | 12,800 | 5,450 |
| Arsenic | mg/kg | 132 | 132 | 100% | 0.180 | 6.05 | 1.99 |
| Barium | mg/kg | 132 | 132 | 100% | 1.60 | 760 | 68.3 |
| Cadmium | mg/kg | 132 | 84 | 64% | 0.0880 | 2.20 | 0.371 |
| Chromium | mg/kg | 132 | 132 | 100% | 0.360 | 30.8 | 7.74 |
| Cobalt | mg/kg | 132 | 132 | 100% | 0.400 | 9.30 | 4.44 |
| Copper | mg/kg | 132 | 111 | 84% | 1.10 | 119 | 12.0 |
| Lead | mg/kg | 132 | 111 | 84% | 2.00 | 51.0 | 11.7 |
| Magnesium | mg/kg | 132 | 132 | 100% | 125 | 6,310 | 2,230 |
| Manganese | mg/kg | 132 | 132 | 100% | 1.55 | 1,220 | 192 |
| Nickel | mg/kg | 132 | 130 | 98% | 0.700 | 25.5 | 6.65 |
| Thallium | mg/kg | 132 | 12 | 9% | 1.27 | 28.6 | 2.71 |
| Vanadium | mg/kg | 132 | 130 | 98% | 1.30 | 27.9 | 12.0 |
| Zinc | mg/kg | 132 | 132 | 100% | 0.800 | 288 | 38.0 |

**Notes**

a - Mean calculations include detected and nondetected values. Nondetected values were set to one-half the detection limit.

**Table C-13**
**Summary Statistics for SVOC Concentrations in Surface Sediment Samples, Dry Weight**

| Analyte | Units | Number of Samples | Number of Detected Measurements | Detection Frequency | Minimum | Maximum | Mean[a] |
|---|---|---|---|---|---|---|---|
| Bis(2-ethylhexyl)phthalate | µg/kg | 124 | 43 | 35% | 9.5 | 3,000 | 75.1 |
| Carbazole | µg/kg | 32 | 6 | 19% | 1.95 | 73 | 12.1 |
| Hexachlorobenzene | µg/kg | 28 | 0 | 0% | 7.5 | 28 | 11.2 |
| Phenol | µg/kg | 32 | 5 | 16% | 1.55 | 550 | 38.6 |

**Notes**

SVOC = semivolatile organic compound

a - Mean calculations include detected and nondetected values. Nondetected values were set to one-half the detection limit.

**Table C-14**
**Summary Statistics for OC-Normalized Concentrations of SVOCs in Surface Sediment Samples**

| Analyte | Units | Number of Samples | Number of Detected Measurements | Detection Frequency | Minimum | Maximum | Mean[a] |
|---|---|---|---|---|---|---|---|
| Bis(2-ethylhexyl)phthalate | µg/kg | 124 | 43 | 35% | 351 | 222,000 | 6,850 |
| Carbazole | µg/kg | 32 | 6 | 19% | 59.8 | 4,230 | 1,050 |
| Hexachlorobenzene | µg/kg | 28 | 0 | 0% | 80.8 | 3,760 | 1,080 |
| Phenol | µg/kg | 32 | 5 | 16% | 145 | 5,580 | 1,660 |

**Notes**

OC = organic carbon

SVOC = semivolatile organic compound

a - Mean calculations include detected and nondetected values. Nondetected values were set to one-half the detection limit.

**Table C-15**
**Summary Statistics for SVOC Concentrations in Subsurface Sediment Samples, Dry Weight**

| Analyte | Units | Number of Samples | Number of Detected Measurements | Detection Frequency | Minimum | Maximum | Mean[a] |
|---|---|---|---|---|---|---|---|
| Bis(2-ethylhexyl)phthalate | µg/kg | 132 | 25 | 19% | 4.45 | 1,340 | 71.5 |
| Carbazole | µg/kg | 40 | 7 | 18% | 1.9 | 290 | 33.8 |
| Hexachlorobenzene | µg/kg | 32 | 0 | 0% | 7.5 | 150 | 24.5 |
| Phenol | µg/kg | 40 | 7 | 18% | 1.55 | 2,100 | 153 |

**Notes**

SVOC = semivolatile organic compound

a - Mean calculations include detected and nondetected values. Nondetected values were set to one-half the detection limit.

**Table C-16**
**Summary Statistics for OC-Normalized Concentrations of SVOCs in Subsurface Sediment Samples**

| Analyte | Units | Number of Samples | Number of Detected Measurements | Detection Frequency | Minimum | Maximum | Mean[a] |
|---|---|---|---|---|---|---|---|
| Bis(2-ethylhexyl)phthalate | µg/kg | 132 | 25 | 19% | 321 | 107,000 | 4,620 |
| Carbazole | µg/kg | 40 | 7 | 18% | 175 | 11,300 | 1,470 |
| Hexachlorobenzene | µg/kg | 32 | 0 | 0% | 307 | 4,450 | 1,150 |
| Phenol | µg/kg | 40 | 7 | 18% | 273 | 34,400 | 3,270 |

**Notes**

OC = organic carbon

SVOC = semivolatile organic compound

a - Mean calculations include detected and nondetected values. Nondetected values were set to one-half the detection limit.

**Table C-17**
**Summary Statistics for Dioxins and Furans in Edible Blue Crab Tissue by FCA, Lipid Normalized**

| | FCA1 | | | | FCA2 | | | | FCA3 | | | | Background | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] |
| Blue Crab - Edible | | | | | | | | | | | | | | | | |
| **Dioxins/Furans (ng/kg - lw)** | | | | | | | | | | | | | | | | |
| 2,3,7,8-TCDD | 5/10 | 442 | 2,570 | 597 | 2/10 | 59.8 | 101 | 47 | 0/10 | -- | -- | 32.7 | 1/20 | 1,020 | 1,020 | 143.45 |
| 1,2,3,7,8-PeCDD | 0/10 | -- | -- | 42.8 | 0/10 | -- | -- | 11.3 | 0/10 | -- | -- | 17.8 | 0/20 | -- | -- | 81.56 |
| 1,2,3,4,7,8-HxCDD | 0/10 | -- | -- | 32.1 | 0/10 | -- | -- | 9.16 | 0/10 | -- | -- | 13.7 | 0/20 | -- | -- | 76.53 |
| 1,2,3,6,7,8-HxCDD | 2/10 | 40.3 | 97.4 | 53.4 | 0/10 | -- | -- | 12 | 0/10 | -- | -- | 16.8 | 0/20 | -- | -- | 95.63 |
| 1,2,3,7,8,9-HxCDD | 1/10 | 101 | 101 | 43.7 | 0/10 | -- | -- | 10.3 | 0/10 | -- | -- | 14.6 | 0/20 | -- | -- | 84.535 |
| 1,2,3,4,6,7,8-HpCDD | 7/10 | 36.2 | 615 | 144 | 1/10 | 28.1 | 28.1 | 12.7 | 0/10 | -- | -- | 15.6 | 1/20 | 172 | 172 | 92.86 |
| OCDD | 5/10 | 342 | 2,400 | 563 | 5/10 | 68.7 | 438 | 132 | 0/10 | -- | -- | 50.3 | 3/20 | 101 | 1,020 | 329.88 |
| 2,3,7,8-TCDF | 9/10 | 105 | 6,400 | 1,620 | 8/10 | 105 | 490 | 192 | 4/10 | 97.2 | 504 | 123 | 1/20 | 1,650 | 1,650 | 199.4 |
| 1,2,3,7,8-PeCDF | 0/10 | -- | -- | 38.6 | 0/10 | -- | -- | 10.8 | 0/10 | -- | -- | 16.2 | 0/20 | -- | -- | 80.322 |
| 2,3,4,7,8-PeCDF | 0/10 | -- | -- | 36.6 | 0/10 | -- | -- | 10.7 | 0/10 | -- | -- | 15.4 | 0/20 | -- | -- | 73.773 |
| 1,2,3,4,7,8-HxCDF | 1/10 | 105 | 105 | 33.9 | 0/10 | -- | -- | 7.39 | 0/10 | -- | -- | 11.3 | 0/20 | -- | -- | 69.553 |
| 1,2,3,6,7,8-HxCDF | 3/10 | 32.4 | 94.4 | 41.3 | 0/10 | -- | -- | 7.2 | 0/10 | -- | -- | 10.7 | 0/20 | -- | -- | 67.506 |
| 1,2,3,7,8,9-HxCDF | 0/10 | -- | -- | 29.8 | 0/10 | -- | -- | 9.71 | 0/10 | -- | -- | 13.8 | 0/20 | -- | -- | 86.789 |
| 2,3,4,6,7,8-HxCDF | 1/10 | 70.9 | 70.9 | 31.1 | 0/10 | -- | -- | 8.01 | 0/10 | -- | -- | 11.6 | 0/20 | -- | -- | 75.995 |
| 1,2,3,4,6,7,8-HpCDF | 0/10 | -- | -- | 33.8 | 0/10 | -- | -- | 7.89 | 0/10 | -- | -- | 13.5 | 0/20 | -- | -- | 72.401 |
| 1,2,3,4,7,8,9-HpCDF | 0/10 | -- | -- | 43.8 | 0/10 | -- | -- | 11.4 | 0/10 | -- | -- | 20 | 0/20 | -- | -- | 92.029 |
| OCDF | 4/10 | 34.6 | 535 | 146 | 0/10 | -- | -- | 17 | 0/10 | -- | -- | 30.6 | 1/20 | 191 | 191 | 130.51 |
| $TEQ_{DF,M}$ | 10/10 | 67.9 | 3,590 | 842 | 8/10 | 41.5 | 199 | 87.8 | 4/10 | 37 | 174 | 77.6 | 6/20 | 37 | 1,280 | 346.76 |
| $TEQ_{DFP,M}$ | 10/10 | 93.5 | 4,010 | 967 | 10/10 | 86.3 | 357 | 191 | 10/10 | 34.9 | 238 | 148 | 10/10 | 69.2 | 684 | 222.69 |
| $TEQ_{P,M}$ | 10/10 | 25.8 | 423 | 125 | 10/10 | 39.7 | 265 | 103 | 10/10 | 22.2 | 168 | 70.3 | 10/10 | 23.9 | 282 | 92.21 |

**Notes**

-- = not applicable, no detected values

FCA = fish collection area

lw = lipid weight

$TEQ_{DF,M}$ = Toxicity equivalent for dioxins and furans calculated using mammalian toxicity equivalency factors with non-detects set at one-half the detection limit.

$TEQ_{DFP,M}$ = Toxicity equivalent for dioxins and furans and polychlorinated biphenyls calculated using mammalian toxicity equivalency factors with non-detects set at one-half the detection limit.

$TEQ_{P,M}$ = Toxicity equivalent for polychlorinated biphenyls calculated using mammalian toxicity equivalency factors with non-detects set at one-half the detection limit.

a - Mean calculation includes detected and non-detected values. Non-detected values were set at one-half the detection limit.

**Table C-18**
**Summary Statistics for Polychlorinated Biphenyl Congeners in Edible Blue Crab Tissue by FCA, Lipid Normalized**

| | FCA1 | | | | FCA2 | | | | FCA3 | | | | Background | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] |
| Blue Crab - Edible | | | | | | | | | | | | | | | | |
| **Polychlorinated Biphenyl Congeners [b] (ng/kg - lw)** | | | | | | | | | | | | | | | | |
| PCB001 | 0/10 | -- | -- | 816 | 0/10 | -- | -- | 398 | 2/10 | 1,040 | 1,430 | 594 | 0/10 | -- | -- | 966 |
| PCB002 | 0/10 | -- | -- | 849 | 0/10 | -- | -- | 386 | 0/10 | -- | -- | 349 | 0/10 | -- | -- | 1,010 |
| PCB003 | 0/10 | -- | -- | 987 | 0/10 | -- | -- | 454 | 2/10 | 1,090 | 1,550 | 663 | 0/10 | -- | -- | 1,180 |
| PCB004 | 0/10 | -- | -- | 2,760 | 0/10 | -- | -- | 2,590 | 0/10 | -- | -- | 7,820 | 0/10 | -- | -- | 9,710 |
| PCB005 | 0/10 | -- | -- | 3,240 | 0/10 | -- | -- | 1,200 | 0/10 | -- | -- | 2,950 | 0/10 | -- | -- | 3,410 |
| PCB006 | 0/10 | -- | -- | 2,670 | 0/10 | -- | -- | 1,020 | 0/10 | -- | -- | 2,710 | 0/10 | -- | -- | 2,890 |
| PCB007 | 0/10 | -- | -- | 2,790 | 0/10 | -- | -- | 1,090 | 0/10 | -- | -- | 2,920 | 0/10 | -- | -- | 3,020 |
| PCB008 | 0/10 | -- | -- | 2,740 | 7/10 | 1,830 | 20,800 | 6,150 | 0/10 | -- | -- | 4,530 | 0/10 | -- | -- | 3,990 |
| PCB009 | 0/10 | -- | -- | 2,750 | 0/10 | -- | -- | 1,050 | 0/10 | -- | -- | 2,720 | 0/10 | -- | -- | 2,960 |
| PCB010 | 0/10 | -- | -- | 2,170 | 0/10 | -- | -- | 1,990 | 0/10 | -- | -- | 5,850 | 0/10 | -- | -- | 7,190 |
| PCB011 | 0/10 | -- | -- | 60,400 | 0/10 | -- | -- | 14,800 | 0/10 | -- | -- | 30,200 | 0/10 | -- | -- | 50,300 |
| PCB012+013 | 0/10 | -- | -- | 2,770 | 0/10 | -- | -- | 1,030 | 0/10 | -- | -- | 2,730 | 0/10 | -- | -- | 2,930 |
| PCB014 | 0/10 | -- | -- | 2,650 | 0/10 | -- | -- | 990 | 0/10 | -- | -- | 2,630 | 0/10 | -- | -- | 2,810 |
| PCB015 | 4/10 | 8,960 | 17,000 | 8,800 | 10/10 | 13,800 | 81,600 | 35,500 | 6/10 | 13,000 | 65,700 | 22,300 | 0/10 | -- | -- | 3,620 |
| PCB016 | 0/10 | -- | -- | 1,850 | 0/10 | -- | -- | 681 | 0/10 | -- | -- | 964 | 0/10 | -- | -- | 1,810 |
| PCB017 | 0/10 | -- | -- | 2,070 | 5/10 | 1,010 | 4,290 | 1,880 | 1/10 | 7,060 | 7,060 | 1,930 | 0/10 | -- | -- | 1,800 |
| PCB018+030 | 0/10 | -- | -- | 3,480 | 2/10 | 1,870 | 5,310 | 2,460 | 0/10 | -- | -- | 2,790 | 0/10 | -- | -- | 2,690 |
| PCB019 | 0/10 | -- | -- | 1,100 | 0/10 | -- | -- | 463 | 3/10 | 504 | 1,720 | 633 | 1/10 | 653 | 653 | 1,110 |
| PCB020+028 | 10/10 | 12,100 | 197,000 | 86,400 | 10/10 | 64,300 | 276,000 | 130,000 | 10/10 | 50,900 | 237,000 | 123,000 | 9/10 | 29,400 | 260,000 | 75,200 |
| PCB021+033 | 0/10 | -- | -- | 2,640 | 1/10 | 2,030 | 2,030 | 1,340 | 0/10 | -- | -- | 1,870 | 0/10 | -- | -- | 2,220 |
| PCB022 | 6/10 | 2,790 | 25,100 | 7,080 | 9/10 | 2,600 | 19,300 | 7,050 | 8/10 | 4,040 | 17,300 | 7,370 | 1/10 | 7,960 | 7,960 | 2,240 |
| PCB023 | 0/10 | -- | -- | 877 | 0/10 | -- | -- | 427 | 0/10 | -- | -- | 321 | 0/10 | -- | -- | 748 |
| PCB024 | 0/10 | -- | -- | 1,010 | 0/10 | -- | -- | 405 | 0/10 | -- | -- | 310 | 0/10 | -- | -- | 887 |
| PCB025 | 1/10 | 577 | 577 | 752 | 5/10 | 752 | 3,660 | 1,340 | 4/10 | 420 | 2,660 | 885 | 0/10 | -- | -- | 671 |
| PCB026+029 | 2/10 | 1,130 | 5,540 | 1,400 | 4/10 | 1,050 | 4,850 | 1,950 | 4/10 | 2,500 | 4,590 | 2,000 | 1/10 | 1,340 | 1,340 | 1,080 |
| PCB027 | 0/10 | -- | -- | 902 | 1/10 | 1,540 | 1,540 | 485 | 4/10 | 691 | 1,810 | 675 | 1/10 | 680 | 680 | 843 |
| PCB031 | 1/10 | 13,700 | 13,700 | 7,440 | 7/10 | 7,090 | 24,900 | 11,300 | 7/10 | 5,130 | 23,400 | 11,500 | 0/10 | -- | -- | 4,710 |
| PCB032 | 8/10 | 593 | 6,570 | 3,670 | 9/10 | 1,620 | 16,700 | 5,590 | 9/10 | 2,350 | 9,060 | 4,470 | 6/10 | 1,240 | 10,800 | 2,690 |
| PCB034 | 0/10 | -- | -- | 835 | 0/10 | -- | -- | 404 | 0/10 | -- | -- | 287 | 0/10 | -- | -- | 689 |
| PCB035 | 0/10 | -- | -- | 826 | 0/10 | -- | -- | 407 | 0/10 | -- | -- | 288 | 0/10 | -- | -- | 712 |
| PCB036 | 0/10 | -- | -- | 754 | 0/10 | -- | -- | 358 | 0/10 | -- | -- | 252 | 0/10 | -- | -- | 614 |
| PCB037 | 6/10 | 1,660 | 13,900 | 5,880 | 8/10 | 5,920 | 26,500 | 10,800 | 8/10 | 4,850 | 23,000 | 11,300 | 8/10 | 1,600 | 13,500 | 3,830 |
| PCB038 | 0/10 | -- | -- | 816 | 0/10 | -- | -- | 396 | 0/10 | -- | -- | 287 | 0/10 | -- | -- | 699 |
| PCB039 | 0/10 | -- | -- | 804 | 0/10 | -- | -- | 391 | 0/10 | -- | -- | 278 | 0/10 | -- | -- | 684 |
| PCB040+041+071 | 9/10 | 746 | 28,300 | 8,330 | 9/10 | 3,780 | 17,900 | 9,920 | 8/10 | 5,220 | 23,100 | 10,700 | 3/10 | 4,030 | 26,700 | 5,470 |
| PCB042 | 3/10 | 2,440 | 8,900 | 2,130 | 9/10 | 1,450 | 10,200 | 5,010 | 7/10 | 1,780 | 8,660 | 4,120 | 4/10 | 763 | 8,140 | 2,180 |
| PCB043+073 | 0/10 | -- | -- | 855 | 0/10 | -- | -- | 376 | 0/10 | -- | -- | 413 | 0/10 | -- | -- | 795 |
| PCB044+047+065 | 10/10 | 10,800 | 377,000 | 109,000 | 10/10 | 73,100 | 235,000 | 140,000 | 10/10 | 56,000 | 296,000 | 138,000 | 7/10 | 24,900 | 194,000 | 69,900 |

**Table C-18**
**Summary Statistics for Polychlorinated Biphenyl Congeners in Edible Blue Crab Tissue by FCA, Lipid Normalized**

| | FCA1 | | | | FCA2 | | | | FCA3 | | | | Background | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] |
| PCB045+051 | 4/10 | 1,110 | 6,770 | 1,990 | 3/10 | 1,800 | 2,690 | 1,160 | 5/10 | 2,180 | 4,530 | 1,990 | 2/10 | 1,630 | 2,950 | 1,460 |
| PCB046 | 0/10 | -- | -- | 1,060 | 0/10 | -- | -- | 476 | 0/10 | -- | -- | 391 | 0/10 | -- | -- | 979 |
| PCB048 | 0/10 | -- | -- | 913 | 1/10 | 1,160 | 1,160 | 684 | 2/10 | 992 | 1,730 | 732 | 1/10 | 1,590 | 1,590 | 1,060 |
| PCB049+069 | 0/10 | -- | -- | 5,050 | 7/10 | 8,470 | 32,900 | 14,100 | 8/10 | 4,630 | 26,400 | 13,700 | 1/10 | 11,100 | 11,100 | 4,730 |
| PCB050+053 | 0/10 | -- | -- | 944 | 4/10 | 1,580 | 4,510 | 2,000 | 7/10 | 1,750 | 6,780 | 3,230 | 1/10 | 1,200 | 1,200 | 963 |
| PCB052 | 0/10 | -- | -- | 10,300 | 5/10 | 19,200 | 51,600 | 22,100 | 6/10 | 20,500 | 44,700 | 20,000 | 0/10 | -- | -- | 8,860 |
| PCB054 | 0/10 | -- | -- | 467 | 0/10 | -- | -- | 230 | 0/10 | -- | -- | 155 | 0/10 | -- | -- | 439 |
| PCB055 | 0/10 | -- | -- | 741 | 0/10 | -- | -- | 338 | 1/10 | 2,430 | 2,430 | 489 | 0/10 | -- | -- | 701 |
| PCB056 | 2/10 | 4,340 | 11,700 | 2,380 | 8/10 | 1,140 | 9,560 | 3,550 | 7/10 | 1,290 | 10,600 | 4,190 | 0/10 | -- | -- | 1,300 |
| PCB057 | 0/10 | -- | -- | 662 | 0/10 | -- | -- | 300 | 0/10 | -- | -- | 244 | 0/10 | -- | -- | 635 |
| PCB058 | 0/10 | -- | -- | 689 | 0/10 | -- | -- | 314 | 0/10 | -- | -- | 252 | 0/10 | -- | -- | 672 |
| PCB059+062+075 | 6/10 | 1,080 | 18,400 | 5,740 | 10/10 | 6,210 | 17,000 | 10,500 | 10/10 | 4,310 | 22,000 | 9,890 | 10/10 | 931 | 14,400 | 5,390 |
| PCB060 | 8/10 | 2,420 | 51,900 | 17,500 | 10/10 | 16,100 | 63,500 | 33,700 | 10/10 | 11,400 | 59,900 | 31,900 | 9/10 | 3,060 | 41,100 | 10,600 |
| PCB061+070+074+076 | 8/10 | 8,100 | 183,000 | 59,600 | 10/10 | 58,300 | 190,000 | 108,000 | 10/10 | 38,400 | 192,000 | 103,000 | 5/10 | 23,400 | 104,000 | 39,400 |
| PCB063 | 4/10 | 1,190 | 10,300 | 2,050 | 8/10 | 971 | 6,930 | 2,890 | 9/10 | 1,850 | 7,780 | 3,110 | 3/10 | 1,040 | 2,820 | 1,060 |
| PCB064 | 4/10 | 6,480 | 23,700 | 7,330 | 10/10 | 3,810 | 27,300 | 12,300 | 8/10 | 4,460 | 21,300 | 11,700 | 0/10 | -- | -- | 2,860 |
| PCB066 | 10/10 | 11,500 | 260,000 | 91,100 | 10/10 | 82,000 | 277,000 | 157,000 | 10/10 | 57,900 | 291,000 | 146,000 | 10/10 | 10,800 | 208,000 | 66,200 |
| PCB067 | 0/10 | -- | -- | 604 | 1/10 | 528 | 528 | 321 | 0/10 | -- | -- | 222 | 0/10 | -- | -- | 584 |
| PCB068 | 3/10 | 1,850 | 7,230 | 2,220 | 6/10 | 1,550 | 4,760 | 2,110 | 10/10 | 1,320 | 6,020 | 2,780 | 5/10 | 1,020 | 6,180 | 1,920 |
| PCB072 | 1/10 | 709 | 709 | 736 | 6/10 | 1,070 | 2,860 | 1,200 | 5/10 | 860 | 3,740 | 1,100 | 1/10 | 863 | 863 | 668 |
| PCB077 | 5/10 | 2,640 | 17,300 | 5,030 | 9/10 | 5,070 | 17,000 | 9,310 | 10/10 | 3,660 | 15,600 | 8,780 | 3/10 | 2,040 | 9,820 | 2,240 |
| PCB078 | 0/10 | -- | -- | 803 | 0/10 | -- | -- | 377 | 0/10 | -- | -- | 374 | 0/10 | -- | -- | 591 |
| PCB079 | 0/10 | -- | -- | 707 | 0/10 | -- | -- | 373 | 1/10 | 940 | 940 | 405 | 0/10 | -- | -- | 526 |
| PCB080 | 0/10 | -- | -- | 693 | 0/10 | -- | -- | 328 | 0/10 | -- | -- | 337 | 0/10 | -- | -- | 517 |
| PCB081 | 0/10 | -- | -- | 938 | 0/10 | -- | -- | 444 | 0/10 | -- | -- | 433 | 0/10 | -- | -- | 667 |
| PCB082 | 0/10 | -- | -- | 1,490 | 1/10 | 1,060 | 1,060 | 695 | 1/10 | 2,410 | 2,410 | 794 | 1/10 | 551 | 551 | 939 |
| PCB083+099 | 10/10 | 15,600 | 560,000 | 161,000 | 10/10 | 125,000 | 528,000 | 270,000 | 10/10 | 80,300 | 461,000 | 220,000 | 10/10 | 38,600 | 368,000 | 149,000 |
| PCB084 | 0/10 | -- | -- | 1,560 | 0/10 | -- | -- | 1,070 | 1/10 | 6,720 | 6,720 | 1,630 | 0/10 | -- | -- | 2,140 |
| PCB085+116 | 10/10 | 2,900 | 89,400 | 24,700 | 10/10 | 20,500 | 92,600 | 47,800 | 10/10 | 13,300 | 69,200 | 35,800 | 9/10 | 3,550 | 42,900 | 14,600 |
| PCB086+087+097+109+119 +125 | 3/10 | 16,600 | 61,000 | 16,900 | 10/10 | 15,700 | 50,400 | 29,900 | 10/10 | 8,870 | 55,100 | 27,900 | 5/10 | 7,390 | 73,900 | 18,300 |
| PCB088+091 | 4/10 | 2,390 | 13,600 | 3,260 | 10/10 | 2,210 | 11,000 | 6,060 | 8/10 | 2,240 | 12,000 | 5,950 | 6/10 | 888 | 12,000 | 3,660 |
| PCB089 | 0/10 | -- | -- | 1,020 | 0/10 | -- | -- | 405 | 0/10 | -- | -- | 310 | 0/10 | -- | -- | 784 |
| PCB090+101+113 | 1/10 | 20,900 | 20,900 | 16,400 | 8/10 | 20,700 | 96,000 | 40,400 | 8/10 | 12,000 | 70,600 | 35,300 | 1/10 | 29,400 | 29,400 | 14,400 |
| PCB092 | 4/10 | 2,680 | 11,200 | 3,130 | 8/10 | 3,320 | 11,300 | 6,830 | 7/10 | 1,910 | 16,600 | 6,610 | 2/10 | 4,590 | 12,200 | 2,880 |
| PCB093+100 | 5/10 | 641 | 19,200 | 3,740 | 10/10 | 4,290 | 18,500 | 9,980 | 9/10 | 3,100 | 18,700 | 8,610 | 7/10 | 1,230 | 10,300 | 3,770 |
| PCB094 | 0/10 | -- | -- | 1,070 | 0/10 | -- | -- | 426 | 0/10 | -- | -- | 401 | 0/10 | -- | -- | 841 |
| PCB095 | 0/10 | -- | -- | 6,520 | 1/10 | 20,300 | 20,300 | 6,330 | 2/10 | 19,400 | 27,900 | 8,520 | 0/10 | -- | -- | 6,360 |
| PCB096 | 0/10 | -- | -- | 699 | 0/10 | -- | -- | 278 | 0/10 | -- | -- | 222 | 0/10 | -- | -- | 541 |
| PCB098+102 | 0/10 | -- | -- | 953 | 2/10 | 1,090 | 1,420 | 632 | 2/10 | 960 | 1,360 | 584 | 0/10 | -- | -- | 750 |

**Table C-18**
**Summary Statistics for Polychlorinated Biphenyl Congeners in Edible Blue Crab Tissue by FCA, Lipid Normalized**

| | FCA1 | | | | FCA2 | | | | FCA3 | | | | Background | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] |
| PCB103 | 0/10 | -- | -- | 841 | 1/10 | 707 | 707 | 455 | 0/10 | -- | -- | 288 | 0/10 | -- | -- | 658 |
| PCB104 | 0/10 | -- | -- | 633 | 0/10 | -- | -- | 250 | 0/10 | -- | -- | 186 | 0/10 | -- | -- | 483 |
| PCB105 | 10/10 | 5,140 | 219,000 | 54,500 | 10/10 | 41,700 | 289,000 | 111,000 | 10/10 | 28,200 | 135,000 | 74,000 | 7/10 | 5,030 | 38,500 | 22,200 |
| PCB106 | 0/10 | -- | -- | 839 | 0/10 | -- | -- | 610 | 0/10 | -- | -- | 396 | 0/10 | -- | -- | 634 |
| PCB107 | 6/10 | 1,080 | 44,000 | 9,950 | 10/10 | 6,640 | 34,800 | 18,600 | 10/10 | 6,760 | 34,600 | 15,900 | 4/10 | 2,310 | 16,800 | 5,400 |
| PCB108+124 | 0/10 | -- | -- | 879 | 2/10 | 1,640 | 1,800 | 931 | 4/10 | 1,180 | 2,460 | 1,060 | 0/10 | -- | -- | 707 |
| PCB110+115 | 2/10 | 15,000 | 15,400 | 16,300 | 8/10 | 16,200 | 69,200 | 37,200 | 8/10 | 10,700 | 82,200 | 35,700 | 0/10 | -- | -- | 12,400 |
| PCB111 | 0/10 | -- | -- | 1,030 | 0/10 | -- | -- | 481 | 0/10 | -- | -- | 372 | 0/10 | -- | -- | 621 |
| PCB112 | 0/10 | -- | -- | 942 | 0/10 | -- | -- | 396 | 0/10 | -- | -- | 365 | 0/10 | -- | -- | 592 |
| PCB114 | 4/10 | 1,970 | 4,690 | 2,530 | 8/10 | 2,670 | 14,800 | 6,350 | 7/10 | 2,010 | 11,100 | 4,400 | 2/10 | 3,240 | 8,360 | 1,660 |
| PCB117 | 1/10 | 1,460 | 1,460 | 1,750 | 7/10 | 2,220 | 4,880 | 3,250 | 5/10 | 1,550 | 5,990 | 2,720 | 2/10 | 1,080 | 1,120 | 912 |
| PCB118 | 10/10 | 17,100 | 771,000 | 186,000 | 10/10 | 140,000 | 808,000 | 339,000 | 10/10 | 92,200 | 466,000 | 245,000 | 10/10 | 24,900 | 333,000 | 116,000 |
| PCB120 | 2/10 | 1,240 | 6,370 | 1,480 | 6/10 | 1,460 | 5,760 | 2,610 | 6/10 | 1,050 | 5,890 | 2,300 | 3/10 | 1,540 | 4,860 | 1,490 |
| PCB121 | 0/10 | -- | -- | 1,000 | 0/10 | -- | -- | 415 | 0/10 | -- | -- | 378 | 0/10 | -- | -- | 622 |
| PCB122 | 0/10 | -- | -- | 918 | 0/10 | -- | -- | 676 | 0/10 | -- | -- | 428 | 0/10 | -- | -- | 702 |
| PCB123 | 2/10 | 1,640 | 2,610 | 1,800 | 3/10 | 4,150 | 4,330 | 3,690 | 6/10 | 1,640 | 4,940 | 3,140 | 0/10 | -- | -- | 881 |
| PCB126 | 0/10 | -- | -- | 916 | 1/10 | 1,670 | 1,670 | 758 | 1/10 | 1,380 | 1,380 | 499 | 0/10 | -- | -- | 655 |
| PCB127 | 0/10 | -- | -- | 887 | 0/10 | -- | -- | 659 | 0/10 | -- | -- | 406 | 0/10 | -- | -- | 682 |
| PCB128+166 | 9/10 | 1,980 | 80,600 | 20,700 | 10/10 | 16,700 | 92,800 | 43,400 | 10/10 | 11,200 | 61,700 | 32,000 | 10/10 | 3,460 | 51,100 | 15,600 |
| PCB129+138+163 | 10/10 | 12,900 | 617,000 | 158,000 | 10/10 | 118,000 | 461,000 | 280,000 | 10/10 | 74,600 | 446,000 | 218,000 | 10/10 | 28,400 | 321,000 | 107,000 |
| PCB130 | 7/10 | 2,100 | 13,500 | 4,220 | 8/10 | 2,620 | 9,630 | 4,890 | 9/10 | 1,850 | 10,300 | 4,740 | 5/10 | 1,080 | 2,310 | 1,470 |
| PCB131 | 0/10 | -- | -- | 897 | 0/10 | -- | -- | 515 | 0/10 | -- | -- | 333 | 0/10 | -- | -- | 682 |
| PCB132 | 5/10 | 1,330 | 6,210 | 2,470 | 0/10 | -- | -- | 1,150 | 1/10 | 6,280 | 6,280 | 2,010 | 0/10 | -- | -- | 2,350 |
| PCB133 | 1/10 | 2,750 | 2,750 | 1,610 | 8/10 | 2,730 | 11,500 | 5,400 | 10/10 | 1,850 | 11,100 | 5,140 | 6/10 | 988 | 4,790 | 2,320 |
| PCB134 | 0/10 | -- | -- | 965 | 0/10 | -- | -- | 563 | 1/10 | 758 | 758 | 465 | 0/10 | -- | -- | 716 |
| PCB135+151 | 4/10 | 1,830 | 4,650 | 2,550 | 8/10 | 2,960 | 13,600 | 6,820 | 8/10 | 2,590 | 20,700 | 7,940 | 5/10 | 1,850 | 13,000 | 2,950 |
| PCB136 | 0/10 | -- | -- | 559 | 4/10 | 345 | 1,360 | 563 | 4/10 | 485 | 2,290 | 722 | 2/10 | 563 | 3,060 | 820 |
| PCB137 | 5/10 | 2,740 | 38,800 | 6,600 | 8/10 | 4,590 | 29,000 | 12,500 | 9/10 | 3,710 | 20,600 | 9,860 | 6/10 | 1,940 | 9,580 | 3,800 |
| PCB139+140 | 4/10 | 1,250 | 12,200 | 2,420 | 9/10 | 2,410 | 11,400 | 5,790 | 9/10 | 1,510 | 9,610 | 4,590 | 5/10 | 1,470 | 6,460 | 2,040 |
| PCB141 | 2/10 | 1,150 | 9,600 | 1,650 | 5/10 | 2,500 | 13,800 | 3,670 | 6/10 | 2,980 | 13,100 | 4,080 | 1/10 | 1,790 | 1,790 | 968 |
| PCB142 | 0/10 | -- | -- | 913 | 0/10 | -- | -- | 505 | 0/10 | -- | -- | 334 | 0/10 | -- | -- | 694 |
| PCB143 | 0/10 | -- | -- | 830 | 0/10 | -- | -- | 457 | 0/10 | -- | -- | 315 | 0/10 | -- | -- | 653 |
| PCB144 | 0/10 | -- | -- | 1,160 | 3/10 | 918 | 1,880 | 706 | 2/10 | 520 | 2,310 | 652 | 0/10 | -- | -- | 931 |
| PCB145 | 0/10 | -- | -- | 608 | 0/10 | -- | -- | 245 | 0/10 | -- | -- | 177 | 0/10 | -- | -- | 417 |
| PCB146 | 10/10 | 2,580 | 113,000 | 29,600 | 10/10 | 21,500 | 103,000 | 50,400 | 10/10 | 16,000 | 94,400 | 42,100 | 9/10 | 6,880 | 43,300 | 20,900 |
| PCB147+149 | 5/10 | 10,300 | 55,000 | 14,900 | 10/10 | 9,970 | 44,100 | 26,400 | 9/10 | 10,400 | 67,200 | 28,900 | 2/10 | 15,200 | 41,000 | 10,700 |
| PCB148 | 0/10 | -- | -- | 769 | 6/10 | 529 | 2,890 | 1,080 | 4/10 | 560 | 2,660 | 877 | 1/10 | 2,180 | 2,180 | 700 |
| PCB150 | 0/10 | -- | -- | 582 | 0/10 | -- | -- | 233 | 0/10 | -- | -- | 171 | 0/10 | -- | -- | 403 |
| PCB152 | 0/10 | -- | -- | 551 | 0/10 | -- | -- | 220 | 0/10 | -- | -- | 160 | 0/10 | -- | -- | 374 |
| PCB153+168 | 10/10 | 15,500 | 685,000 | 177,000 | 10/10 | 141,000 | 642,000 | 329,000 | 10/10 | 93,800 | 628,000 | 275,000 | 10/10 | 53,100 | 414,000 | 167,000 |

**Table C-18**
**Summary Statistics for Polychlorinated Biphenyl Congeners in Edible Blue Crab Tissue by FCA, Lipid Normalized**

| | FCA1 | | | | FCA2 | | | | FCA3 | | | | Background | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] |
| PCB154 | 7/10 | 563 | 21,500 | 5,390 | 10/10 | 4,750 | 22,100 | 11,200 | 9/10 | 3,300 | 21,200 | 10,200 | 7/10 | 5,950 | 25,800 | 9,710 |
| PCB155 | 0/10 | -- | -- | 575 | 3/10 | 576 | 904 | 483 | 3/10 | 215 | 585 | 356 | 0/10 | -- | -- | 359 |
| PCB156+157 | 9/10 | 1,500 | 103,000 | 20,100 | 10/10 | 11,800 | 121,000 | 38,200 | 10/10 | 8,630 | 51,700 | 25,000 | 5/10 | 2,810 | 22,800 | 8,820 |
| PCB158 | 10/10 | 1,100 | 74,600 | 16,200 | 10/10 | 9,710 | 65,900 | 28,700 | 10/10 | 6,990 | 43,000 | 20,600 | 10/10 | 2,490 | 24,800 | 9,270 |
| PCB159 | 0/10 | -- | -- | 758 | 0/10 | -- | -- | 345 | 0/10 | -- | -- | 278 | 0/10 | -- | -- | 674 |
| PCB160 | 0/10 | -- | -- | 681 | 0/10 | -- | -- | 377 | 0/10 | -- | -- | 250 | 0/10 | -- | -- | 540 |
| PCB161 | 0/10 | -- | -- | 650 | 0/10 | -- | -- | 356 | 0/10 | -- | -- | 235 | 0/10 | -- | -- | 483 |
| PCB162 | 0/10 | -- | -- | 790 | 3/10 | 887 | 2,140 | 929 | 5/10 | 471 | 2,760 | 900 | 0/10 | -- | -- | 710 |
| PCB164 | 1/10 | 1,220 | 1,220 | 827 | 5/10 | 954 | 5,010 | 1,690 | 4/10 | 1,130 | 7,170 | 1,820 | 3/10 | 563 | 2,940 | 868 |
| PCB165 | 0/10 | -- | -- | 725 | 0/10 | -- | -- | 401 | 0/10 | -- | -- | 261 | 0/10 | -- | -- | 539 |
| PCB167 | 6/10 | 734 | 7,290 | 6,090 | 10/10 | 6,680 | 35,600 | 15,400 | 10/10 | 4,280 | 23,800 | 11,300 | 7/10 | 1,640 | 14,900 | 4,780 |
| PCB169 | 0/10 | -- | -- | 812 | 0/10 | -- | -- | 357 | 0/10 | -- | -- | 284 | 0/10 | -- | -- | 721 |
| PCB170 | 7/10 | 1,180 | 57,500 | 13,800 | 10/10 | 9,170 | 53,100 | 26,000 | 9/10 | 5,550 | 38,000 | 18,100 | 8/10 | 1,960 | 45,400 | 10,500 |
| PCB171+173 | 4/10 | 4,930 | 31,900 | 6,360 | 10/10 | 5,290 | 25,500 | 12,600 | 10/10 | 3,180 | 23,800 | 10,000 | 6/10 | 1,180 | 19,300 | 4,400 |
| PCB172 | 1/10 | 1,750 | 1,750 | 2,080 | 8/10 | 2,240 | 13,300 | 5,610 | 7/10 | 1,540 | 11,900 | 4,170 | 5/10 | 1,260 | 2,980 | 2,190 |
| PCB174 | 1/10 | 1,250 | 1,250 | 1,440 | 6/10 | 708 | 4,780 | 1,770 | 3/10 | 1,700 | 13,100 | 2,550 | 1/10 | 3,960 | 3,960 | 1,520 |
| PCB175 | 0/10 | -- | -- | 876 | 4/10 | 890 | 3,950 | 1,140 | 5/10 | 488 | 3,360 | 959 | 0/10 | -- | -- | 568 |
| PCB176 | 0/10 | -- | -- | 629 | 0/10 | -- | -- | 288 | 2/10 | 492 | 1,460 | 334 | 0/10 | -- | -- | 418 |
| PCB177 | 6/10 | 3,420 | 26,000 | 6,660 | 9/10 | 6,090 | 18,800 | 9,050 | 8/10 | 3,560 | 26,200 | 9,040 | 3/10 | 3,390 | 16,700 | 3,640 |
| PCB178 | 6/10 | 1,320 | 26,900 | 5,990 | 10/10 | 6,960 | 27,700 | 13,700 | 9/10 | 4,870 | 31,500 | 12,500 | 9/10 | 1,570 | 22,000 | 7,110 |
| PCB179 | 0/10 | -- | -- | 602 | 3/10 | 834 | 1,940 | 686 | 5/10 | 269 | 2,760 | 877 | 2/10 | 217 | 471 | 501 |
| PCB180+193 | 10/10 | 3,250 | 177,000 | 45,900 | 10/10 | 25,900 | 167,000 | 80,200 | 10/10 | 16,900 | 136,000 | 58,300 | 10/10 | 8,440 | 122,000 | 38,400 |
| PCB181 | 0/10 | -- | -- | 1,410 | 0/10 | -- | -- | 534 | 0/10 | -- | -- | 343 | 0/10 | -- | -- | 1,230 |
| PCB182 | 0/10 | -- | -- | 838 | 1/10 | 862 | 862 | 474 | 1/10 | 1,020 | 1,020 | 301 | 0/10 | -- | -- | 561 |
| PCB183 | 8/10 | 1,640 | 52,700 | 13,500 | 10/10 | 8,680 | 51,700 | 25,000 | 9/10 | 5,900 | 47,600 | 19,000 | 7/10 | 2,760 | 26,600 | 9,640 |
| PCB184 | 0/10 | -- | -- | 626 | 2/10 | 598 | 889 | 392 | 1/10 | 656 | 656 | 217 | 0/10 | -- | -- | 427 |
| PCB185 | 0/10 | -- | -- | 1,470 | 1/10 | 1,120 | 1,120 | 641 | 0/10 | -- | -- | 361 | 0/10 | -- | -- | 1,290 |
| PCB186 | 0/10 | -- | -- | 669 | 0/10 | -- | -- | 303 | 0/10 | -- | -- | 174 | 0/10 | -- | -- | 455 |
| PCB187 | 9/10 | 3,190 | 160,000 | 40,000 | 10/10 | 26,400 | 126,000 | 64,100 | 10/10 | 17,700 | 147,000 | 61,000 | 9/10 | 8,130 | 110,000 | 31,900 |
| PCB188 | 0/10 | -- | -- | 674 | 3/10 | 303 | 1,510 | 561 | 4/10 | 244 | 1,420 | 476 | 0/10 | -- | -- | 431 |
| PCB189 | 0/10 | -- | -- | 1,090 | 1/10 | 2,650 | 2,650 | 765 | 4/10 | 1,040 | 2,480 | 835 | 1/10 | 1,640 | 1,640 | 1,100 |
| PCB190 | 3/10 | 2,510 | 8,550 | 2,720 | 8/10 | 2,550 | 11,700 | 5,810 | 8/10 | 1,570 | 9,440 | 3,970 | 4/10 | 1,250 | 4,700 | 1,950 |
| PCB191 | 0/10 | -- | -- | 1,130 | 2/10 | 881 | 2,640 | 940 | 2/10 | 1,130 | 1,550 | 658 | 0/10 | -- | -- | 955 |
| PCB192 | 0/10 | -- | -- | 1,270 | 0/10 | -- | -- | 441 | 0/10 | -- | -- | 295 | 0/10 | -- | -- | 1,040 |
| PCB194 | 5/10 | 2,410 | 17,700 | 4,800 | 9/10 | 2,380 | 19,000 | 8,740 | 9/10 | 1,980 | 14,100 | 5,870 | 4/10 | 1,380 | 10,600 | 3,460 |
| PCB195 | 2/10 | 1,470 | 2,620 | 1,660 | 8/10 | 1,280 | 7,540 | 3,170 | 10/10 | 645 | 6,220 | 2,830 | 1/10 | 1,350 | 1,350 | 1,120 |
| PCB196 | 3/10 | 1,590 | 8,500 | 2,680 | 8/10 | 2,320 | 19,200 | 7,490 | 10/10 | 1,660 | 15,800 | 6,250 | 7/10 | 1,000 | 11,700 | 3,560 |
| PCB197 | 0/10 | -- | -- | 794 | 4/10 | 852 | 2,400 | 966 | 1/10 | 1,400 | 1,400 | 620 | 1/10 | 1,180 | 1,180 | 763 |
| PCB198+199 | 8/10 | 861 | 34,800 | 9,560 | 10/10 | 5,570 | 36,100 | 15,800 | 10/10 | 4,140 | 38,200 | 14,300 | 8/10 | 1,760 | 35,000 | 8,090 |
| PCB200 | 0/10 | -- | -- | 800 | 0/10 | -- | -- | 323 | 0/10 | -- | -- | 226 | 0/10 | -- | -- | 638 |

**Table C-18**
**Summary Statistics for Polychlorinated Biphenyl Congeners in Edible Blue Crab Tissue by FCA, Lipid Normalized**

| | FCA1 | | | | FCA2 | | | | FCA3 | | | | Background | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] |
| PCB201 | 2/10 | 868 | 5,080 | 1,180 | 7/10 | 1,070 | 5,020 | 2,040 | 5/10 | 1,640 | 5,780 | 1,770 | 2/10 | 1,290 | 2,490 | 961 |
| PCB202 | 8/10 | 464 | 17,300 | 4,250 | 9/10 | 3,930 | 15,200 | 7,130 | 10/10 | 2,570 | 17,300 | 6,840 | 5/10 | 1,190 | 4,770 | 2,860 |
| PCB203 | 1/10 | 13,600 | 13,600 | 2,520 | 8/10 | 1,680 | 18,200 | 6,980 | 9/10 | 1,960 | 13,400 | 5,820 | 3/10 | 1,710 | 7,270 | 2,960 |
| PCB204 | 0/10 | -- | -- | 757 | 0/10 | -- | -- | 319 | 0/10 | -- | -- | 204 | 0/10 | -- | -- | 640 |
| PCB205 | 0/10 | -- | -- | 873 | 0/10 | -- | -- | 345 | 0/10 | -- | -- | 218 | 0/10 | -- | -- | 737 |
| PCB206 | 1/10 | 2,080 | 2,080 | 1,930 | 6/10 | 1,390 | 9,060 | 3,010 | 4/10 | 2,970 | 6,610 | 2,350 | 1/10 | 3,730 | 3,730 | 1,890 |
| PCB207 | 0/10 | -- | -- | 1,060 | 5/10 | 1,170 | 7,270 | 2,330 | 7/10 | 1,190 | 7,060 | 2,270 | 4/10 | 1,300 | 2,370 | 1,400 |
| PCB208 | 1/10 | 2,920 | 2,920 | 1,320 | 8/10 | 1,420 | 12,600 | 4,470 | 9/10 | 1,540 | 9,890 | 3,930 | 4/10 | 1,470 | 19,300 | 3,540 |
| PCB209 | 9/10 | 2,040 | 354,000 | 48,000 | 10/10 | 15,000 | 142,000 | 45,300 | 10/10 | 12,500 | 103,000 | 40,100 | 7/10 | 9,640 | 82,900 | 19,100 |
| **Total Polychlorinated Biphenyls (µg/kg - lw)** | | | | | | | | | | | | | | | | |
| Total PCBs [c] | 10/10 | 186 | 6,150 | 1,810 | 10/10 | 1,390 | 5,000 | 2,970 | 10/10 | 927 | 5,030 | 2,520 | 10/10 | 342 | 4,020 | 1,370 |

**Notes**

-- = not applicable, no detected values
FCA = fish collection area
lw = lipid weight
PCB = polychlorinated biphenyl

a - Mean calculation includes detected and non-detected values. Non-detected values were set at one-half the detection limit.
b - PCB###+#### indicates a co-elution of two or more PCB congeners.
c - Total polychlorinated biphenyls were calculated as the sum of all 209 congeners with non-detects set at one-half the detection limit.

**Table C-19**
**Summary Statistics for Dioxins and Furans in Whole Blue Crab Tissue by FCA, Lipid Normalized**

| | FCA1 | | | | FCA2 | | | | FCA3 | | | | Background | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] |
| Blue Crab - Whole | | | | | | | | | | | | | | | | |
| **Dioxins/Furans (ng/kg - lw)** | | | | | | | | | | | | | | | | |
| 2,3,7,8-TCDD | 3/3 | 303 | 735 | 566 | 3/3 | 201 | 385 | 323 | 2/3 | 100 | 197 | 147 | 1/3 | 38.3 | 38.3 | 26.9 |
| 1,2,3,7,8-PeCDD | 0/3 | -- | -- | 8.03 | 0/3 | -- | -- | 4.62 | 0/3 | -- | -- | 6.56 | 0/3 | -- | -- | 15.5 |
| 1,2,3,4,7,8-HxCDD | 0/3 | -- | -- | 6.21 | 0/3 | -- | -- | 4.15 | 0/3 | -- | -- | 5.96 | 0/3 | -- | -- | 10.7 |
| 1,2,3,6,7,8-HxCDD | 1/3 | 29.9 | 29.9 | 17.7 | 0/3 | -- | -- | 5.69 | 0/3 | -- | -- | 7.37 | 0/3 | -- | -- | 13.0 |
| 1,2,3,7,8,9-HxCDD | 0/3 | -- | -- | 7.94 | 0/3 | -- | -- | 4.76 | 0/3 | -- | -- | 6.38 | 0/3 | -- | -- | 11.3 |
| 1,2,3,4,6,7,8-HpCDD | 3/3 | 27.6 | 61.1 | 49.8 | 1/3 | 25.6 | 25.6 | 20.7 | 1/3 | 12.5 | 12.5 | 19.5 | 0/3 | -- | -- | 22.8 |
| OCDD | 2/3 | 244 | 774 | 441 | 3/3 | 272 | 766 | 564 | 2/3 | 599 | 634 | 437 | 3/3 | 440 | 919 | 606 |
| 2,3,7,8-TCDF | 3/3 | 792 | 2,300 | 1,700 | 3/3 | 627 | 1,400 | 1130 | 3/3 | 377 | 986 | 677 | 2/3 | 75.2 | 77.6 | 59.0 |
| 1,2,3,7,8-PeCDF | 1/3 | 34.4 | 34.4 | 18.6 | 0/3 | -- | -- | 8.67 | 0/3 | -- | -- | 7.82 | 0/3 | -- | -- | 13.4 |
| 2,3,4,7,8-PeCDF | 3/3 | 23.9 | 45.4 | 37.6 | 1/3 | 31.9 | 31.9 | 17.6 | 0/3 | -- | -- | 7.56 | 0/3 | -- | -- | 12.8 |
| 1,2,3,4,7,8-HxCDF | 0/3 | -- | -- | 5.93 | 0/3 | -- | -- | 5.00 | 0/3 | -- | -- | 6.26 | 0/3 | -- | -- | 7.42 |
| 1,2,3,6,7,8-HxCDF | 0/3 | -- | -- | 4.93 | 0/3 | -- | -- | 4.96 | 0/3 | -- | -- | 4.34 | 0/3 | -- | -- | 7.09 |
| 1,2,3,7,8,9-HxCDF | 0/3 | -- | -- | 5.20 | 0/3 | -- | -- | 6.73 | 0/3 | -- | -- | 5.48 | 0/3 | -- | -- | 8.56 |
| 2,3,4,6,7,8-HxCDF | 0/3 | -- | -- | 4.69 | 0/3 | -- | -- | 5.45 | 0/3 | -- | -- | 4.68 | 0/3 | -- | -- | 7.90 |
| 1,2,3,4,6,7,8-HpCDF | 1/3 | 16.1 | 16.1 | 9.83 | 0/3 | -- | -- | 4.50 | 2/3 | 9.21 | 20.5 | 10.7 | 0/3 | -- | -- | 7.71 |
| 1,2,3,4,7,8,9-HpCDF | 0/3 | -- | -- | 6.89 | 0/3 | -- | -- | 5.74 | 0/3 | -- | -- | 6.92 | 0/3 | -- | -- | 11.1 |
| OCDF | 1/3 | 29.0 | 29.0 | 26.2 | 0/3 | -- | -- | 11.6 | 0/3 | -- | -- | 11.0 | 0/3 | -- | -- | 17.8 |
| $TEQ_{DF,M}$ | 3/3 | 400 | 992 | 762 | 3/3 | 273 | 540 | 450 | 3/3 | 143 | 284 | 228 | 3/3 | 44.2 | 70.5 | 59.7 |
| $TEQ_{DFP,M}$ | 3/3 | 573 | 1,090 | 913 | 3/3 | 354 | 717 | 588 | 3/3 | 169 | 495 | 380 | 3/3 | 75.4 | 159 | 111 |
| $TEQ_{P,M}$ | 3/3 | 82.0 | 198 | 151 | 3/3 | 80.6 | 177 | 137 | 3/3 | 25.7 | 237 | 152 | 3/3 | 31.2 | 88.6 | 51.0 |

**Notes**

-- = not applicable, no detected values

FCA = fish collection area

lw = lipid weight

$TEQ_{DF,M}$ = Toxicity equivalent for dioxins and furans calculated using mammalian toxicity equivalency factors with non-detects set at one-half the detection limit.

$TEQ_{DFP,M}$ = Toxicity equivalent for dioxins and furans and polychlorinated biphenyls calculated using mammalian toxicity equivalency factors with non-detects set at one-half the detection limit.

$TEQ_{P,M}$ = Toxicity equivalent for polychlorinated biphenyls calculated using mammalian toxicity equivalency factors with non-detects set at one-half the detection limit.

a - Mean calculation includes detected and non-detected values. Non-detected values were set at one-half the detection limit.

**Table C-20**
**Summary Statistics for Polychlorinated Biphenyl Congners in Whole Blue Crab Tissue by FCA, Lipid Normalized**

| | FCA1 | | | | FCA2 | | | | FCA3 | | | | Background | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] |
| Blue Crab - Whole | | | | | | | | | | | | | | | | |
| **Polychlorinated Biphenyl Congeners [b] (ng/kg - lw)** | | | | | | | | | | | | | | | | |
| PCB001 | 0/3 | -- | -- | 239 | 1/3 | 433 | 433 | 269 | 0/3 | -- | -- | 205 | 0/3 | -- | -- | 276 |
| PCB002 | 0/3 | -- | -- | 250 | 0/3 | -- | -- | 167 | 0/3 | -- | -- | 192 | 0/3 | -- | -- | 291 |
| PCB003 | 0/3 | -- | -- | 289 | 0/3 | -- | -- | 192 | 0/3 | -- | -- | 220 | 0/3 | -- | -- | 334 |
| PCB004 | 0/3 | -- | -- | 1,040 | 0/3 | -- | -- | 824 | 1/3 | 285 | 285 | 5,620 | 0/3 | -- | -- | 2,480 |
| PCB005 | 0/3 | -- | -- | 831 | 0/3 | -- | -- | 356 | 0/3 | -- | -- | 1,940 | 0/3 | -- | -- | 992 |
| PCB006 | 0/3 | -- | -- | 692 | 0/3 | -- | -- | 311 | 1/3 | 285 | 285 | 1,860 | 0/3 | -- | -- | 858 |
| PCB007 | 0/3 | -- | -- | 715 | 0/3 | -- | -- | 322 | 0/3 | -- | -- | 1,930 | 0/3 | -- | -- | 905 |
| PCB008 | 2/3 | 2,350 | 2,690 | 2,390 | 3/3 | 1,170 | 4,650 | 2,800 | 1/3 | 1,650 | 1,650 | 2,600 | 0/3 | -- | -- | 1,910 |
| PCB009 | 0/3 | -- | -- | 705 | 0/3 | -- | -- | 311 | 0/3 | -- | -- | 1,800 | 0/3 | -- | -- | 878 |
| PCB010 | 0/3 | -- | -- | 798 | 0/3 | -- | -- | 575 | 0/3 | -- | -- | 4,120 | 0/3 | -- | -- | 1,820 |
| PCB011 | 0/3 | -- | -- | 13,300 | 0/3 | -- | -- | 7,490 | 0/3 | -- | -- | 12,600 | 0/3 | -- | -- | 19,800 |
| PCB012+013 | 0/3 | -- | -- | 717 | 0/3 | -- | -- | 307 | 0/3 | -- | -- | 1,790 | 0/3 | -- | -- | 873 |
| PCB014 | 0/3 | -- | -- | 682 | 0/3 | -- | -- | 293 | 0/3 | -- | -- | 1,730 | 0/3 | -- | -- | 837 |
| PCB015 | 3/3 | 25,900 | 48,800 | 36,000 | 3/3 | 24,700 | 39,600 | 31,600 | 3/3 | 11,500 | 33,700 | 22,300 | 1/3 | 4,480 | 4,480 | 2,460 |
| PCB016 | 0/3 | -- | -- | 562 | 3/3 | 340 | 1,090 | 634 | 0/3 | -- | -- | 392 | 1/3 | 778 | 778 | 794 |
| PCB017 | 1/3 | 2,130 | 2,130 | 1,470 | 3/3 | 596 | 3,820 | 2,010 | 1/3 | 1,010 | 1,010 | 931 | 1/3 | 647 | 647 | 943 |
| PCB018+030 | 2/3 | 5,330 | 9,450 | 5,430 | 3/3 | 1,140 | 8,590 | 4,230 | 1/3 | 2,290 | 2,290 | 1,640 | 0/3 | -- | -- | 1,460 |
| PCB019 | 1/3 | 388 | 388 | 346 | 0/3 | -- | -- | 188 | 2/3 | 105 | 227 | 242 | 1/3 | 452 | 452 | 361 |
| PCB020+028 | 3/3 | 108,000 | 301,000 | 181,000 | 3/3 | 119,000 | 166,000 | 135,000 | 3/3 | 47,700 | 204,000 | 139,000 | 3/3 | 40,500 | 62,400 | 49,900 |
| PCB021+033 | 1/3 | 4,500 | 4,500 | 2,340 | 3/3 | 728 | 3,500 | 2,010 | 0/3 | -- | -- | 672 | 0/3 | -- | -- | 1,320 |
| PCB022 | 3/3 | 4,690 | 11,900 | 7,100 | 3/3 | 3,110 | 11,600 | 6,730 | 3/3 | 3,070 | 4,430 | 3,640 | 1/3 | 1,020 | 1,020 | 1,430 |
| PCB023 | 0/3 | -- | -- | 425 | 0/3 | -- | -- | 168 | 0/3 | -- | -- | 232 | 0/3 | -- | -- | 253 |
| PCB024 | 0/3 | -- | -- | 246 | 0/3 | -- | -- | 159 | 0/3 | -- | -- | 166 | 0/3 | -- | -- | 262 |
| PCB025 | 3/3 | 696 | 2,130 | 1,550 | 3/3 | 360 | 2,400 | 1,170 | 3/3 | 228 | 754 | 578 | 2/3 | 732 | 1,060 | 671 |
| PCB026+029 | 3/3 | 1,720 | 6,960 | 4,460 | 3/3 | 776 | 6,560 | 3,200 | 1/3 | 1,830 | 1,830 | 907 | 2/3 | 408 | 1,200 | 832 |
| PCB027 | 2/3 | 872 | 1,210 | 797 | 2/3 | 183 | 536 | 532 | 2/3 | 205 | 446 | 316 | 1/3 | 426 | 426 | 301 |
| PCB031 | 3/3 | 7,560 | 24,300 | 18,000 | 3/3 | 4,390 | 26,300 | 14,000 | 3/3 | 3,910 | 7,360 | 5,290 | 1/3 | 5,760 | 5,760 | 3,720 |
| PCB032 | 3/3 | 3,330 | 7,510 | 5,280 | 3/3 | 2,360 | 8,830 | 4,750 | 3/3 | 2,280 | 3,050 | 2,730 | 3/3 | 520 | 2,030 | 1,450 |
| PCB034 | 0/3 | -- | -- | 400 | 0/3 | -- | -- | 182 | 0/3 | -- | -- | 205 | 0/3 | -- | -- | 236 |
| PCB035 | 0/3 | -- | -- | 399 | 0/3 | -- | -- | 161 | 0/3 | -- | -- | 207 | 0/3 | -- | -- | 239 |
| PCB036 | 0/3 | -- | -- | 368 | 0/3 | -- | -- | 144 | 0/3 | -- | -- | 177 | 0/3 | -- | -- | 211 |
| PCB037 | 3/3 | 15,600 | 47,500 | 27,600 | 3/3 | 14,000 | 20,600 | 18,100 | 3/3 | 6,130 | 31,700 | 19,700 | 3/3 | 1,250 | 3,090 | 2,380 |
| PCB038 | 0/3 | -- | -- | 394 | 0/3 | -- | -- | 158 | 0/3 | -- | -- | 203 | 0/3 | -- | -- | 238 |
| PCB039 | 0/3 | -- | -- | 389 | 1/3 | 341 | 341 | 278 | 0/3 | -- | -- | 198 | 0/3 | -- | -- | 232 |
| PCB040+041+071 | 3/3 | 14,700 | 23,900 | 20,000 | 3/3 | 7,200 | 30,100 | 16,500 | 3/3 | 5,080 | 13,900 | 9,090 | 3/3 | 2,220 | 6,870 | 5,020 |
| PCB042 | 3/3 | 3,960 | 10,500 | 7,470 | 3/3 | 1,700 | 14,300 | 7,330 | 2/3 | 1,910 | 3,910 | 2,540 | 2/3 | 2,510 | 3,240 | 2,030 |
| PCB043+073 | 1/3 | 2,210 | 2,210 | 969 | 2/3 | 340 | 1,250 | 627 | 1/3 | 423 | 423 | 370 | 0/3 | -- | -- | 236 |
| PCB044+047+065 | 3/3 | 149,000 | 348,000 | 234,000 | 3/3 | 149,000 | 240,000 | 182,000 | 3/3 | 62,000 | 250,000 | 177,000 | 3/3 | 44,800 | 106,000 | 70,900 |

**Table C-20**
**Summary Statistics for Polychlorinated Biphenyl Congners in Whole Blue Crab Tissue by FCA, Lipid Normalized**

| | FCA1 | | | | FCA2 | | | | FCA3 | | | | Background | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] |
| PCB045+051 | 2/3 | 1,180 | 2,450 | 1,380 | 2/3 | 540 | 2,600 | 1,240 | 3/3 | 516 | 2,390 | 1,250 | 0/3 | -- | -- | 398 |
| PCB046 | 0/3 | -- | -- | 376 | 0/3 | -- | -- | 185 | 0/3 | -- | -- | 170 | 0/3 | -- | -- | 288 |
| PCB048 | 3/3 | 813 | 2,970 | 1,920 | 3/3 | 426 | 2,430 | 1,320 | 2/3 | 284 | 767 | 610 | 2/3 | 839 | 1,160 | 765 |
| PCB049+069 | 3/3 | 9,470 | 29,400 | 17,900 | 3/3 | 3,410 | 47,600 | 22,900 | 3/3 | 2,870 | 13,500 | 8,610 | 2/3 | 9,190 | 9,780 | 6,650 |
| PCB050+053 | 3/3 | 1,320 | 9,230 | 4,160 | 2/3 | 1,980 | 8,710 | 3,640 | 3/3 | 465 | 1,900 | 1,130 | 0/3 | -- | -- | 402 |
| PCB052 | 3/3 | 15,200 | 87,200 | 43,000 | 3/3 | 5,770 | 73,700 | 36,100 | 2/3 | 12,300 | 21,400 | 12,200 | 1/3 | 14,900 | 14,900 | 8,650 |
| PCB054 | 0/3 | -- | -- | 126 | 0/3 | -- | -- | 89.2 | 0/3 | -- | -- | 82.1 | 0/3 | -- | -- | 130 |
| PCB055 | 0/3 | -- | -- | 270 | 0/3 | -- | -- | 131 | 0/3 | -- | -- | 117 | 0/3 | -- | -- | 205 |
| PCB056 | 3/3 | 4,780 | 9,180 | 7,650 | 3/3 | 2,240 | 13,400 | 7,700 | 3/3 | 1,530 | 3,790 | 2,640 | 1/3 | 2,210 | 2,210 | 1,360 |
| PCB057 | 0/3 | -- | -- | 241 | 0/3 | -- | -- | 115 | 0/3 | -- | -- | 105 | 0/3 | -- | -- | 188 |
| PCB058 | 1/3 | 903 | 903 | 489 | 0/3 | -- | -- | 134 | 0/3 | -- | -- | 108 | 0/3 | -- | -- | 195 |
| PCB059+062+075 | 3/3 | 11,400 | 27,800 | 18,500 | 3/3 | 12,000 | 18,700 | 14,600 | 3/3 | 4,800 | 19,100 | 14,000 | 3/3 | 3,710 | 7,610 | 5,110 |
| PCB060 | 3/3 | 29,300 | 86,300 | 49,300 | 3/3 | 31,400 | 42,900 | 37,100 | 3/3 | 11,300 | 88,500 | 48,400 | 3/3 | 5,260 | 10,400 | 8,300 |
| PCB061+070+074+076 | 3/3 | 128,000 | 311,000 | 207,000 | 3/3 | 121,000 | 220,000 | 156,000 | 3/3 | 57,500 | 222,000 | 154,000 | 3/3 | 32,300 | 70,600 | 48,000 |
| PCB063 | 3/3 | 3,860 | 10,000 | 6,780 | 3/3 | 3850 | 6,910 | 4,950 | 3/3 | 1,710 | 4,240 | 2,990 | 3/3 | 643 | 1,830 | 1,240 |
| PCB064 | 3/3 | 11,400 | 33,200 | 21,600 | 3/3 | 4,650 | 36,700 | 19,000 | 3/3 | 3,320 | 9,840 | 6,500 | 2/3 | 4,980 | 6,090 | 3,920 |
| PCB066 | 3/3 | 200,000 | 504,000 | 314,000 | 3/3 | 189,000 | 285,000 | 226,000 | 3/3 | 75,400 | 372,000 | 247,000 | 3/3 | 51,300 | 86,800 | 67,200 |
| PCB067 | 1/3 | 1,810 | 1,810 | 767 | 0/3 | -- | -- | 312 | 1/3 | 285 | 285 | 182 | 0/3 | -- | -- | 171 |
| PCB068 | 3/3 | 2,930 | 7,910 | 5,120 | 3/3 | 1,760 | 3,490 | 2,640 | 3/3 | 1,370 | 4,410 | 3,020 | 3/3 | 866 | 2,410 | 1,440 |
| PCB072 | 3/3 | 2,090 | 4,770 | 3,790 | 3/3 | 1,520 | 4,410 | 2,770 | 3/3 | 716 | 1,650 | 1,170 | 2/3 | 292 | 606 | 426 |
| PCB077 | 3/3 | 13,300 | 34,100 | 21,700 | 3/3 | 12,800 | 19,500 | 16,100 | 3/3 | 4,910 | 28,100 | 17,000 | 3/3 | 1,590 | 2,800 | 2,120 |
| PCB078 | 0/3 | -- | -- | 343 | 0/3 | -- | -- | 208 | 0/3 | -- | -- | 269 | 0/3 | -- | -- | 232 |
| PCB079 | 1/3 | 1,580 | 1,580 | 1,090 | 2/3 | 826 | 883 | 814 | 1/3 | 1,010 | 1,010 | 543 | 0/3 | -- | -- | 207 |
| PCB080 | 1/3 | 790 | 790 | 421 | 1/3 | 256 | 256 | 232 | 0/3 | -- | -- | 241 | 0/3 | -- | -- | 205 |
| PCB081 | 2/3 | 745 | 1,670 | 928 | 3/3 | 467 | 963 | 683 | 1/3 | 242 | 242 | 468 | 0/3 | -- | -- | 263 |
| PCB082 | 0/3 | -- | -- | 520 | 2/3 | 313 | 2,350 | 1,000 | 1/3 | 622 | 622 | 375 | 1/3 | 775 | 775 | 451 |
| PCB083+099 | 3/3 | 455,000 | 884,000 | 680,000 | 3/3 | 332,000 | 615,000 | 427,000 | 3/3 | 154,000 | 596,000 | 435,000 | 3/3 | 132,000 | 294,000 | 190,000 |
| PCB084 | 2/3 | 2,340 | 2,930 | 2,140 | 2/3 | 1,190 | 4,280 | 1,990 | 1/3 | 1,170 | 1,170 | 991 | 0/3 | -- | -- | 961 |
| PCB085+116 | 3/3 | 64,700 | 138,000 | 89,000 | 3/3 | 51,300 | 98,700 | 69,900 | 3/3 | 23,100 | 93,300 | 68,700 | 3/3 | 11,900 | 25,100 | 17,100 |
| PCB086+087+097+109+119 +125 | 3/3 | 60,400 | 89,700 | 71,000 | 3/3 | 32,000 | 75,500 | 48,100 | 3/3 | 20,800 | 58,500 | 41,000 | 3/3 | 14,600 | 26,800 | 19,300 |
| PCB088+091 | 3/3 | 6,900 | 20,900 | 14,200 | 3/3 | 4,860 | 22,000 | 11,700 | 3/3 | 2,180 | 6,090 | 4,370 | 3/3 | 1,540 | 4,500 | 3,330 |
| PCB089 | 0/3 | -- | -- | 298 | 1/3 | 381 | 381 | 232 | 1/3 | 102 | 102 | 154 | 0/3 | -- | -- | 263 |
| PCB090+101+113 | 3/3 | 43,600 | 151,000 | 91,700 | 3/3 | 29,000 | 157,000 | 82,100 | 3/3 | 17,700 | 42,000 | 32,900 | 2/3 | 23,100 | 26,300 | 18,300 |
| PCB092 | 3/3 | 8,110 | 31,200 | 17,500 | 3/3 | 4,540 | 29,600 | 14,900 | 3/3 | 2,670 | 8,450 | 5,090 | 2/3 | 1,440 | 3,770 | 2,430 |
| PCB093+100 | 3/3 | 13,800 | 33,300 | 21,600 | 3/3 | 12,200 | 21,800 | 16,200 | 3/3 | 6,370 | 25,000 | 16,800 | 3/3 | 3,730 | 9,010 | 5,760 |
| PCB094 | 3/3 | 892 | 1,380 | 1,150 | 3/3 | 630 | 1,850 | 1,090 | 3/3 | 482 | 1,160 | 721 | 0/3 | -- | -- | 281 |
| PCB095 | 3/3 | 10,000 | 30,500 | 18,200 | 3/3 | 5,960 | 29,600 | 14,400 | 3/3 | 4,830 | 8,260 | 6,770 | 1/3 | 6,910 | 6,910 | 4620 |
| PCB096 | 0/3 | -- | -- | 203 | 0/3 | -- | -- | 117 | 0/3 | -- | -- | 95.4 | 0/3 | -- | -- | 184 |
| PCB098+102 | 3/3 | 1,610 | 4,100 | 2790 | 2/3 | 921 | 4,060 | 1,870 | 0/3 | -- | -- | 387 | 1/3 | 565 | 565 | 376 |

**Table C-20**
**Summary Statistics for Polychlorinated Biphenyl Congners in Whole Blue Crab Tissue by FCA, Lipid Normalized**

| | FCA1 | | | | FCA2 | | | | FCA3 | | | | Background | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] |
| PCB103 | 2/3 | 1,050 | 2,490 | 1,270 | 2/3 | 852 | 2,620 | 1,190 | 1/3 | 586 | 586 | 295 | 0/3 | -- | -- | 232 |
| PCB104 | 0/3 | -- | -- | 181 | 0/3 | -- | -- | 107 | 0/3 | -- | -- | 83.3 | 0/3 | -- | -- | 161 |
| PCB105 | 3/3 | 125,000 | 251,000 | 170,000 | 3/3 | 103,000 | 178,000 | 134,000 | 3/3 | 46,800 | 194,000 | 133,000 | 3/3 | 19,900 | 32,600 | 26,100 |
| PCB106 | 0/3 | -- | -- | 332 | 0/3 | -- | -- | 196 | 0/3 | -- | -- | 223 | 0/3 | -- | -- | 411 |
| PCB107 | 3/3 | 24,100 | 64,500 | 40,600 | 3/3 | 24,400 | 48,400 | 32,800 | 3/3 | 11,000 | 35,600 | 26,300 | 3/3 | 6,580 | 10,900 | 8,130 |
| PCB108+124 | 2/3 | 2,240 | 3,730 | 2,190 | 3/3 | 1,240 | 5,020 | 2,710 | 2/3 | 725 | 1,360 | 860 | 0/3 | -- | -- | 505 |
| PCB110+115 | 3/3 | 40,900 | 98,500 | 68,200 | 3/3 | 23,100 | 139,000 | 70,400 | 3/3 | 22,300 | 38,300 | 30,600 | 2/3 | 18,300 | 19,300 | 14,200 |
| PCB111 | 1/3 | 2,150 | 2,150 | 985 | 2/3 | 791 | 1,220 | 748 | 2/3 | 278 | 993 | 500 | 1/3 | 597 | 597 | 353 |
| PCB112 | 0/3 | -- | -- | 323 | 0/3 | -- | -- | 194 | 0/3 | -- | -- | 139 | 0/3 | -- | -- | 198 |
| PCB114 | 3/3 | 8,320 | 16,500 | 11,100 | 3/3 | 6,430 | 11,600 | 8,420 | 3/3 | 3,230 | 13,600 | 8,360 | 3/3 | 1,560 | 2,630 | 2,050 |
| PCB117 | 3/3 | 5,550 | 13,900 | 10,100 | 3/3 | 4,950 | 7,150 | 6,130 | 2/3 | 413 | 3,240 | 1,310 | 2/3 | 1,170 | 1,650 | 1,130 |
| PCB118 | 3/3 | 422,000 | 831,000 | 572,000 | 3/3 | 343,000 | 620,000 | 444,000 | 3/3 | 162,000 | 603,000 | 446,000 | 3/3 | 96,800 | 157,000 | 119,000 |
| PCB120 | 3/3 | 4,440 | 10,400 | 6750 | 2/3 | 3,640 | 7,000 | 4,140 | 3/3 | 1,780 | 7,830 | 5,050 | 3/3 | 1,810 | 4,500 | 2,750 |
| PCB121 | 0/3 | -- | -- | 369 | 0/3 | -- | -- | 251 | 0/3 | -- | -- | 271 | 0/3 | -- | -- | 208 |
| PCB122 | 0/3 | -- | -- | 364 | 0/3 | -- | -- | 208 | 0/3 | -- | -- | 244 | 0/3 | -- | -- | 446 |
| PCB123 | 3/3 | 8,000 | 14,700 | 10,600 | 3/3 | 5,770 | 11,300 | 7,930 | 2/3 | 2,900 | 12,500 | 6,710 | 3/3 | 1,620 | 2,140 | 1,840 |
| PCB126 | 1/3 | 1,680 | 1,680 | 1,140 | 2/3 | 1,300 | 1,390 | 1,090 | 2/3 | 1,570 | 2,010 | 1,250 | 0/3 | -- | -- | 386 |
| PCB127 | 0/3 | -- | -- | 356 | 1/3 | 468 | 468 | 301 | 1/3 | 825 | 825 | 463 | 0/3 | -- | -- | 431 |
| PCB128+166 | 3/3 | 61,400 | 123,000 | 86,400 | 3/3 | 46,400 | 102,000 | 68,200 | 3/3 | 24,300 | 88,800 | 64,200 | 3/3 | 12,600 | 22,500 | 16,800 |
| PCB129+138+163 | 3/3 | 503,000 | 977,000 | 691,000 | 3/3 | 378,000 | 808,000 | 550,000 | 3/3 | 200,000 | 676,000 | 503,000 | 3/3 | 110,000 | 193,000 | 140,000 |
| PCB130 | 3/3 | 9,720 | 21,200 | 15,500 | 3/3 | 8,910 | 22,100 | 14,000 | 3/3 | 5,350 | 11,900 | 7,790 | 2/3 | 2,090 | 3,680 | 2,390 |
| PCB131 | 0/3 | -- | -- | 364 | 1/3 | 496 | 496 | 335 | 0/3 | -- | -- | 176 | 0/3 | -- | -- | 208 |
| PCB132 | 2/3 | 921 | 6,780 | 2,660 | 1/3 | 7,850 | 7,850 | 3,210 | 1/3 | 2,170 | 2,170 | 1,120 | 1/3 | 3,040 | 3,040 | 1,830 |
| PCB133 | 3/3 | 9,960 | 19,600 | 13,500 | 3/3 | 8,260 | 15,400 | 11,100 | 3/3 | 3,990 | 15,600 | 11,200 | 3/3 | 3,110 | 6,250 | 4,260 |
| PCB134 | 1/3 | 1,680 | 1,680 | 799 | 0/3 | -- | -- | 245 | 1/3 | 155 | 155 | 205 | 0/3 | -- | -- | 214 |
| PCB135+151 | 3/3 | 10,300 | 31,300 | 18,200 | 3/3 | 5,400 | 33,000 | 16,500 | 2/3 | 3,200 | 9,520 | 5,060 | 3/3 | 2,180 | 7,140 | 5,140 |
| PCB136 | 2/3 | 719 | 1,260 | 761 | 3/3 | 421 | 1,820 | 929 | 3/3 | 281 | 608 | 491 | 3/3 | 409 | 1,160 | 837 |
| PCB137 | 3/3 | 18,500 | 35,100 | 25,200 | 3/3 | 12,800 | 27,500 | 19,800 | 3/3 | 7,510 | 28,700 | 20,300 | 3/3 | 4,530 | 6,320 | 5,170 |
| PCB139+140 | 3/3 | 8,960 | 16,000 | 11,700 | 3/3 | 6,240 | 12,700 | 9,180 | 3/3 | 3,280 | 12,500 | 9,420 | 3/3 | 2,390 | 4,130 | 2,970 |
| PCB141 | 2/3 | 5,010 | 15,900 | 7,830 | 3/3 | 2,990 | 17,800 | 8,720 | 3/3 | 2,410 | 4,950 | 3,360 | 2/3 | 2,410 | 2,700 | 1760 |
| PCB142 | 0/3 | -- | -- | 336 | 0/3 | -- | -- | 204 | 0/3 | -- | -- | 175 | 0/3 | -- | -- | 210 |
| PCB143 | 0/3 | -- | -- | 302 | 0/3 | -- | -- | 183 | 0/3 | -- | -- | 168 | 0/3 | -- | -- | 201 |
| PCB144 | 2/3 | 1,480 | 2,970 | 1,880 | 3/3 | 1,100 | 2,530 | 1,620 | 2/3 | 1,050 | 1,840 | 1,030 | 2/3 | 374 | 743 | 501 |
| PCB145 | 0/3 | -- | -- | 141 | 0/3 | -- | -- | 110 | 0/3 | -- | -- | 82.4 | 0/3 | -- | -- | 139 |
| PCB146 | 3/3 | 94,200 | 202,000 | 139,000 | 3/3 | 79,900 | 153,000 | 106,000 | 3/3 | 37,600 | 135,000 | 95,200 | 3/3 | 26,600 | 59,100 | 38,700 |
| PCB147+149 | 3/3 | 46,600 | 115,000 | 77,600 | 3/3 | 35,000 | 117,000 | 65,700 | 3/3 | 17,300 | 32,400 | 26,900 | 3/3 | 8,910 | 19,900 | 16,000 |
| PCB148 | 3/3 | 1,870 | 4,320 | 2,840 | 3/3 | 1,240 | 2,870 | 1,920 | 2/3 | 2,830 | 3,430 | 2,190 | 2/3 | 1,100 | 1,560 | 1,040 |
| PCB150 | 0/3 | -- | -- | 162 | 1/3 | 394 | 394 | 203 | 1/3 | 107 | 107 | 107 | 0/3 | -- | -- | 135 |
| PCB152 | 0/3 | -- | -- | 126 | 0/3 | -- | -- | 98.7 | 0/3 | -- | -- | 74.3 | 0/3 | -- | -- | 125 |
| PCB153+168 | 3/3 | 646,000 | 1,140,000 | 829,000 | 3/3 | 494,000 | 949,000 | 650,000 | 3/3 | 241,000 | 933,000 | 676,000 | 3/3 | 188,000 | 380,000 | 256,000 |

**Table C-20**
**Summary Statistics for Polychlorinated Biphenyl Congners in Whole Blue Crab Tissue by FCA, Lipid Normalized**

| | FCA1 | | | | FCA2 | | | | FCA3 | | | | Background | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] |
| PCB154 | 3/3 | 23,500 | 49,900 | 33,100 | 3/3 | 20,500 | 29,900 | 24,000 | 3/3 | 9,770 | 44,800 | 27,400 | 3/3 | 9,850 | 24,500 | 15,500 |
| PCB155 | 3/3 | 1,160 | 3,280 | 2,020 | 3/3 | 907 | 1,850 | 1,270 | 3/3 | 441 | 1,650 | 1,160 | 3/3 | 420 | 776 | 555 |
| PCB156+157 | 3/3 | 46,300 | 91,100 | 63,700 | 3/3 | 33,700 | 65,800 | 47,300 | 3/3 | 17,700 | 71,000 | 48,400 | 3/3 | 11,100 | 17,700 | 13,400 |
| PCB158 | 3/3 | 40,100 | 76,600 | 54,200 | 3/3 | 26,600 | 56,700 | 40,700 | 3/3 | 15,300 | 61,000 | 42,800 | 3/3 | 8670 | 13,400 | 10,400 |
| PCB159 | 0/3 | -- | -- | 303 | 1/3 | 595 | 595 | 324 | 0/3 | -- | -- | 181 | 0/3 | -- | -- | 228 |
| PCB160 | 0/3 | -- | -- | 255 | 0/3 | -- | -- | 150 | 0/3 | -- | -- | 131 | 0/3 | -- | -- | 165 |
| PCB161 | 0/3 | -- | -- | 238 | 0/3 | -- | -- | 143 | 0/3 | -- | -- | 123 | 0/3 | -- | -- | 148 |
| PCB162 | 3/3 | 1,930 | 4,770 | 3,120 | 3/3 | 1,720 | 3,410 | 2,430 | 3/3 | 886 | 3,200 | 2,370 | 3/3 | 896 | 1,570 | 1,130 |
| PCB164 | 1/3 | 7,180 | 7,180 | 3,600 | 3/3 | 2,220 | 11,200 | 5,550 | 1/3 | 2,870 | 2,870 | 1,570 | 2/3 | 797 | 1,560 | 928 |
| PCB165 | 0/3 | -- | -- | 266 | 1/3 | 392 | 392 | 263 | 1/3 | 553 | 553 | 277 | 0/3 | -- | -- | 163 |
| PCB167 | 3/3 | 24,900 | 44,900 | 31,900 | 3/3 | 19,100 | 36,200 | 25,100 | 3/3 | 9,560 | 33,600 | 24,700 | 3/3 | 4,960 | 8,460 | 6,450 |
| PCB169 | 0/3 | -- | -- | 287 | 0/3 | -- | -- | 214 | 0/3 | -- | -- | 176 | 0/3 | -- | -- | 232 |
| PCB170 | 3/3 | 37,000 | 135,000 | 78,700 | 3/3 | 33,700 | 75,100 | 50,500 | 3/3 | 19,100 | 70,300 | 50,800 | 3/3 | 12,600 | 18,800 | 16,500 |
| PCB171+173 | 3/3 | 19,700 | 52,200 | 33,100 | 3/3 | 17,400 | 33,700 | 23,300 | 3/3 | 9,140 | 31,900 | 23,300 | 3/3 | 4,720 | 7,810 | 6,490 |
| PCB172 | 3/3 | 8,790 | 31,600 | 18,800 | 3/3 | 9,160 | 17,700 | 12,900 | 3/3 | 5,190 | 17,400 | 12,400 | 3/3 | 4,150 | 6,470 | 5,050 |
| PCB174 | 3/3 | 1,480 | 10,000 | 5,140 | 3/3 | 1,430 | 11,300 | 5,380 | 2/3 | 2,220 | 3,380 | 2,050 | 2/3 | 1,040 | 3,070 | 1,800 |
| PCB175 | 3/3 | 2,300 | 6,130 | 4,020 | 3/3 | 1,850 | 3,860 | 2,790 | 3/3 | 1,150 | 4,210 | 2,790 | 2/3 | 731 | 1,060 | 805 |
| PCB176 | 1/3 | 1,300 | 1,300 | 553 | 1/3 | 305 | 305 | 359 | 2/3 | 210 | 374 | 242 | 1/3 | 379 | 379 | 219 |
| PCB177 | 3/3 | 21,600 | 42,500 | 31,300 | 3/3 | 19,200 | 44,500 | 27,800 | 3/3 | 11,800 | 21,100 | 15,900 | 3/3 | 5,380 | 6,220 | 5,790 |
| PCB178 | 3/3 | 25,200 | 49,800 | 34,200 | 3/3 | 17,500 | 39,700 | 27,200 | 3/3 | 10,200 | 33,600 | 25,700 | 3/3 | 7,220 | 11,900 | 9,190 |
| PCB179 | 1/3 | 4,160 | 4,160 | 1,640 | 3/3 | 319 | 4,260 | 2,090 | 3/3 | 254 | 1,390 | 685 | 3/3 | 250 | 1,300 | 921 |
| PCB180+193 | 3/3 | 135,000 | 423,000 | 254,000 | 3/3 | 128,000 | 234,000 | 170,000 | 3/3 | 69,700 | 241,000 | 178,000 | 3/3 | 47,200 | 76,400 | 60,200 |
| PCB181 | 2/3 | 898 | 1,680 | 993 | 0/3 | -- | -- | 368 | 2/3 | 902 | 1,150 | 733 | 0/3 | -- | -- | 289 |
| PCB182 | 1/3 | 2,010 | 2,010 | 817 | 1/3 | 774 | 774 | 623 | 2/3 | 528 | 1,290 | 799 | 0/3 | -- | -- | 185 |
| PCB183 | 3/3 | 44,200 | 107,000 | 73,200 | 3/3 | 42,100 | 72,300 | 54,000 | 3/3 | 23,900 | 73,800 | 52,600 | 3/3 | 14,000 | 23,200 | 18,100 |
| PCB184 | 2/3 | 808 | 1,150 | 744 | 3/3 | 371 | 700 | 504 | 3/3 | 198 | 634 | 482 | 2/3 | 254 | 376 | 259 |
| PCB185 | 0/3 | -- | -- | 564 | 1/3 | 3,440 | 3,440 | 1,270 | 0/3 | -- | -- | 202 | 1/3 | 396 | 396 | 367 |
| PCB186 | 0/3 | -- | -- | 158 | 0/3 | -- | -- | 112 | 0/3 | -- | -- | 79.0 | 0/3 | -- | -- | 136 |
| PCB187 | 3/3 | 155,000 | 335,000 | 231,000 | 3/3 | 126,000 | 258,000 | 175,000 | 3/3 | 66,400 | 202,000 | 151,000 | 3/3 | 46,800 | 80,700 | 58,300 |
| PCB188 | 3/3 | 860 | 2,300 | 1,430 | 3/3 | 772 | 1,400 | 1,010 | 3/3 | 348 | 1,400 | 931 | 1/3 | 872 | 872 | 453 |
| PCB189 | 3/3 | 1,960 | 5,640 | 3,480 | 3/3 | 1,630 | 3,290 | 2,280 | 3/3 | 999 | 3,780 | 2,820 | 2/3 | 936 | 1,230 | 983 |
| PCB190 | 3/3 | 6,200 | 26,600 | 15,200 | 3/3 | 6,160 | 13,500 | 8,950 | 3/3 | 3,620 | 13,600 | 9,840 | 3/3 | 2,780 | 4,160 | 3,300 |
| PCB191 | 2/3 | 2,290 | 6,810 | 3,600 | 3/3 | 1,800 | 4,350 | 2,820 | 3/3 | 1,190 | 4,270 | 3,080 | 3/3 | 705 | 1,330 | 1,050 |
| PCB192 | 0/3 | -- | -- | 487 | 0/3 | -- | -- | 187 | 0/3 | -- | -- | 167 | 0/3 | -- | -- | 245 |
| PCB194 | 3/3 | 12,700 | 50,600 | 29,000 | 3/3 | 11,400 | 25,100 | 16,400 | 3/3 | 7,190 | 28,000 | 20,300 | 3/3 | 8,710 | 12,500 | 10,200 |
| PCB195 | 3/3 | 3,050 | 14,000 | 8,650 | 3/3 | 3,190 | 8,800 | 5,270 | 3/3 | 2,440 | 9,000 | 6,780 | 3/3 | 2,170 | 3,200 | 2,800 |
| PCB196 | 3/3 | 9,750 | 30,700 | 20,000 | 3/3 | 9,520 | 20,100 | 13,600 | 3/3 | 6,110 | 24,900 | 16,200 | 3/3 | 4,510 | 8,340 | 6,260 |
| PCB197 | 2/3 | 3,890 | 5,280 | 3,350 | 3/3 | 1,490 | 3,730 | 2,400 | 3/3 | 1,060 | 3,670 | 2,730 | 2/3 | 1,160 | 1,250 | 963 |
| PCB198+199 | 3/3 | 20,300 | 73,800 | 44,700 | 3/3 | 21,600 | 43,200 | 30,700 | 3/3 | 12,100 | 48,700 | 32,700 | 3/3 | 11,900 | 17,400 | 14,300 |
| PCB200 | 1/3 | 510 | 510 | 305 | 0/3 | -- | -- | 177 | 0/3 | -- | -- | 103 | 0/3 | -- | -- | 181 |

**Table C-20**
**Summary Statistics for Polychlorinated Biphenyl Congners in Whole Blue Crab Tissue by FCA, Lipid Normalized**

| | FCA1 | | | | FCA2 | | | | FCA3 | | | | Background | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] |
| PCB201 | 3/3 | 3,540 | 9,160 | 6,020 | 3/3 | 3,320 | 5,690 | 4,380 | 3/3 | 1,780 | 5,550 | 4,060 | 2/3 | 1,880 | 2,100 | 1,550 |
| PCB202 | 3/3 | 10,700 | 24,600 | 16,200 | 3/3 | 9,420 | 17,700 | 12,400 | 3/3 | 4,520 | 14,500 | 10,800 | 3/3 | 1,960 | 4,620 | 3,410 |
| PCB203 | 3/3 | 7,150 | 29,000 | 19,000 | 3/3 | 7960 | 20,600 | 12,600 | 3/3 | 5,420 | 23,500 | 15,800 | 3/3 | 6,600 | 11,300 | 8,950 |
| PCB204 | 1/3 | 318 | 318 | 257 | 1/3 | 379 | 379 | 196 | 0/3 | -- | -- | 114 | 0/3 | -- | -- | 182 |
| PCB205 | 2/3 | 410 | 1,010 | 528 | 2/3 | 283 | 621 | 351 | 3/3 | 192 | 707 | 503 | 1/3 | 591 | 591 | 332 |
| PCB206 | 3/3 | 3,320 | 13,400 | 8,620 | 3/3 | 4,470 | 9,090 | 6,210 | 3/3 | 2,870 | 10,800 | 7,890 | 3/3 | 3,570 | 5,910 | 4,870 |
| PCB207 | 3/3 | 2,450 | 8,470 | 5,690 | 3/3 | 2,450 | 5,810 | 3,650 | 3/3 | 1,440 | 7,110 | 4,900 | 3/3 | 1,950 | 3,740 | 2,780 |
| PCB208 | 3/3 | 3,930 | 13,000 | 8,570 | 3/3 | 4,180 | 8,660 | 5,930 | 3/3 | 2,740 | 9,410 | 6,930 | 3/3 | 3,510 | 5,530 | 4,770 |
| PCB209 | 3/3 | 42,200 | 151,000 | 93,900 | 3/3 | 48,300 | 95,700 | 72,100 | 3/3 | 30,100 | 95,800 | 71,900 | 3/3 | 16,300 | 30,900 | 25,000 |
| **Polychlorinated Biphenyls (µg/kg - lw)** | | | | | | | | | | | | | | | | |
| Total PCBs [c] | 3/3 | 4,520 | 9,070 | 6,410 | 3/3 | 3,670 | 7,080 | 4,850 | 3/3 | 1,870 | 5,880 | 4,530 | 3/3 | 1,290 | 2,290 | 1,640 |

**Notes**

-- = not applicable, no detected values
FCA = fish collection area
lw = lipid weight
PCB = polychlorinated biphenyl

a - Mean calculation includes detected and non-detected values. Non-detected values were set at one-half the detection limit.
b - PCB###+#### indicates a co-elution of two or more PCB congeners.
c - Total polychlorinated biphenyls were calculated as the sum of all 209 congeners with non-detects set at one-half the detection limit.

**Table C-21**
**Summary Statistics for Dioxins and Furans in Fillet Hardhead Catfish Tissue by FCA, Lipid Normalized**

| | FCA1 | | | | FCA2 | | | | FCA3 | | | | Background | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] |
| Catfish - Fillet | | | | | | | | | | | | | | | | |
| **Dioxins/Furans (ng/kg - lw)** | | | | | | | | | | | | | | | | |
| 2,3,7,8-TCDD | 10/10 | 184 | 304 | 255 | 10/10 | 176 | 477 | 310 | 10/10 | 149 | 413 | 246 | 10/20 | 16.2 | 151 | 42.728 |
| 1,2,3,7,8-PeCDD | 2/10 | 6.32 | 13.7 | 5.57 | 4/10 | 6.74 | 13.1 | 7.49 | 4/10 | 7.79 | 28.1 | 9.58 | 5/20 | 10.2 | 32.5 | 7.811 |
| 1,2,3,4,7,8-HxCDD | 2/10 | 1.67 | 5.06 | 2.76 | 3/10 | 3.84 | 10 | 3.48 | 3/10 | 5.13 | 15.9 | 5.23 | 11/20 | 2.92 | 30.6 | 8.4195 |
| 1,2,3,6,7,8-HxCDD | 6/10 | 9.4 | 29.7 | 15.1 | 6/10 | 20.6 | 40.5 | 21 | 5/10 | 14.6 | 142 | 35.9 | 11/20 | 10.8 | 97.3 | 24.487 |
| 1,2,3,7,8,9-HxCDD | 4/10 | 3.45 | 14.6 | 5.25 | 0/10 | -- | -- | 3.55 | 4/10 | 2.02 | 50.8 | 11.2 | 7/20 | 5.01 | 48.1 | 10.676 |
| 1,2,3,4,6,7,8-HpCDD | 1/10 | 32.8 | 32.8 | 19.8 | 0/10 | -- | -- | 19.7 | 2/10 | 146 | 286 | 62.1 | 8/20 | 49.6 | 205 | 59.325 |
| OCDD | 0/10 | -- | -- | 46.8 | 0/10 | -- | -- | 47.7 | 0/10 | -- | -- | 78.4 | 0/20 | -- | -- | 186.27 |
| 2,3,7,8-TCDF | 6/10 | 17.2 | 39.9 | 23 | 9/10 | 50.3 | 102 | 65 | 8/10 | 33 | 57.2 | 40.4 | 3/20 | 13.5 | 45 | 10.041 |
| 1,2,3,7,8-PeCDF | 0/10 | -- | -- | 3.43 | 1/10 | 5.2 | 5.2 | 2.56 | 0/10 | -- | -- | 2.56 | 1/20 | 5.86 | 5.86 | 2.4951 |
| 2,3,4,7,8-PeCDF | 3/10 | 9.15 | 16.8 | 8.04 | 5/10 | 10.2 | 19.6 | 12 | 3/10 | 13.6 | 33.8 | 12.4 | 5/20 | 8.59 | 33.9 | 6.7265 |
| 1,2,3,4,7,8-HxCDF | 0/10 | -- | -- | 2.06 | 1/10 | 2.9 | 2.9 | 1.95 | 1/10 | 4.75 | 4.75 | 2 | 1/20 | 2.01 | 2.01 | 2.0185 |
| 1,2,3,6,7,8-HxCDF | 0/10 | -- | -- | 1.97 | 0/10 | -- | -- | 1.64 | 0/10 | -- | -- | 1.55 | 2/20 | 4.31 | 6.18 | 2.1753 |
| 1,2,3,7,8,9-HxCDF | 0/10 | -- | -- | 2.65 | 0/10 | -- | -- | 2.05 | 0/10 | -- | -- | 1.86 | 0/20 | -- | -- | 2.3331 |
| 2,3,4,6,7,8-HxCDF | 0/10 | -- | -- | 2.2 | 0/10 | -- | -- | 1.91 | 0/10 | -- | -- | 1.7 | 0/20 | -- | -- | 2.0374 |
| 1,2,3,4,6,7,8-HpCDF | 0/10 | -- | -- | 2.62 | 0/10 | -- | -- | 1.7 | 0/10 | -- | -- | 1.76 | 1/20 | 0.686 | 11 | 2.5736 |
| 1,2,3,4,7,8,9-HpCDF | 0/10 | -- | -- | 3.97 | 0/10 | -- | -- | 2.37 | 0/10 | -- | -- | 2.34 | 0/20 | -- | -- | 2.559 |
| OCDF | 0/10 | -- | -- | 8.48 | 0/10 | -- | -- | 3.4 | 0/10 | -- | -- | 4.69 | 3/20 | 12.2 | 63 | 8.819 |
| $TEQ_{DF,M}$ | 10/10 | 191 | 324 | 269 | 10/10 | 193 | 499 | 332 | 10/10 | 165 | 434 | 270 | 18/20 | 12.5 | 212 | 59.245 |
| $TEQ_{DFP,M}$ | 10/10 | 243 | 567 | 416 | 10/10 | 272 | 724 | 442 | 10/10 | 198 | 834 | 390 | 10/10 | 38.7 | 131 | 64.91 |
| $TEQ_{P,M}$ | 10/10 | 39.5 | 264 | 147 | 10/10 | 65.5 | 225 | 110 | 10/10 | 32.3 | 403 | 120 | 10/10 | 19.3 | 99.9 | 44.46 |

**Notes**

-- = not applicable, no detected values

FCA = fish collection area

lw = lipid weight

$TEQ_{DF,M}$ = Toxicity equivalent for dioxins and furans calculated using mammalian toxicity equivalency factors with non-detects set at one-half the detection limit.

$TEQ_{DFP,M}$ = Toxicity equivalent for dioxins and furans and polychlorinated biphenyls calculated using mammalian toxicity equivalency factors with non-detects set at one-half the detection limit.

$TEQ_{P,M}$ = Toxicity equivalent for polychlorinated biphenyls calculated using mammalian toxicity equivalency factors with non-detects set at one-half the detection limit.

a - Mean calculation includes detected and non-detected values. Non-detected values were set at one-half the detection limit.

**Table C-22**
**Summary Statistics for Polychlorinated Biphenyl Congeners in Fillet Hardhead Catfish Tissue by FCA, Lipid Normalized**

| | FCA1 | | | | FCA2 | | | | FCA3 | | | | Background | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] |
| Catfish - Fillet | | | | | | | | | | | | | | | | |
| **Polychlorinated Biphenyl Congeners [b] (ng/kg - lw)** | | | | | | | | | | | | | | | | |
| PCB001 | 4/10 | 106 | 621 | 255 | 5/10 | 334 | 2,010 | 445 | 2/10 | 325 | 367 | 183 | 0/10 | -- | -- | 93.9 |
| PCB002 | 0/10 | -- | -- | 150 | 0/10 | -- | -- | 89.6 | 0/10 | -- | -- | 87.4 | 0/10 | -- | -- | 91.5 |
| PCB003 | 0/10 | -- | -- | 164 | 1/10 | 188 | 188 | 116 | 0/10 | -- | -- | 107 | 0/10 | -- | -- | 107 |
| PCB004 | 1/10 | 1,530 | 1,530 | 1,660 | 4/10 | 1,200 | 6,470 | 1,850 | 3/10 | 1,390 | 1,780 | 1,650 | 0/10 | -- | -- | 611 |
| PCB005 | 0/10 | -- | -- | 1,160 | 0/10 | -- | -- | 523 | 0/10 | -- | -- | 661 | 0/10 | -- | -- | 386 |
| PCB006 | 0/10 | -- | -- | 1,050 | 2/10 | 320 | 478 | 528 | 0/10 | -- | -- | 550 | 1/10 | 424 | 424 | 368 |
| PCB007 | 0/10 | -- | -- | 1,080 | 0/10 | -- | -- | 493 | 0/10 | -- | -- | 587 | 0/10 | -- | -- | 353 |
| PCB008 | 1/10 | 639 | 639 | 1,030 | 0/10 | -- | -- | 512 | 0/10 | -- | -- | 656 | 1/10 | 485 | 485 | 352 |
| PCB009 | 0/10 | -- | -- | 1,000 | 0/10 | -- | -- | 470 | 0/10 | -- | -- | 583 | 0/10 | -- | -- | 335 |
| PCB010 | 0/10 | -- | -- | 1,050 | 0/10 | -- | -- | 576 | 0/10 | -- | -- | 898 | 0/10 | -- | -- | 427 |
| PCB011 | 0/10 | -- | -- | 4,830 | 0/10 | -- | -- | 4,330 | 0/10 | -- | -- | 4,390 | 0/10 | -- | -- | 3,310 |
| PCB012+013 | 0/10 | -- | -- | 1,050 | 0/10 | -- | -- | 475 | 0/10 | -- | -- | 587 | 0/10 | -- | -- | 336 |
| PCB014 | 0/10 | -- | -- | 1,010 | 0/10 | -- | -- | 454 | 0/10 | -- | -- | 569 | 0/10 | -- | -- | 322 |
| PCB015 | 0/10 | -- | -- | 1,100 | 1/10 | 619 | 619 | 604 | 0/10 | -- | -- | 647 | 0/10 | -- | -- | 371 |
| PCB016 | 9/10 | 1,200 | 11,900 | 4,660 | 10/10 | 2,140 | 6,850 | 3,820 | 9/10 | 1,300 | 7,530 | 3,420 | 7/10 | 613 | 1,710 | 904 |
| PCB017 | 3/10 | 740 | 2,950 | 832 | 8/10 | 564 | 1,860 | 908 | 8/10 | 615 | 2,520 | 1,080 | 7/10 | 334 | 807 | 409 |
| PCB018+030 | 9/10 | 1,410 | 13,600 | 5,680 | 10/10 | 2,990 | 10,000 | 5,320 | 9/10 | 3,210 | 13,000 | 5,930 | 10/10 | 775 | 2,300 | 1,480 |
| PCB019 | 9/10 | 1,250 | 9,780 | 4,540 | 10/10 | 2,660 | 8,110 | 4,770 | 10/10 | 2,170 | 7,900 | 4,480 | 7/10 | 482 | 1,290 | 625 |
| PCB020+028 | 10/10 | 17,900 | 188,000 | 75,700 | 10/10 | 23,000 | 115,000 | 59,100 | 10/10 | 29,100 | 119,000 | 60,200 | 10/10 | 16,000 | 40,200 | 26,200 |
| PCB021+033 | 8/10 | 243 | 5,770 | 1,590 | 0/10 | -- | -- | 369 | 4/10 | 507 | 1,730 | 637 | 6/10 | 402 | 864 | 421 |
| PCB022 | 1/10 | 535 | 535 | 501 | 1/10 | 680 | 680 | 445 | 3/10 | 500 | 1,600 | 672 | 1/10 | 204 | 204 | 156 |
| PCB023 | 0/10 | -- | -- | 136 | 0/10 | -- | -- | 71.7 | 0/10 | -- | -- | 76.7 | 0/10 | -- | -- | 76.6 |
| PCB024 | 5/10 | 214 | 1,720 | 544 | 9/10 | 328 | 1,110 | 576 | 6/10 | 280 | 1,250 | 438 | 3/10 | 137 | 357 | 123 |
| PCB025 | 5/10 | 647 | 1,640 | 769 | 5/10 | 441 | 1,770 | 749 | 8/10 | 580 | 1,770 | 1,010 | 8/10 | 691 | 1,440 | 856 |
| PCB026+029 | 10/10 | 1,060 | 14,100 | 5,110 | 10/10 | 2,000 | 8,390 | 4,810 | 10/10 | 2,520 | 6,540 | 4,620 | 9/10 | 2,060 | 4,540 | 2,770 |
| PCB027 | 5/10 | 314 | 960 | 458 | 7/10 | 257 | 971 | 473 | 7/10 | 219 | 1,670 | 583 | 2/10 | 118 | 179 | 88.1 |
| PCB031 | 7/10 | 1,850 | 10,300 | 3,710 | 10/10 | 1,640 | 8,860 | 4,710 | 9/10 | 3,130 | 5,910 | 4,360 | 10/10 | 2,260 | 6,030 | 3,910 |
| PCB032 | 1/10 | 465 | 465 | 435 | 10/10 | 322 | 1,180 | 648 | 8/10 | 394 | 2,020 | 654 | 7/10 | 172 | 362 | 225 |
| PCB034 | 2/10 | 89.9 | 416 | 263 | 5/10 | 281 | 594 | 261 | 3/10 | 313 | 694 | 235 | 0/10 | -- | -- | 99 |
| PCB035 | 0/10 | -- | -- | 124 | 0/10 | -- | -- | 67.9 | 0/10 | -- | -- | 69.5 | 0/10 | -- | -- | 70.6 |
| PCB036 | 0/10 | -- | -- | 111 | 0/10 | -- | -- | 59.1 | 0/10 | -- | -- | 63.2 | 0/10 | -- | -- | 63.7 |
| PCB037 | 0/10 | -- | -- | 296 | 4/10 | 523 | 826 | 354 | 4/10 | 339 | 607 | 360 | 3/10 | 186 | 291 | 146 |
| PCB038 | 0/10 | -- | -- | 123 | 0/10 | -- | -- | 66.5 | 1/10 | 130 | 130 | 78.1 | 0/10 | -- | -- | 70.5 |
| PCB039 | 0/10 | -- | -- | 120 | 0/10 | -- | -- | 64.6 | 0/10 | -- | -- | 68.6 | 0/10 | -- | -- | 69.2 |
| PCB040+041+071 | 8/10 | 1,400 | 11,800 | 4,760 | 10/10 | 2,970 | 9,040 | 4,730 | 10/10 | 1,760 | 10,900 | 5,070 | 7/10 | 1,090 | 2,280 | 1,270 |
| PCB042 | 9/10 | 3,480 | 32,000 | 13,600 | 10/10 | 6,950 | 24,400 | 12,100 | 10/10 | 3,940 | 26,400 | 11,700 | 10/10 | 1,500 | 5,350 | 3,140 |
| PCB043+073 | 2/10 | 1,080 | 1,090 | 321 | 6/10 | 730 | 1,670 | 925 | 1/10 | 1,430 | 1,430 | 235 | 4/10 | 274 | 1,010 | 279 |
| PCB044+047+065 | 10/10 | 75,600 | 839,000 | 371,000 | 10/10 | 128,000 | 446,000 | 266,000 | 10/10 | 99,900 | 822,000 | 289,000 | 10/10 | 46,600 | 182,000 | 94,400 |
| PCB045+051 | 10/10 | 3,160 | 18,900 | 10,200 | 10/10 | 4,390 | 16,500 | 8,430 | 10/10 | 4,180 | 18,000 | 8,520 | 10/10 | 1,580 | 4,690 | 2,450 |

**Table C-22**
**Summary Statistics for Polychlorinated Biphenyl Congeners in Fillet Hardhead Catfish Tissue by FCA, Lipid Normalized**

| | FCA1 | | | | FCA2 | | | | FCA3 | | | | Background | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] |
| PCB046 | 5/10 | 300 | 3,000 | 752 | 6/10 | 557 | 1,510 | 696 | 4/10 | 547 | 1,310 | 441 | 3/10 | 232 | 495 | 183 |
| PCB048 | 1/10 | 1,090 | 1,090 | 209 | 1/10 | 501 | 501 | 256 | 3/10 | 457 | 1,950 | 379 | 1/10 | 360 | 360 | 124 |
| PCB049+069 | 10/10 | 50,800 | 559,000 | 238,000 | 10/10 | 88,300 | 299,000 | 174,000 | 10/10 | 68,400 | 476,000 | 189,000 | 10/10 | 39,800 | 134,000 | 67,300 |
| PCB050+053 | 10/10 | 5,120 | 34,500 | 19,500 | 10/10 | 11,400 | 36,400 | 23,600 | 10/10 | 7,560 | 42,300 | 22,500 | 10/10 | 2,870 | 8,860 | 4,570 |
| PCB052 | 10/10 | 68,600 | 629,000 | 293,000 | 10/10 | 126,000 | 408,000 | 228,000 | 10/10 | 97,600 | 549,000 | 245,000 | 10/10 | 45,900 | 154,000 | 76,200 |
| PCB054 | 7/10 | 286 | 1,800 | 768 | 7/10 | 765 | 1,320 | 816 | 9/10 | 445 | 1,780 | 839 | 5/10 | 111 | 186 | 124 |
| PCB055 | 0/10 | -- | -- | 82.9 | 0/10 | -- | -- | 64.1 | 0/10 | -- | -- | 62.9 | 0/10 | -- | -- | 51.7 |
| PCB056 | 5/10 | 295 | 2,180 | 785 | 6/10 | 718 | 2,630 | 958 | 8/10 | 693 | 3,350 | 1,400 | 2/10 | 195 | 213 | 158 |
| PCB057 | 0/10 | -- | -- | 83.6 | 0/10 | -- | -- | 64.1 | 1/10 | 246 | 246 | 82 | 3/10 | 151 | 217 | 107 |
| PCB058 | 2/10 | 287 | 377 | 176 | 1/10 | 257 | 257 | 79.8 | 0/10 | -- | -- | 79.3 | 5/10 | 595 | 1,640 | 542 |
| PCB059+062+075 | 10/10 | 5,270 | 45,400 | 20,700 | 10/10 | 8,830 | 28,700 | 15,900 | 10/10 | 6,510 | 44,200 | 17,500 | 10/10 | 2,910 | 9,880 | 4,900 |
| PCB060 | 10/10 | 9,460 | 94,500 | 47,800 | 10/10 | 15,300 | 64,700 | 37,900 | 10/10 | 15,100 | 120,000 | 41,500 | 10/10 | 4,030 | 27,000 | 12,000 |
| PCB061+070+074+076 | 10/10 | 40,700 | 396,000 | 206,000 | 10/10 | 73,600 | 279,000 | 170,000 | 10/10 | 65,800 | 507,000 | 181,000 | 10/10 | 29,600 | 124,000 | 64,900 |
| PCB063 | 10/10 | 2,760 | 24,200 | 12,700 | 10/10 | 4,730 | 16,100 | 10,000 | 10/10 | 4,130 | 28,100 | 10,600 | 10/10 | 1,620 | 7,180 | 3,720 |
| PCB064 | 10/10 | 11,400 | 85,900 | 40,700 | 10/10 | 22,100 | 70,900 | 36,600 | 10/10 | 14,900 | 88,700 | 40,700 | 10/10 | 4,770 | 17,600 | 8,490 |
| PCB066 | 10/10 | 68,600 | 680,000 | 337,000 | 10/10 | 117,000 | 427,000 | 259,000 | 10/10 | 91,200 | 853,000 | 282,000 | 10/10 | 39,700 | 186,000 | 91,300 |
| PCB067 | 0/10 | -- | -- | 104 | 0/10 | -- | -- | 52.6 | 0/10 | -- | -- | 64.6 | 5/10 | 372 | 732 | 367 |
| PCB068 | 9/10 | 1,190 | 15,800 | 5,860 | 10/10 | 2,100 | 7,150 | 4,730 | 9/10 | 2,370 | 12,000 | 4,580 | 10/10 | 1,490 | 6,330 | 3,200 |
| PCB072 | 10/10 | 954 | 11,100 | 4,330 | 10/10 | 1,740 | 5,390 | 3,610 | 10/10 | 1,330 | 8,620 | 3,470 | 9/10 | 1,080 | 4,970 | 2,100 |
| PCB077 | 8/10 | 413 | 1,760 | 738 | 7/10 | 1,010 | 1,650 | 959 | 7/10 | 499 | 1,570 | 897 | 8/10 | 498 | 1,150 | 647 |
| PCB078 | 0/10 | -- | -- | 163 | 0/10 | -- | -- | 127 | 0/10 | -- | -- | 130 | 0/10 | -- | -- | 98.9 |
| PCB079 | 7/10 | 220 | 1,730 | 896 | 7/10 | 414 | 1,450 | 728 | 5/10 | 435 | 2,050 | 604 | 1/10 | 194 | 194 | 167 |
| PCB080 | 0/10 | -- | -- | 144 | 0/10 | -- | -- | 114 | 0/10 | -- | -- | 116 | 0/10 | -- | -- | 85.8 |
| PCB081 | 1/10 | 151 | 151 | 186 | 0/10 | -- | -- | 156 | 4/10 | 254 | 409 | 232 | 0/10 | -- | -- | 112 |
| PCB082 | 4/10 | 902 | 2,800 | 1,210 | 7/10 | 1,200 | 4,270 | 1800 | 3/10 | 837 | 2,130 | 936 | 3/10 | 371 | 1,000 | 437 |
| PCB083+099 | 10/10 | 181,000 | 1,820,000 | 913,000 | 10/10 | 282,000 | 1,070,000 | 677,000 | 10/10 | 264,000 | 2,330,000 | 729,000 | 10/10 | 126,000 | 884,000 | 341,000 |
| PCB084 | 9/10 | 2,880 | 17,500 | 9,370 | 10/10 | 6,550 | 23,600 | 12,500 | 9/10 | 6,050 | 16,600 | 9,240 | 10/10 | 2,450 | 7,680 | 4,350 |
| PCB085+116 | 10/10 | 24,900 | 307,000 | 146,000 | 10/10 | 40,100 | 191,000 | 109,000 | 10/10 | 36,200 | 367,000 | 112,000 | 10/10 | 13,300 | 88,000 | 34,500 |
| PCB086+087+097+109+119 +125 | 10/10 | 32,900 | 306,000 | 144,000 | 10/10 | 60,900 | 210,000 | 115,000 | 10/10 | 40,400 | 294,000 | 111,000 | 10/10 | 24,500 | 98,200 | 42,700 |
| PCB088+091 | 10/10 | 10,800 | 97,300 | 43,900 | 10/10 | 19,500 | 74,200 | 42,500 | 10/10 | 16,100 | 74,400 | 34,200 | 10/10 | 13,000 | 41,200 | 20,800 |
| PCB089 | 0/10 | -- | -- | 101 | 0/10 | -- | -- | 87.8 | 0/10 | -- | -- | 84.9 | 0/10 | -- | -- | 63.8 |
| PCB090+101+113 | 10/10 | 117,000 | 1,160,000 | 555,000 | 10/10 | 201,000 | 716,000 | 418,000 | 10/10 | 143,000 | 1,240,000 | 433,000 | 10/10 | 88,200 | 412,000 | 175,000 |
| PCB092 | 10/10 | 15,100 | 117,000 | 60,700 | 10/10 | 30,700 | 91,700 | 54,200 | 10/10 | 21,700 | 115,000 | 53,300 | 10/10 | 13,300 | 53,800 | 24,400 |
| PCB093+100 | 10/10 | 5,700 | 57,900 | 29,200 | 10/10 | 8,910 | 35,500 | 23,100 | 10/10 | 8,550 | 73,600 | 23,000 | 10/10 | 4,760 | 24,200 | 11,000 |
| PCB094 | 8/10 | 260 | 1,770 | 994 | 8/10 | 603 | 1,690 | 1,040 | 6/10 | 625 | 1,490 | 859 | 8/10 | 282 | 1,040 | 479 |
| PCB095 | 10/10 | 23,400 | 153,000 | 84,400 | 10/10 | 46,700 | 162,000 | 91,900 | 10/10 | 30,600 | 148,000 | 75,200 | 10/10 | 21,300 | 70,800 | 34,700 |
| PCB096 | 6/10 | 302 | 710 | 366 | 5/10 | 257 | 1,160 | 447 | 6/10 | 238 | 610 | 311 | 3/10 | 127 | 410 | 131 |
| PCB098+102 | 3/10 | 1,730 | 3,350 | 1,670 | 10/10 | 1,420 | 4,820 | 2,920 | 8/10 | 907 | 4,740 | 2,240 | 7/10 | 625 | 1,530 | 836 |
| PCB103 | 10/10 | 2,310 | 24,400 | 10,400 | 10/10 | 3,280 | 12,700 | 8,520 | 10/10 | 2,860 | 20,200 | 7,380 | 10/10 | 2,660 | 10,100 | 4,570 |
| PCB104 | 2/10 | 196 | 814 | 179 | 5/10 | 153 | 372 | 156 | 3/10 | 134 | 591 | 152 | 1/10 | 225 | 225 | 57.9 |

**Table C-22**
**Summary Statistics for Polychlorinated Biphenyl Congeners in Fillet Hardhead Catfish Tissue by FCA, Lipid Normalized**

| | FCA1 | | | | FCA2 | | | | FCA3 | | | | Background | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] |
| PCB105 | 10/10 | 48,100 | 542,000 | 255,000 | 10/10 | 85,100 | 364,000 | 215,000 | 10/10 | 75,400 | 686,000 | 225,000 | 10/10 | 22,100 | 188,000 | 66,500 |
| PCB106 | 0/10 | -- | -- | 324 | 0/10 | -- | -- | 174 | 0/10 | -- | -- | 176 | 0/10 | -- | -- | 142 |
| PCB107 | 10/10 | 11,800 | 111,000 | 57,000 | 10/10 | 20,200 | 71,700 | 44,100 | 10/10 | 18,800 | 136,000 | 48,200 | 10/10 | 9,310 | 51,900 | 23,900 |
| PCB108+124 | 6/10 | 589 | 5,640 | 2,330 | 9/10 | 1,870 | 5,260 | 3,260 | 9/10 | 887 | 5,830 | 3,020 | 9/10 | 1,200 | 4,950 | 2,020 |
| PCB110+115 | 10/10 | 31,700 | 257,000 | 128,000 | 10/10 | 75,300 | 233,000 | 125,000 | 10/10 | 44,200 | 281,000 | 130,000 | 10/10 | 18,000 | 78,700 | 33,400 |
| PCB111 | 6/10 | 332 | 2,840 | 1,290 | 5/10 | 443 | 2,030 | 956 | 7/10 | 519 | 3,960 | 1,050 | 6/10 | 486 | 1,920 | 683 |
| PCB112 | 0/10 | -- | -- | 404 | 0/10 | -- | -- | 216 | 0/10 | -- | -- | 242 | 0/10 | -- | -- | 196 |
| PCB114 | 9/10 | 3,240 | 30,500 | 15,000 | 9/10 | 5,160 | 22,200 | 11,900 | 10/10 | 4,870 | 39,800 | 13,400 | 6/10 | 2,170 | 11,900 | 3,860 |
| PCB117 | 9/10 | 3,170 | 16,900 | 7,780 | 9/10 | 3,860 | 11,900 | 5,300 | 9/10 | 2,770 | 11,400 | 6,210 | 7/10 | 1,900 | 5,930 | 2,590 |
| PCB118 | 10/10 | 176,000 | 1,640,000 | 818,000 | 10/10 | 284,000 | 1,080,000 | 660,000 | 10/10 | 261,000 | 2,050,000 | 691,000 | 10/10 | 93,800 | 698,000 | 269,000 |
| PCB120 | 10/10 | 2,070 | 20,800 | 10,700 | 10/10 | 3,150 | 11,600 | 7,570 | 10/10 | 3,030 | 25,200 | 7,790 | 10/10 | 2,190 | 14,800 | 5,810 |
| PCB121 | 2/10 | 225 | 913 | 519 | 2/10 | 1,280 | 1,750 | 490 | 2/10 | 321 | 2,240 | 438 | 2/10 | 319 | 1,050 | 314 |
| PCB122 | 0/10 | -- | -- | 366 | 0/10 | -- | -- | 184 | 0/10 | -- | -- | 183 | 0/10 | -- | -- | 157 |
| PCB123 | 9/10 | 2,790 | 31,000 | 14,500 | 10/10 | 5,280 | 21,300 | 12,800 | 10/10 | 3,640 | 38,600 | 12,500 | 8/10 | 1,950 | 11,000 | 3,710 |
| PCB126 | 6/10 | 299 | 1,580 | 986 | 6/10 | 586 | 1,700 | 709 | 4/10 | 616 | 2,870 | 821 | 5/10 | 250 | 712 | 283 |
| PCB127 | 0/10 | -- | -- | 344 | 0/10 | -- | -- | 202 | 6/10 | 442 | 2,660 | 729 | 0/10 | -- | -- | 152 |
| PCB128+166 | 10/10 | 28,900 | 338,000 | 155,000 | 10/10 | 50,700 | 203,000 | 125,000 | 10/10 | 47,400 | 398,000 | 132,000 | 10/10 | 19,100 | 156,000 | 55,800 |
| PCB129+138+163 | 10/10 | 217,000 | 2,130,000 | 1,030,000 | 10/10 | 387,000 | 1,300,000 | 854,000 | 10/10 | 330,000 | 2,660,000 | 892,000 | 10/10 | 142,000 | 1,060,000 | 406,000 |
| PCB130 | 9/10 | 4,190 | 33,600 | 17,900 | 10/10 | 10,000 | 25,800 | 17,100 | 10/10 | 6,460 | 31,900 | 16,200 | 10/10 | 5,910 | 18,200 | 10,400 |
| PCB131 | 0/10 | -- | -- | 264 | 1/10 | 665 | 665 | 240 | 0/10 | -- | -- | 151 | 2/10 | 257 | 840 | 195 |
| PCB132 | 10/10 | 9,650 | 65,100 | 36,200 | 10/10 | 19,900 | 60,800 | 37,600 | 10/10 | 12,900 | 66,000 | 32,900 | 10/10 | 10,300 | 38,700 | 16,700 |
| PCB133 | 10/10 | 4,110 | 32,500 | ` | 10/10 | 5,800 | 18,000 | 11,900 | 10/10 | 5,210 | 32,900 | 12,100 | 10/10 | 3,500 | 18,800 | 8,390 |
| PCB134 | 0/10 | -- | -- | 267 | 1/10 | 1,470 | 1,470 | 336 | 0/10 | -- | -- | 160 | 2/10 | 966 | 2,430 | 534 |
| PCB135+151 | 10/10 | 11,200 | 68,000 | 38,600 | 10/10 | 24,500 | 62,800 | 40,000 | 10/10 | 13,400 | 73,800 | 37,900 | 10/10 | 11,500 | 47,300 | 19,800 |
| PCB136 | 9/10 | 1,280 | 6,110 | 3,510 | 10/10 | 2,360 | 7,620 | 5,290 | 10/10 | 1,700 | 6,080 | 3,560 | 10/10 | 1,280 | 4,810 | 2,320 |
| PCB137 | 10/10 | 8,990 | 95,500 | 43,900 | 10/10 | 16,100 | 57,900 | 35,800 | 10/10 | 13,600 | 105,000 | 39,600 | 10/10 | 4,830 | 46,900 | 16,000 |
| PCB139+140 | 10/10 | 4,030 | 39,500 | 19,200 | 10/10 | 6,670 | 23,600 | 15,000 | 10/10 | 5,990 | 47,800 | 16,000 | 10/10 | 2,740 | 18,100 | 7,310 |
| PCB141 | 10/10 | 12,900 | 162,000 | 75,000 | 10/10 | 28,300 | 87,900 | 58,000 | 10/10 | 23,700 | 164,000 | 64,000 | 10/10 | 9,310 | 48,300 | 22,300 |
| PCB142 | 0/10 | -- | -- | 257 | 0/10 | -- | -- | 182 | 0/10 | -- | -- | 150 | 0/10 | -- | -- | 113 |
| PCB143 | 0/10 | -- | -- | 246 | 0/10 | -- | -- | 167 | 0/10 | -- | -- | 139 | 0/10 | -- | -- | 110 |
| PCB144 | 10/10 | 2,290 | 43,800 | 18,500 | 10/10 | 7,510 | 28,900 | 14,000 | 10/10 | 6,690 | 31,700 | 14,700 | 10/10 | 1,800 | 14,100 | 3,800 |
| PCB145 | 0/10 | -- | -- | 64.4 | 0/10 | -- | -- | 50.3 | 0/10 | -- | -- | 57.7 | 0/10 | -- | -- | 51.9 |
| PCB146 | 10/10 | 54,300 | 494,000 | 248,000 | 10/10 | 80,500 | 290,000 | 187,000 | 10/10 | 78,800 | 635,000 | 200,000 | 10/10 | 39,100 | 301,000 | 113,000 |
| PCB147+149 | 10/10 | 58,500 | 488,000 | 252,000 | 10/10 | 110,000 | 337,000 | 222,000 | 10/10 | 89,000 | 514,000 | 211,000 | 10/10 | 59,800 | 264,000 | 118,000 |
| PCB148 | 10/10 | 1,090 | 9,670 | 5,060 | 10/10 | 1,350 | 5,820 | 3,670 | 10/10 | 1,430 | 12,300 | 3,560 | 10/10 | 1,060 | 6,190 | 2,640 |
| PCB150 | 5/10 | 229 | 916 | 445 | 10/10 | 332 | 1,050 | 739 | 7/10 | 348 | 904 | 443 | 6/10 | 409 | 1720 | 601 |
| PCB152 | 6/10 | 55 | 376 | 157 | 3/10 | 73 | 191 | 92.4 | 3/10 | 147 | 236 | 114 | 0/10 | -- | -- | 53.5 |
| PCB153+168 | 10/10 | 326,000 | 2,920,000 | 1,440,000 | 10/10 | 461,000 | 1,640,000 | 1,080,000 | 10/10 | 444,000 | 3,650,000 | 1,140,000 | 10/10 | 211,000 | 1,880,000 | 645,000 |
| PCB154 | 10/10 | 10,300 | 128,000 | 62,700 | 10/10 | 18,600 | 76,100 | 43,300 | 10/10 | 19,500 | 164,000 | 50,000 | 10/10 | 10,100 | 78,700 | 29,100 |
| PCB155 | 9/10 | 713 | 7,610 | 3,140 | 10/10 | 954 | 3,450 | 2,230 | 9/10 | 859 | 7,340 | 2,210 | 9/10 | 447 | 3,810 | 1,300 |
| PCB156+157 | 10/10 | 20,500 | 218,000 | 103,000 | 10/10 | 39,100 | 143,000 | 86,800 | 10/10 | 33,600 | 256,000 | 93,000 | 10/10 | 13,100 | 110,000 | 38,000 |

**Table C-22**
**Summary Statistics for Polychlorinated Biphenyl Congeners in Fillet Hardhead Catfish Tissue by FCA, Lipid Normalized**

| | FCA1 | | | | FCA2 | | | | FCA3 | | | | Background | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] |
| PCB158 | 10/10 | 16,600 | 184,000 | 84,200 | 10/10 | 31,100 | 108,000 | 68,000 | 10/10 | 26,400 | 200,000 | 72,300 | 10/10 | 9,030 | 78,800 | 27,300 |
| PCB159 | 8/10 | 242 | 3,400 | 1,580 | 9/10 | 730 | 2,600 | 1,500 | 8/10 | 902 | 3,310 | 1,560 | 6/10 | 344 | 1690 | 667 |
| PCB160 | 0/10 | -- | -- | 195 | 0/10 | -- | -- | 135 | 0/10 | -- | -- | 107 | 0/10 | -- | -- | 88.2 |
| PCB161 | 0/10 | -- | -- | 179 | 0/10 | -- | -- | 127 | 0/10 | -- | -- | 103 | 0/10 | -- | -- | 81.1 |
| PCB162 | 9/10 | 1,240 | 11,900 | 5,720 | 9/10 | 2,070 | 6,760 | 4,190 | 10/10 | 1,900 | 15,200 | 4,950 | 9/10 | 1,380 | 9,480 | 3,080 |
| PCB164 | 10/10 | 4,380 | 46,100 | 24,200 | 10/10 | 11,400 | 33,400 | 22,300 | 9/10 | 9,840 | 54,100 | 22,100 | 10/10 | 4,140 | 20,300 | 8,560 |
| PCB165 | 0/10 | -- | -- | 202 | 0/10 | -- | -- | 143 | 0/10 | -- | -- | 117 | 1/10 | 300 | 300 | 173 |
| PCB167 | 10/10 | 7,830 | 69,000 | 35,100 | 10/10 | 14,300 | 47,800 | 29,500 | 10/10 | 10,400 | 83,400 | 30,500 | 10/10 | 5,900 | 28,800 | 14,000 |
| PCB169 | 2/10 | 691 | 1,130 | 344 | 0/10 | -- | -- | 278 | 0/10 | -- | -- | 194 | 0/10 | -- | -- | 137 |
| PCB170 | 10/10 | 33,900 | 509,000 | 221,000 | 10/10 | 77,000 | 274,000 | 164,000 | 10/10 | 75,200 | 549,000 | 194,000 | 10/10 | 30,600 | 342,000 | 102,000 |
| PCB171+173 | 10/10 | 13,400 | 157,000 | 72,900 | 10/10 | 27,200 | 88,100 | 56,200 | 10/10 | 26,100 | 184,000 | 63,800 | 10/10 | 9,170 | 103,000 | 31,400 |
| PCB172 | 10/10 | 7,210 | 92,900 | 42,300 | 10/10 | 14,300 | 47,400 | 29,500 | 10/10 | 14,100 | 93,900 | 34,300 | 10/10 | 6,940 | 73,600 | 22,400 |
| PCB174 | 10/10 | 6,740 | 75,200 | 40,000 | 10/10 | 21,200 | 62,000 | 40,000 | 10/10 | 19,900 | 77,100 | 41,900 | 10/10 | 8,960 | 31,100 | 17,100 |
| PCB175 | 10/10 | 1,690 | 16,300 | 7,770 | 10/10 | 2,670 | 8,880 | 5,830 | 8/10 | 2,640 | 15,100 | 5,470 | 9/10 | 1,440 | 9,390 | 3,630 |
| PCB176 | 8/10 | 628 | 4,000 | 1,680 | 7/10 | 1,010 | 3,340 | 1,690 | 8/10 | 723 | 2,040 | 1,190 | 9/10 | 750 | 2,740 | 1,190 |
| PCB177 | 9/10 | 4,260 | 23,500 | 13,600 | 10/10 | 11,300 | 22,800 | 15,500 | 9/10 | 6,680 | 25,500 | 14,800 | 10/10 | 6,450 | 20,100 | 10,800 |
| PCB178 | 10/10 | 8,060 | 55,900 | 30,000 | 10/10 | 13,200 | 38,500 | 25,200 | 10/10 | 10,000 | 59,300 | 23,600 | 10/10 | 8,190 | 40,800 | 18,500 |
| PCB179 | 9/10 | 1,780 | 8,920 | 4,910 | 10/10 | 3,260 | 9,610 | 6,750 | 10/10 | 2,620 | 10,100 | 5,320 | 10/10 | 2,250 | 7,970 | 3,840 |
| PCB180+193 | 10/10 | 96,900 | 1,250,000 | 561,000 | 10/10 | 173,000 | 621,000 | 377,000 | 10/10 | 169,000 | 1,200,000 | 431,000 | 10/10 | 77,100 | 928,000 | 268,000 |
| PCB181 | 7/10 | 442 | 5,260 | 1,870 | 5/10 | 770 | 2,790 | 1,360 | 7/10 | 902 | 6,080 | 1,920 | 7/10 | 272 | 3,170 | 915 |
| PCB182 | 7/10 | 453 | 4,710 | 2,040 | 8/10 | 996 | 3,080 | 1,790 | 9/10 | 934 | 5,640 | 2,060 | 7/10 | 692 | 3,980 | 1,210 |
| PCB183 | 10/10 | 34,100 | 358,000 | 162,000 | 10/10 | 63,900 | 207,000 | 136,000 | 10/10 | 59,100 | 388,000 | 139,000 | 10/10 | 20,400 | 269,000 | 77,400 |
| PCB184 | 7/10 | 329 | 3,200 | 1,250 | 8/10 | 517 | 1,790 | 1,080 | 7/10 | 536 | 3,940 | 1,190 | 9/10 | 345 | 2,400 | 764 |
| PCB185 | 10/10 | 1,110 | 19,800 | 8,140 | 8/10 | 3,000 | 9,130 | 5,250 | 9/10 | 3,510 | 10,900 | 7,450 | 3/10 | 1,480 | 5,510 | 1,630 |
| PCB186 | 0/10 | -- | -- | 62.6 | 0/10 | -- | -- | 62.5 | 0/10 | -- | -- | 51.7 | 0/10 | -- | -- | 50.2 |
| PCB187 | 10/10 | 79,100 | 705,000 | 347,000 | 10/10 | 130,000 | 453,000 | 292,000 | 10/10 | 128,000 | 834,000 | 289,000 | 10/10 | 65,900 | 419,000 | 180,000 |
| PCB188 | 10/10 | 465 | 4,610 | 2,370 | 9/10 | 684 | 2,930 | 1,670 | 10/10 | 728 | 5,050 | 1,790 | 10/10 | 642 | 4,350 | 1,750 |
| PCB189 | 10/10 | 1,560 | 16,200 | 7,720 | 9/10 | 2,490 | 8,880 | 5,110 | 10/10 | 2,530 | 19,800 | 6,800 | 10/10 | 1,530 | 13,400 | 4,180 |
| PCB190 | 10/10 | 7,210 | 97,500 | 43,600 | 10/10 | 15,900 | 55,500 | 33,400 | 10/10 | 15,200 | 109,000 | 38,900 | 10/10 | 5,610 | 66,800 | 19,700 |
| PCB191 | 10/10 | 1,710 | 22,400 | 9,890 | 10/10 | 3,370 | 11,800 | 7,400 | 10/10 | 3,750 | 24,300 | 8,700 | 10/10 | 1,310 | 13,800 | 4,230 |
| PCB192 | 0/10 | -- | -- | 161 | 0/10 | -- | -- | 142 | 0/10 | -- | -- | 164 | 0/10 | -- | -- | 134 |
| PCB194 | 10/10 | 16,400 | 221,000 | 95,500 | 10/10 | 22,400 | 88,400 | 54,400 | 10/10 | 24,700 | 202,000 | 70,300 | 10/10 | 22,400 | 177,000 | 57,900 |
| PCB195 | 10/10 | 6,200 | 86,900 | 38,000 | 10/10 | 12,900 | 46,900 | 29,200 | 10/10 | 12,300 | 89,500 | 33,400 | 10/10 | 7,010 | 57,700 | 19,700 |
| PCB196 | 10/10 | 10,000 | 125,000 | 56,100 | 10/10 | 20,500 | 66,100 | 43,500 | 10/10 | 19,900 | 141,000 | 50,500 | 10/10 | 9,380 | 81,500 | 28,400 |
| PCB197 | 10/10 | 1,950 | 21,800 | 10,500 | 10/10 | 3,900 | 13,100 | 8,620 | 10/10 | 3,700 | 26,200 | 9,210 | 10/10 | 1,940 | 15,800 | 5,460 |
| PCB198+199 | 10/10 | 17,100 | 203,000 | 93,000 | 10/10 | 39,200 | 121,000 | 77,500 | 10/10 | 35,400 | 201,000 | 85,400 | 10/10 | 21,200 | 127,000 | 53,900 |
| PCB200 | 8/10 | 231 | 2,440 | 995 | 5/10 | 957 | 1,810 | 958 | 6/10 | 521 | 2,030 | 845 | 7/10 | 400 | 1,480 | 655 |
| PCB201 | 10/10 | 2,420 | 23,800 | 11,200 | 9/10 | 3,780 | 12,100 | 7,420 | 10/10 | 3,710 | 21,600 | 8,390 | 10/10 | 3,160 | 16,100 | 7,870 |
| PCB202 | 10/10 | 3,660 | 25,400 | 14,200 | 9/10 | 5,980 | 18,000 | 10,700 | 10/10 | 4,860 | 28,500 | 11,600 | 10/10 | 5,170 | 21,700 | 10,500 |
| PCB203 | 10/10 | 15,000 | 200,000 | 88,900 | 10/10 | 33,900 | 111,000 | 71,900 | 10/10 | 32,100 | 212,000 | 80,800 | 10/10 | 16,100 | 137,000 | 47,500 |
| PCB204 | 9/10 | 131 | 1,460 | 714 | 8/10 | 261 | 1,070 | 564 | 4/10 | 317 | 1,750 | 520 | 4/10 | 171 | 521 | 181 |

**Table C-22**
**Summary Statistics for Polychlorinated Biphenyl Congeners in Fillet Hardhead Catfish Tissue by FCA, Lipid Normalized**

| | FCA1 | | | | FCA2 | | | | FCA3 | | | | Background | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] |
| PCB205 | 10/10 | 752 | 9,870 | 4,520 | 9/10 | 1,590 | 5,600 | 3,470 | 8/10 | 1,930 | 5,460 | 3,370 | 8/10 | 1,060 | 8,720 | 2,540 |
| PCB206 | 10/10 | 7,950 | 113,000 | 49,700 | 10/10 | 17,900 | 60,300 | 39,600 | 10/10 | 19,400 | 116,000 | 44,400 | 10/10 | 12,200 | 99,900 | 34,300 |
| PCB207 | 10/10 | 4,150 | 51,600 | 26,100 | 10/10 | 9,080 | 31,600 | 20,400 | 10/10 | 9,930 | 76,900 | 24,000 | 10/10 | 6,130 | 38,500 | 15,100 |
| PCB208 | 10/10 | 5,430 | 72,300 | 35,700 | 10/10 | 12,000 | 41,300 | 25,600 | 10/10 | 11,800 | 83,200 | 30,400 | 10/10 | 10,700 | 63,400 | 25,300 |
| PCB209 | 10/10 | 88,000 | 1,200,000 | 555,000 | 10/10 | 194,000 | 693,000 | 442,000 | 10/10 | 178,000 | 1,470,000 | 488,000 | 10/10 | 95,100 | 574,000 | 216,000 |
| **Polychlorinated Biphenyls (µg/kg - lw)** | | | | | | | | | | | | | | | | |
| Total PCBs [c] | 10/10 | 2,360 | 22,600 | 11,400 | 10/10 | 4,200 | 14,500 | 9,020 | 10/10 | 3,800 | 27,300 | 9,540 | 10/10 | 1,770 | 11,100 | 4,470 |

**Notes**

-- = not applicable, no detected values
FCA = fish collection area
lw = lipid weight
PCB = polychlorinated biphenyl

a - Mean calculation includes detected and non-detected values. Non-detected values were set at one-half the detection limit.
b - PCB###+#### indicates a co-elution of two or more PCB congeners.
c - Total polychlorinated biphenyls were calculated as the sum of all 209 congeners with non-detects set at one-half the detection limit.

**Table C-23**

**Summary Statistics for Dioxins and Furans in Whole Hardhead Catfish Tissue by FCA, Lipid Normalized**

| | FCA1 | | | | FCA2 | | | | FCA3 | | | | Background | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] |
| Catfish - Whole | | | | | | | | | | | | | | | | |
| **Dioxins/Furans (ng/kg - lw)** | | | | | | | | | | | | | | | | |
| 2,3,7,8-TCDD | 3/3 | 243 | 338 | 295 | 4/4 | 167 | 294 | 234 | 3/3 | 206 | 313 | 255 | 8/8 | 15.9 | 46.1 | 27.9 |
| 1,2,3,7,8-PeCDD | 1/3 | 14.1 | 14.1 | 8.26 | 4/4 | 5.87 | 12.9 | 8.48 | 3/3 | 7.61 | 26.5 | 16.6 | 7/8 | 5.13 | 13.9 | 7.96 |
| 1,2,3,4,7,8-HxCDD | 3/3 | 4.40 | 6.00 | 5.16 | 4/4 | 2.02 | 7.17 | 3.64 | 3/3 | 3.02 | 24.7 | 13.1 | 6/8 | 3.14 | 6.70 | 3.72 |
| 1,2,3,6,7,8-HxCDD | 3/3 | 23.7 | 37.7 | 31.2 | 3/4 | 6.78 | 38.8 | 17.9 | 3/3 | 17.8 | 141 | 73.7 | 8/8 | 11.4 | 32.1 | 17.4 |
| 1,2,3,7,8,9-HxCDD | 3/3 | 6.35 | 9.27 | 8.30 | 3/4 | 4.60 | 9.74 | 5.08 | 3/3 | 4.75 | 45.9 | 24.3 | 8/8 | 3.71 | 8.75 | 5.42 |
| 1,2,3,4,6,7,8-HpCDD | 3/3 | 38.3 | 43.9 | 42.0 | 4/4 | 22.1 | 46.0 | 31.2 | 3/3 | 30.3 | 288 | 140 | 8/8 | 31.0 | 50.3 | 37.2 |
| OCDD | 3/3 | 83.8 | 118 | 103 | 4/4 | 54.5 | 88.6 | 72.6 | 3/3 | 98.7 | 373 | 205 | 8/8 | 76.5 | 134 | 108 |
| 2,3,7,8-TCDF | 3/3 | 29.9 | 38.8 | 33.2 | 4/4 | 37.8 | 55.0 | 45.8 | 3/3 | 24.7 | 49.4 | 40.1 | 6/8 | 7.15 | 9.93 | 7.39 |
| 1,2,3,7,8-PeCDF | 1/3 | 1.79 | 1.79 | 1.07 | 2/4 | 1.31 | 1.58 | 1.06 | 2/3 | 1.37 | 2.99 | 2.03 | 0/8 | -- | -- | 0.659 |
| 2,3,4,7,8-PeCDF | 3/3 | 17.6 | 20.2 | 19.3 | 4/4 | 11.1 | 19.2 | 14.2 | 3/3 | 8.36 | 32.4 | 22.2 | 5/8 | 3.23 | 6.98 | 3.65 |
| 1,2,3,4,7,8-HxCDF | 2/3 | 0.904 | 1.29 | 0.799 | 2/4 | 0.750 | 1.48 | 0.685 | 1/3 | 2.52 | 2.52 | 1.32 | 1/8 | 0.810 | 0.810 | 0.429 |
| 1,2,3,6,7,8-HxCDF | 0/3 | -- | -- | 0.195 | 1/4 | 0.614 | 0.614 | 0.337 | 2/3 | 1.27 | 1.62 | 1.04 | 2/8 | 0.712 | 3.36 | 0.741 |
| 1,2,3,7,8,9-HxCDF | 0/3 | -- | -- | 0.233 | 0/4 | -- | -- | 0.280 | 2/3 | 0.419 | 0.529 | 0.412 | 1/8 | 0.885 | 0.885 | 0.469 |
| 2,3,4,6,7,8-HxCDF | 0/3 | -- | -- | 0.238 | 1/4 | 0.593 | 0.593 | 0.346 | 1/3 | 1.90 | 1.90 | 0.939 | 1/8 | 1.08 | 1.08 | 0.453 |
| 1,2,3,4,6,7,8-HpCDF | 1/3 | 0.803 | 0.803 | 0.408 | 0/4 | -- | -- | 0.313 | 1/3 | 0.607 | 0.607 | 0.381 | 1/8 | 1.39 | 1.39 | 0.450 |
| 1,2,3,4,7,8,9-HpCDF | 0/3 | -- | -- | 0.297 | 0/4 | -- | -- | 0.435 | 0/3 | -- | -- | 0.314 | 0/8 | -- | -- | 0.396 |
| OCDF | 1/3 | 3.42 | 3.42 | 1.53 | 0/4 | -- | -- | 0.431 | 0/3 | -- | -- | 0.531 | 2/8 | 2.00 | 3.68 | 1.28 |
| $TEQ_{DF,M}$ | 3/3 | 264 | 367 | 318 | 4/4 | 183 | 316 | 255 | 3/3 | 222 | 378 | 296 | 8/8 | 24.2 | 68.5 | 41.0 |
| $TEQ_{DFP,M}$ | 3/3 | 359 | 540 | 440 | 4/4 | 246 | 462 | 343 | 3/3 | 332 | 489 | 389 | 8/8 | 37.7 | 159 | 94.6 |
| $TEQ_{P,M}$ | 3/3 | 94.5 | 174 | 123 | 4/4 | 44.8 | 146 | 88.0 | 3/3 | 58.9 | 111 | 93.3 | 8/8 | 11.8 | 92.3 | 53.6 |

**Notes**

-- = not applicable, no detected values

FCA = fish collection area

lw = lipid weight

$TEQ_{DF,M}$ = Toxicity equivalent for dioxins and furans calculated using mammalian toxicity equivalency factors with non-detects set at one-half the detection limit.

$TEQ_{DFP,M}$ = Toxicity equivalent for dioxins and furans and polychlorinated biphenyls calculated using mammalian toxicity equivalency factors with non-detects set at one-half the detection limit.

$TEQ_{P,M}$ = Toxicity equivalent for polychlorinated biphenyls calculated using mammalian toxicity equivalency factors with non-detects set at one-half the detection limit.

a - Mean calculation includes detected and non-detected values. Non-detected values were set at one-half the detection limit.

**Table C-24**
**Summary Statistics for Polychlorinated Biphenyl Congeners in Whole Hardhead Catfish Tissue by FCA, Lipid Normalized**

| | FCA1 | | | | FCA2 | | | | FCA3 | | | | Background | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] |
| Catfish - Whole | | | | | | | | | | | | | | | | |
| **Polychlorinated Biphenyl Congeners [b] (ng/kg - lw)** | | | | | | | | | | | | | | | | |
| PCB001 | 3/3 | 119 | 204 | 173 | 3/4 | 150 | 203 | 178 | 3/3 | 174 | 242 | 219 | 4/8 | 38.8 | 137 | 57.1 |
| PCB002 | 0/3 | -- | -- | 16.8 | 0/4 | -- | -- | 15.3 | 0/3 | -- | -- | 18.0 | 0/8 | -- | -- | 17.1 |
| PCB003 | 0/3 | -- | -- | 18.5 | 1/4 | 17.4 | 17.4 | 17.9 | 0/3 | -- | -- | 20.8 | 1/8 | 67.5 | 67.5 | 25.3 |
| PCB004 | 3/3 | 1,130 | 1,610 | 1,340 | 4/4 | 948 | 1,640 | 1240 | 2/3 | 585 | 1380 | 857 | 5/8 | 183 | 626 | 322 |
| PCB005 | 0/3 | -- | -- | 58.5 | 0/4 | -- | -- | 68.1 | 0/3 | -- | -- | 169 | 4/8 | 131 | 429 | 201 |
| PCB006 | 3/3 | 289 | 467 | 404 | 1/4 | 225 | 225 | 161 | 0/3 | -- | -- | 141 | 3/8 | 103 | 370 | 149 |
| PCB007 | 0/3 | -- | -- | 53.6 | 1/4 | 129 | 129 | 98.6 | 0/3 | -- | -- | 150 | 2/8 | 77.6 | 122 | 101 |
| PCB008 | 2/3 | 243 | 401 | 261 | 2/4 | 280 | 300 | 226 | 0/3 | -- | -- | 146 | 3/8 | 104 | 629 | 170 |
| PCB009 | 1/3 | 252 | 252 | 148 | 2/4 | 179 | 205 | 158 | 0/3 | -- | -- | 148 | 2/8 | 88.6 | 310 | 120 |
| PCB010 | 0/3 | -- | -- | 86.0 | 0/4 | -- | -- | 101 | 0/3 | -- | -- | 203 | 0/8 | -- | -- | 59.8 |
| PCB011 | 0/3 | -- | -- | 466 | 0/4 | -- | -- | 730 | 0/3 | -- | -- | 568 | 0/8 | -- | -- | 774 |
| PCB012+013 | 0/3 | -- | -- | 51.6 | 0/4 | -- | -- | 61.7 | 0/3 | -- | -- | 150 | 0/8 | -- | -- | 72.7 |
| PCB014 | 0/3 | -- | -- | 49.7 | 0/4 | -- | -- | 58.8 | 0/3 | -- | -- | 146 | 0/8 | -- | -- | 69.6 |
| PCB015 | 3/3 | 339 | 466 | 404 | 2/4 | 315 | 340 | 237 | 0/3 | -- | -- | 166 | 0/8 | -- | -- | 82.7 |
| PCB016 | 3/3 | 2,690 | 4,070 | 3,300 | 4/4 | 1,850 | 3,160 | 2,480 | 3/3 | 2,470 | 2,860 | 2,600 | 8/8 | 550 | 1,480 | 975 |
| PCB017 | 3/3 | 577 | 957 | 809 | 3/4 | 411 | 817 | 498 | 3/3 | 654 | 892 | 770 | 8/8 | 166 | 806 | 385 |
| PCB018+030 | 3/3 | 3,420 | 5,970 | 4,780 | 4/4 | 2,490 | 4,990 | 3,490 | 3/3 | 3,660 | 4,660 | 4,090 | 8/8 | 550 | 2,160 | 1,240 |
| PCB019 | 3/3 | 2,790 | 4,430 | 3,490 | 4/4 | 2,780 | 3,880 | 3,410 | 3/3 | 2,590 | 3,230 | 2,920 | 8/8 | 321 | 1,080 | 688 |
| PCB020+028 | 3/3 | 26,300 | 51,200 | 39,200 | 4/4 | 25,900 | 51,600 | 35,900 | 3/3 | 31,400 | 47,100 | 37,100 | 8/8 | 7,720 | 32,000 | 18,500 |
| PCB021+033 | 3/3 | 294 | 557 | 398 | 3/4 | 267 | 401 | 288 | 3/3 | 403 | 636 | 486 | 6/8 | 48.1 | 743 | 244 |
| PCB022 | 3/3 | 471 | 763 | 618 | 4/4 | 352 | 572 | 475 | 3/3 | 558 | 701 | 634 | 2/8 | 140 | 244 | 129 |
| PCB023 | 0/3 | -- | -- | 27.4 | 0/4 | -- | -- | 28.4 | 0/3 | -- | -- | 20.8 | 0/8 | -- | -- | 29.6 |
| PCB024 | 3/3 | 378 | 637 | 495 | 4/4 | 300 | 594 | 411 | 3/3 | 316 | 502 | 384 | 6/8 | 75.8 | 225 | 145 |
| PCB025 | 3/3 | 463 | 853 | 641 | 4/4 | 694 | 952 | 828 | 3/3 | 566 | 819 | 721 | 8/8 | 456 | 1,420 | 937 |
| PCB026+029 | 3/3 | 2,370 | 4,030 | 3,330 | 4/4 | 3,070 | 4,490 | 3,470 | 3/3 | 2,690 | 4,130 | 3,400 | 8/8 | 1,150 | 4,400 | 2,940 |
| PCB027 | 3/3 | 358 | 602 | 508 | 4/4 | 237 | 461 | 343 | 3/3 | 460 | 528 | 495 | 7/8 | 75.3 | 233 | 137 |
| PCB031 | 3/3 | 2,070 | 3,400 | 2,640 | 4/4 | 2,610 | 3,950 | 3,310 | 3/3 | 2,380 | 3,490 | 2,990 | 8/8 | 1,700 | 6,250 | 3,830 |
| PCB032 | 3/3 | 368 | 532 | 465 | 4/4 | 193 | 480 | 319 | 3/3 | 331 | 524 | 399 | 8/8 | 97.9 | 463 | 177 |
| PCB034 | 3/3 | 182 | 309 | 225 | 4/4 | 148 | 292 | 211 | 3/3 | 232 | 294 | 253 | 3/8 | 199 | 264 | 144 |
| PCB035 | 0/3 | -- | -- | 25.1 | 0/4 | -- | -- | 26.5 | 0/3 | -- | -- | 18.9 | 0/8 | -- | -- | 27.4 |
| PCB036 | 0/3 | -- | -- | 23.0 | 0/4 | -- | -- | 23.2 | 0/3 | -- | -- | 17.3 | 0/8 | -- | -- | 24.5 |
| PCB037 | 2/3 | 285 | 454 | 298 | 4/4 | 298 | 446 | 367 | 2/3 | 317 | 353 | 272 | 4/8 | 182 | 284 | 150 |
| PCB038 | 0/3 | -- | -- | 27.1 | 0/4 | -- | -- | 26.2 | 1/3 | 84.3 | 84.3 | 41.6 | 0/8 | -- | -- | 27.7 |
| PCB039 | 0/3 | -- | -- | 24.3 | 0/4 | -- | -- | 25.4 | 0/3 | -- | -- | 18.7 | 0/8 | -- | -- | 26.8 |
| PCB040+041+071 | 3/3 | 3,090 | 5,850 | 4,460 | 4/4 | 2,470 | 4,360 | 3,190 | 3/3 | 3,280 | 3,640 | 3,430 | 8/8 | 729 | 2,400 | 1,430 |
| PCB042 | 3/3 | 8,120 | 14,500 | 11,300 | 4/4 | 6,400 | 10,900 | 8,430 | 3/3 | 7,490 | 7,980 | 7,720 | 8/8 | 1,610 | 4,530 | 2,980 |
| PCB043+073 | 1/3 | 1,060 | 1,060 | 476 | 2/4 | 27.7 | 628 | 172 | 0/3 | -- | -- | 14.3 | 4/8 | 21.9 | 364 | 121 |
| PCB044+047+065 | 3/3 | 177,000 | 436,000 | 279,000 | 4/4 | 116,000 | 259,000 | 196,000 | 3/3 | 200,000 | 210,000 | 203,000 | 8/8 | 31,000 | 202,000 | 95,900 |
| PCB045+051 | 3/3 | 4,780 | 10,400 | 6,860 | 4/4 | 4,200 | 7,500 | 5,550 | 3/3 | 4,210 | 6,580 | 5,150 | 8/8 | 1,130 | 2,940 | 2,040 |

**Table C-24**
**Summary Statistics for Polychlorinated Biphenyl Congeners in Whole Hardhead Catfish Tissue by FCA, Lipid Normalized**

| | FCA1 | | | | FCA2 | | | | FCA3 | | | | Background | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] |
| PCB046 | 3/3 | 580 | 1,060 | 760 | 3/4 | 451 | 846 | 544 | 1/3 | 896 | 896 | 307 | 5/8 | 23.3 | 336 | 143 |
| PCB048 | 2/3 | 753 | 895 | 553 | 0/4 | -- | -- | 12.8 | 2/3 | 33.6 | 696 | 247 | 3/8 | 169 | 225 | 84.6 |
| PCB049+069 | 3/3 | 129,000 | 292,000 | 191,000 | 4/4 | 84,200 | 170,000 | 134,000 | 3/3 | 119,000 | 155,000 | 137,000 | 8/8 | 26,100 | 123,000 | 67,100 |
| PCB050+053 | 3/3 | 7,950 | 22,300 | 13,800 | 4/4 | 13,400 | 20,600 | 17,100 | 3/3 | 9,710 | 12,600 | 11,500 | 8/8 | 2,170 | 5,740 | 4,110 |
| PCB052 | 3/3 | 173,000 | 367,000 | 238,000 | 4/4 | 117,000 | 214,000 | 174,000 | 3/3 | 147,000 | 190,000 | 173,000 | 8/8 | 29,600 | 141,000 | 76,000 |
| PCB054 | 3/3 | 217 | 911 | 571 | 4/4 | 546 | 944 | 720 | 3/3 | 373 | 625 | 511 | 8/8 | 60.4 | 249 | 154 |
| PCB055 | 0/3 | -- | -- | 8.50 | 0/4 | -- | -- | 10.5 | 0/3 | -- | -- | 11.9 | 0/8 | -- | -- | 12.3 |
| PCB056 | 3/3 | 659 | 1,260 | 1,050 | 4/4 | 666 | 1030 | 876 | 3/3 | 910 | 1,390 | 1170 | 6/8 | 183 | 677 | 284 |
| PCB057 | 1/3 | 111 | 111 | 70.0 | 0/4 | -- | -- | 20.6 | 0/3 | -- | -- | 23.6 | 6/8 | 173 | 311 | 169 |
| PCB058 | 2/3 | 347 | 1,690 | 682 | 0/4 | -- | -- | 9.75 | 0/3 | -- | -- | 11.1 | 6/8 | 151 | 931 | 467 |
| PCB059+062+075 | 3/3 | 12,500 | 24,000 | 16,600 | 4/4 | 8,270 | 15,600 | 11,700 | 3/3 | 11,100 | 13,400 | 12,100 | 8/8 | 1,890 | 8,630 | 4,670 |
| PCB060 | 3/3 | 22,000 | 56,900 | 34,600 | 4/4 | 18,100 | 37,600 | 30,000 | 3/3 | 24,500 | 32,500 | 28,400 | 8/8 | 2,710 | 33,700 | 12,600 |
| PCB061+070+074+076 | 3/3 | 104,000 | 241,000 | 155,000 | 4/4 | 86,400 | 166,000 | 136,000 | 3/3 | 113,000 | 140,000 | 129,000 | 8/8 | 20,000 | 155,000 | 69,900 |
| PCB063 | 3/3 | 6,860 | 16,500 | 10,300 | 4/4 | 4,650 | 9,870 | 7,850 | 3/3 | 7,380 | 8,330 | 7,840 | 8/8 | 1,090 | 9,000 | 3,980 |
| PCB064 | 3/3 | 23,400 | 47,400 | 34,500 | 4/4 | 21,100 | 30,800 | 25,600 | 3/3 | 23,200 | 32,400 | 27,200 | 8/8 | 4,010 | 11,600 | 7,990 |
| PCB066 | 3/3 | 162,000 | 406,000 | 254,000 | 4/4 | 117,000 | 256,000 | 202,000 | 3/3 | 184,000 | 214,000 | 201,000 | 8/8 | 26,500 | 232,000 | 98,400 |
| PCB067 | 2/3 | 355 | 682 | 348 | 0/4 | -- | -- | 8.64 | 0/3 | -- | -- | 9.80 | 8/8 | 212 | 685 | 462 |
| PCB068 | 3/3 | 109 | 7,070 | 3,850 | 4/4 | 2,770 | 4,910 | 3,900 | 3/3 | 3,180 | 4,310 | 3,660 | 8/8 | 110 | 7,290 | 2,820 |
| PCB072 | 3/3 | 2,070 | 4,710 | 3,130 | 4/4 | 2,240 | 3,190 | 2,740 | 3/3 | 2,180 | 2,720 | 2,420 | 8/8 | 708 | 4,170 | 2,050 |
| PCB077 | 3/3 | 525 | 737 | 630 | 4/4 | 713 | 976 | 851 | 3/3 | 277 | 800 | 574 | 8/8 | 376 | 1,010 | 695 |
| PCB078 | 0/3 | -- | -- | 35.8 | 0/4 | -- | -- | 51.5 | 0/3 | -- | -- | 45.5 | 0/8 | -- | -- | 31.3 |
| PCB079 | 3/3 | 331 | 1,020 | 744 | 4/4 | 190 | 888 | 582 | 3/3 | 530 | 786 | 620 | 8/8 | 148 | 764 | 402 |
| PCB080 | 0/3 | -- | -- | 31.9 | 0/4 | -- | -- | 48.2 | 0/3 | -- | -- | 40.7 | 0/8 | -- | -- | 27.3 |
| PCB081 | 2/3 | 58.6 | 275 | 129 | 2/4 | 202 | 219 | 148 | 2/3 | 150 | 184 | 139 | 2/8 | 111 | 325 | 97.9 |
| PCB082 | 2/3 | 922 | 2,140 | 1,070 | 4/4 | 1,020 | 1,980 | 1,450 | 2/3 | 1,370 | 1,400 | 1,010 | 2/8 | 383 | 492 | 230 |
| PCB083+099 | 3/3 | 449,000 | 897,000 | 614,000 | 4/4 | 301,000 | 816,000 | 563,000 | 3/3 | 389,000 | 571,000 | 475,000 | 8/8 | 87,200 | 1,100,000 | 415,000 |
| PCB084 | 3/3 | 4,710 | 11,300 | 7,410 | 4/4 | 6,320 | 12,200 | 8,360 | 3/3 | 4,340 | 6,890 | 5,700 | 8/8 | 2,120 | 5,520 | 3,940 |
| PCB085+116 | 3/3 | 66,700 | 164,000 | 102,000 | 4/4 | 39,000 | 121,000 | 81,900 | 3/3 | 76,100 | 95,800 | 89,100 | 8/8 | 9,220 | 109,000 | 42,100 |
| PCB086+087+097+109+119 +125 | 3/3 | 87,900 | 164,000 | 116,000 | 4/4 | 56,800 | 130,000 | 90,200 | 3/3 | 78,900 | 93,700 | 87,300 | 8/8 | 17,100 | 79,600 | 43,700 |
| PCB088+091 | 3/3 | 26,200 | 55,100 | 36,000 | 4/4 | 21,700 | 38,300 | 31,200 | 3/3 | 20,900 | 34,500 | 25,600 | 8/8 | 9,150 | 32,200 | 20,400 |
| PCB089 | 0/3 | -- | -- | 21.6 | 0/4 | -- | -- | 20.1 | 0/3 | -- | -- | 19.1 | 0/8 | -- | -- | 17.2 |
| PCB090+101+113 | 3/3 | 329,000 | 517,000 | 395,000 | 4/4 | 193,000 | 491,000 | 358,000 | 3/3 | 280,000 | 359,000 | 316,000 | 8/8 | 59,200 | 384,000 | 191,000 |
| PCB092 | 3/3 | 33,500 | 78,800 | 51,600 | 4/4 | 31,600 | 50,400 | 42,700 | 3/3 | 33,100 | 50,400 | 41,200 | 8/8 | 8,890 | 49,500 | 25,900 |
| PCB093+100 | 3/3 | 15,200 | 36,000 | 22,800 | 4/4 | 8,610 | 27,000 | 18,400 | 3/3 | 17,700 | 19,900 | 18,700 | 8/8 | 3220 | 29,000 | 12,500 |
| PCB094 | 3/3 | 621 | 1,260 | 881 | 4/4 | 532 | 1,110 | 827 | 3/3 | 627 | 792 | 689 | 7/8 | 105 | 609 | 411 |
| PCB095 | 3/3 | 38,900 | 104,000 | 65,800 | 4/4 | 47,100 | 80,500 | 63,300 | 3/3 | 46,100 | 53,700 | 49,100 | 8/8 | 15,900 | 44,300 | 30,200 |
| PCB096 | 3/3 | 204 | 503 | 338 | 4/4 | 294 | 534 | 393 | 3/3 | 61.0 | 311 | 203 | 6/8 | 89.0 | 221 | 139 |
| PCB098+102 | 3/3 | 1,470 | 3,490 | 2,360 | 4/4 | 1,430 | 2,670 | 2,090 | 3/3 | 1,580 | 1,840 | 1,730 | 7/8 | 284 | 1,360 | 780 |
| PCB103 | 3/3 | 5,630 | 12,800 | 8,360 | 4/4 | 3,910 | 8,570 | 6,680 | 3/3 | 4,880 | 7,710 | 5,860 | 8/8 | 1,800 | 7,970 | 4,700 |
| PCB104 | 3/3 | 46.5 | 177 | 106 | 3/4 | 60.8 | 151 | 95.2 | 1/3 | 41.2 | 41.2 | 38.6 | 2/8 | 36.6 | 38.9 | 23.4 |

**Table C-24**
**Summary Statistics for Polychlorinated Biphenyl Congeners in Whole Hardhead Catfish Tissue by FCA, Lipid Normalized**

| | FCA1 | | | | FCA2 | | | | FCA3 | | | | Background | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] |
| PCB105 | 3/3 | 127,000 | 331,000 | 198,000 | 4/4 | 87,500 | 227,000 | 165,000 | 3/3 | 149,000 | 182,000 | 169,000 | 8/8 | 15,900 | 227,000 | 81,300 |
| PCB106 | 0/3 | -- | -- | 78.1 | 0/4 | -- | -- | 78.5 | 0/3 | -- | -- | 70.8 | 0/8 | -- | -- | 69.3 |
| PCB107 | 3/3 | 31,700 | 65,300 | 44,100 | 4/4 | 23,500 | 43,200 | 35,500 | 3/3 | 36,300 | 46,200 | 40,500 | 8/8 | 6740 | 70,700 | 28,400 |
| PCB108+124 | 3/3 | 1,710 | 2,590 | 2,010 | 4/4 | 2,250 | 3,300 | 2,780 | 3/3 | 1,820 | 2,310 | 2,130 | 8/8 | 865 | 3,860 | 2,150 |
| PCB110+115 | 3/3 | 69,500 | 161,000 | 114,000 | 4/4 | 75,200 | 123,000 | 94,100 | 3/3 | 74,700 | 128,000 | 98,600 | 8/8 | 14,400 | 57,400 | 33,800 |
| PCB111 | 3/3 | 990 | 2,110 | 1,370 | 4/4 | 764 | 1,430 | 1,240 | 3/3 | 848 | 1,170 | 999 | 8/8 | 205 | 2,590 | 1,000 |
| PCB112 | 0/3 | -- | -- | 148 | 0/4 | -- | -- | 97.3 | 0/3 | -- | -- | 144 | 0/8 | -- | -- | 67.0 |
| PCB114 | 3/3 | 7,770 | 21,700 | 12,900 | 4/4 | 5,650 | 13,400 | 9,880 | 3/3 | 9,630 | 11,300 | 10,500 | 8/8 | 1,060 | 14,300 | 5,320 |
| PCB117 | 3/3 | 4,720 | 6,830 | 5,850 | 4/4 | 2,880 | 6,050 | 4,340 | 3/3 | 2,850 | 10,800 | 6,410 | 8/8 | 1,130 | 6,610 | 3,180 |
| PCB118 | 3/3 | 402,000 | 821,000 | 545,000 | 4/4 | 295,000 | 715,000 | 501,000 | 3/3 | 325,000 | 513,000 | 408,000 | 8/8 | 67,900 | 871,000 | 329,000 |
| PCB120 | 3/3 | 5,770 | 12,700 | 8,300 | 4/4 | 4,320 | 8,300 | 6,440 | 3/3 | 6,350 | 7,550 | 6,960 | 8/8 | 1,520 | 19,400 | 7,340 |
| PCB121 | 2/3 | 601 | 1,400 | 701 | 1/4 | 1,200 | 1,200 | 387 | 0/3 | -- | -- | 155 | 3/8 | 448 | 1,630 | 434 |
| PCB122 | 1/3 | 639 | 639 | 276 | 0/4 | -- | -- | 84.4 | 0/3 | -- | -- | 73.4 | 1/8 | 259 | 259 | 125 |
| PCB123 | 3/3 | 7,290 | 20,800 | 12,000 | 4/4 | 5,680 | 13,000 | 9,630 | 3/3 | 8,100 | 10,200 | 9420 | 8/8 | 890 | 12,800 | 4,650 |
| PCB126 | 3/3 | 700 | 1,300 | 910 | 3/4 | 465 | 1,120 | 616 | 2/3 | 706 | 880 | 658 | 6/8 | 74.3 | 473 | 325 |
| PCB127 | 0/3 | -- | -- | 140 | 2/4 | 522 | 524 | 314 | 3/3 | 360 | 987 | 654 | 3/8 | 297 | 702 | 220 |
| PCB128+166 | 3/3 | 82,000 | 203,000 | 126,000 | 4/4 | 59,600 | 154,000 | 106,000 | 3/3 | 93,400 | 141,000 | 115,000 | 8/8 | 14,200 | 198,000 | 73,300 |
| PCB129+138+163 | 3/3 | 661,000 | 1,080,000 | 809,000 | 4/4 | 482,000 | 1,310,000 | 819,000 | 3/3 | 495,000 | 758,000 | 649,000 | 8/8 | 104,000 | 1,620,000 | 586,000 |
| PCB130 | 3/3 | 11,500 | 26,800 | 17,900 | 4/4 | 11,200 | 17,600 | 14,600 | 3/3 | 10,400 | 16,600 | 13,900 | 8/8 | 4030 | 21,600 | 11,900 |
| PCB131 | 1/3 | 369 | 369 | 191 | 0/4 | -- | -- | 71.1 | 0/3 | -- | -- | 82.7 | 2/8 | 278 | 433 | 143 |
| PCB132 | 3/3 | 19,700 | 44,200 | 30,500 | 4/4 | 22,000 | 37,700 | 29,000 | 3/3 | 20,200 | 25,300 | 22,900 | 8/8 | 7,260 | 25,500 | 16,500 |
| PCB133 | 3/3 | 9,960 | 22,300 | 14,400 | 4/4 | 6,670 | 12,600 | 10,000 | 3/3 | 9,210 | 13,400 | 11,400 | 8/8 | 2,510 | 22,200 | 10,000 |
| PCB134 | 1/3 | 1,610 | 1,610 | 606 | 0/4 | -- | -- | 76.5 | 0/3 | -- | -- | 88.3 | 4/8 | 72.0 | 1,400 | 520 |
| PCB135+151 | 3/3 | 19,800 | 45,200 | 31,400 | 4/4 | 27,100 | 43,200 | 32,600 | 3/3 | 24,600 | 33,700 | 28,400 | 8/8 | 8,980 | 30,200 | 20,100 |
| PCB136 | 3/3 | 1,760 | 4,480 | 2,950 | 4/4 | 3,030 | 5,690 | 3,980 | 3/3 | 1,510 | 2,950 | 2,230 | 8/8 | 1,030 | 3,100 | 2,190 |
| PCB137 | 3/3 | 23,500 | 66,900 | 39,500 | 4/4 | 18,500 | 42,100 | 30,300 | 3/3 | 30,500 | 45,200 | 36,500 | 8/8 | 3,610 | 59,300 | 21,700 |
| PCB139+140 | 3/3 | 10,800 | 25,800 | 16,100 | 4/4 | 6,900 | 17,600 | 12,400 | 3/3 | 12,900 | 16,900 | 14,400 | 8/8 | 1,920 | 23,900 | 9,460 |
| PCB141 | 3/3 | 45,100 | 104,000 | 67,700 | 4/4 | 28,500 | 64,400 | 48,800 | 3/3 | 51,300 | 69,700 | 58,300 | 8/8 | 6,660 | 60,200 | 26,500 |
| PCB142 | 0/3 | -- | -- | 96.3 | 0/4 | -- | -- | 72.6 | 0/3 | -- | -- | 82.0 | 0/8 | -- | -- | 54.9 |
| PCB143 | 0/3 | -- | -- | 92.3 | 0/4 | -- | -- | 67.0 | 0/3 | -- | -- | 76.1 | 0/8 | -- | -- | 53.0 |
| PCB144 | 3/3 | 8,460 | 13,400 | 11,300 | 4/4 | 7,910 | 19,700 | 12,400 | 3/3 | 11,300 | 14,900 | 12,600 | 8/8 | 1,220 | 10,400 | 4,080 |
| PCB145 | 0/3 | -- | -- | 5.92 | 0/4 | -- | -- | 8.99 | 0/3 | -- | -- | 8.78 | 0/8 | -- | -- | 10.9 |
| PCB146 | 3/3 | 138,000 | 308,000 | 197,000 | 4/4 | 104,000 | 223,000 | 161,000 | 3/3 | 158,000 | 207,000 | 177,000 | 8/8 | 29,200 | 382,000 | 146,000 |
| PCB147+149 | 3/3 | 145,000 | 318,000 | 211,000 | 4/4 | 118,000 | 221,000 | 177,000 | 3/3 | 140,000 | 189,000 | 170,000 | 8/8 | 42,000 | 240,000 | 127,000 |
| PCB148 | 3/3 | 2,540 | 6,060 | 3,720 | 4/4 | 1,800 | 4,080 | 3,010 | 3/3 | 2,830 | 3,280 | 3,060 | 8/8 | 725 | 7,680 | 3,180 |
| PCB150 | 3/3 | 397 | 640 | 492 | 4/4 | 470 | 682 | 544 | 3/3 | 225 | 649 | 401 | 8/8 | 294 | 986 | 628 |
| PCB152 | 3/3 | 20.6 | 219 | 114 | 3/4 | 84.9 | 157 | 105 | 1/3 | 34.8 | 34.8 | 38.3 | 5/8 | 27.8 | 117 | 40.7 |
| PCB153+168 | 3/3 | 880,000 | 1,550,000 | 1,110,000 | 4/4 | 673,000 | 1,850,000 | 1,130,000 | 3/3 | 664,000 | 1,080,000 | 884,000 | 8/8 | 153,000 | 3,020,000 | 987,000 |
| PCB154 | 3/3 | 28,600 | 60,500 | 42,200 | 4/4 | 24,900 | 59,000 | 39,300 | 3/3 | 39,300 | 50,700 | 45,500 | 8/8 | 7040 | 86,800 | 37,000 |
| PCB155 | 3/3 | 1,660 | 4,080 | 2,670 | 4/4 | 1,210 | 2,530 | 1,840 | 3/3 | 1,700 | 2,670 | 2,190 | 8/8 | 353 | 4,750 | 1,680 |
| PCB156+157 | 3/3 | 54,500 | 146,000 | 88,800 | 4/4 | 44,100 | 97,000 | 71,300 | 3/3 | 69,600 | 96,500 | 80,800 | 8/8 | 9450 | 141,000 | 50,500 |

**Table C-24**
**Summary Statistics for Polychlorinated Biphenyl Congeners in Whole Hardhead Catfish Tissue by FCA, Lipid Normalized**

| | FCA1 | | | | FCA2 | | | | FCA3 | | | | Background | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] |
| PCB158 | 3/3 | 45,000 | 119,000 | 72,100 | 4/4 | 35,500 | 76,200 | 56,000 | 3/3 | 53,900 | 82,300 | 65,400 | 8/8 | 6410 | 98,900 | 36,300 |
| PCB159 | 3/3 | 1,190 | 2,280 | 1,610 | 4/4 | 530 | 1,650 | 1,120 | 3/3 | 1,260 | 1,830 | 1,500 | 8/8 | 111 | 2,340 | 933 |
| PCB160 | 0/3 | -- | -- | 72.1 | 0/4 | -- | -- | 54.6 | 0/3 | -- | -- | 58.4 | 0/8 | -- | -- | 43.1 |
| PCB161 | 0/3 | -- | -- | 69.0 | 0/4 | -- | -- | 50.2 | 0/3 | -- | -- | 56.3 | 0/8 | -- | -- | 39.5 |
| PCB162 | 3/3 | 3,200 | 8,670 | 5220 | 4/4 | 2,820 | 5,380 | 4,090 | 3/3 | 3,920 | 5,170 | 4,380 | 8/8 | 780 | 12,000 | 4,220 |
| PCB164 | 3/3 | 16,200 | 32,700 | 22,700 | 4/4 | 12,000 | 22,700 | 18,200 | 3/3 | 16,000 | 26,700 | 20,100 | 8/8 | 2,690 | 20,500 | 9,620 |
| PCB165 | 2/3 | 560 | 1,170 | 592 | 0/4 | -- | -- | 56.4 | 0/3 | -- | -- | 64.3 | 3/8 | 524 | 1,200 | 312 |
| PCB167 | 3/3 | 20,600 | 49,800 | 31,100 | 4/4 | 15,000 | 34,300 | 24,800 | 3/3 | 23,700 | 28,900 | 25,900 | 8/8 | 4270 | 39,800 | 17,500 |
| PCB169 | 1/3 | 357 | 357 | 158 | 0/4 | -- | -- | 90.5 | 1/3 | 538 | 538 | 204 | 1/8 | 703 | 703 | 205 |
| PCB170 | 3/3 | 129,000 | 316,000 | 196,000 | 4/4 | 101,000 | 214,000 | 150,000 | 3/3 | 160,000 | 230,000 | 188,000 | 8/8 | 26,400 | 512,000 | 156,000 |
| PCB171+173 | 3/3 | 40,500 | 104,000 | 64,400 | 4/4 | 33,900 | 70,500 | 51,300 | 3/3 | 51,000 | 69,800 | 58,600 | 8/8 | 7660 | 146,000 | 46,300 |
| PCB172 | 3/3 | 26,100 | 62,900 | 39,900 | 4/4 | 20,300 | 38,900 | 28,200 | 3/3 | 32,200 | 44,700 | 36,400 | 8/8 | 6230 | 108,000 | 34,800 |
| PCB174 | 3/3 | 26,300 | 57,700 | 40,700 | 4/4 | 25,400 | 37,600 | 33,700 | 3/3 | 30,300 | 42,900 | 36,000 | 8/8 | 6840 | 46,900 | 21,300 |
| PCB175 | 3/3 | 5,020 | 10,900 | 7,100 | 4/4 | 3,620 | 7,640 | 5,410 | 3/3 | 5,170 | 6,300 | 5,820 | 8/8 | 1,110 | 13,900 | 5,310 |
| PCB176 | 3/3 | 1,190 | 2,050 | 1,500 | 4/4 | 1,150 | 2,310 | 1,640 | 2/3 | 391 | 1,380 | 675 | 8/8 | 672 | 1,800 | 1,340 |
| PCB177 | 3/3 | 8,160 | 18,300 | 13,800 | 4/4 | 11,200 | 15,200 | 13,200 | 3/3 | 9,730 | 14,500 | 11,900 | 8/8 | 5,520 | 20,100 | 12,100 |
| PCB178 | 3/3 | 18,900 | 41,300 | 28,100 | 4/4 | 17,900 | 28,400 | 23,000 | 3/3 | 17,600 | 24,900 | 21,900 | 8/8 | 6,490 | 49,500 | 23,100 |
| PCB179 | 3/3 | 2,740 | 7,140 | 4,670 | 4/4 | 4,850 | 7,680 | 5,710 | 3/3 | 2,980 | 4,340 | 3,650 | 8/8 | 1,970 | 6,440 | 4,120 |
| PCB180+193 | 3/3 | 288,000 | 700,000 | 440,000 | 4/4 | 261,000 | 500,000 | 350,000 | 3/3 | 233,000 | 403,000 | 326,000 | 8/8 | 66,000 | 1,070,000 | 376,000 |
| PCB181 | 3/3 | 1,360 | 3,550 | 2,130 | 4/4 | 1,120 | 2,020 | 1,550 | 3/3 | 1,710 | 2,800 | 2,150 | 7/8 | 274 | 4,870 | 1,490 |
| PCB182 | 3/3 | 1,170 | 3,500 | 2,080 | 4/4 | 1,280 | 2,250 | 1,740 | 3/3 | 1,650 | 2,350 | 1,930 | 7/8 | 338 | 5,060 | 1,620 |
| PCB183 | 3/3 | 88,000 | 248,000 | 150,000 | 4/4 | 94,300 | 165,000 | 125,000 | 3/3 | 114,000 | 149,000 | 126,000 | 8/8 | 17,700 | 408,000 | 122,000 |
| PCB184 | 3/3 | 1,010 | 2,630 | 1,580 | 4/4 | 745 | 1,450 | 1,110 | 3/3 | 1,190 | 1,580 | 1,380 | 8/8 | 213 | 3,230 | 1,170 |
| PCB185 | 3/3 | 243 | 11,500 | 5,690 | 4/4 | 4,740 | 11,600 | 6,770 | 3/3 | 7,490 | 9,240 | 8,420 | 7/8 | 1,130 | 7,980 | 2,940 |
| PCB186 | 0/3 | -- | -- | 11.0 | 0/4 | -- | -- | 12.0 | 0/3 | -- | -- | 11.7 | 0/8 | -- | -- | 13.7 |
| PCB187 | 3/3 | 209,000 | 467,000 | 311,000 | 4/4 | 176,000 | 352,000 | 258,000 | 3/3 | 236,000 | 320,000 | 270,000 | 8/8 | 54,200 | 635,000 | 247,000 |
| PCB188 | 3/3 | 1,530 | 3,360 | 2,140 | 4/4 | 1,240 | 2,080 | 1,590 | 3/3 | 1,450 | 2,010 | 1,700 | 8/8 | 531 | 6,440 | 2,380 |
| PCB189 | 3/3 | 4,330 | 12,000 | 7,200 | 4/4 | 3,510 | 6,890 | 5,080 | 3/3 | 5,900 | 8,610 | 6,810 | 8/8 | 1,180 | 19,100 | 6,150 |
| PCB190 | 3/3 | 25,000 | 64,900 | 39,800 | 4/4 | 22,300 | 43,700 | 31,000 | 3/3 | 31,400 | 47,200 | 38,300 | 8/8 | 4,950 | 100,000 | 30,300 |
| PCB191 | 3/3 | 5,490 | 14,100 | 8,820 | 4/4 | 4,600 | 9,040 | 6,710 | 3/3 | 6,940 | 10,600 | 8,530 | 8/8 | 1,100 | 20,000 | 6,320 |
| PCB192 | 0/3 | -- | -- | 59.8 | 0/4 | -- | -- | 66.2 | 0/3 | -- | -- | 56.9 | 0/8 | -- | -- | 51.3 |
| PCB194 | 3/3 | 48,800 | 131,000 | 76,600 | 4/4 | 33,100 | 74,200 | 49,600 | 3/3 | 64,100 | 89,700 | 74,100 | 8/8 | 17,000 | 242,000 | 79,200 |
| PCB195 | 3/3 | 21,700 | 60,600 | 36,500 | 4/4 | 17,900 | 41,500 | 28,000 | 3/3 | 31,300 | 42,000 | 35,400 | 8/8 | 5,810 | 84,000 | 29,700 |
| PCB196 | 3/3 | 32,300 | 88,300 | 53,800 | 4/4 | 27,400 | 57,400 | 41,800 | 3/3 | 48,100 | 64,900 | 53,900 | 8/8 | 8,580 | 125,000 | 44,000 |
| PCB197 | 3/3 | 6,390 | 17,900 | 10,700 | 4/4 | 6,000 | 10,900 | 8,510 | 3/3 | 8,670 | 11,200 | 9,590 | 8/8 | 1,550 | 23,700 | 8,330 |
| PCB198+199 | 3/3 | 58,600 | 152,000 | 96,200 | 4/4 | 50,400 | 91,800 | 72,900 | 3/3 | 79,000 | 115,000 | 92,100 | 8/8 | 18,800 | 200,000 | 78,500 |
| PCB200 | 3/3 | 711 | 1,550 | 1,060 | 4/4 | 893 | 1,250 | 1,080 | 3/3 | 734 | 1,240 | 926 | 8/8 | 389 | 1620 | 825 |
| PCB201 | 3/3 | 7,670 | 18,000 | 11,500 | 4/4 | 5,810 | 10,000 | 7,810 | 3/3 | 7,820 | 10,400 | 9,280 | 8/8 | 2,790 | 26,900 | 11,100 |
| PCB202 | 3/3 | 8,570 | 21,700 | 13,700 | 4/4 | 8,640 | 13,700 | 11,000 | 3/3 | 8,950 | 12,900 | 10,700 | 8/8 | 4,210 | 27,400 | 13,300 |
| PCB203 | 3/3 | 52,000 | 141,000 | 86,100 | 4/4 | 47,700 | 96,000 | 69,500 | 3/3 | 77,500 | 99,500 | 85,300 | 8/8 | 14,000 | 212,000 | 74,700 |
| PCB204 | 3/3 | 452 | 1,360 | 782 | 4/4 | 377 | 760 | 546 | 3/3 | 702 | 953 | 786 | 8/8 | 88.9 | 1,300 | 432 |

**Table C-24**
**Summary Statistics for Polychlorinated Biphenyl Congeners in Whole Hardhead Catfish Tissue by FCA, Lipid Normalized**

| | FCA1 | | | | FCA2 | | | | FCA3 | | | | Background | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] |
| PCB205 | 3/3 | 2,490 | 7,190 | 4,280 | 4/4 | 2,450 | 4,710 | 3,340 | 3/3 | 3,640 | 4,580 | 4,040 | 8/8 | 860 | 13,000 | 4,210 |
| PCB206 | 3/3 | 26,200 | 72,800 | 43,300 | 4/4 | 27,900 | 43,000 | 33,400 | 3/3 | 37,400 | 44,600 | 42,100 | 8/8 | 10,200 | 138,000 | 49,000 |
| PCB207 | 3/3 | 14,700 | 37,800 | 22,600 | 4/4 | 12,000 | 21,900 | 17,600 | 3/3 | 21,000 | 25,800 | 23,400 | 8/8 | 4,530 | 45,600 | 19,800 |
| PCB208 | 3/3 | 22,900 | 56,100 | 34,100 | 4/4 | 16,400 | 27,000 | 22,600 | 3/3 | 25,800 | 36,400 | 31,100 | 8/8 | 8,920 | 88,000 | 35,800 |
| PCB209 | 3/3 | 305,000 | 679,000 | 433,000 | 4/4 | 273,000 | 458,000 | 367,000 | 3/3 | 268,000 | 519,000 | 377,000 | 8/8 | 72,000 | 772,000 | 302,000 |
| **Polychlorinated Biphenyls (µg/kg - lw)** | | | | | | | | | | | | | | | | |
| Total PCBs [c] | 3/3 | 6,380 | 14,700 | 9,300 | 4/4 | 4,780 | 9,930 | 7,400 | 3/3 | 7,370 | 9,060 | 8,050 | 8/8 | 1,290 | 14,600 | 5,620 |

**Notes**

-- = not applicable, no detected values
FCA = fish collection area
lw = lipid weight
PCB = polychlorinated biphenyl

a - Mean calculation includes detected and non-detected values. Non-detected values were set at one-half the detection limit.
b - PCB###+#### indicates a co-elution of two or more PCB congeners.
c - Total polychlorinated biphenyls were calculated as the sum of all 209 congeners with non-detects set at one-half the detection limit.

**Table C-25**
**Summary Statistics for Dioxins and Furans in Edible Clam Tissue by FCA, Lipid Normalized**

| | FCA1 | | | | FCA2 | | | | FCA3 | | | | Background | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] |
| Clam - Edible | | | | | | | | | | | | | | | | |
| **Dioxins/Furans (ng/kg - lw)** | | | | | | | | | | | | | | | | |
| 2,3,7,8-TCDD | 4/5 | 23 | 615 | 297 | 13/15 | 15.3 | 17,000 | 3,100 | 3/5 | 14.3 | 38.1 | 69.4 | 1/10 | 58.8 | 58.8 | 9.47 |
| 1,2,3,7,8-PeCDD | 0/5 | -- | -- | 9.55 | 0/15 | -- | -- | 19.2 | 0/5 | -- | -- | 19.1 | 0/10 | -- | -- | 1.52 |
| 1,2,3,4,7,8-HxCDD | 0/5 | -- | -- | 8.3 | 0/15 | -- | -- | 23.7 | 0/5 | -- | -- | 15.5 | 0/10 | -- | -- | 1.23 |
| 1,2,3,6,7,8-HxCDD | 0/5 | -- | -- | 10.3 | 1/15 | 5.64 | 5.64 | 28.9 | 0/5 | -- | -- | 20 | 0/10 | -- | -- | 1.63 |
| 1,2,3,7,8,9-HxCDD | 0/5 | -- | -- | 9.04 | 1/15 | 3.63 | 3.63 | 25.5 | 0/5 | -- | -- | 16.5 | 0/10 | -- | -- | 1.35 |
| 1,2,3,4,6,7,8-HpCDD | 3/5 | 18 | 382 | 169 | 8/15 | 30.5 | 1,200 | 190 | 3/5 | 18.2 | 128 | 77.2 | 6/10 | 7.24 | 67.1 | 15.6 |
| OCDD | 5/5 | 129 | 3,090 | 1,680 | 13/15 | 218 | 4,960 | 1,540 | 5/5 | 92.8 | 2,870 | 929 | 10/10 | 58.8 | 624 | 178 |
| 2,3,7,8-TCDF | 4/5 | 92.6 | 1,990 | 1,100 | 15/15 | 63.3 | 96,600 | 17,100 | 5/5 | 59.1 | 2,240 | 662 | 9/10 | 7.71 | 219 | 52.8 |
| 1,2,3,7,8-PeCDF | 0/5 | -- | -- | 10.3 | 2/15 | 2.78 | 935 | 111 | 0/5 | -- | -- | 16.9 | 0/10 | -- | -- | 1.35 |
| 2,3,4,7,8-PeCDF | 0/5 | -- | -- | 11.3 | 3/15 | 85 | 823 | 127 | 0/5 | -- | -- | 16.3 | 0/10 | -- | -- | 1.35 |
| 1,2,3,4,7,8-HxCDF | 0/5 | -- | -- | 9.57 | 2/15 | 10.5 | 66 | 49.9 | 0/5 | -- | -- | 18.4 | 0/10 | -- | -- | 1.09 |
| 1,2,3,6,7,8-HxCDF | 0/5 | -- | -- | 9.23 | 2/15 | 5.36 | 19.3 | 16.8 | 0/5 | -- | -- | 17.5 | 0/10 | -- | -- | 1.04 |
| 1,2,3,7,8,9-HxCDF | 0/5 | -- | -- | 15 | 0/15 | -- | -- | 20.6 | 0/5 | -- | -- | 23.8 | 0/10 | -- | -- | 1.5 |
| 2,3,4,6,7,8-HxCDF | 0/5 | -- | -- | 10.8 | 1/15 | 4.74 | 4.74 | 15.1 | 0/5 | -- | -- | 20.2 | 0/10 | -- | -- | 1.21 |
| 1,2,3,4,6,7,8-HpCDF | 0/5 | -- | -- | 11.1 | 1/15 | 79.1 | 79.1 | 22.1 | 0/5 | -- | -- | 16.6 | 0/10 | -- | -- | 1.22 |
| 1,2,3,4,7,8,9-HpCDF | 0/5 | -- | -- | 15.6 | 1/15 | 8.53 | 8.53 | 24.8 | 0/5 | -- | -- | 22.1 | 0/10 | -- | -- | 1.77 |
| OCDF | 0/5 | -- | -- | 16.3 | 1/15 | 352 | 352 | 51.2 | 0/5 | -- | -- | 49.2 | 0/10 | -- | -- | 2.83 |
| $TEQ_{DF,M}$ | 5/5 | 33.6 | 766 | 430 | 15/15 | 28.8 | 27,000 | 4,880 | 5/5 | 22.4 | 553 | 175 | 10/10 | 2.68 | 90.9 | 17.9 |
| $TEQ_{DFP,M}$ | 5/5 | 37.2 | 861 | 499 | 15/15 | 35.4 | 28,000 | 5,130 | 5/5 | 30.6 | 951 | 301 | 10/10 | 4.58 | 117 | 24.6 |
| $TEQ_{P,M}$ | 5/5 | 3.5 | 148 | 68.8 | 15/15 | 6.64 | 896 | 246 | 5/5 | 8.13 | 399 | 126 | 10/10 | 1.74 | 26 | 6.71 |

**Notes**

-- = not applicable, no detected values

FCA = fish collection area

lw = lipid weight

$TEQ_{DF,M}$ = Toxicity equivalent for dioxins and furans calculated using mammalian toxicity equivalency factors with non-detects set at one-half the detection limit.

$TEQ_{DFP,M}$ = Toxicity equivalent for dioxins and furans and polychlorinated biphenyls calculated using mammalian toxicity equivalency factors with non-detects set at one-half the detection limit.

$TEQ_{P,M}$ = Toxicity equivalent for polychlorinated biphenyls calculated using mammalian toxicity equivalency factors with non-detects set at one-half the detection limit.

a - Mean calculation includes detected and non-detected values. Non-detected values were set at one-half the detection limit.

**Table C-26**
**Summary Statistics for Polychlorinated Biphenyl Congeners in Edible Clam Tissue by FCA, Lipid Normalized**

| | FCA1 | | | | FCA2 | | | | FCA3 | | | | Background | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] |
| Clam - Edible | | | | | | | | | | | | | | | | |
| **Polychlorinated Biphenyl Congeners [b] (ng/kg - lw)** | | | | | | | | | | | | | | | | |
| PCB001 | 0/5 | -- | -- | 710 | 7/15 | 5,240 | 55,900 | 16,600 | 5/5 | 207 | 11,100 | 3,520 | 9/10 | 69.8 | 642 | 177 |
| PCB002 | 0/5 | -- | -- | 211 | 2/15 | 226 | 2,290 | 541 | 0/5 | -- | -- | 314 | 0/10 | -- | -- | 44.4 |
| PCB003 | 0/5 | -- | -- | 416 | 1/15 | 1,360 | 1,360 | 1,590 | 3/5 | 255 | 7,330 | 2,100 | 1/10 | 116 | 116 | 60.9 |
| PCB004 | 2/5 | 5,790 | 17,200 | 5,760 | 15/15 | 297 | 241,000 | 73,000 | 3/5 | 2,510 | 39,300 | 12,400 | 0/10 | -- | -- | 818 |
| PCB005 | 0/5 | -- | -- | 592 | 0/15 | -- | -- | 896 | 0/5 | -- | -- | 681 | 0/10 | -- | -- | 189 |
| PCB006 | 2/5 | 3,520 | 4,290 | 1,780 | 11/15 | 1,270 | 42,400 | 8,990 | 5/5 | 370 | 24,600 | 7,630 | 1/10 | 893 | 893 | 274 |
| PCB007 | 0/5 | -- | -- | 551 | 5/15 | 1,030 | 13,400 | 3,460 | 0/5 | -- | -- | 691 | 0/10 | -- | -- | 174 |
| PCB008 | 5/5 | 507 | 23,700 | 11,700 | 15/15 | 588 | 464,000 | 137,000 | 4/5 | 3,800 | 111,000 | 32,800 | 10/10 | 768 | 6,710 | 1,900 |
| PCB009 | 0/5 | -- | -- | 542 | 5/15 | 1,030 | 15,300 | 3,400 | 0/5 | -- | -- | 669 | 0/10 | -- | -- | 167 |
| PCB010 | 0/5 | -- | -- | 1,470 | 0/15 | -- | -- | 1,790 | 0/5 | -- | -- | 1,120 | 0/10 | -- | -- | 581 |
| PCB011 | 0/5 | -- | -- | 37,100 | 0/15 | -- | -- | 56,400 | 0/5 | -- | -- | 68,300 | 0/10 | -- | -- | 4,950 |
| PCB012+013 | 0/5 | -- | -- | 548 | 2/15 | 2,830 | 21,000 | 2,230 | 0/5 | -- | -- | 737 | 0/10 | -- | -- | 169 |
| PCB014 | 0/5 | -- | -- | 530 | 0/15 | -- | -- | 779 | 0/5 | -- | -- | 652 | 0/10 | -- | -- | 164 |
| PCB015 | 0/5 | -- | -- | 8,730 | 7/15 | 22,500 | 276,000 | 70,600 | 0/5 | -- | -- | 12,300 | 0/10 | -- | -- | 745 |
| PCB016 | 3/5 | 621 | 29,100 | 11,700 | 12/15 | 385 | 139,000 | 26,100 | 5/5 | 928 | 60,000 | 17,900 | 9/10 | 406 | 3,510 | 1,210 |
| PCB017 | 5/5 | 808 | 37,500 | 17,400 | 15/15 | 510 | 187,000 | 36,400 | 5/5 | 1,630 | 101,000 | 31,300 | 9/10 | 844 | 8,340 | 2,240 |
| PCB018+030 | 5/5 | 1,900 | 70,700 | 34,800 | 15/15 | 946 | 331,000 | 70,600 | 5/5 | 2,730 | 179,000 | 56,400 | 10/10 | 1,250 | 15,000 | 4,220 |
| PCB019 | 5/5 | 1,490 | 58,700 | 25,300 | 15/15 | 345 | 195,000 | 38,800 | 5/5 | 1,590 | 103,000 | 32,600 | 10/10 | 687 | 6,100 | 1,970 |
| PCB020+028 | 3/5 | 3,960 | 199,000 | 78,800 | 15/15 | 2,390 | 955,000 | 193,000 | 5/5 | 11,700 | 729,000 | 224,000 | 9/10 | 3,650 | 38,200 | 10,300 |
| PCB021+033 | 5/5 | 811 | 45,700 | 20,600 | 14/15 | 533 | 203,000 | 38,500 | 2/5 | 4,100 | 5,870 | 18,300 | 0/10 | -- | -- | 1,300 |
| PCB022 | 0/5 | -- | -- | 11,800 | 5/15 | 13,100 | 59,300 | 28,400 | 5/5 | 3,140 | 201,000 | 61,400 | 0/10 | -- | -- | 1,280 |
| PCB023 | 0/5 | -- | -- | 518 | 0/15 | -- | -- | 752 | 0/5 | -- | -- | 641 | 0/10 | -- | -- | 64 |
| PCB024 | 1/5 | 515 | 515 | 347 | 8/15 | 23.8 | 2,310 | 889 | 1/5 | 267 | 267 | 651 | 1/10 | 60.2 | 60.2 | 54.5 |
| PCB025 | 5/5 | 393 | 18,400 | 8,370 | 14/15 | 193 | 83,800 | 15,800 | 4/5 | 1,010 | 63,900 | 19,600 | 10/10 | 196 | 2,950 | 815 |
| PCB026+029 | 5/5 | 602 | 27,900 | 13,300 | 15/15 | 347 | 136,000 | 26,400 | 5/5 | 1,370 | 85,000 | 26,300 | 10/10 | 294 | 4,700 | 1,330 |
| PCB027 | 5/5 | 267 | 11,200 | 5,280 | 15/15 | 147 | 49,300 | 9,860 | 5/5 | 446 | 26,000 | 7,930 | 9/10 | 189 | 1,990 | 558 |
| PCB031 | 4/5 | 2,120 | 115,000 | 47,000 | 15/15 | 1,260 | 514,000 | 98,400 | 5/5 | 4,640 | 309,000 | 94,100 | 7/10 | 2,200 | 19,800 | 5,050 |
| PCB032 | 2/5 | 27,000 | 38,300 | 15,500 | 9/15 | 478 | 56,100 | 21,800 | 5/5 | 1,820 | 110,000 | 33,800 | 0/10 | -- | -- | 662 |
| PCB034 | 0/5 | -- | -- | 474 | 0/15 | -- | -- | 682 | 0/5 | -- | -- | 546 | 0/10 | -- | -- | 60.1 |
| PCB035 | 1/5 | 802 | 802 | 640 | 3/15 | 185 | 2,340 | 1,180 | 2/5 | 2,650 | 9,860 | 2,580 | 0/10 | -- | -- | 59.5 |
| PCB036 | 0/5 | -- | -- | 426 | 0/15 | -- | -- | 642 | 0/5 | -- | -- | 563 | 0/10 | -- | -- | 56.2 |
| PCB037 | 1/5 | 43,800 | 43,800 | 12,900 | 6/15 | 463 | 34,700 | 18,100 | 5/5 | 2,810 | 177,000 | 53,400 | 0/10 | -- | -- | 755 |
| PCB038 | 0/5 | -- | -- | 458 | 0/15 | -- | -- | 675 | 0/5 | -- | -- | 583 | 0/10 | -- | -- | 59.7 |
| PCB039 | 0/5 | -- | -- | 455 | 1/15 | 5,280 | 5,280 | 920 | 0/5 | -- | -- | 563 | 0/10 | -- | -- | 60.9 |
| PCB040+041+071 | 5/5 | 3,930 | 179,000 | 84,200 | 15/15 | 2,020 | 655,000 | 154,000 | 5/5 | 7,680 | 513,000 | 159,000 | 10/10 | 1,520 | 22,900 | 6,040 |
| PCB042 | 5/5 | 2,180 | 97,300 | 46,800 | 15/15 | 1,220 | 366,000 | 89,400 | 5/5 | 3,780 | 251,000 | 80,100 | 10/10 | 855 | 13,100 | 3,560 |
| PCB043+073 | 5/5 | 195 | 10,800 | 5,070 | 12/15 | 1,000 | 48,300 | 9,420 | 4/5 | 423 | 31,000 | 9,560 | 3/10 | 217 | 1,180 | 215 |
| PCB044+047+065 | 5/5 | 10,900 | 481,000 | 229,000 | 15/15 | 5,620 | 1,900,000 | 469,000 | 5/5 | 15,800 | 1,030,000 | 322,000 | 10/10 | 4,500 | 68,100 | 18,100 |
| PCB045+051 | 5/5 | 1,420 | 60,300 | 28,900 | 15/15 | 726 | 229,000 | 51,500 | 5/5 | 2,220 | 139,000 | 43,100 | 10/10 | 506 | 8,170 | 2,160 |

**Table C-26**
**Summary Statistics for Polychlorinated Biphenyl Congeners in Edible Clam Tissue by FCA, Lipid Normalized**

| | FCA1 | | | | FCA2 | | | | FCA3 | | | | Background | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] |
| PCB046 | 5/5 | 384 | 17,700 | 8,000 | 15/15 | 183 | 63,400 | 14,300 | 5/5 | 630 | 41,300 | 13,100 | 9/10 | 147 | 2,110 | 582 |
| PCB048 | 5/5 | 966 | 46,300 | 21,800 | 15/15 | 551 | 194,000 | 41,800 | 5/5 | 2,110 | 133,000 | 41,600 | 10/10 | 435 | 6,320 | 1,810 |
| PCB049+069 | 5/5 | 8,100 | 349,000 | 168,000 | 15/15 | 4,150 | 1,360,000 | 344,000 | 5/5 | 11,200 | 759,000 | 235,000 | 10/10 | 3,200 | 48,400 | 13,200 |
| PCB050+053 | 5/5 | 7,930 | 343,000 | 150,000 | 15/15 | 2,210 | 1,070,000 | 233,000 | 5/5 | 8,710 | 629,000 | 196,000 | 10/10 | 2,770 | 29,100 | 9,160 |
| PCB052 | 5/5 | 13,200 | 615,000 | 282,000 | 15/15 | 7,020 | 2,460,000 | 705,000 | 5/5 | 19,600 | 1,220,000 | 381,000 | 9/10 | 6,980 | 82,100 | 21,600 |
| PCB054 | 4/5 | 110 | 4,070 | 1,680 | 15/15 | 33.9 | 12,600 | 2,970 | 5/5 | 84.4 | 5,710 | 1,830 | 7/10 | 49.5 | 644 | 142 |
| PCB055 | 0/5 | -- | -- | 382 | 2/15 | 7,800 | 11,600 | 2,140 | 0/5 | -- | -- | 181 | 0/10 | -- | -- | 31.6 |
| PCB056 | 5/5 | 2,640 | 124,000 | 56,400 | 15/15 | 1,400 | 497,000 | 120,000 | 5/5 | 8,170 | 561,000 | 175,000 | 10/10 | 1,200 | 16,700 | 4,440 |
| PCB057 | 2/5 | 345 | 414 | 356 | 2/15 | 347 | 1,020 | 508 | 1/5 | 124 | 124 | 664 | 1/10 | 36.1 | 36.1 | 31.1 |
| PCB058 | 0/5 | -- | -- | 375 | 4/15 | 25.3 | 1,640 | 829 | 1/5 | 6,500 | 6,500 | 1,370 | 0/10 | -- | -- | 39.5 |
| PCB059+062+075 | 5/5 | 891 | 39,300 | 18,900 | 15/15 | 491 | 157,000 | 36,300 | 5/5 | 1,750 | 113,000 | 35,700 | 10/10 | 366 | 6,050 | 1,590 |
| PCB060 | 5/5 | 1,000 | 51,100 | 21,900 | 15/15 | 547 | 230,000 | 47,200 | 5/5 | 4,230 | 281,000 | 89,300 | 10/10 | 586 | 8,410 | 2,190 |
| PCB061+070+074+076 | 5/5 | 12,100 | 601,000 | 268,000 | 15/15 | 6,810 | 2,310,000 | 603,000 | 5/5 | 26,500 | 1,740,000 | 538,000 | 10/10 | 5,900 | 84,600 | 21,600 |
| PCB063 | 5/5 | 320 | 14,000 | 6,440 | 15/15 | 174 | 61,700 | 14,700 | 5/5 | 758 | 50,900 | 15,600 | 9/10 | 167 | 2,440 | 623 |
| PCB064 | 5/5 | 3,590 | 167,000 | 78,900 | 15/15 | 2,020 | 655,000 | 163,000 | 5/5 | 7,680 | 501,000 | 157,000 | 10/10 | 1,550 | 24,000 | 6,300 |
| PCB066 | 5/5 | 8,080 | 357,000 | 168,000 | 15/15 | 4,410 | 1,420,000 | 337,000 | 5/5 | 20,400 | 1,330,000 | 410,000 | 10/10 | 3,790 | 57,400 | 14,900 |
| PCB067 | 4/5 | 88.6 | 5,060 | 1,780 | 9/15 | 43.7 | 16,400 | 3,500 | 4/5 | 541 | 16,900 | 5,230 | 3/10 | 68.4 | 79.6 | 68.3 |
| PCB068 | 5/5 | 224 | 8,600 | 4,340 | 11/15 | 88.4 | 32,800 | 7,480 | 3/5 | 166 | 14,400 | 4,240 | 9/10 | 104 | 1,310 | 325 |
| PCB072 | 5/5 | 244 | 8,930 | 4,570 | 14/15 | 105 | 32,700 | 8,250 | 3/5 | 592 | 15,400 | 4,600 | 8/10 | 76.1 | 994 | 264 |
| PCB077 | 5/5 | 495 | 23,800 | 10,700 | 15/15 | 352 | 93,100 | 22,400 | 5/5 | 1,870 | 119,000 | 36,700 | 8/10 | 235 | 3,340 | 720 |
| PCB078 | 0/5 | -- | -- | 267 | 0/15 | -- | -- | 592 | 0/5 | -- | -- | 511 | 0/10 | -- | -- | 38.4 |
| PCB079 | 4/5 | 97.5 | 5,210 | 1,960 | 9/15 | 467 | 32,800 | 7,190 | 3/5 | 314 | 10,200 | 2,890 | 1/10 | 60.6 | 60.6 | 43.8 |
| PCB080 | 0/5 | -- | -- | 246 | 0/15 | -- | -- | 540 | 0/5 | -- | -- | 485 | 0/10 | -- | -- | 33.9 |
| PCB081 | 1/5 | 396 | 396 | 345 | 3/15 | 25.2 | 493 | 772 | 1/5 | 2,270 | 2,270 | 860 | 0/10 | -- | -- | 40.8 |
| PCB082 | 5/5 | 1,200 | 66,700 | 26,900 | 15/15 | 618 | 549,000 | 130,000 | 5/5 | 3,180 | 199,000 | 61,400 | 2/10 | 1,190 | 4,620 | 1,220 |
| PCB083+099 | 5/5 | 15,800 | 713,000 | 329,000 | 15/15 | 7,210 | 4,490,000 | 1,100,000 | 5/5 | 24,600 | 1,570,000 | 474,000 | 10/10 | 6,190 | 87,200 | 22,300 |
| PCB084 | 5/5 | 2,870 | 170,000 | 71,100 | 15/15 | 1,780 | 1,230,000 | 296,000 | 5/5 | 5,170 | 343,000 | 105,000 | 0/10 | -- | -- | 2,090 |
| PCB085+116 | 5/5 | 2,120 | 109,000 | 46,300 | 15/15 | 1,070 | 905,000 | 209,000 | 5/5 | 4,950 | 330,000 | 101,000 | 10/10 | 933 | 12,800 | 3,310 |
| PCB086+087+097+109+119 +125 | 5/5 | 7,730 | 454,000 | 186,000 | 15/15 | 3,970 | 3,580,000 | 834,000 | 5/5 | 17,200 | 1,070,000 | 329,000 | 0/10 | -- | -- | 5,770 |
| PCB088+091 | 5/5 | 3,100 | 150,000 | 69,400 | 15/15 | 1,700 | 924,000 | 229,000 | 4/5 | 9,460 | 293,000 | 87,800 | 7/10 | 1,240 | 16,200 | 3,500 |
| PCB089 | 3/5 | 1,610 | 5,270 | 2,350 | 11/15 | 566 | 36,800 | 7,810 | 4/5 | 246 | 16,400 | 5,070 | 4/10 | 56.1 | 371 | 91.9 |
| PCB090+101+113 | 5/5 | 17,400 | 887,000 | 388,000 | 15/15 | 8,600 | 6,730,000 | 1,560,000 | 5/5 | 31,000 | 2,010,000 | 613,000 | 4/10 | 13,900 | 89,600 | 20,400 |
| PCB092 | 5/5 | 3,500 | 170,000 | 75,200 | 15/15 | 1,740 | 1,330,000 | 315,000 | 5/5 | 6,120 | 403,000 | 123,000 | 10/10 | 1,450 | 20,200 | 5,190 |
| PCB093+100 | 4/5 | 567 | 25,400 | 10,300 | 15/15 | 298 | 93,000 | 27,500 | 5/5 | 600 | 35,600 | 10,900 | 10/10 | 254 | 3,380 | 942 |
| PCB094 | 4/5 | 1,770 | 6,280 | 2,920 | 13/15 | 86 | 30,300 | 8,370 | 4/5 | 190 | 12,800 | 3,410 | 8/10 | 56.8 | 970 | 224 |
| PCB095 | 5/5 | 11,800 | 629,000 | 271,000 | 15/15 | 6,710 | 4,680,000 | 1,110,000 | 5/5 | 19,200 | 1,220,000 | 373,000 | 3/10 | 9,820 | 66,600 | 14,200 |
| PCB096 | 5/5 | 118 | 5,450 | 2,550 | 14/15 | 62.9 | 27,800 | 7,610 | 5/5 | 198 | 11,900 | 3,780 | 6/10 | 39.2 | 578 | 119 |
| PCB098+102 | 5/5 | 720 | 34,600 | 16,000 | 15/15 | 365 | 189,000 | 48,100 | 5/5 | 1,090 | 69,000 | 21,500 | 7/10 | 211 | 3,170 | 754 |
| PCB103 | 5/5 | 473 | 19,000 | 9,140 | 14/15 | 203 | 78,800 | 21,000 | 5/5 | 351 | 24,300 | 7,390 | 10/10 | 144 | 2,220 | 558 |
| PCB104 | 1/5 | 23.2 | 23.2 | 149 | 3/15 | 269 | 2,240 | 340 | 0/5 | -- | -- | 131 | 0/10 | -- | -- | 17.3 |

**Table C-26**
**Summary Statistics for Polychlorinated Biphenyl Congeners in Edible Clam Tissue by FCA, Lipid Normalized**

| | FCA1 | | | | FCA2 | | | | FCA3 | | | | Background | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] |
| PCB105 | 5/5 | 4,090 | 201,000 | 87,300 | 15/15 | 2,150 | 1,530,000 | 373,000 | 5/5 | 12,300 | 771,000 | 233,000 | 4/10 | 5,360 | 29,300 | 6,820 |
| PCB106 | 0/5 | -- | -- | 464 | 0/15 | -- | -- | 755 | 0/5 | -- | -- | 809 | 0/10 | -- | -- | 46.3 |
| PCB107 | 5/5 | 1,390 | 61,100 | 28,300 | 15/15 | 638 | 412,000 | 103,000 | 5/5 | 2,630 | 180,000 | 53,000 | 10/10 | 608 | 8,330 | 2,160 |
| PCB108+124 | 5/5 | 527 | 24,700 | 11,000 | 13/15 | 2,510 | 204,000 | 48,200 | 5/5 | 1,370 | 96,600 | 28,300 | 6/10 | 282 | 3,670 | 849 |
| PCB110+115 | 5/5 | 16,900 | 887,000 | 383,000 | 15/15 | 8,840 | 6,910,000 | 1,650,000 | 5/5 | 38,600 | 2,460,000 | 742,000 | 4/10 | 16,700 | 107,000 | 24,000 |
| PCB111 | 0/5 | -- | -- | 358 | 0/15 | -- | -- | 1,010 | 0/5 | -- | -- | 652 | 0/10 | -- | -- | 56.9 |
| PCB112 | 0/5 | -- | -- | 334 | 0/15 | -- | -- | 931 | 0/5 | -- | -- | 585 | 0/10 | -- | -- | 51.5 |
| PCB114 | 5/5 | 241 | 13,300 | 5,700 | 13/15 | 154 | 102,000 | 24,700 | 4/5 | 719 | 16,800 | 8,170 | 8/10 | 159 | 1,900 | 498 |
| PCB117 | 1/5 | 10,300 | 10,300 | 4,380 | 9/15 | 263 | 147,000 | 29,400 | 3/5 | 1,060 | 56,100 | 14,400 | 6/10 | 226 | 2,720 | 566 |
| PCB118 | 5/5 | 13,500 | 645,000 | 285,000 | 15/15 | 6,470 | 4,080,000 | 1,020,000 | 5/5 | 31,800 | 2,040,000 | 608,000 | 10/10 | 6,500 | 85,600 | 22,300 |
| PCB120 | 4/5 | 192 | 8,070 | 3,250 | 12/15 | 733 | 23,400 | 6,280 | 4/5 | 154 | 10,800 | 3,110 | 6/10 | 66.9 | 860 | 183 |
| PCB121 | 0/5 | -- | -- | 368 | 0/15 | -- | -- | 1,020 | 0/5 | -- | -- | 643 | 0/10 | -- | -- | 55.1 |
| PCB122 | 3/5 | 135 | 2,630 | 2,200 | 8/15 | 753 | 49,200 | 12,500 | 4/5 | 1,110 | 30,100 | 8,720 | 4/10 | 154 | 1,280 | 283 |
| PCB123 | 5/5 | 281 | 12,900 | 5,790 | 13/15 | 1350 | 82,400 | 20,200 | 4/5 | 1,540 | 47,900 | 13,800 | 8/10 | 137 | 1,060 | 359 |
| PCB126 | 0/5 | -- | -- | 443 | 4/15 | 57.6 | 7,170 | 1,670 | 0/5 | -- | -- | 803 | 0/10 | -- | -- | 46.8 |
| PCB127 | 0/5 | -- | -- | 469 | 0/15 | -- | -- | 771 | 0/5 | -- | -- | 894 | 0/10 | -- | -- | 53.6 |
| PCB128+166 | 5/5 | 2,640 | 121,000 | 54,700 | 15/15 | 1,470 | 1,570,000 | 332,000 | 5/5 | 6,900 | 460,000 | 137,000 | 6/10 | 1,650 | 19,800 | 4,660 |
| PCB129+138+163 | 5/5 | 20,700 | 913,000 | 419,000 | 15/15 | 10,400 | 9,970,000 | 2,160,000 | 5/5 | 45,000 | 3,090,000 | 899,000 | 10/10 | 10,100 | 140,000 | 35,200 |
| PCB130 | 5/5 | 1,030 | 47,600 | 21,500 | 15/15 | 550 | 522,000 | 114,000 | 5/5 | 2,030 | 161,000 | 46,200 | 9/10 | 490 | 6,650 | 1,640 |
| PCB131 | 3/5 | 127 | 7,930 | 2,560 | 11/15 | 1,660 | 113,000 | 23,000 | 4/5 | 318 | 23,700 | 7,010 | 5/10 | 96.9 | 799 | 172 |
| PCB132 | 5/5 | 4,330 | 231,000 | 95,100 | 15/15 | 2,160 | 2,950,000 | 615,000 | 5/5 | 9,470 | 717,000 | 213,000 | 1/10 | 3,580 | 3,580 | 3,260 |
| PCB133 | 5/5 | 350 | 15,100 | 7,410 | 15/15 | 171 | 116,000 | 27,200 | 4/5 | 1,120 | 34,900 | 10,200 | 8/10 | 156 | 1,900 | 474 |
| PCB134 | 5/5 | 521 | 30,700 | 13,000 | 15/15 | 357 | 391,000 | 86,900 | 5/5 | 1,230 | 89,300 | 27,200 | 0/10 | -- | -- | 445 |
| PCB135+151 | 5/5 | 6,210 | 285,000 | 130,000 | 15/15 | 3,120 | 2,970,000 | 664,000 | 5/5 | 9,380 | 709,000 | 211,000 | 10/10 | 2,540 | 33,800 | 8,520 |
| PCB136 | 5/5 | 1,920 | 96,000 | 43,000 | 15/15 | 992 | 1,030,000 | 225,000 | 5/5 | 2,690 | 210,000 | 64,000 | 4/10 | 1,190 | 8,430 | 1,910 |
| PCB137 | 5/5 | 668 | 33,100 | 14,300 | 15/15 | 344 | 464,000 | 96,800 | 5/5 | 1,870 | 146,000 | 41,600 | 4/10 | 623 | 5,210 | 1,020 |
| PCB139+140 | 4/5 | 352 | 9,870 | 5,340 | 15/15 | 153 | 196,000 | 42,300 | 5/5 | 643 | 47,900 | 14,000 | 8/10 | 137 | 1,810 | 455 |
| PCB141 | 5/5 | 2,380 | 111,000 | 49,900 | 15/15 | 1,220 | 1,280,000 | 275,000 | 5/5 | 5,320 | 373,000 | 107,000 | 7/10 | 1,300 | 15,300 | 3,690 |
| PCB142 | 0/5 | -- | -- | 459 | 0/15 | -- | -- | 1,360 | 0/5 | -- | -- | 751 | 0/10 | -- | -- | 35.8 |
| PCB143 | 0/5 | -- | -- | 435 | 3/15 | 7,290 | 24,200 | 3,950 | 1/5 | 446 | 446 | 727 | 0/10 | -- | -- | 31.7 |
| PCB144 | 5/5 | 1,200 | 65,400 | 26,200 | 15/15 | 311 | 768,000 | 163,000 | 5/5 | 2,260 | 177,000 | 52,800 | 0/10 | -- | -- | 885 |
| PCB145 | 0/5 | -- | -- | 121 | 0/15 | -- | -- | 214 | 0/5 | -- | -- | 109 | 0/10 | -- | -- | 17.2 |
| PCB146 | 5/5 | 4,270 | 177,000 | 83,500 | 15/15 | 1,950 | 1,420,000 | 320,000 | 5/5 | 5,830 | 417,000 | 121,000 | 10/10 | 1,670 | 20,500 | 5,310 |
| PCB147+149 | 5/5 | 15,500 | 700,000 | 322,000 | 15/15 | 6,990 | 6,820,000 | 1,510,000 | 5/5 | 22,200 | 1,740,000 | 516,000 | 10/10 | 5,600 | 69,800 | 18,100 |
| PCB148 | 5/5 | 89.1 | 3,170 | 1,540 | 12/15 | 31.6 | 16,200 | 3,550 | 3/5 | 138 | 4,100 | 1,210 | 3/10 | 59.4 | 367 | 68.4 |
| PCB150 | 5/5 | 144 | 6,250 | 2,870 | 14/15 | 44.7 | 19,300 | 5,070 | 5/5 | 68.8 | 6,910 | 2,030 | 8/10 | 30.1 | 481 | 122 |
| PCB152 | 2/5 | 29.3 | 920 | 292 | 7/15 | 632 | 10,900 | 2,250 | 4/5 | 79.8 | 2,570 | 734 | 2/10 | 27.3 | 33.2 | 19.5 |
| PCB153+168 | 5/5 | 23,000 | 953,000 | 453,000 | 15/15 | 11,200 | 8,230,000 | 1,850,000 | 5/5 | 36,600 | 2,700,000 | 769,000 | 10/10 | 9,940 | 128,000 | 32,700 |
| PCB154 | 5/5 | 1,180 | 46,900 | 22,200 | 15/15 | 342 | 236,000 | 56,700 | 5/5 | 885 | 67,300 | 19,800 | 7/10 | 383 | 2,780 | 720 |
| PCB155 | 4/5 | 1,010 | 2,880 | 1,450 | 7/15 | 23.6 | 5,830 | 1,100 | 1/5 | 927 | 927 | 407 | 3/10 | 16.8 | 36.1 | 33.5 |
| PCB156+157 | 5/5 | 1,720 | 81,300 | 35,500 | 15/15 | 798 | 830,000 | 182,000 | 5/5 | 4,460 | 289,000 | 85,100 | 4/10 | 2,040 | 12,200 | 2,790 |

**Table C-26**
**Summary Statistics for Polychlorinated Biphenyl Congeners in Edible Clam Tissue by FCA, Lipid Normalized**

| | FCA1 | | | | FCA2 | | | | FCA3 | | | | Background | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] |
| PCB158 | 5/5 | 1,500 | 72,700 | 32,300 | 15/15 | 783 | 919,000 | 197,000 | 5/5 | 3,840 | 281,000 | 81,800 | 6/10 | 891 | 10,800 | 2,550 |
| PCB159 | 3/5 | 111 | 4,480 | 1,680 | 14/15 | 51.3 | 53,000 | 11,200 | 3/5 | 190 | 13,100 | 3,170 | 5/10 | 68.5 | 427 | 123 |
| PCB160 | 0/5 | -- | -- | 332 | 0/15 | -- | -- | 985 | 0/5 | -- | -- | 541 | 0/10 | -- | -- | 26.9 |
| PCB161 | 0/5 | -- | -- | 314 | 0/15 | -- | -- | 926 | 0/5 | -- | -- | 507 | 0/10 | -- | -- | 26 |
| PCB162 | 3/5 | 78.5 | 1,290 | 1,010 | 9/15 | 1,030 | 27,700 | 6,150 | 2/5 | 178 | 3,970 | 1,880 | 3/10 | 45.8 | 626 | 107 |
| PCB164 | 5/5 | 943 | 50,100 | 22,400 | 15/15 | 649 | 535,000 | 111,000 | 5/5 | 2,360 | 170,000 | 49,800 | 6/10 | 587 | 7,180 | 1,690 |
| PCB165 | 0/5 | -- | -- | 346 | 0/15 | -- | -- | 1,050 | 0/5 | -- | -- | 562 | 0/10 | -- | -- | 29.6 |
| PCB167 | 5/5 | 874 | 35,200 | 16,400 | 15/15 | 383 | 319,000 | 71,200 | 5/5 | 1,780 | 124,000 | 35,900 | 10/10 | 430 | 5,280 | 1,390 |
| PCB169 | 0/5 | -- | -- | 339 | 1/15 | 1,250 | 1,250 | 839 | 0/5 | -- | -- | 413 | 0/10 | -- | -- | 30.4 |
| PCB170 | 5/5 | 3,720 | 139,000 | 68,500 | 15/15 | 1,360 | 1,450,000 | 310,000 | 5/5 | 7,100 | 400,000 | 117,000 | 10/10 | 1,540 | 24,400 | 6,080 |
| PCB171+173 | 5/5 | 1,400 | 54,800 | 27,000 | 15/15 | 595 | 653,000 | 140,000 | 5/5 | 2,460 | 164,000 | 48,100 | 10/10 | 573 | 8,780 | 2,160 |
| PCB172 | 5/5 | 667 | 24,700 | 12,400 | 15/15 | 218 | 208,000 | 48,000 | 5/5 | 998 | 60,300 | 17,600 | 6/10 | 316 | 4,030 | 910 |
| PCB174 | 5/5 | 3,060 | 119,000 | 58,000 | 15/15 | 1,280 | 1,620,000 | 343,000 | 5/5 | 5,110 | 340,000 | 101,000 | 10/10 | 1,350 | 19,400 | 4,930 |
| PCB175 | 3/5 | 169 | 6,410 | 2,290 | 14/15 | 51.9 | 50,400 | 11,300 | 5/5 | 224 | 15,300 | 4,270 | 6/10 | 66.1 | 776 | 175 |
| PCB176 | 5/5 | 479 | 16,500 | 8,140 | 15/15 | 172 | 209,000 | 42,300 | 5/5 | 598 | 42,400 | 12,200 | 8/10 | 140 | 1,830 | 432 |
| PCB177 | 5/5 | 2,270 | 87,300 | 43,500 | 15/15 | 891 | 962,000 | 211,000 | 5/5 | 3,470 | 227,000 | 67,000 | 10/10 | 918 | 13,100 | 3,340 |
| PCB178 | 5/5 | 1,010 | 40,400 | 19,800 | 15/15 | 476 | 339,000 | 79,700 | 5/5 | 1,280 | 96,000 | 27,600 | 10/10 | 420 | 6,170 | 1,590 |
| PCB179 | 5/5 | 1,710 | 68,000 | 32,900 | 15/15 | 791 | 711,000 | 158,000 | 5/5 | 1,990 | 151,000 | 45,000 | 10/10 | 645 | 8,300 | 2,130 |
| PCB180+193 | 5/5 | 8,420 | 289,000 | 146,000 | 15/15 | 2,410 | 2,840,000 | 605,000 | 5/5 | 13,900 | 821,000 | 235,000 | 10/10 | 3,950 | 43,300 | 11,800 |
| PCB181 | 3/5 | 47.2 | 1,710 | 749 | 8/15 | 758 | 20,400 | 4,800 | 1/5 | 74.1 | 74.1 | 639 | 0/10 | -- | -- | 51.5 |
| PCB182 | 2/5 | 55.8 | 2,210 | 669 | 10/15 | 32.3 | 16,200 | 3,960 | 1/5 | 204 | 204 | 314 | 2/10 | 90.1 | 273 | 63.4 |
| PCB183 | 5/5 | 2,960 | 113,000 | 55,300 | 15/15 | 1,160 | 1,210,000 | 265,000 | 5/5 | 4,780 | 340,000 | 97,000 | 10/10 | 1,360 | 19,200 | 4,940 |
| PCB184 | 4/5 | 62.2 | 1,610 | 857 | 4/15 | 142 | 3,180 | 489 | 0/5 | -- | -- | 154 | 0/10 | -- | -- | 16.6 |
| PCB185 | 4/5 | 3,960 | 12,100 | 6,000 | 12/15 | 1,420 | 155,000 | 30,700 | 4/5 | 1,310 | 38,900 | 11,400 | 7/10 | 143 | 1,310 | 382 |
| PCB186 | 0/5 | -- | -- | 135 | 0/15 | -- | -- | 230 | 0/5 | -- | -- | 159 | 0/10 | -- | -- | 17 |
| PCB187 | 5/5 | 8,160 | 303,000 | 151,000 | 15/15 | 3,800 | 2,840,000 | 631,000 | 5/5 | 10,500 | 776,000 | 225,000 | 10/10 | 3,620 | 51,700 | 13,100 |
| PCB188 | 3/5 | 657 | 1,740 | 879 | 6/15 | 275 | 5,070 | 840 | 0/5 | -- | -- | 146 | 2/10 | 157 | 202 | 43.7 |
| PCB189 | 3/5 | 141 | 5,690 | 2,100 | 13/15 | 55.1 | 37,400 | 8,080 | 4/5 | 234 | 14,600 | 3,610 | 4/10 | 70.9 | 117 | 87.8 |
| PCB190 | 5/5 | 690 | 25,700 | 13,300 | 15/15 | 315 | 314,000 | 65,800 | 5/5 | 1,480 | 76,000 | 22,200 | 8/10 | 340 | 5,620 | 1,380 |
| PCB191 | 5/5 | 190 | 6,670 | 3,310 | 12/15 | 71.5 | 68,900 | 14,700 | 4/5 | 678 | 19,000 | 5,680 | 5/10 | 83.7 | 1,330 | 271 |
| PCB192 | 0/5 | -- | -- | 222 | 0/15 | -- | -- | 866 | 0/5 | -- | -- | 479 | 0/10 | -- | -- | 41.2 |
| PCB194 | 5/5 | 1,210 | 42,100 | 21,600 | 15/15 | 274 | 323,000 | 66,200 | 5/5 | 2,220 | 109,000 | 30,200 | 10/10 | 576 | 5,440 | 1,650 |
| PCB195 | 5/5 | 610 | 27,100 | 13,500 | 15/15 | 394 | 334,000 | 62,100 | 5/5 | 1,390 | 82,400 | 23,300 | 10/10 | 410 | 6,010 | 1,510 |
| PCB196 | 5/5 | 1,250 | 43,400 | 22,100 | 15/15 | 471 | 434,000 | 93,500 | 5/5 | 1,810 | 116,000 | 32,800 | 10/10 | 602 | 7,640 | 2,010 |
| PCB197 | 4/5 | 427 | 15,300 | 6,640 | 13/15 | 105 | 56,900 | 13,500 | 3/5 | 257 | 6,680 | 3,280 | 9/10 | 102 | 1,160 | 307 |
| PCB198+199 | 5/5 | 2,350 | 88,700 | 44,700 | 15/15 | 1,200 | 807,000 | 178,000 | 5/5 | 3,450 | 229,000 | 66,300 | 10/10 | 1,230 | 17,400 | 4,490 |
| PCB200 | 3/5 | 212 | 8,330 | 3,180 | 14/15 | 118 | 97,700 | 20,900 | 5/5 | 296 | 23,300 | 6,780 | 8/10 | 107 | 1,390 | 340 |
| PCB201 | 5/5 | 321 | 10,200 | 5,320 | 14/15 | 78.3 | 74,900 | 15,400 | 3/5 | 255 | 7,050 | 3,620 | 6/10 | 209 | 916 | 261 |
| PCB202 | 4/5 | 619 | 24,400 | 11,000 | 15/15 | 254 | 147,000 | 35,600 | 5/5 | 776 | 50,700 | 14,600 | 9/10 | 280 | 2,230 | 760 |
| PCB203 | 5/5 | 1,870 | 68,700 | 34,600 | 15/15 | 791 | 628,000 | 140,000 | 5/5 | 3,140 | 200,000 | 56,900 | 10/10 | 1,030 | 13,900 | 3,600 |
| PCB204 | 2/5 | 439 | 582 | 451 | 2/15 | 694 | 1,720 | 384 | 0/5 | -- | -- | 212 | 0/10 | -- | -- | 16.1 |

**Table C-26**
**Summary Statistics for Polychlorinated Biphenyl Congeners in Edible Clam Tissue by FCA, Lipid Normalized**

| | FCA1 | | | | FCA2 | | | | FCA3 | | | | Background | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] |
| PCB205 | 3/5 | 95.1 | 1,260 | 1,070 | 13/15 | 42.4 | 29,200 | 5,680 | 5/5 | 130 | 9,090 | 2,610 | 3/10 | 130 | 592 | 128 |
| PCB206 | 5/5 | 1,460 | 46,100 | 24,400 | 14/15 | 509 | 234,000 | 62,200 | 5/5 | 1,780 | 125,000 | 35,700 | 10/10 | 567 | 7,810 | 2,030 |
| PCB207 | 5/5 | 1,600 | 43,700 | 24,100 | 14/15 | 350 | 182,000 | 37,800 | 5/5 | 758 | 60,100 | 17,100 | 10/10 | 259 | 3,600 | 937 |
| PCB208 | 5/5 | 1,460 | 53,500 | 28,600 | 14/15 | 456 | 144,000 | 36,900 | 5/5 | 1,010 | 68,400 | 19,700 | 10/10 | 277 | 5,090 | 1,270 |
| PCB209 | 5/5 | 22,400 | 820,000 | 445,000 | 15/15 | 8,680 | 2,430,000 | 650,000 | 5/5 | 15,800 | 1,110,000 | 314,000 | 10/10 | 2,490 | 54,400 | 13,200 |
| **Polychlorinated Biphenyls (µg/kg - lw)** | | | | | | | | | | | | | | | | |
| Total PCBs[c] | 5/5 | 369 | 16,700 | 7,670 | 15/15 | 178 | 112,000 | 27,400 | 5/5 | 647 | 43,700 | 13,100 | 10/10 | 167 | 2,150 | 558 |

**Notes**

-- = not applicable, no detected values
FCA = fish collection area
lw = lipid weight
PCB = polychlorinated biphenyl

a - Mean calculation includes detected and non-detected values. Non-detected values were set at one-half the detection limit.
b - PCB###+#### indicates a co-elution of two or more PCB congeners.
c - Total polychlorinated biphenyls were calculated as the sum of all 209 congeners with non-detects set at one-half the detection limit.

**Table C-27**
**Summary Statistics for Dioxins and Furans in Whole Gulf Killifish Tissue by FCA, Lipid Normalized**

| | FCA1 | | | | FCA2 | | | | FCA3 | | | | Background | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] |
| Gulf Killifish - Whole | | | | | | | | | | | | | | | | |
| **Dioxins/Furans (ng/kg - lw)** | | | | | | | | | | | | | | | | |
| 2,3,7,8-TCDD | 0/2 | -- | -- | 44.3 | 3/6 | 128 | 255 | 98.5 | 0/2 | -- | -- | 2.4 | 0/8 | -- | -- | 2.39 |
| 1,2,3,7,8-PeCDD | 0/2 | -- | -- | 12.7 | 0/6 | -- | -- | 19.4 | 0/2 | -- | -- | 0.734 | 0/8 | -- | -- | 0.811 |
| 1,2,3,4,7,8-HxCDD | 0/2 | -- | -- | 13.9 | 0/6 | -- | -- | 18.8 | 0/2 | -- | -- | 0.361 | 0/8 | -- | -- | 0.768 |
| 1,2,3,6,7,8-HxCDD | 0/2 | -- | -- | 15.5 | 0/6 | -- | -- | 20.7 | 0/2 | -- | -- | 0.485 | 0/8 | -- | -- | 0.909 |
| 1,2,3,7,8,9-HxCDD | 0/2 | -- | -- | 14.3 | 0/6 | -- | -- | 19.1 | 0/2 | -- | -- | 0.393 | 0/8 | -- | -- | 0.807 |
| 1,2,3,4,6,7,8-HpCDD | 0/2 | -- | -- | 8.38 | 4/6 | 2.59 | 15.7 | 46.6 | 2/2 | 3.64 | 8.94 | 6.29 | 6/8 | 4.08 | 31.5 | 7.9 |
| OCDD | 0/2 | -- | -- | 213 | 1/6 | 42.7 | 42.7 | 392 | 2/2 | 35.2 | 58 | 46.6 | 4/8 | 61.5 | 90.7 | 68.5 |
| 2,3,7,8-TCDF | 0/2 | -- | -- | 11.7 | 4/6 | 26.2 | 306 | 106 | 2/2 | 6.81 | 7.2 | 7 | 2/8 | 7.4 | 35.2 | 6.24 |
| 1,2,3,7,8-PeCDF | 0/2 | -- | -- | 17.4 | 0/6 | -- | -- | 16.8 | 0/2 | -- | -- | 0.477 | 0/8 | -- | -- | 0.77 |
| 2,3,4,7,8-PeCDF | 0/2 | -- | -- | 17 | 1/6 | 5.61 | 5.61 | 18.1 | 0/2 | -- | -- | 0.487 | 0/8 | -- | -- | 0.75 |
| 1,2,3,4,7,8-HxCDF | 0/2 | -- | -- | 8.26 | 1/6 | 7.11 | 7.11 | 11.4 | 0/2 | -- | -- | 0.38 | 0/8 | -- | -- | 0.583 |
| 1,2,3,6,7,8-HxCDF | 0/2 | -- | -- | 7.86 | 1/6 | 1.86 | 1.86 | 10.1 | 0/2 | -- | -- | 0.365 | 0/8 | -- | -- | 0.558 |
| 1,2,3,7,8,9-HxCDF | 0/2 | -- | -- | 9.11 | 0/6 | -- | -- | 11.5 | 0/2 | -- | -- | 0.521 | 0/8 | -- | -- | 0.672 |
| 2,3,4,6,7,8-HxCDF | 0/2 | -- | -- | 8.3 | 0/6 | -- | -- | 10.5 | 0/2 | -- | -- | 0.418 | 0/8 | -- | -- | 0.596 |
| 1,2,3,4,6,7,8-HpCDF | 0/2 | -- | -- | 13.2 | 0/6 | -- | -- | 14 | 0/2 | -- | -- | 0.426 | 1/8 | 7.2 | 7.2 | 1.53 |
| 1,2,3,4,7,8,9-HpCDF | 0/2 | -- | -- | 15.6 | 0/6 | -- | -- | 18.5 | 0/2 | -- | -- | 0.544 | 0/8 | -- | -- | 1.05 |
| OCDF | 0/2 | -- | -- | 14.8 | 0/6 | -- | -- | 20.2 | 0/2 | -- | -- | 0.781 | 1/8 | 39.5 | 39.5 | 5.76 |
| $TEQ_{DF,M}$ | 0/2 | -- | -- | 72 | 5/6 | 5.53 | 270 | 146 | 2/2 | 3.64 | 5.11 | 4.38 | 7/8 | 0.905 | 17.1 | 4.69 |
| $TEQ_{DFP,M}$ | 2/2 | 56.2 | 736 | 396 | 6/6 | 41.7 | 3,240 | 700 | 2/2 | 9.32 | 9.77 | 9.55 | 8/8 | 4.59 | 40.9 | 15 |
| $TEQ_{P,M}$ | 2/2 | 47.5 | 600 | 324 | 6/6 | 29.6 | 2,960 | 554 | 2/2 | 4.66 | 5.71 | 5.19 | 8/8 | 3.3 | 23.8 | 10.3 |

**Notes**

-- = not applicable, no detected values

FCA = fish collection area

lw = lipid weight

$TEQ_{DF,M}$ = Toxicity equivalent for dioxins and furans calculated using mammalian toxicity equivalency factors with non-detects set at one-half the detection limit.

$TEQ_{DFP,M}$ = Toxicity equivalent for dioxins and furans and polychlorinated biphenyls calculated using mammalian toxicity equivalency factors with non-detects set at one-half the detection limit.

$TEQ_{P,M}$ = Toxicity equivalent for polychlorinated biphenyls calculated using mammalian toxicity equivalency factors with non-detects set at one-half the detection limit.

a - Mean calculation includes detected and non-detected values. Non-detected values were set at one-half the detection limit.

**Table C-28**
**Summary Statistics for Polychlorinated Biphenyl Congeners in Whole Gulf Killifish Tissue by FCA, Lipid Normalized**

| | FCA1 | | | | FCA2 | | | | FCA3 | | | | Background | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] |
| Gulf Killifish - Whole | | | | | | | | | | | | | | | | |
| **Polychlorinated Biphenyl Congeners [b] (ng/kg - lw)** | | | | | | | | | | | | | | | | |
| PCB001 | 2/2 | 527 | 12,500 | 6,520 | 6/6 | 1,110 | 38,600 | 11,900 | 1/2 | 52.4 | 52.4 | 44.4 | 7/8 | 60.8 | 408 | 143 |
| PCB002 | 0/2 | -- | -- | 533 | 0/6 | -- | -- | 685 | 0/2 | -- | -- | 10.5 | 3/8 | 53.4 | 260 | 68.5 |
| PCB003 | 0/2 | -- | -- | 599 | 4/6 | 186 | 16,100 | 2,900 | 0/2 | -- | -- | 11.8 | 5/8 | 56.3 | 153 | 84.4 |
| PCB004 | 1/2 | 2,360 | 2,360 | 13,900 | 4/6 | 6,140 | 32,400 | 25,900 | 1/2 | 265 | 265 | 412 | 0/8 | -- | -- | 391 |
| PCB005 | 0/2 | -- | -- | 816 | 0/6 | -- | -- | 1,310 | 0/2 | -- | -- | 65.4 | 0/8 | -- | -- | 47.2 |
| PCB006 | 2/2 | 799 | 18,500 | 9,630 | 6/6 | 907 | 73,600 | 13,900 | 0/2 | -- | -- | 94.9 | 5/8 | 211 | 941 | 331 |
| PCB007 | 0/2 | -- | -- | 743 | 3/6 | 281 | 1,330 | 1,510 | 0/2 | -- | -- | 61.2 | 1/8 | 194 | 194 | 61.1 |
| PCB008 | 0/2 | -- | -- | 33,500 | 4/6 | 12,500 | 55,000 | 65,900 | 2/2 | 465 | 538 | 501 | 1/8 | 446 | 446 | 1,130 |
| PCB009 | 1/2 | 207 | 207 | 792 | 3/6 | 442 | 1,870 | 1,630 | 0/2 | -- | -- | 59.2 | 1/8 | 254 | 254 | 67.3 |
| PCB010 | 1/2 | 197 | 197 | 1,480 | 2/6 | 282 | 1,180 | 3,550 | 0/2 | -- | -- | 213 | 0/8 | -- | -- | 71.2 |
| PCB011 | 0/2 | -- | -- | 120,000 | 0/6 | -- | -- | 149,000 | 0/2 | -- | -- | 649 | 0/8 | -- | -- | 4,710 |
| PCB012+013 | 0/2 | -- | -- | 734 | 0/6 | -- | -- | 1,160 | 0/2 | -- | -- | 59 | 0/8 | -- | -- | 43.4 |
| PCB014 | 0/2 | -- | -- | 700 | 0/6 | -- | -- | 1,110 | 0/2 | -- | -- | 56.9 | 0/8 | -- | -- | 40.9 |
| PCB015 | 1/2 | 45,300 | 45,300 | 23,000 | 5/6 | 1,200 | 238,000 | 41,900 | 0/2 | -- | -- | 63.3 | 4/8 | 476 | 2,710 | 795 |
| PCB016 | 2/2 | 4,380 | 101,000 | 52,600 | 6/6 | 1,670 | 366,000 | 65,600 | 2/2 | 331 | 431 | 381 | 7/8 | 345 | 3,680 | 1,290 |
| PCB017 | 2/2 | 5,790 | 131,000 | 68,300 | 6/6 | 2,170 | 502,000 | 90,400 | 2/2 | 506 | 690 | 598 | 0/8 | -- | -- | 970 |
| PCB018+030 | 2/2 | 11,400 | 257,000 | 134,000 | 5/6 | 3,900 | 29,200 | 57,000 | 2/2 | 873 | 1,210 | 1,040 | 0/8 | -- | -- | 1,640 |
| PCB019 | 0/2 | -- | -- | 10,700 | 0/6 | -- | -- | 12,900 | 1/2 | 205 | 205 | 152 | 2/8 | 257 | 267 | 354 |
| PCB020+028 | 2/2 | 39,300 | 796,000 | 418,000 | 6/6 | 15,100 | 3,280,000 | 586,000 | 2/2 | 5,030 | 6,100 | 5,560 | 1/8 | 3,250 | 3,250 | 5,540 |
| PCB021+033 | 0/2 | -- | -- | 23,000 | 0/6 | -- | -- | 41,100 | 0/2 | -- | -- | 173 | 0/8 | -- | -- | 749 |
| PCB022 | 0/2 | -- | -- | 36,500 | 0/6 | -- | -- | 55,100 | 1/2 | 1,030 | 1,030 | 755 | 0/8 | -- | -- | 983 |
| PCB023 | 0/2 | -- | -- | 999 | 0/6 | -- | -- | 1,230 | 0/2 | -- | -- | 23.4 | 0/8 | -- | -- | 37.8 |
| PCB024 | 2/2 | 222 | 5,040 | 2,630 | 4/6 | 83.4 | 13,500 | 2,450 | 0/2 | -- | -- | 11.8 | 3/8 | 57.8 | 93 | 42 |
| PCB025 | 2/2 | 1,270 | 28,700 | 15,000 | 4/6 | 919 | 121,000 | 21,700 | 2/2 | 203 | 224 | 213 | 2/8 | 128 | 152 | 231 |
| PCB026+029 | 2/2 | 4,470 | 96,000 | 50,300 | 6/6 | 1,210 | 344,000 | 62,100 | 2/2 | 483 | 554 | 518 | 2/8 | 360 | 431 | 595 |
| PCB027 | 2/2 | 1,970 | 38,900 | 20,400 | 6/6 | 564 | 122,000 | 22,200 | 2/2 | 152 | 187 | 170 | 2/8 | 159 | 199 | 250 |
| PCB031 | 1/2 | 13,500 | 13,500 | 78,500 | 2/6 | 8,260 | 40,000 | 111,000 | 1/2 | 1,650 | 1,650 | 1,300 | 0/8 | -- | -- | 2,020 |
| PCB032 | 1/2 | 7,080 | 7,080 | 40,700 | 2/6 | 2,540 | 16,100 | 43,200 | 2/2 | 694 | 742 | 718 | 0/8 | -- | -- | 638 |
| PCB034 | 0/2 | -- | -- | 945 | 1/6 | 434 | 434 | 1,190 | 0/2 | -- | -- | 21.3 | 0/8 | -- | -- | 34.8 |
| PCB035 | 0/2 | -- | -- | 945 | 0/6 | -- | -- | 1,120 | 0/2 | -- | -- | 20.9 | 0/8 | -- | -- | 35.1 |
| PCB036 | 0/2 | -- | -- | 907 | 0/6 | -- | -- | 1,050 | 0/2 | -- | -- | 20 | 0/8 | -- | -- | 33.1 |
| PCB037 | 0/2 | -- | -- | 13,800 | 0/6 | -- | -- | 20,400 | 0/2 | -- | -- | 115 | 0/8 | -- | -- | 439 |
| PCB038 | 0/2 | -- | -- | 945 | 0/6 | -- | -- | 1,160 | 0/2 | -- | -- | 21.4 | 0/8 | -- | -- | 35.1 |
| PCB039 | 0/2 | -- | -- | 950 | 0/6 | -- | -- | 1,160 | 0/2 | -- | -- | 21.3 | 0/8 | -- | -- | 35.1 |
| PCB040+041+071 | 2/2 | 18,200 | 400,000 | 209,000 | 6/6 | 7,620 | 1,240,000 | 225,000 | 2/2 | 2,140 | 2,640 | 2,390 | 2/8 | 1,230 | 1,680 | 2,000 |
| PCB042 | 2/2 | 9,090 | 194,000 | 102,000 | 6/6 | 3,640 | 698,000 | 126,000 | 2/2 | 1,110 | 1,190 | 1,150 | 7/8 | 629 | 5,780 | 1,970 |
| PCB043+073 | 2/2 | 1,180 | 26,000 | 13,600 | 3/6 | 2,600 | 80,700 | 14,500 | 1/2 | 176 | 176 | 127 | 4/8 | 112 | 330 | 184 |
| PCB044+047+065 | 2/2 | 76,600 | 1,560,000 | 817,000 | 6/6 | 28,300 | 4,930,000 | 886,000 | 2/2 | 6,350 | 7,080 | 6,720 | 8/8 | 5,220 | 41,000 | 15,700 |

**Table C-28**
**Summary Statistics for Polychlorinated Biphenyl Congeners in Whole Gulf Killifish Tissue by FCA, Lipid Normalized**

| | FCA1 | | | | FCA2 | | | | FCA3 | | | | Background | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] |
| PCB045+051 | 2/2 | 4,250 | 114,000 | 59,100 | 6/6 | 1,930 | 393,000 | 70,600 | 2/2 | 635 | 679 | 657 | 7/8 | 356 | 3,060 | 1,060 |
| PCB046 | 2/2 | 799 | 20,000 | 10,400 | 3/6 | 281 | 1,720 | 6,610 | 1/2 | 100 | 100 | 79.9 | 4/8 | 76.4 | 287 | 151 |
| PCB048 | 2/2 | 2,600 | 78,700 | 40,600 | 5/6 | 1,110 | 246,000 | 44,300 | 1/2 | 442 | 442 | 329 | 4/8 | 393 | 2,340 | 700 |
| PCB049+069 | 2/2 | 50,100 | 1,120,000 | 585,000 | 6/6 | 22,500 | 3,440,000 | 626,000 | 2/2 | 4,890 | 5,640 | 5,260 | 8/8 | 4,140 | 31,400 | 11,800 |
| PCB050+053 | 2/2 | 6,470 | 169,000 | 87,600 | 6/6 | 2,970 | 634,000 | 113,000 | 2/2 | 740 | 826 | 783 | 8/8 | 995 | 9,350 | 2,530 |
| PCB052 | 2/2 | 87,700 | 1,910,000 | 997,000 | 6/6 | 41,700 | 5,810,000 | 1,070,000 | 2/2 | 7,860 | 9,320 | 8,590 | 6/8 | 6,700 | 58,100 | 17,200 |
| PCB054 | 1/2 | 3,750 | 3,750 | 1,910 | 6/6 | 53.1 | 13,900 | 2,510 | 0/2 | -- | -- | 5.91 | 1/8 | 59.4 | 59.4 | 29.3 |
| PCB055 | 0/2 | -- | -- | 505 | 0/6 | -- | -- | 981 | 0/2 | -- | -- | 7.41 | 0/8 | -- | -- | 20.5 |
| PCB056 | 2/2 | 4,600 | 111,000 | 57,900 | 6/6 | 1,280 | 406,000 | 73,700 | 2/2 | 858 | 1,100 | 980 | 0/8 | -- | -- | 588 |
| PCB057 | 0/2 | -- | -- | 449 | 1/6 | 285 | 285 | 879 | 0/2 | -- | -- | 6.72 | 0/8 | -- | -- | 18.4 |
| PCB058 | 0/2 | -- | -- | 467 | 3/6 | 74.2 | 15,800 | 3,240 | 0/2 | -- | -- | 6.91 | 0/8 | -- | -- | 19 |
| PCB059+062+075 | 2/2 | 6,620 | 133,000 | 70,000 | 6/6 | 2,420 | 436,000 | 78,300 | 2/2 | 677 | 864 | 770 | 8/8 | 481 | 3,530 | 1,380 |
| PCB060 | 2/2 | 9,740 | 209,000 | 110,000 | 6/6 | 3,770 | 661,000 | 119,000 | 2/2 | 1,990 | 3,380 | 2,690 | 8/8 | 683 | 6,230 | 2,360 |
| PCB061+070+074+076 | 2/2 | 76,600 | 1,580,000 | 831,000 | 6/6 | 23,300 | 4,710,000 | 849,000 | 2/2 | 9,460 | 12,100 | 10,800 | 8/8 | 5,140 | 43,000 | 16,500 |
| PCB063 | 2/2 | 2,810 | 57,000 | 29,900 | 6/6 | 992 | 171,000 | 30,900 | 2/2 | 371 | 508 | 440 | 7/8 | 188 | 1,650 | 607 |
| PCB064 | 2/2 | 25,300 | 521,000 | 273,000 | 6/6 | 12,600 | 1,740,000 | 316,000 | 2/2 | 3,020 | 4,140 | 3,580 | 8/8 | 1,830 | 14,900 | 5,570 |
| PCB066 | 2/2 | 76,600 | 1,620,000 | 847,000 | 6/6 | 21,600 | 4,010,000 | 722,000 | 2/2 | 9,110 | 14,300 | 11,700 | 8/8 | 4,650 | 39,200 | 15,300 |
| PCB067 | 0/2 | -- | -- | 1,910 | 3/6 | 540 | 24,300 | 4,380 | 0/2 | -- | -- | 15.7 | 0/8 | -- | -- | 26.1 |
| PCB068 | 2/2 | 1,680 | 27,900 | 14,800 | 6/6 | 460 | 84,300 | 15,200 | 1/2 | 105 | 105 | 72.5 | 7/8 | 104 | 993 | 352 |
| PCB072 | 2/2 | 1,580 | 31,100 | 16,400 | 6/6 | 452 | 85,000 | 15,200 | 2/2 | 107 | 110 | 109 | 7/8 | 79.9 | 778 | 267 |
| PCB077 | 2/2 | 1,890 | 39,800 | 20,900 | 6/6 | 588 | 138,000 | 24,800 | 2/2 | 364 | 589 | 476 | 0/8 | -- | -- | 214 |
| PCB078 | 0/2 | -- | -- | 935 | 0/6 | -- | -- | 953 | 0/2 | -- | -- | 15.5 | 0/8 | -- | -- | 25.7 |
| PCB079 | 2/2 | 266 | 6,450 | 3,360 | 4/6 | 441 | 1,110 | 1,720 | 2/2 | 60.8 | 133 | 97 | 4/8 | 39.8 | 182 | 65.3 |
| PCB080 | 0/2 | -- | -- | 839 | 0/6 | -- | -- | 827 | 0/2 | -- | -- | 14 | 0/8 | -- | -- | 23 |
| PCB081 | 0/2 | -- | -- | 1,050 | 0/6 | -- | -- | 990 | 0/2 | -- | -- | 16.5 | 0/8 | -- | -- | 28.1 |
| PCB082 | 0/2 | -- | -- | 12,700 | 4/6 | 2,240 | 10,300 | 16,700 | 1/2 | 519 | 519 | 368 | 0/8 | -- | -- | 318 |
| PCB083+099 | 2/2 | 155,000 | 3,300,000 | 1,730,000 | 6/6 | 60,600 | 6,680,000 | 1,280,000 | 2/2 | 15,800 | 18,800 | 17,300 | 8/8 | 7,850 | 84,400 | 28,200 |
| PCB084 | 0/2 | -- | -- | 38,000 | 3/6 | 8,990 | 28,400 | 45,000 | 0/2 | -- | -- | 419 | 0/8 | -- | -- | 888 |
| PCB085+116 | 2/2 | 21,000 | 389,000 | 205,000 | 6/6 | 11,400 | 1,040,000 | 206,000 | 2/2 | 3,730 | 4,910 | 4,320 | 8/8 | 1,370 | 15,200 | 4,710 |
| PCB086+087+097+109+119 +125 | 2/2 | 41,400 | 842,000 | 441,000 | 6/6 | 28,900 | 2,440,000 | 484,000 | 2/2 | 6,890 | 9,150 | 8,020 | 1/8 | 38,700 | 38,700 | 8,170 |
| PCB088+091 | 2/2 | 13,400 | 266,000 | 140,000 | 6/6 | 8,180 | 793,000 | 153,000 | 2/2 | 1,630 | 1,930 | 1,780 | 6/8 | 916 | 9,720 | 2,900 |
| PCB089 | 1/2 | 276 | 276 | 1,590 | 3/6 | 291 | 877 | 1,780 | 1/2 | 51.3 | 51.3 | 38.5 | 0/8 | -- | -- | 22.5 |
| PCB090+101+113 | 2/2 | 105,000 | 2,260,000 | 1,180,000 | 6/6 | 66,100 | 6,700,000 | 1,330,000 | 2/2 | 18,200 | 21,100 | 19,600 | 7/8 | 8,650 | 95,000 | 27,900 |
| PCB092 | 2/2 | 20,800 | 542,000 | 281,000 | 6/6 | 13,700 | 1,200,000 | 243,000 | 2/2 | 3,250 | 4,300 | 3,770 | 8/8 | 1,640 | 18,700 | 5,820 |
| PCB093+100 | 2/2 | 4,340 | 77,700 | 41,000 | 6/6 | 1,480 | 189,000 | 34,800 | 2/2 | 237 | 251 | 244 | 8/8 | 265 | 2,200 | 910 |
| PCB094 | 2/2 | 455 | 9,250 | 4,850 | 5/6 | 236 | 21,900 | 4,010 | 0/2 | -- | -- | 21 | 4/8 | 45.9 | 160 | 70.4 |
| PCB095 | 1/2 | 45,000 | 45,000 | 281,000 | 5/6 | 31,900 | 171,000 | 349,000 | 1/2 | 7,350 | 7,350 | 5,130 | 0/8 | -- | -- | 6,820 |
| PCB096 | 1/2 | 4,740 | 4,740 | 2,400 | 3/6 | 142 | 12,400 | 2,190 | 0/2 | -- | -- | 8.8 | 1/8 | 91.7 | 91.7 | 26.9 |
| PCB098+102 | 2/2 | 2,120 | 43,600 | 22,900 | 5/6 | 1090 | 119,000 | 22,200 | 2/2 | 249 | 308 | 278 | 5/8 | 132 | 1,310 | 400 |

**Table C-28**
**Summary Statistics for Polychlorinated Biphenyl Congeners in Whole Gulf Killifish Tissue by FCA, Lipid Normalized**

| | FCA1 | | | | FCA2 | | | | FCA3 | | | | Background | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] |
| PCB103 | 2/2 | 1,760 | 40,600 | 21,200 | 6/6 | 788 | 106,000 | 19,900 | 2/2 | 125 | 166 | 146 | 7/8 | 152 | 1,290 | 461 |
| PCB104 | 0/2 | -- | -- | 293 | 0/6 | -- | -- | 436 | 0/2 | -- | -- | 4.1 | 0/8 | -- | -- | 12 |
| PCB105 | 2/2 | 41,100 | 972,000 | 506,000 | 6/6 | 23,300 | 2,140,000 | 418,000 | 2/2 | 9,470 | 10,800 | 10,100 | 8/8 | 2,960 | 38,100 | 11,200 |
| PCB106 | 0/2 | -- | -- | 424 | 0/6 | -- | -- | 548 | 0/2 | -- | -- | 25.9 | 0/8 | -- | -- | 30.2 |
| PCB107 | 2/2 | 11,900 | 208,000 | 110,000 | 6/6 | 6,140 | 643,000 | 124,000 | 2/2 | 2,090 | 2,320 | 2,210 | 8/8 | 918 | 8,530 | 2,750 |
| PCB108+124 | 1/2 | 1,480 | 1,480 | 6,590 | 5/6 | 1,120 | 108,000 | 20,000 | 1/2 | 300 | 300 | 209 | 1/8 | 198 | 198 | 217 |
| PCB110+115 | 2/2 | 79,200 | 1,580,000 | 827,000 | 6/6 | 61,400 | 5,010,000 | 1,000,000 | 2/2 | 15,000 | 19,200 | 17,100 | 2/8 | 9,980 | 81,800 | 17,800 |
| PCB111 | 1/2 | 352 | 352 | 1,530 | 1/6 | 848 | 848 | 1,240 | 0/2 | -- | -- | 21.5 | 0/8 | -- | -- | 33.9 |
| PCB112 | 0/2 | -- | -- | 1,250 | 0/6 | -- | -- | 1,000 | 0/2 | -- | -- | 19.9 | 0/8 | -- | -- | 30.9 |
| PCB114 | 2/2 | 2,750 | 72,100 | 37,400 | 6/6 | 1,390 | 132,000 | 25,900 | 2/2 | 578 | 651 | 615 | 6/8 | 230 | 2,560 | 682 |
| PCB117 | 2/2 | 4,210 | 91,300 | 47,800 | 4/6 | 10,300 | 269,000 | 51,500 | 2/2 | 593 | 898 | 746 | 5/8 | 296 | 1,150 | 648 |
| PCB118 | 2/2 | 143,000 | 3,510,000 | 1,830,000 | 6/6 | 66,500 | 6,790,000 | 1,310,000 | 2/2 | 27,000 | 30,700 | 28,800 | 8/8 | 9,350 | 109,000 | 33,200 |
| PCB120 | 2/2 | 1,890 | 32,500 | 17,200 | 6/6 | 614 | 76,400 | 14,300 | 1/2 | 133 | 133 | 96.4 | 6/8 | 94 | 970 | 304 |
| PCB121 | 0/2 | -- | -- | 1,390 | 0/6 | -- | -- | 1,060 | 0/2 | -- | -- | 22 | 0/8 | -- | -- | 33.9 |
| PCB122 | 0/2 | -- | -- | 472 | 0/6 | -- | -- | 606 | 0/2 | -- | -- | 28 | 0/8 | -- | -- | 33.1 |
| PCB123 | 2/2 | 2,030 | 58,100 | 30,100 | 4/6 | 2,830 | 5,670 | 9,960 | 2/2 | 389 | 522 | 456 | 4/8 | 167 | 1,820 | 427 |
| PCB126 | 1/2 | 396 | 396 | 2,010 | 5/6 | 253 | 25,400 | 4,730 | 0/2 | -- | -- | 32.6 | 3/8 | 73.8 | 122 | 78.4 |
| PCB127 | 0/2 | -- | -- | 455 | 2/6 | 522 | 703 | 808 | 0/2 | -- | -- | 26.9 | 0/8 | -- | -- | 32.2 |
| PCB128+166 | 2/2 | 29,100 | 757,000 | 393,000 | 6/6 | 18,500 | 1,340,000 | 283,000 | 2/2 | 6,060 | 6,340 | 6,200 | 8/8 | 2,130 | 21,200 | 6,990 |
| PCB129+138+163 | 2/2 | 222,000 | 5,790,000 | 3,010,000 | 6/6 | 125,000 | 10,100,000 | 2,080,000 | 2/2 | 42,500 | 46,400 | 44,400 | 8/8 | 14,900 | 154,000 | 50,700 |
| PCB130 | 2/2 | 9,810 | 213,000 | 112,000 | 6/6 | 6,650 | 505,000 | 107,000 | 2/2 | 1,910 | 2,210 | 2,060 | 8/8 | 659 | 7,500 | 2,320 |
| PCB131 | 0/2 | -- | -- | 940 | 0/6 | -- | -- | 1,080 | 0/2 | -- | -- | 20.3 | 0/8 | -- | -- | 34.3 |
| PCB132 | 1/2 | 11,900 | 11,900 | 67,300 | 4/6 | 11,800 | 59,700 | 103,000 | 2/2 | 2,790 | 3,430 | 3,110 | 0/8 | -- | -- | 2,100 |
| PCB133 | 2/2 | 4,690 | 123,000 | 63,700 | 6/6 | 2,430 | 218,000 | 44,200 | 2/2 | 714 | 773 | 744 | 8/8 | 302 | 2,790 | 993 |
| PCB134 | 0/2 | -- | -- | 7,780 | 4/6 | 1,580 | 8,200 | 12,900 | 1/2 | 344 | 344 | 252 | 0/8 | -- | -- | 275 |
| PCB135+151 | 2/2 | 28,700 | 704,000 | 366,000 | 6/6 | 20,300 | 1,510,000 | 325,000 | 2/2 | 4,890 | 7,220 | 6,060 | 6/8 | 2,200 | 22,700 | 7190 |
| PCB136 | 0/2 | -- | -- | 25,400 | 3/6 | 10,200 | 19,000 | 32,200 | 1/2 | 647 | 647 | 463 | 0/8 | -- | -- | 649 |
| PCB137 | 2/2 | 8,310 | 219,000 | 114,000 | 6/6 | 5,720 | 401,000 | 87,400 | 2/2 | 2,220 | 2,500 | 2,360 | 8/8 | 639 | 7,650 | 2360 |
| PCB139+140 | 2/2 | 3,180 | 67,900 | 35,600 | 6/6 | 1,920 | 134,000 | 28,900 | 2/2 | 590 | 669 | 630 | 7/8 | 188 | 2,070 | 663 |
| PCB141 | 2/2 | 12,900 | 330,000 | 172,000 | 6/6 | 12,700 | 836,000 | 180,000 | 2/2 | 3,560 | 4,220 | 3,890 | 4/8 | 1,450 | 16,100 | 3,740 |
| PCB142 | 0/2 | -- | -- | 974 | 0/6 | -- | -- | 1,070 | 0/2 | -- | -- | 20.7 | 0/8 | -- | -- | 35.5 |
| PCB143 | 0/2 | -- | -- | 844 | 0/6 | -- | -- | 1,010 | 0/2 | -- | -- | 19.5 | 0/8 | -- | -- | 31.1 |
| PCB144 | 2/2 | 2,920 | 72,500 | 37,700 | 5/6 | 2,230 | 17,000 | 22,500 | 1/2 | 1,640 | 1,640 | 986 | 0/8 | -- | -- | 545 |
| PCB145 | 0/2 | -- | -- | 429 | 0/6 | -- | -- | 276 | 0/2 | -- | -- | 4.56 | 0/8 | -- | -- | 14.3 |
| PCB146 | 2/2 | 48,100 | 1,190,000 | 617,000 | 6/6 | 21,400 | 2,000,000 | 404,000 | 2/2 | 6,660 | 7,210 | 6,940 | 8/8 | 2,850 | 27,300 | 9,450 |
| PCB147+149 | 2/2 | 57,800 | 1,170,000 | 616,000 | 6/6 | 44,100 | 3,520,000 | 725,000 | 2/2 | 10,800 | 13,400 | 12,100 | 2/8 | 6,650 | 47,700 | 11,400 |
| PCB148 | 2/2 | 675 | 11,400 | 6,030 | 4/6 | 687 | 31,600 | 5,850 | 2/2 | 44.3 | 55.5 | 49.9 | 7/8 | 33.3 | 275 | 122 |
| PCB150 | 2/2 | 273 | 6,110 | 3,190 | 6/6 | 159 | 19,900 | 3,670 | 0/2 | -- | -- | 10.2 | 4/8 | 33 | 127 | 49.7 |
| PCB152 | 1/2 | 71.4 | 71.4 | 415 | 1/6 | 156 | 156 | 288 | 0/2 | -- | -- | 4.17 | 0/8 | -- | -- | 12.9 |
| PCB153+168 | 2/2 | 275,000 | 7,250,000 | 3,760,000 | 6/6 | 130,000 | 11,100,000 | 2,270,000 | 2/2 | 42,700 | 43,300 | 43,000 | 8/8 | 16,400 | 160,000 | 56,200 |

**Table C-28**
**Summary Statistics for Polychlorinated Biphenyl Congeners in Whole Gulf Killifish Tissue by FCA, Lipid Normalized**

| | FCA1 | | | | FCA2 | | | | FCA3 | | | | Background | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] |
| PCB154 | 2/2 | 7,730 | 161,000 | 84,400 | 6/6 | 2,340 | 292,000 | 55,400 | 2/2 | 601 | 616 | 609 | 8/8 | 394 | 3,490 | 1,400 |
| PCB155 | 2/2 | 456 | 9,960 | 5,210 | 3/6 | 111 | 654 | 1,310 | 0/2 | -- | -- | 6.03 | 5/8 | 17.9 | 165 | 56.9 |
| PCB156+157 | 2/2 | 18,200 | 502,000 | 260,000 | 6/6 | 10,700 | 850,000 | 176,000 | 2/2 | 4,700 | 4,830 | 4,770 | 8/8 | 1,320 | 16,200 | 4,940 |
| PCB158 | 2/2 | 16,500 | 451,000 | 234,000 | 6/6 | 10,500 | 729,000 | 156,000 | 2/2 | 3,380 | 3,810 | 3,590 | 8/8 | 1,210 | 14,100 | 4,310 |
| PCB159 | 2/2 | 358 | 8,450 | 4410 | 5/6 | 314 | 19,800 | 4,210 | 1/2 | 67.8 | 67.8 | 51.7 | 4/8 | 73.3 | 263 | 89.8 |
| PCB160 | 0/2 | -- | -- | 738 | 0/6 | -- | -- | 915 | 0/2 | -- | -- | 15 | 0/8 | -- | -- | 26.8 |
| PCB161 | 0/2 | -- | -- | 675 | 0/6 | -- | -- | 783 | 0/2 | -- | -- | 14.7 | 0/8 | -- | -- | 24.7 |
| PCB162 | 1/2 | 942 | 942 | 5,110 | 5/6 | 572 | 64,400 | 12,200 | 2/2 | 202 | 230 | 216 | 3/8 | 56.4 | 205 | 127 |
| PCB164 | 2/2 | 5,550 | 115,000 | 60,500 | 6/6 | 4,660 | 350,000 | 72,800 | 2/2 | 1,300 | 1,610 | 1,450 | 5/8 | 735 | 5,590 | 1,590 |
| PCB165 | 0/2 | -- | -- | 757 | 0/6 | -- | -- | 895 | 0/2 | -- | -- | 18 | 0/8 | -- | -- | 28.2 |
| PCB167 | 2/2 | 9,480 | 274,000 | 142,000 | 6/6 | 5,080 | 418,000 | 85,200 | 2/2 | 2,160 | 2,180 | 2,170 | 8/8 | 635 | 7,010 | 2,280 |
| PCB169 | 0/2 | -- | -- | 1,180 | 0/6 | -- | -- | 606 | 0/2 | -- | -- | 15.5 | 0/8 | -- | -- | 28.8 |
| PCB170 | 2/2 | 39,700 | 1,260,000 | 651,000 | 6/6 | 22,700 | 1,810,000 | 369,000 | 2/2 | 7,030 | 7,400 | 7,220 | 8/8 | 2,530 | 23,900 | 8,980 |
| PCB171+173 | 2/2 | 13,000 | 340,000 | 176,000 | 6/6 | 7,290 | 588,000 | 121,000 | 2/2 | 1,970 | 1,990 | 1,980 | 8/8 | 705 | 6,330 | 2,570 |
| PCB172 | 2/2 | 7,920 | 228,000 | 118,000 | 6/6 | 4,070 | 367,000 | 74,900 | 2/2 | 895 | 1,190 | 1,040 | 8/8 | 442 | 4,410 | 1,560 |
| PCB174 | 2/2 | 10,000 | 230,000 | 120,000 | 6/6 | 9,360 | 639,000 | 136,000 | 2/2 | 1,860 | 2,520 | 2,190 | 6/8 | 726 | 7,840 | 2,660 |
| PCB175 | 2/2 | 1,500 | 39,800 | 20,700 | 5/6 | 1,760 | 54,600 | 11,500 | 2/2 | 249 | 288 | 269 | 5/8 | 129 | 818 | 291 |
| PCB176 | 1/2 | 1,100 | 1,100 | 5,550 | 6/6 | 962 | 62,600 | 13,200 | 2/2 | 203 | 217 | 210 | 4/8 | 130 | 510 | 208 |
| PCB177 | 2/2 | 19,000 | 489,000 | 254,000 | 6/6 | 11,400 | 1,010,000 | 211,000 | 2/2 | 2,530 | 2,760 | 2,650 | 8/8 | 1,040 | 8,170 | 3,180 |
| PCB178 | 2/2 | 12,600 | 328,000 | 170,000 | 6/6 | 6,440 | 599,000 | 123,000 | 2/2 | 1,660 | 1,700 | 1,680 | 8/8 | 761 | 6,330 | 2,620 |
| PCB179 | 2/2 | 4,100 | 86,200 | 45,200 | 6/6 | 3,650 | 279,000 | 58,200 | 2/2 | 655 | 762 | 708 | 5/8 | 318 | 1,900 | 811 |
| PCB180+193 | 2/2 | 116,000 | 3,550,000 | 1,830,000 | 6/6 | 55,900 | 4,810,000 | 990,000 | 2/2 | 17,400 | 18,100 | 17,700 | 8/8 | 6,790 | 61,000 | 23,600 |
| PCB181 | 1/2 | 481 | 481 | 2,470 | 5/6 | 344 | 2,460 | 3,130 | 1/2 | 103 | 103 | 73.9 | 4/8 | 162 | 365 | 124 |
| PCB182 | 1/2 | 525 | 525 | 2,620 | 4/6 | 823 | 1,360 | 3,170 | 2/2 | 91.5 | 98.4 | 95 | 4/8 | 61.1 | 367 | 110 |
| PCB183 | 2/2 | 31,900 | 875,000 | 454,000 | 6/6 | 15,700 | 1,340,000 | 277,000 | 2/2 | 4,610 | 5,470 | 5,040 | 8/8 | 1,890 | 18,500 | 6,970 |
| PCB184 | 1/2 | 316 | 316 | 1,180 | 2/6 | 208 | 11,900 | 2,060 | 0/2 | -- | -- | 7.83 | 1/8 | 58.9 | 58.9 | 24.4 |
| PCB185 | 2/2 | 1,400 | 29,800 | 15,600 | 6/6 | 1,040 | 114,000 | 22,900 | 1/2 | 267 | 267 | 144 | 4/8 | 131 | 452 | 250 |
| PCB186 | 0/2 | -- | -- | 381 | 0/6 | -- | -- | 392 | 0/2 | -- | -- | 5.79 | 0/8 | -- | -- | 14.5 |
| PCB187 | 2/2 | 94,800 | 2,380,000 | 1,240,000 | 6/6 | 44,900 | 4,070,000 | 836,000 | 2/2 | 12,000 | 12,900 | 12,400 | 8/8 | 5,430 | 47,200 | 19,400 |
| PCB188 | 2/2 | 347 | 7,580 | 3,970 | 5/6 | 117 | 13,900 | 2,570 | 1/2 | 31.4 | 31.4 | 17.9 | 4/8 | 25.9 | 147 | 48 |
| PCB189 | 2/2 | 1,260 | 31,500 | 16,400 | 6/6 | 555 | 43,400 | 8,890 | 2/2 | 161 | 170 | 165 | 5/8 | 69 | 722 | 202 |
| PCB190 | 2/2 | 5,900 | 183,000 | 94,500 | 6/6 | 2,770 | 246,000 | 50,400 | 2/2 | 656 | 873 | 765 | 8/8 | 404 | 3,680 | 1,250 |
| PCB191 | 2/2 | 2,070 | 60,400 | 31,200 | 6/6 | 1,000 | 82,900 | 17,000 | 2/2 | 347 | 376 | 362 | 5/8 | 161 | 1,360 | 454 |
| PCB192 | 0/2 | -- | -- | 1,110 | 0/6 | -- | -- | 588 | 0/2 | -- | -- | 22.3 | 0/8 | -- | -- | 27.4 |
| PCB194 | 2/2 | 11,000 | 451,000 | 231,000 | 6/6 | 5,550 | 435,000 | 90,600 | 2/2 | 1,670 | 1,870 | 1,770 | 8/8 | 899 | 8,990 | 3,350 |
| PCB195 | 2/2 | 6,310 | 221,000 | 114,000 | 6/6 | 2,900 | 272,000 | 56,000 | 2/2 | 932 | 1,040 | 986 | 8/8 | 508 | 4,680 | 1,950 |
| PCB196 | 2/2 | 13,600 | 398,000 | 206,000 | 6/6 | 6,440 | 582,000 | 118,000 | 2/2 | 1,720 | 1,910 | 1,820 | 8/8 | 935 | 8,010 | 3,510 |
| PCB197 | 2/2 | 2,680 | 67,900 | 35,300 | 6/6 | 822 | 106,000 | 20,400 | 2/2 | 209 | 264 | 237 | 7/8 | 145 | 1,030 | 463 |
| PCB198+199 | 2/2 | 29,200 | 815,000 | 422,000 | 6/6 | 14,200 | 1,340,000 | 273,000 | 2/2 | 3,700 | 4,020 | 3,860 | 8/8 | 2,120 | 16,100 | 7,520 |
| PCB200 | 1/2 | 429 | 429 | 2,590 | 5/6 | 408 | 34,100 | 6,730 | 2/2 | 57.3 | 79.6 | 68.4 | 4/8 | 34.9 | 319 | 91.1 |

**Table C-28**
**Summary Statistics for Polychlorinated Biphenyl Congeners in Whole Gulf Killifish Tissue by FCA, Lipid Normalized**

| | FCA1 | | | | FCA2 | | | | FCA3 | | | | Background | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] |
| PCB201 | 2/2 | 3,550 | 101,000 | 52,200 | 6/6 | 1,640 | 159,000 | 32,400 | 2/2 | 440 | 445 | 442 | 7/8 | 213 | 1,680 | 773 |
| PCB202 | 2/2 | 5,860 | 167,000 | 86,200 | 6/6 | 2,420 | 282,000 | 55,200 | 2/2 | 690 | 815 | 753 | 8/8 | 399 | 3,410 | 1,580 |
| PCB203 | 2/2 | 13,700 | 440,000 | 227,000 | 6/6 | 6,400 | 592,000 | 120,000 | 2/2 | 1,540 | 1,740 | 1,640 | 8/8 | 1,260 | 10,400 | 3,880 |
| PCB204 | 2/2 | 180 | 4,190 | 2,180 | 2/6 | 104 | 249 | 646 | 0/2 | -- | -- | 8.28 | 0/8 | -- | -- | 20.8 |
| PCB205 | 2/2 | 350 | 11,800 | 6,070 | 3/6 | 422 | 1,150 | 1,400 | 0/2 | -- | -- | 12.1 | 1/8 | 257 | 257 | 51.1 |
| PCB206 | 2/2 | 4,350 | 127,000 | 65,500 | 5/6 | 1,930 | 159,000 | 30,100 | 2/2 | 398 | 454 | 426 | 7/8 | 477 | 4,790 | 1,530 |
| PCB207 | 2/2 | 4,900 | 165,000 | 85,200 | 6/6 | 1,390 | 226,000 | 41,400 | 2/2 | 382 | 487 | 434 | 7/8 | 344 | 3,130 | 1,160 |
| PCB208 | 2/2 | 5,900 | 174,000 | 90,000 | 6/6 | 1,760 | 277,000 | 50,400 | 2/2 | 391 | 495 | 443 | 6/8 | 374 | 3,560 | 1,160 |
| PCB209 | 2/2 | 58,000 | 1,650,000 | 853,000 | 6/6 | 12,300 | 2,480,000 | 446,000 | 2/2 | 2,520 | 4,040 | 3,280 | 8/8 | 2,980 | 31,900 | 10,800 |
| **Polychlorinated Biphenyls (µg/kg - lw)** | | | | | | | | | | | | | | | | |
| Total PCBs [c] | 2/2 | 2,600 | 63,200 | 32,900 | 6/6 | 1,390 | 139,000 | 27,000 | 2/2 | 389 | 440 | 415 | 8/8 | 178 | 1,800 | 616 |

**Notes**

-- = not applicable, no detected values
FCA = fish collection area
lw = lipid weight
PCB = polychlorinated biphenyl

a - Mean calculation includes detected and non-detected values. Non-detected values were set at one-half the detection limit.
b - PCB###+#### indicates a co-elution of two or more PCB congeners.
c - Total polychlorinated biphenyls were calculated as the sum of all 209 congeners with non-detects set at one-half the detection limit.

**Table C-29**
**Summary Statistics for Polychlorinated Biphenyls in Edible Blue Crab Tissue by FCA, Wet Weight**

| | FCA1 | | | | | FCA2 | | | | | FCA3 | | | | | Background | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] |
| Blue Crab - Edible | | | | | | | | | | | | | | | | | | | | |
| **Polychlorinated Biphenyls [b] (ng/kg - ww)** | | | | | | | | | | | | | | | | | | | | |
| PCB001 | 0/10 | -- | -- | 0.717 | NA | 0/10 | -- | -- | 0.971 | NA | 2/10 | 1.32 | 2.57 | 1.18 | NA | 0/10 | -- | -- | 0.735 | NA |
| PCB002 | 0/10 | -- | -- | 0.741 | NA | 0/10 | -- | -- | 0.949 | NA | 0/10 | -- | -- | 0.749 | NA | 0/10 | -- | -- | 0.773 | NA |
| PCB003 | 0/10 | -- | -- | 0.858 | NA | 0/10 | -- | -- | 1.11 | NA | 2/10 | 1.97 | 1.97 | 1.26 | NA | 0/10 | -- | -- | 0.902 | NA |
| PCB004 | 0/10 | -- | -- | 2.7 | NA | 0/10 | -- | -- | 5.94 | NA | 0/10 | -- | -- | 17.7 | NA | 0/10 | -- | -- | 5.9 | NA |
| PCB005 | 0/10 | -- | -- | 2.73 | NA | 0/10 | -- | -- | 2.83 | NA | 0/10 | -- | -- | 5.9 | NA | 0/10 | -- | -- | 2.61 | NA |
| PCB006 | 0/10 | -- | -- | 2.27 | NA | 0/10 | -- | -- | 2.4 | NA | 0/10 | -- | -- | 5.41 | NA | 0/10 | -- | -- | 2.23 | NA |
| PCB007 | 0/10 | -- | -- | 2.36 | NA | 0/10 | -- | -- | 2.57 | NA | 0/10 | -- | -- | 5.83 | NA | 0/10 | -- | -- | 2.34 | NA |
| PCB008 | 0/10 | -- | -- | 2.74 | NA | 7/10 | 7.13 | 46.7 | 14.9 | NA | 0/10 | -- | -- | 8.78 | NA | 0/10 | -- | -- | 3.45 | NA |
| PCB009 | 0/10 | -- | -- | 2.32 | NA | 0/10 | -- | -- | 2.48 | NA | 0/10 | -- | -- | 5.44 | NA | 0/10 | -- | -- | 2.28 | NA |
| PCB010 | 0/10 | -- | -- | 2.1 | NA | 0/10 | -- | -- | 4.56 | NA | 0/10 | -- | -- | 13.3 | NA | 0/10 | -- | -- | 4.38 | NA |
| PCB011 | 0/10 | -- | -- | 50 | NA | 0/10 | -- | -- | 35.8 | NA | 0/10 | -- | -- | 59.2 | NA | 0/10 | -- | -- | 46.7 | NA |
| PCB012+013 | 0/10 | -- | -- | 2.35 | NA | 0/10 | -- | -- | 2.42 | NA | 0/10 | -- | -- | 5.44 | NA | 0/10 | -- | -- | 2.28 | NA |
| PCB014 | 0/10 | -- | -- | 2.24 | NA | 0/10 | -- | -- | 2.34 | NA | 0/10 | -- | -- | 5.26 | NA | 0/10 | -- | -- | 2.18 | NA |
| PCB015 | 4/10 | 21.5 | 55.2 | 15.5 | NA | 10/10 | 48.1 | 159 | 83.9 | NA | 6/10 | 33.1 | 83.4 | 41.8 | NA | 0/10 | -- | -- | 2.9 | NA |
| PCB016 | 0/10 | -- | -- | 1.56 | NA | 0/10 | -- | -- | 1.68 | NA | 0/10 | -- | -- | 1.87 | NA | 0/10 | -- | -- | 1.66 | NA |
| PCB017 | 0/10 | -- | -- | 1.84 | NA | 5/10 | 2.93 | 7.17 | 4.59 | NA | 1/10 | 12.7 | 12.7 | 3.88 | NA | 0/10 | -- | -- | 1.69 | NA |
| PCB018+030 | 0/10 | -- | -- | 3.07 | NA | 2/10 | 6.39 | 17.8 | 6.4 | NA | 0/10 | -- | -- | 5.59 | NA | 0/10 | -- | -- | 2.62 | NA |
| PCB019 | 0/10 | -- | -- | 0.967 | NA | 0/10 | -- | -- | 1.14 | NA | 3/10 | 1.29 | 3.09 | 1.24 | NA | 1/10 | 1.09 | 1.09 | 1 | NA |
| PCB020+028 | 10/10 | 32.7 | 487 | 110 | NA | 10/10 | 221 | 484 | 326 | NA | 10/10 | 158 | 346 | 247 | NA | 9/10 | 56.6 | 92.2 | 68.1 | NA |
| PCB021+033 | 0/10 | -- | -- | 2.53 | NA | 1/10 | 6.94 | 6.94 | 3.4 | NA | 0/10 | -- | -- | 3.76 | NA | 0/10 | -- | -- | 2.23 | NA |
| PCB022 | 6/10 | 5.01 | 29.5 | 6.88 | NA | 9/10 | 8.79 | 26.2 | 16.3 | NA | 8/10 | 12.8 | 31.1 | 15.8 | NA | 1/10 | 2.23 | 2.23 | 1.95 | NA |
| PCB023 | 0/10 | -- | -- | 0.856 | NA | 0/10 | -- | -- | 1.08 | NA | 0/10 | -- | -- | 0.664 | NA | 0/10 | -- | -- | 0.684 | NA |
| PCB024 | 0/10 | -- | -- | 0.902 | NA | 0/10 | -- | -- | 0.997 | NA | 0/10 | -- | -- | 0.645 | NA | 0/10 | -- | -- | 0.798 | NA |
| PCB025 | 1/10 | 1.09 | 1.09 | 0.768 | NA | 5/10 | 3.1 | 8.19 | 3.03 | NA | 4/10 | 0.751 | 4.78 | 1.77 | NA | 0/10 | -- | -- | 0.61 | NA |
| PCB026+029 | 2/10 | 2.14 | 2.88 | 1.38 | NA | 4/10 | 3.21 | 9.95 | 4.38 | NA | 4/10 | 6.4 | 8.27 | 4.09 | NA | 1/10 | 1.6 | 1.6 | 1.05 | NA |
| PCB027 | 0/10 | -- | -- | 0.803 | NA | 1/10 | 3.46 | 3.46 | 1.18 | NA | 4/10 | 1.6 | 3.26 | 1.33 | NA | 1/10 | 0.891 | 0.891 | 0.771 | NA |
| PCB031 | 1/10 | 44.4 | 44.4 | 9.3 | NA | 7/10 | 25.2 | 46.7 | 27.3 | NA | 7/10 | 27.7 | 42.1 | 25 | NA | 0/10 | -- | -- | 4.54 | NA |
| PCB032 | 8/10 | 2.59 | 13 | 4.47 | NA | 9/10 | 4.71 | 37.4 | 12.9 | NA | 9/10 | 6.2 | 16.3 | 9.5 | NA | 6/10 | 1.98 | 5.3 | 2.64 | NA |
| PCB034 | 0/10 | -- | -- | 0.807 | NA | 0/10 | -- | -- | 1.02 | NA | 0/10 | -- | -- | 0.59 | NA | 0/10 | -- | -- | 0.632 | NA |
| PCB035 | 0/10 | -- | -- | 0.807 | NA | 0/10 | -- | -- | 1.03 | NA | 0/10 | -- | -- | 0.594 | NA | 0/10 | -- | -- | 0.655 | NA |
| PCB036 | 0/10 | -- | -- | 0.743 | NA | 0/10 | -- | -- | 0.907 | NA | 0/10 | -- | -- | 0.517 | NA | 0/10 | -- | -- | 0.57 | NA |
| PCB037 | 6/10 | 3.19 | 44.9 | 9.01 | NA | 8/10 | 17.4 | 61.1 | 27.1 | NA | 8/10 | 16 | 41.1 | 23 | NA | 8/10 | 3.12 | 4.62 | 3.24 | NA |
| PCB038 | 0/10 | -- | -- | 0.796 | NA | 0/10 | -- | -- | 1 | NA | 0/10 | -- | -- | 0.59 | NA | 0/10 | -- | -- | 0.643 | NA |
| PCB039 | 0/10 | -- | -- | 0.785 | NA | 0/10 | -- | -- | 0.99 | NA | 0/10 | -- | -- | 0.571 | NA | 0/10 | -- | -- | 0.625 | NA |
| PCB040+041+071 | 9/10 | 2.56 | 23.5 | 8.51 | NA | 9/10 | 11.6 | 38.7 | 24.1 | NA | 8/10 | 18.1 | 41.6 | 22.4 | NA | 3/10 | 4.63 | 13.1 | 4.46 | NA |
| PCB042 | 3/10 | 4.63 | 7.91 | 2.76 | NA | 9/10 | 4.46 | 20 | 12 | NA | 7/10 | 3.74 | 12.1 | 8.52 | NA | 4/10 | 1.22 | 5 | 2.05 | NA |
| PCB043+073 | 0/10 | -- | -- | 0.908 | NA | 0/10 | -- | -- | 0.943 | NA | 0/10 | -- | -- | 0.819 | NA | 0/10 | -- | -- | 0.74 | NA |
| PCB044+047+065 | 10/10 | 43.2 | 342 | 109 | NA | 10/10 | 201 | 637 | 362 | NA | 10/10 | 167 | 431 | 272 | NA | 7/10 | 74.6 | 102 | 70.4 | NA |
| PCB045+051 | 4/10 | 2.09 | 4.6 | 2.18 | NA | 3/10 | 3.65 | 6.03 | 2.85 | NA | 5/10 | 3.44 | 8.16 | 3.7 | NA | 2/10 | 2.61 | 3.87 | 1.52 | NA |
| PCB046 | 0/10 | -- | -- | 1.12 | NA | 0/10 | -- | -- | 1.19 | NA | 0/10 | -- | -- | 0.811 | NA | 0/10 | -- | -- | 0.91 | NA |
| PCB048 | 0/10 | -- | -- | 0.974 | NA | 1/10 | 3.26 | 3.26 | 1.76 | NA | 2/10 | 2.2 | 2.54 | 1.4 | NA | 1/10 | 2.08 | 2.08 | 1.05 | NA |
| PCB049+069 | 0/10 | -- | -- | 4.76 | NA | 7/10 | 27.1 | 73.6 | 33.4 | NA | 8/10 | 23.1 | 47.5 | 29.2 | NA | 1/10 | 14.5 | 14.5 | 4.73 | NA |
| PCB050+053 | 0/10 | -- | -- | 1.06 | NA | 4/10 | 6.49 | 15.1 | 5.42 | NA | 7/10 | 4.47 | 12.9 | 6.41 | NA | 1/10 | 1.57 | 1.57 | 0.956 | NA |
| PCB052 | 0/10 | -- | -- | 9.71 | NA | 5/10 | 60.7 | 173 | 58 | NA | 6/10 | 48.6 | 69.7 | 41 | NA | 0/10 | -- | -- | 8.2 | NA |

**Table C-29**
**Summary Statistics for Polychlorinated Biphenyls in Edible Blue Crab Tissue by FCA, Wet Weight**

| | FCA1 | | | | | FCA2 | | | | | FCA3 | | | | | Background | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] |
| PCB054 | 0/10 | -- | -- | 0.441 | NA | 0/10 | -- | -- | 0.563 | NA | 0/10 | -- | -- | 0.327 | NA | 0/10 | -- | -- | 0.416 | NA |
| PCB055 | 0/10 | -- | -- | 0.802 | NA | 0/10 | -- | -- | 0.843 | NA | 1/10 | 3.09 | 3.09 | 0.837 | NA | 0/10 | -- | -- | 0.664 | NA |
| PCB056 | 2/10 | 2.33 | 2.43 | 1.74 | NA | 8/10 | 3.9 | 13.4 | 8.84 | NA | 7/10 | 8.8 | 19 | 8.59 | NA | 0/10 | -- | -- | 1.25 | NA |
| PCB057 | 0/10 | -- | -- | 0.713 | NA | 0/10 | -- | -- | 0.747 | NA | 0/10 | -- | -- | 0.505 | NA | 0/10 | -- | -- | 0.606 | NA |
| PCB058 | 0/10 | -- | -- | 0.741 | NA | 0/10 | -- | -- | 0.777 | NA | 0/10 | -- | -- | 0.52 | NA | 0/10 | -- | -- | 0.648 | NA |
| PCB059+062+075 | 6/10 | 2.08 | 24.1 | 6.48 | NA | 10/10 | 14.3 | 46 | 27.3 | NA | 10/10 | 11.5 | 29.3 | 19.7 | NA | 10/10 | 1.49 | 7.01 | 5.03 | NA |
| PCB060 | 8/10 | 6.25 | 107 | 22.7 | NA | 10/10 | 49.6 | 172 | 86.7 | NA | 10/10 | 36.6 | 99 | 62.8 | NA | 9/10 | 7.21 | 12.7 | 9.13 | NA |
| PCB061+070+074+076 | 8/10 | 35.8 | 262 | 76.4 | NA | 10/10 | 201 | 514 | 276 | NA | 10/10 | 147 | 320 | 206 | NA | 5/10 | 51 | 66.9 | 39 | NA |
| PCB063 | 4/10 | 2.74 | 10.6 | 2.58 | NA | 8/10 | 2.98 | 12.3 | 7.24 | NA | 9/10 | 4.02 | 12.6 | 6.58 | NA | 3/10 | 1.38 | 1.89 | 1.04 | NA |
| PCB064 | 4/10 | 11.9 | 22.3 | 8.46 | NA | 10/10 | 11.7 | 46.7 | 29.8 | NA | 8/10 | 25.4 | 38.3 | 24.7 | NA | 0/10 | -- | -- | 2.61 | NA |
| PCB066 | 10/10 | 26.8 | 430 | 114 | NA | 10/10 | 234 | 750 | 402 | NA | 10/10 | 172 | 450 | 291 | NA | 10/10 | 17.2 | 87.9 | 62.2 | NA |
| PCB067 | 0/10 | -- | -- | 0.649 | NA | 1/10 | 1.77 | 1.77 | 0.829 | NA | 0/10 | -- | -- | 0.461 | NA | 0/10 | -- | -- | 0.556 | NA |
| PCB068 | 3/10 | 1.61 | 8.02 | 2 | NA | 6/10 | 4.69 | 10.5 | 5.29 | NA | 10/10 | 3.17 | 8.97 | 5.67 | NA | 5/10 | 1.66 | 2.76 | 1.61 | NA |
| PCB072 | 1/10 | 1.34 | 1.34 | 0.832 | NA | 6/10 | 3.51 | 4.62 | 2.97 | NA | 5/10 | 2.78 | 5.85 | 2.36 | NA | 1/10 | 1.13 | 1.13 | 0.659 | NA |
| PCB077 | 5/10 | 2.56 | 26.9 | 5.92 | 2.51 | 9/10 | 15.4 | 39 | 23.5 | 22 | 10/10 | 9.66 | 24.9 | 17.8 | 16.3 | 3/10 | 2.59 | 2.75 | 1.59 | 1.48 |
| PCB078 | 0/10 | -- | -- | 0.828 | NA | 0/10 | -- | -- | 0.928 | NA | 0/10 | -- | -- | 0.742 | NA | 0/10 | -- | -- | 0.589 | NA |
| PCB079 | 0/10 | -- | -- | 0.727 | NA | 0/10 | -- | -- | 0.933 | NA | 1/10 | 2.34 | 2.34 | 0.841 | NA | 0/10 | -- | -- | 0.524 | NA |
| PCB080 | 0/10 | -- | -- | 0.704 | NA | 0/10 | -- | -- | 0.808 | NA | 0/10 | -- | -- | 0.667 | NA | 0/10 | -- | -- | 0.518 | NA |
| PCB081 | 0/10 | -- | -- | 0.947 | 0.85 | 0/10 | -- | -- | 1.1 | 1.03 | 0/10 | -- | -- | 0.86 | 0.833 | 0/10 | -- | -- | 0.665 | 0.635 |
| PCB082 | 0/10 | -- | -- | 1.45 | NA | 1/10 | 2.96 | 2.96 | 1.62 | NA | 1/10 | 4.33 | 4.33 | 1.58 | NA | 1/10 | 0.881 | 0.881 | 0.962 | NA |
| PCB083+099 | 10/10 | 40.2 | 509 | 183 | NA | 10/10 | 351 | 1,430 | 684 | NA | 10/10 | 225 | 830 | 433 | NA | 10/10 | 61.7 | 243 | 144 | NA |
| PCB084 | 0/10 | -- | -- | 1.26 | NA | 0/10 | -- | -- | 2.6 | NA | 1/10 | 12.1 | 12.1 | 3.23 | NA | 0/10 | -- | -- | 1.78 | NA |
| PCB085+116 | 10/10 | 7.29 | 78.1 | 27.4 | NA | 10/10 | 61.3 | 251 | 120 | NA | 10/10 | 34 | 122 | 71.1 | NA | 9/10 | 5.68 | 23.2 | 13.3 | NA |
| PCB086+087+097+109+119 +125 | 3/10 | 31.7 | 53.7 | 18.1 | NA | 10/10 | 50.8 | 113 | 75 | NA | 10/10 | 32.4 | 99.1 | 55 | NA | 5/10 | 16.4 | 26.1 | 15.6 | NA |
| PCB088+091 | 4/10 | 4.52 | 9.82 | 3.8 | NA | 10/10 | 6.77 | 25.1 | 15.1 | NA | 8/10 | 11.7 | 21.6 | 12.4 | NA | 6/10 | 1.42 | 6.55 | 3 | NA |
| PCB089 | 0/10 | -- | -- | 0.958 | NA | 0/10 | -- | -- | 0.999 | NA | 0/10 | -- | -- | 0.651 | NA | 0/10 | -- | -- | 0.76 | NA |
| PCB090+101+113 | 1/10 | 64.1 | 64.1 | 18.4 | NA | 8/10 | 70.9 | 215 | 101 | NA | 8/10 | 70.7 | 127 | 73.3 | NA | 1/10 | 38.5 | 38.5 | 13.4 | NA |
| PCB092 | 4/10 | 5.07 | 13 | 3.88 | NA | 8/10 | 9.63 | 37.7 | 17.2 | NA | 7/10 | 13 | 29.9 | 13.3 | NA | 2/10 | 3.42 | 5 | 2.24 | NA |
| PCB093+100 | 5/10 | 3.23 | 10 | 4.46 | NA | 10/10 | 12 | 50.2 | 26 | NA | 9/10 | 9.23 | 33.7 | 16.6 | NA | 7/10 | 1.96 | 7.35 | 3.85 | NA |
| PCB094 | 0/10 | -- | -- | 0.997 | NA | 0/10 | -- | -- | 1.05 | NA | 0/10 | -- | -- | 0.848 | NA | 0/10 | -- | -- | 0.811 | NA |
| PCB095 | 0/10 | -- | -- | 5.81 | NA | 1/10 | 68 | 68 | 16.8 | NA | 2/10 | 30.2 | 50.2 | 16.3 | NA | 0/10 | -- | -- | 5.61 | NA |
| PCB096 | 0/10 | -- | -- | 0.648 | NA | 0/10 | -- | -- | 0.688 | NA | 0/10 | -- | -- | 0.466 | NA | 0/10 | -- | -- | 0.516 | NA |
| PCB098+102 | 0/10 | -- | -- | 0.888 | NA | 2/10 | 2.96 | 3.19 | 1.59 | NA | 2/10 | 2.12 | 2.39 | 1.17 | NA | 0/10 | -- | -- | 0.731 | NA |
| PCB103 | 0/10 | -- | -- | 0.783 | NA | 1/10 | 1.98 | 1.98 | 1.18 | NA | 0/10 | -- | -- | 0.595 | NA | 0/10 | -- | -- | 0.634 | NA |
| PCB104 | 0/10 | -- | -- | 0.594 | NA | 0/10 | -- | -- | 0.621 | NA | 0/10 | -- | -- | 0.391 | NA | 0/10 | -- | -- | 0.46 | NA |
| PCB105 | 10/10 | 15.2 | 177 | 58.9 | 43.1 | 10/10 | 123 | 483 | 267 | 214 | 10/10 | 76.8 | 237 | 149 | 142 | 7/10 | 8.04 | 45.8 | 22 | 18.4 |
| PCB106 | 0/10 | -- | -- | 0.816 | NA | 0/10 | -- | -- | 1.37 | NA | 0/10 | -- | -- | 0.816 | NA | 0/10 | -- | -- | 0.654 | NA |
| PCB107 | 6/10 | 3.06 | 35.8 | 10.7 | NA | 10/10 | 20.4 | 85.9 | 45.6 | NA | 10/10 | 18.2 | 62.3 | 32.3 | NA | 4/10 | 6.92 | 9.73 | 5 | NA |
| PCB108+124 | 0/10 | -- | -- | 0.855 | NA | 2/10 | 5.04 | 5.48 | 2.32 | NA | 4/10 | 2.99 | 3.12 | 2 | NA | 0/10 | -- | -- | 0.72 | NA |
| PCB110+115 | 2/10 | 46.1 | 50 | 19 | NA | 8/10 | 55.5 | 155 | 89.8 | NA | 8/10 | 68.3 | 148 | 73.9 | NA | 0/10 | -- | -- | 10.6 | NA |
| PCB111 | 0/10 | -- | -- | 1 | NA | 0/10 | -- | -- | 1.13 | NA | 0/10 | -- | -- | 0.76 | NA | 0/10 | -- | -- | 0.628 | NA |
| PCB112 | 0/10 | -- | -- | 0.905 | NA | 0/10 | -- | -- | 0.905 | NA | 0/10 | -- | -- | 0.747 | NA | 0/10 | -- | -- | 0.598 | NA |
| PCB114 | 4/10 | 4.11 | 15.2 | 3.8 | 2.5 | 8/10 | 9.92 | 40.1 | 16.6 | 15.1 | 7/10 | 6.38 | 14.1 | 8.98 | 8.26 | 2/10 | 2.34 | 3.86 | 1.26 | 0.918 |
| PCB117 | 1/10 | 2.43 | 2.43 | 1.85 | NA | 7/10 | 9.13 | 16.7 | 8.89 | NA | 5/10 | 2.78 | 8.91 | 5.54 | NA | 2/10 | 1.87 | 2.54 | 1.07 | NA |
| PCB118 | 10/10 | 48.4 | 545 | 195 | 139 | 10/10 | 428 | 1540 | 826 | 680 | 10/10 | 268 | 839 | 489 | 446 | 10/10 | 39.9 | 178 | 111 | 99.2 |

**Table C-29**
**Summary Statistics for Polychlorinated Biphenyls in Edible Blue Crab Tissue by FCA, Wet Weight**

| | FCA1 | | | | | FCA2 | | | | | FCA3 | | | | | Background | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] |
| PCB120 | 2/10 | 2.07 | 3.31 | 1.3 | NA | 6/10 | 4.1 | 15.6 | 6.32 | NA | 6/10 | 2.68 | 10.6 | 3.99 | NA | 3/10 | 2.38 | 2.62 | 1.44 | NA |
| PCB121 | 0/10 | -- | -- | 0.952 | NA | 0/10 | -- | -- | 0.955 | NA | 0/10 | -- | -- | 0.773 | NA | 0/10 | -- | -- | 0.616 | NA |
| PCB122 | 0/10 | -- | -- | 0.888 | NA | 0/10 | -- | -- | 1.52 | NA | 0/10 | -- | -- | 0.884 | NA | 0/10 | -- | -- | 0.728 | NA |
| PCB123 | 2/10 | 4.36 | 5.04 | 2.28 | 1.09 | 3/10 | 12.3 | 13.9 | 9.59 | 9.6 | 6/10 | 4.2 | 12.3 | 6.46 | 6.41 | 0/10 | -- | -- | 0.824 | 0.778 |
| PCB126 | 0/10 | -- | -- | 0.861 | 0.683 | 1/10 | 4.53 | 4.53 | 1.76 | 1.44 | 1/10 | 2.48 | 2.48 | 0.995 | 1.02 | 0/10 | -- | -- | 0.675 | 0.648 |
| PCB127 | 0/10 | -- | -- | 0.876 | NA | 0/10 | -- | -- | 1.46 | NA | 0/10 | -- | -- | 0.838 | NA | 0/10 | -- | -- | 0.71 | NA |
| PCB128+166 | 9/10 | 6.24 | 61.7 | 22.5 | NA | 10/10 | 55.5 | 182 | 106 | NA | 10/10 | 28.6 | 111 | 64.5 | NA | 10/10 | 6.41 | 24.7 | 14.3 | NA |
| PCB129+138+163 | 10/10 | 42.5 | 482 | 167 | NA | 10/10 | 361 | 1,250 | 703 | NA | 10/10 | 191 | 802 | 434 | NA | 10/10 | 45.4 | 192 | 101 | NA |
| PCB130 | 7/10 | 2.49 | 8.87 | 3.96 | NA | 8/10 | 10.1 | 22 | 12.3 | NA | 9/10 | 3.31 | 18.5 | 9.61 | NA | 5/10 | 1.8 | 3.03 | 1.55 | NA |
| PCB131 | 0/10 | -- | -- | 0.769 | NA | 0/10 | -- | -- | 1.22 | NA | 0/10 | -- | -- | 0.681 | NA | 0/10 | -- | -- | 0.651 | NA |
| PCB132 | 5/10 | 2.55 | 4.82 | 2.3 | NA | 0/10 | -- | -- | 2.99 | NA | 1/10 | 11.3 | 11.3 | 4.05 | NA | 0/10 | -- | -- | 1.9 | NA |
| PCB133 | 1/10 | 4.6 | 4.6 | 1.86 | NA | 8/10 | 7.65 | 31.3 | 13.9 | NA | 10/10 | 5.5 | 20 | 10.2 | NA | 6/10 | 1.58 | 5.51 | 2.5 | NA |
| PCB134 | 0/10 | -- | -- | 0.84 | NA | 0/10 | -- | -- | 1.34 | NA | 1/10 | 1.94 | 1.94 | 0.957 | NA | 0/10 | -- | -- | 0.675 | NA |
| PCB135+151 | 4/10 | 4.39 | 8.52 | 3.33 | NA | 8/10 | 8.59 | 45.7 | 17.6 | NA | 8/10 | 14 | 37.3 | 16.6 | NA | 5/10 | 3.65 | 5.13 | 2.74 | NA |
| PCB136 | 0/10 | -- | -- | 0.489 | NA | 4/10 | 1.42 | 4.56 | 1.49 | NA | 4/10 | 0.869 | 4.13 | 1.39 | NA | 2/10 | 0.9 | 1.5 | 0.676 | NA |
| PCB137 | 5/10 | 2.02 | 20.2 | 6.16 | NA | 8/10 | 13.7 | 78.7 | 31.4 | NA | 9/10 | 10.3 | 37.1 | 20 | NA | 6/10 | 3.57 | 11.4 | 4.06 | NA |
| PCB139+140 | 4/10 | 2.36 | 8.07 | 2.53 | NA | 9/10 | 6.8 | 31 | 14.5 | NA | 9/10 | 4.42 | 17.3 | 9.03 | NA | 5/10 | 1.81 | 3.77 | 1.74 | NA |
| PCB141 | 2/10 | 1.92 | 2.17 | 1.12 | NA | 5/10 | 9.54 | 31 | 9.04 | NA | 6/10 | 5.18 | 23.5 | 7.56 | NA | 1/10 | 2.99 | 2.99 | 1.09 | NA |
| PCB142 | 0/10 | -- | -- | 0.782 | NA | 0/10 | -- | -- | 1.2 | NA | 0/10 | -- | -- | 0.683 | NA | 0/10 | -- | -- | 0.654 | NA |
| PCB143 | 0/10 | -- | -- | 0.701 | NA | 0/10 | -- | -- | 1.08 | NA | 0/10 | -- | -- | 0.648 | NA | 0/10 | -- | -- | 0.622 | NA |
| PCB144 | 0/10 | -- | -- | 1.09 | NA | 3/10 | 2.57 | 4.21 | 1.9 | NA | 2/10 | 1.33 | 4.15 | 1.4 | NA | 0/10 | -- | -- | 0.757 | NA |
| PCB145 | 0/10 | -- | -- | 0.533 | NA | 0/10 | -- | -- | 0.605 | NA | 0/10 | -- | -- | 0.377 | NA | 0/10 | -- | -- | 0.396 | NA |
| PCB146 | 10/10 | 7.47 | 82.6 | 31 | NA | 10/10 | 66.1 | 280 | 129 | NA | 10/10 | 40.9 | 170 | 83.8 | NA | 9/10 | 11 | 39.4 | 22.5 | NA |
| PCB147+149 | 5/10 | 19.4 | 39.8 | 17.6 | NA | 10/10 | 30.6 | 118 | 68.1 | NA | 9/10 | 18.4 | 121 | 59.1 | NA | 2/10 | 19.9 | 20.1 | 8.48 | NA |
| PCB148 | 0/10 | -- | -- | 0.678 | NA | 6/10 | 1.48 | 7.83 | 2.73 | NA | 4/10 | 1.45 | 4.78 | 1.56 | NA | 1/10 | 1.07 | 1.07 | 0.581 | NA |
| PCB150 | 0/10 | -- | -- | 0.511 | NA | 0/10 | -- | -- | 0.577 | NA | 0/10 | -- | -- | 0.363 | NA | 0/10 | -- | -- | 0.382 | NA |
| PCB152 | 0/10 | -- | -- | 0.48 | NA | 0/10 | -- | -- | 0.544 | NA | 0/10 | -- | -- | 0.34 | NA | 0/10 | -- | -- | 0.357 | NA |
| PCB153+168 | 10/10 | 46.3 | 529 | 189 | NA | 10/10 | 395 | 1,740 | 841 | NA | 10/10 | 240 | 1130 | 542 | NA | 10/10 | 85 | 345 | 166 | NA |
| PCB154 | 7/10 | 1.57 | 12.4 | 5.33 | NA | 10/10 | 12.2 | 59.8 | 30 | NA | 9/10 | 8.45 | 38.2 | 20 | NA | 7/10 | 7.21 | 23.3 | 8.65 | NA |
| PCB155 | 0/10 | -- | -- | 0.535 | NA | 3/10 | 1.23 | 2.64 | 1.24 | NA | 3/10 | 0.745 | 1.46 | 0.746 | NA | 0/10 | -- | -- | 0.349 | NA |
| PCB156+157 | 9/10 | 5.46 | 53.5 | 20.2 | 13.9 | 10/10 | 34.1 | 202 | 89.7 | 59.2 | 10/10 | 22.1 | 93 | 50.3 | 45.9 | 5/10 | 4.49 | 27.1 | 9.4 | 8.16 |
| PCB158 | 10/10 | 3.95 | 45.5 | 16 | NA | 10/10 | 27.2 | 144 | 69.9 | NA | 10/10 | 18.7 | 77.4 | 41.4 | NA | 10/10 | 3.99 | 18.9 | 8.85 | NA |
| PCB159 | 0/10 | -- | -- | 0.736 | NA | 0/10 | -- | -- | 0.836 | NA | 0/10 | -- | -- | 0.543 | NA | 0/10 | -- | -- | 0.578 | NA |
| PCB160 | 0/10 | -- | -- | 0.601 | NA | 0/10 | -- | -- | 0.89 | NA | 0/10 | -- | -- | 0.511 | NA | 0/10 | -- | -- | 0.509 | NA |
| PCB161 | 0/10 | -- | -- | 0.558 | NA | 0/10 | -- | -- | 0.844 | NA | 0/10 | -- | -- | 0.48 | NA | 0/10 | -- | -- | 0.458 | NA |
| PCB162 | 0/10 | -- | -- | 0.768 | NA | 3/10 | 2.97 | 4.79 | 2.39 | NA | 5/10 | 1.43 | 4.96 | 1.82 | NA | 0/10 | -- | -- | 0.606 | NA |
| PCB164 | 1/10 | 2.31 | 2.31 | 0.849 | NA | 5/10 | 2.93 | 6.82 | 3.99 | NA | 4/10 | 3.91 | 12.9 | 3.91 | NA | 3/10 | 0.941 | 1.93 | 0.804 | NA |
| PCB165 | 0/10 | -- | -- | 0.623 | NA | 0/10 | -- | -- | 0.949 | NA | 0/10 | -- | -- | 0.532 | NA | 0/10 | -- | -- | 0.512 | NA |
| PCB167 | 6/10 | 3.7 | 23.4 | 7.2 | 5.65 | 10/10 | 18.7 | 68.3 | 37.5 | 29.8 | 10/10 | 11.3 | 42.8 | 22.6 | 21.4 | 7/10 | 3.84 | 8.61 | 4.34 | 4.27 |
| PCB169 | 0/10 | -- | -- | 0.776 | 0.628 | 0/10 | -- | -- | 0.869 | 0.8 | 0/10 | -- | -- | 0.554 | 0.503 | 0/10 | -- | -- | 0.615 | 0.531 |
| PCB170 | 7/10 | 5.94 | 76.8 | 18.6 | 11.9 | 10/10 | 31.3 | 123 | 64.9 | 48.7 | 9/10 | 14.2 | 68.4 | 35.9 | 36.1 | 8/10 | 3.14 | 19.1 | 8.55 | 6.81 |
| PCB171+173 | 4/10 | 4.81 | 29.4 | 7.26 | NA | 10/10 | 14.8 | 69.2 | 32 | NA | 10/10 | 8.13 | 42.9 | 19.8 | NA | 6/10 | 1.89 | 8.06 | 3.59 | NA |
| PCB172 | 1/10 | 5.37 | 5.37 | 2.42 | NA | 8/10 | 6.27 | 36.1 | 14.5 | NA | 7/10 | 5.06 | 21.5 | 8.28 | NA | 5/10 | 1.46 | 4.53 | 2.09 | NA |
| PCB174 | 1/10 | 2.09 | 2.09 | 1.46 | NA | 6/10 | 2.42 | 10.7 | 4.74 | NA | 3/10 | 4.23 | 23.6 | 4.82 | NA | 1/10 | 1.94 | 1.94 | 1.07 | NA |
| PCB175 | 0/10 | -- | -- | 0.801 | NA | 4/10 | 2.23 | 10.7 | 2.88 | NA | 5/10 | 1.69 | 6.04 | 2.03 | NA | 0/10 | -- | -- | 0.551 | NA |
| PCB176 | 0/10 | -- | -- | 0.538 | NA | 0/10 | -- | -- | 0.664 | NA | 2/10 | 0.768 | 2.63 | 0.621 | NA | 0/10 | -- | -- | 0.405 | NA |

**Table C-29**
**Summary Statistics for Polychlorinated Biphenyls in Edible Blue Crab Tissue by FCA, Wet Weight**

| | FCA1 | | | | | FCA2 | | | | | FCA3 | | | | | Background | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] |
| PCB177 | 6/10 | 2.96 | 13.5 | 5.97 | NA | 9/10 | 16.3 | 37.8 | 22.9 | NA | 8/10 | 6.37 | 47.2 | 19.2 | NA | 3/10 | 4.44 | 4.92 | 2.37 | NA |
| PCB178 | 6/10 | 2.53 | 14 | 6.46 | NA | 10/10 | 19.5 | 75.2 | 35.1 | NA | 9/10 | 13.4 | 56.7 | 24.7 | NA | 9/10 | 2.51 | 9.58 | 6.18 | NA |
| PCB179 | 0/10 | -- | -- | 0.518 | NA | 3/10 | 2.26 | 6.49 | 1.93 | NA | 5/10 | 1.83 | 4.97 | 1.8 | NA | 2/10 | 0.347 | 0.617 | 0.493 | NA |
| PCB180+193 | 10/10 | 8.12 | 200 | 54.9 | 34.9 | 10/10 | 72.5 | 452 | 204 | 158 | 10/10 | 43.3 | 245 | 114 | 107 | 10/10 | 13.5 | 99.6 | 36.3 | 29.4 |
| PCB181 | 0/10 | -- | -- | 1.39 | NA | 0/10 | -- | -- | 1.32 | NA | 0/10 | -- | -- | 0.68 | NA | 0/10 | -- | -- | 0.916 | NA |
| PCB182 | 0/10 | -- | -- | 0.731 | NA | 1/10 | 1.93 | 1.93 | 1.1 | NA | 1/10 | 1.3 | 1.3 | 0.538 | NA | 0/10 | -- | -- | 0.543 | NA |
| PCB183 | 8/10 | 3.14 | 55.6 | 15.2 | NA | 10/10 | 24.3 | 140 | 64.5 | NA | 9/10 | 15.1 | 85.7 | 38 | NA | 7/10 | 4.42 | 30.6 | 10.3 | NA |
| PCB184 | 0/10 | -- | -- | 0.535 | NA | 2/10 | 1.34 | 2.41 | 0.932 | NA | 1/10 | 1.18 | 1.18 | 0.42 | NA | 0/10 | -- | -- | 0.41 | NA |
| PCB185 | 0/10 | -- | -- | 1.46 | NA | 1/10 | 3.75 | 3.75 | 1.64 | NA | 0/10 | -- | -- | 0.716 | NA | 0/10 | -- | -- | 0.956 | NA |
| PCB186 | 0/10 | -- | -- | 0.574 | NA | 0/10 | -- | -- | 0.695 | NA | 0/10 | -- | -- | 0.343 | NA | 0/10 | -- | -- | 0.441 | NA |
| PCB187 | 9/10 | 10 | 119 | 43.3 | NA | 10/10 | 77.5 | 341 | 167 | NA | 10/10 | 45.3 | 264 | 120 | NA | 9/10 | 13 | 51.5 | 27.3 | NA |
| PCB188 | 0/10 | -- | -- | 0.599 | NA | 3/10 | 1.25 | 4.09 | 1.45 | NA | 4/10 | 0.945 | 2.15 | 0.913 | NA | 0/10 | -- | -- | 0.425 | NA |
| PCB189 | 0/10 | -- | -- | 1.04 | 1 | 1/10 | 7.17 | 7.17 | 1.9 | 1.17 | 4/10 | 1.79 | 4.47 | 1.57 | 1.13 | 1/10 | 1.89 | 1.89 | 0.853 | 0.523 |
| PCB190 | 3/10 | 1.71 | 16.2 | 3.52 | NA | 8/10 | 7.39 | 31.7 | 13.9 | NA | 8/10 | 5.78 | 17 | 8.19 | NA | 4/10 | 1.75 | 5.4 | 1.86 | NA |
| PCB191 | 0/10 | -- | -- | 1.16 | NA | 2/10 | 2.95 | 4.41 | 2.26 | NA | 2/10 | 1.97 | 2.03 | 1.23 | NA | 0/10 | -- | -- | 0.72 | NA |
| PCB192 | 0/10 | -- | -- | 1.28 | NA | 0/10 | -- | -- | 1.08 | NA | 0/10 | -- | -- | 0.586 | NA | 0/10 | -- | -- | 0.79 | NA |
| PCB194 | 5/10 | 2.3 | 24.4 | 5.53 | NA | 9/10 | 6.66 | 51.5 | 22 | NA | 9/10 | 5.08 | 25.4 | 11.6 | NA | 4/10 | 2.2 | 12.2 | 3.6 | NA |
| PCB195 | 2/10 | 4.51 | 8.5 | 2.21 | NA | 8/10 | 3.58 | 17.1 | 7.7 | NA | 10/10 | 1.65 | 11.2 | 5.8 | NA | 1/10 | 1.77 | 1.77 | 0.977 | NA |
| PCB196 | 3/10 | 1.7 | 15.5 | 3.26 | NA | 8/10 | 6.49 | 52 | 19.3 | NA | 10/10 | 4.25 | 28.5 | 12.6 | NA | 7/10 | 1.6 | 10.1 | 3.19 | NA |
| PCB197 | 0/10 | -- | -- | 0.762 | NA | 4/10 | 2.23 | 5.38 | 2.39 | NA | 1/10 | 3.48 | 3.48 | 1.29 | NA | 1/10 | 1.36 | 1.36 | 0.632 | NA |
| PCB198+199 | 8/10 | 4.34 | 36.7 | 10.8 | NA | 10/10 | 15.6 | 97.8 | 40.3 | NA | 10/10 | 10.6 | 68.8 | 29.3 | NA | 8/10 | 2.81 | 12.3 | 7.24 | NA |
| PCB200 | 0/10 | -- | -- | 0.76 | NA | 0/10 | -- | -- | 0.794 | NA | 0/10 | -- | -- | 0.432 | NA | 0/10 | -- | -- | 0.503 | NA |
| PCB201 | 2/10 | 1.45 | 2.64 | 1.11 | NA | 7/10 | 3.3 | 13.6 | 5.43 | NA | 5/10 | 2.76 | 10.4 | 3.18 | NA | 2/10 | 1.22 | 1.48 | 0.768 | NA |
| PCB202 | 8/10 | 1.39 | 15.4 | 4.85 | NA | 9/10 | 10.9 | 41.1 | 18.4 | NA | 10/10 | 7.62 | 31.2 | 13.7 | NA | 5/10 | 2.81 | 5.48 | 2.93 | NA |
| PCB203 | 1/10 | 7.09 | 7.09 | 2.57 | NA | 8/10 | 6.91 | 40.7 | 17.1 | NA | 9/10 | 6.51 | 24.2 | 11.7 | NA | 3/10 | 2.85 | 8.36 | 2.77 | NA |
| PCB204 | 0/10 | -- | -- | 0.721 | NA | 0/10 | -- | -- | 0.782 | NA | 0/10 | -- | -- | 0.391 | NA | 0/10 | -- | -- | 0.505 | NA |
| PCB205 | 0/10 | -- | -- | 0.85 | NA | 0/10 | -- | -- | 0.844 | NA | 0/10 | -- | -- | 0.417 | NA | 0/10 | -- | -- | 0.573 | NA |
| PCB206 | 1/10 | 6.73 | 6.73 | 2.03 | NA | 6/10 | 4.41 | 20.3 | 7.66 | NA | 4/10 | 5.31 | 11.9 | 4.72 | NA | 1/10 | 4.29 | 4.29 | 1.72 | NA |
| PCB207 | 0/10 | -- | -- | 1.11 | NA | 5/10 | 3.28 | 19.7 | 5.52 | NA | 7/10 | 3.49 | 12.7 | 4.97 | NA | 4/10 | 1.7 | 2.73 | 1.35 | NA |
| PCB208 | 1/10 | 9.47 | 9.47 | 1.99 | NA | 8/10 | 5.84 | 34.1 | 11.4 | NA | 9/10 | 3.94 | 17.8 | 8 | NA | 4/10 | 3.41 | 5.41 | 2.7 | NA |
| PCB209 | 9/10 | 4.73 | 184 | 41.8 | NA | 10/10 | 55 | 384 | 117 | NA | 10/10 | 32.1 | 186 | 80.3 | NA | 7/10 | 10.3 | 27.6 | 15 | NA |

**Notes**

-- = not applicable, no detected values
FCA = fish collection area
NA = data not available
PCB = polychlorinated biphenyl
ww = wet weight

a - Mean and median calculations include detected and non-detected values. Non-detected values were set at one-half the detection limit.
b - PCB###+#### indicates a co-elution of two or more PCB congeners.

**Table C-30**
**Summary Statistics for Polychlorinated Biphenyls in Whole Blue Crab Tissue by FCA, Wet Weight**

| | FCA1 | | | | | FCA2 | | | | | FCA3 | | | | | Background | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] |
| Blue Crab - Whole | | | | | | | | | | | | | | | | | | | | |
| **Polychlorinated Biphenyls [b] (ng/kg - ww)** | | | | | | | | | | | | | | | | | | | | |
| PCB001 | 0/3 | -- | -- | 0.940 | 0.756 | 1/3 | 2.05 | 2.05 | 1.34 | 1.11 | 0/3 | -- | -- | 0.933 | 0.934 | 0/3 | -- | -- | 0.839 | 0.800 |
| PCB002 | 0/3 | -- | -- | 0.987 | 0.779 | 0/3 | -- | -- | 0.855 | 0.830 | 0/3 | -- | -- | 0.763 | 0.387 | 0/3 | -- | -- | 0.871 | 0.818 |
| PCB003 | 0/3 | -- | -- | 1.14 | 0.896 | 0/3 | -- | -- | 0.986 | 0.960 | 0/3 | -- | -- | 0.877 | 0.448 | 0/3 | -- | -- | 1.00 | 0.928 |
| PCB004 | 0/3 | -- | -- | 4.11 | 2.78 | 0/3 | -- | -- | 4.20 | 4.18 | 1/3 | 3.16 | 3.16 | 20.0 | 3.16 | 0/3 | -- | -- | 7.78 | 4.30 |
| PCB005 | 0/3 | -- | -- | 3.28 | 2.58 | 0/3 | -- | -- | 1.90 | 2.18 | 0/3 | -- | -- | 6.94 | 1.08 | 0/3 | -- | -- | 2.97 | 3.11 |
| PCB006 | 0/3 | -- | -- | 2.73 | 2.13 | 0/3 | -- | -- | 1.67 | 1.84 | 1/3 | 3.16 | 3.16 | 7.12 | 3.16 | 0/3 | -- | -- | 2.57 | 2.78 |
| PCB007 | 0/3 | -- | -- | 2.83 | 2.23 | 0/3 | -- | -- | 1.72 | 1.98 | 0/3 | -- | -- | 6.87 | 1.01 | 0/3 | -- | -- | 2.71 | 2.98 |
| PCB008 | 2/3 | 9.03 | 11.9 | 9.72 | 9.03 | 3/3 | 9.51 | 19.3 | 13.7 | 12.2 | 1/3 | 18.3 | 18.3 | 13.3 | 17.8 | 0/3 | -- | -- | 5.10 | 4.36 |
| PCB009 | 0/3 | -- | -- | 2.79 | 2.19 | 0/3 | -- | -- | 1.67 | 1.90 | 0/3 | -- | -- | 6.42 | 0.977 | 0/3 | -- | -- | 2.63 | 2.84 |
| PCB010 | 0/3 | -- | -- | 3.15 | 2.23 | 0/3 | -- | -- | 2.86 | 2.70 | 0/3 | -- | -- | 14.3 | 1.01 | 0/3 | -- | -- | 5.70 | 3.25 |
| PCB011 | 0/3 | -- | -- | 53.1 | 52.9 | 0/3 | -- | -- | 39.8 | 39.4 | 0/3 | -- | -- | 61.0 | 61.0 | 0/3 | -- | -- | 49.4 | 51.0 |
| PCB012+013 | 0/3 | -- | -- | 2.83 | 2.20 | 0/3 | -- | -- | 1.64 | 1.85 | 0/3 | -- | -- | 6.40 | 0.970 | 0/3 | -- | -- | 2.60 | 2.79 |
| PCB014 | 0/3 | -- | -- | 2.70 | 2.11 | 0/3 | -- | -- | 1.57 | 1.79 | 0/3 | -- | -- | 6.19 | 0.932 | 0/3 | -- | -- | 2.49 | 2.69 |
| PCB015 | 3/3 | 86.9 | 188 | 148 | 169 | 3/3 | 117 | 247 | 176 | 165 | 3/3 | 89.7 | 128 | 111 | 115 | 1/3 | 14.5 | 14.5 | 7.43 | 5.40 |
| PCB016 | 0/3 | -- | -- | 2.33 | 2.44 | 3/3 | 2.25 | 4.52 | 3.18 | 2.76 | 0/3 | -- | -- | 1.94 | 2.08 | 1/3 | 2.52 | 2.52 | 2.16 | 2.35 |
| PCB017 | 1/3 | 10.8 | 10.8 | 6.40 | 5.43 | 3/3 | 4.84 | 15.9 | 9.47 | 7.71 | 1/3 | 11.2 | 11.2 | 5.94 | 3.69 | 1/3 | 2.09 | 2.09 | 2.51 | 2.16 |
| PCB018+030 | 2/3 | 20.5 | 48.0 | 24.5 | 20.5 | 3/3 | 9.26 | 35.7 | 19.7 | 14.1 | 1/3 | 25.4 | 25.4 | 11.7 | 5.97 | 0/3 | -- | -- | 3.68 | 3.97 |
| PCB019 | 1/3 | 1.30 | 1.30 | 1.37 | 1.30 | 0/3 | -- | -- | 0.967 | 0.919 | 2/3 | 0.937 | 1.16 | 1.15 | 1.16 | 1/3 | 0.748 | 0.748 | 0.978 | 1.09 |
| PCB020+028 | 3/3 | 363 | 1160 | 736 | 686 | 3/3 | 564 | 969 | 741 | 691 | 3/3 | 528 | 842 | 645 | 566 | 3/3 | 103 | 151 | 135 | 151 |
| PCB021+033 | 1/3 | 17.3 | 17.3 | 9.27 | 6.05 | 3/3 | 5.91 | 14.5 | 9.69 | 8.62 | 0/3 | -- | -- | 3.96 | 3.42 | 0/3 | -- | -- | 3.31 | 3.65 |
| PCB022 | 3/3 | 15.8 | 45.6 | 28.5 | 24.1 | 3/3 | 25.3 | 48.0 | 33.2 | 26.2 | 3/3 | 11.7 | 34.0 | 21.3 | 18.3 | 1/3 | 3.29 | 3.29 | 3.75 | 3.35 |
| PCB023 | 0/3 | -- | -- | 1.74 | 1.80 | 0/3 | -- | -- | 0.819 | 0.750 | 0/3 | -- | -- | 1.09 | 1.21 | 0/3 | -- | -- | 0.708 | 0.785 |
| PCB024 | 0/3 | -- | -- | 0.968 | 0.758 | 0/3 | -- | -- | 0.814 | 0.746 | 0/3 | -- | -- | 0.696 | 0.466 | 0/3 | -- | -- | 0.752 | 0.858 |
| PCB025 | 3/3 | 2.34 | 9.26 | 6.60 | 8.21 | 3/3 | 2.92 | 9.98 | 5.47 | 3.52 | 3/3 | 0.937 | 8.36 | 3.96 | 2.57 | 2/3 | 1.75 | 2.73 | 1.73 | 1.75 |
| PCB026+029 | 3/3 | 5.77 | 35.4 | 19.7 | 18.1 | 3/3 | 6.30 | 27.3 | 14.8 | 10.7 | 1/3 | 20.3 | 20.3 | 7.85 | 1.92 | 2/3 | 1.32 | 4.46 | 2.42 | 1.48 |
| PCB027 | 2/3 | 3.35 | 6.13 | 3.51 | 3.35 | 2/3 | 1.48 | 2.54 | 2.56 | 2.54 | 2/3 | 0.843 | 4.94 | 2.27 | 1.02 | 1/3 | 1.59 | 1.59 | 0.920 | 0.779 |
| PCB031 | 3/3 | 25.4 | 112 | 77.1 | 93.6 | 3/3 | 35.6 | 109 | 66.3 | 54.3 | 3/3 | 15.7 | 81.6 | 37.8 | 16.1 | 1/3 | 21.5 | 21.5 | 10.6 | 7.40 |
| PCB032 | 3/3 | 11.2 | 28.9 | 21.8 | 25.4 | 3/3 | 14.6 | 36.7 | 23.5 | 19.1 | 3/3 | 9.79 | 25.2 | 15.9 | 12.5 | 3/3 | 1.68 | 7.56 | 4.08 | 2.99 |
| PCB034 | 0/3 | -- | -- | 1.64 | 1.72 | 0/3 | -- | -- | 0.867 | 0.725 | 0/3 | -- | -- | 0.977 | 1.12 | 0/3 | -- | -- | 0.659 | 0.715 |
| PCB035 | 0/3 | -- | -- | 1.64 | 1.69 | 0/3 | -- | -- | 0.790 | 0.743 | 0/3 | -- | -- | 0.984 | 1.13 | 0/3 | -- | -- | 0.663 | 0.740 |
| PCB036 | 0/3 | -- | -- | 1.51 | 1.54 | 0/3 | -- | -- | 0.705 | 0.688 | 0/3 | -- | -- | 0.844 | 0.970 | 0/3 | -- | -- | 0.589 | 0.634 |
| PCB037 | 3/3 | 52.3 | 183 | 112 | 100 | 3/3 | 66.5 | 168 | 105 | 81.5 | 3/3 | 67.9 | 130 | 90.5 | 73.2 | 3/3 | 4.65 | 9.98 | 6.43 | 4.66 |
| PCB038 | 0/3 | -- | -- | 1.62 | 1.67 | 0/3 | -- | -- | 0.773 | 0.743 | 0/3 | -- | -- | 0.966 | 1.11 | 0/3 | -- | -- | 0.659 | 0.720 |
| PCB039 | 0/3 | -- | -- | 1.60 | 1.64 | 1/3 | 2.77 | 2.77 | 1.64 | 1.42 | 0/3 | -- | -- | 0.945 | 1.09 | 0/3 | -- | -- | 0.643 | 0.710 |
| PCB040+041+071 | 3/3 | 49.3 | 109 | 83.4 | 92.0 | 3/3 | 57.5 | 125 | 80.3 | 58.4 | 3/3 | 20.9 | 92.4 | 53.5 | 47.4 | 3/3 | 7.18 | 22.3 | 13.6 | 11.4 |
| PCB042 | 3/3 | 13.3 | 53.1 | 32.4 | 30.8 | 3/3 | 13.8 | 59.4 | 33.9 | 28.5 | 2/3 | 7.88 | 43.3 | 19.1 | 7.88 | 2/3 | 5.36 | 9.35 | 5.27 | 5.36 |
| PCB043+073 | 1/3 | 11.2 | 11.2 | 4.60 | 1.75 | 2/3 | 2.76 | 5.20 | 3.11 | 2.76 | 1/3 | 1.74 | 1.74 | 1.47 | 1.74 | 0/3 | -- | -- | 0.714 | 0.887 |
| PCB044+047+065 | 3/3 | 500 | 1340 | 962 | 1050 | 3/3 | 707 | 1270 | 990 | 997 | 3/3 | 688 | 905 | 815 | 853 | 3/3 | 145 | 229 | 183 | 176 |
| PCB045+051 | 2/3 | 3.97 | 12.4 | 6.11 | 3.97 | 2/3 | 4.39 | 10.8 | 5.97 | 4.39 | 3/3 | 2.12 | 9.35 | 6.55 | 8.18 | 0/3 | -- | -- | 1.18 | 0.960 |
| PCB046 | 0/3 | -- | -- | 1.52 | 1.46 | 0/3 | -- | -- | 0.945 | 0.989 | 0/3 | -- | -- | 0.737 | 0.584 | 0/3 | -- | -- | 0.872 | 1.09 |
| PCB048 | 3/3 | 2.73 | 15.1 | 8.49 | 7.65 | 3/3 | 3.46 | 10.1 | 6.26 | 5.25 | 2/3 | 1.17 | 8.51 | 4.11 | 2.66 | 2/3 | 1.92 | 3.13 | 2.00 | 1.92 |
| PCB049+069 | 3/3 | 31.8 | 149 | 79.4 | 57.1 | 3/3 | 27.7 | 198 | 103 | 83.8 | 3/3 | 11.8 | 150 | 64.6 | 32.3 | 2/3 | 15.2 | 36.5 | 18.3 | 15.2 |
| PCB050+053 | 3/3 | 4.44 | 46.9 | 19.6 | 7.45 | 2/3 | 9.43 | 36.2 | 15.8 | 9.43 | 3/3 | 1.91 | 21.1 | 8.82 | 3.48 | 0/3 | -- | -- | 1.10 | 0.937 |
| PCB052 | 3/3 | 51.2 | 443 | 199 | 103 | 3/3 | 46.9 | 306 | 163 | 137 | 2/3 | 42.1 | 237 | 97.1 | 42.1 | 1/3 | 55.7 | 55.7 | 25.9 | 14.4 |

**Table C-30**
**Summary Statistics for Polychlorinated Biphenyls in Whole Blue Crab Tissue by FCA, Wet Weight**

| | FCA1 | | | | | FCA2 | | | | | FCA3 | | | | | Background | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] |
| PCB054 | 0/3 | -- | -- | 0.498 | 0.408 | 0/3 | -- | -- | 0.460 | 0.451 | 0/3 | -- | -- | 0.369 | 0.327 | 0/3 | -- | -- | 0.378 | 0.464 |
| PCB055 | 0/3 | -- | -- | 1.09 | 1.02 | 0/3 | -- | -- | 0.666 | 0.682 | 0/3 | -- | -- | 0.505 | 0.393 | 0/3 | -- | -- | 0.615 | 0.769 |
| PCB056 | 3/3 | 16.1 | 45.6 | 32.3 | 35.3 | 3/3 | 18.2 | 55.7 | 36.4 | 35.3 | 3/3 | 6.31 | 42.0 | 19.1 | 8.91 | 1/3 | 8.26 | 8.26 | 3.99 | 2.41 |
| PCB057 | 0/3 | -- | -- | 0.969 | 0.908 | 0/3 | -- | -- | 0.584 | 0.604 | 0/3 | -- | -- | 0.457 | 0.359 | 0/3 | -- | -- | 0.564 | 0.692 |
| PCB058 | 1/3 | 4.58 | 4.58 | 2.22 | 1.44 | 0/3 | -- | -- | 0.733 | 0.679 | 0/3 | -- | -- | 0.471 | 0.372 | 0/3 | -- | -- | 0.586 | 0.729 |
| PCB059+062+075 | 3/3 | 38.4 | 107 | 76.1 | 83.1 | 3/3 | 62.4 | 97.3 | 79.1 | 77.5 | 3/3 | 53.2 | 74.1 | 64.2 | 65.3 | 3/3 | 12.0 | 15.0 | 13.2 | 12.6 |
| PCB060 | 3/3 | 98.6 | 332 | 198 | 164 | 3/3 | 149 | 300 | 209 | 178 | 3/3 | 125 | 364 | 215 | 155 | 3/3 | 17.2 | 29.9 | 22.2 | 19.6 |
| PCB061+070+074+076 | 3/3 | 431 | 1200 | 851 | 927 | 3/3 | 603 | 983 | 834 | 915 | 3/3 | 627 | 913 | 726 | 637 | 3/3 | 105 | 153 | 125 | 117 |
| PCB063 | 3/3 | 13.0 | 38.5 | 28.1 | 32.9 | 3/3 | 18.3 | 33.1 | 26.7 | 28.7 | 3/3 | 12.4 | 18.9 | 15.3 | 14.5 | 3/3 | 2.08 | 4.71 | 3.27 | 3.02 |
| PCB064 | 3/3 | 38.3 | 169 | 94.8 | 77.5 | 3/3 | 37.8 | 153 | 88.0 | 73.7 | 3/3 | 13.7 | 109 | 48.1 | 21.6 | 2/3 | 10.1 | 18.6 | 10.3 | 10.1 |
| PCB066 | 3/3 | 671 | 1940 | 1270 | 1220 | 3/3 | 898 | 1,640 | 1240 | 1190 | 3/3 | 836 | 1530 | 1120 | 997 | 3/3 | 144 | 205 | 180 | 192 |
| PCB067 | 1/3 | 9.20 | 9.20 | 3.66 | 1.23 | 0/3 | -- | -- | 1.52 | 1.19 | 1/3 | 3.15 | 3.15 | 1.36 | 0.701 | 0/3 | -- | -- | 0.517 | 0.639 |
| PCB068 | 3/3 | 9.86 | 30.4 | 21.0 | 22.9 | 3/3 | 8.34 | 28.4 | 16.0 | 11.2 | 3/3 | 13.5 | 15.2 | 14.6 | 15.1 | 3/3 | 3.23 | 3.99 | 3.54 | 3.39 |
| PCB072 | 3/3 | 7.03 | 22.8 | 16.1 | 18.3 | 3/3 | 11.3 | 18.3 | 14.0 | 12.3 | 3/3 | 2.95 | 12.8 | 7.14 | 5.64 | 2/3 | 0.944 | 1.00 | 1.12 | 1.00 |
| PCB077 | 3/3 | 44.8 | 131 | 88.3 | 88.9 | 3/3 | 60.6 | 131 | 90.8 | 81.1 | 3/3 | 54.5 | 116 | 77.2 | 61.2 | 3/3 | 3.27 | 9.06 | 6.09 | 5.94 |
| PCB078 | 0/3 | -- | -- | 1.36 | 1.15 | 0/3 | -- | -- | 1.05 | 0.926 | 0/3 | -- | -- | 1.21 | 1.29 | 0/3 | -- | -- | 0.619 | 0.643 |
| PCB079 | 1/3 | 8.00 | 8.00 | 4.77 | 4.87 | 2/3 | 4.19 | 6.71 | 4.65 | 4.19 | 1/3 | 4.16 | 4.16 | 2.64 | 2.37 | 0/3 | -- | -- | 0.552 | 0.578 |
| PCB080 | 1/3 | 3.04 | 3.04 | 1.65 | 1.01 | 1/3 | 2.08 | 2.08 | 1.33 | 1.18 | 0/3 | -- | -- | 1.09 | 1.17 | 0/3 | -- | -- | 0.546 | 0.578 |
| PCB081 | 2/3 | 3.78 | 6.43 | 3.81 | 3.78 | 3/3 | 2.22 | 5.03 | 3.75 | 4.00 | 1/3 | 2.68 | 2.68 | 2.38 | 2.68 | 0/3 | -- | -- | 0.703 | 0.759 |
| PCB082 | 0/3 | -- | -- | 2.07 | 1.91 | 2/3 | 2.54 | 9.77 | 4.63 | 2.54 | 1/3 | 6.89 | 6.89 | 2.91 | 1.13 | 1/3 | 1.28 | 1.28 | 1.10 | 1.20 |
| PCB083+099 | 3/3 | 2310 | 3400 | 2690 | 2350 | 3/3 | 1,590 | 2,700 | 2280 | 2560 | 3/3 | 1,710 | 2,280 | 2010 | 2030 | 3/3 | 425 | 537 | 483 | 486 |
| PCB084 | 2/3 | 8.98 | 14.9 | 9.25 | 8.98 | 2/3 | 9.65 | 17.8 | 9.95 | 9.65 | 1/3 | 13.0 | 13.0 | 6.55 | 3.68 | 0/3 | -- | -- | 2.59 | 2.13 |
| PCB085+116 | 3/3 | 217 | 530 | 359 | 329 | 3/3 | 244 | 484 | 379 | 410 | 3/3 | 257 | 369 | 315 | 319 | 3/3 | 41.5 | 46.0 | 44.0 | 44.5 |
| PCB086+087+097+1-0+119 +125 | 3/3 | 211 | 345 | 288 | 307 | 3/3 | 174 | 314 | 249 | 260 | 3/3 | 180 | 230 | 203 | 200 | 3/3 | 44.3 | 61.2 | 51.0 | 47.4 |
| PCB088+091 | 3/3 | 23.2 | 106 | 61.9 | 56.7 | 3/3 | 39.4 | 91.6 | 56.8 | 39.4 | 3/3 | 8.98 | 67.5 | 31.0 | 16.6 | 3/3 | 4.97 | 14.7 | 9.04 | 7.45 |
| PCB089 | 0/3 | -- | -- | 1.20 | 1.20 | 1/3 | 1.58 | 1.58 | 1.13 | 1.06 | 1/3 | 1.13 | 1.13 | 0.807 | 0.922 | 0/3 | -- | -- | 0.799 | 0.888 |
| PCB090+101+113 | 3/3 | 146 | 767 | 408 | 309 | 3/3 | 236 | 653 | 392 | 286 | 3/3 | 73.0 | 465 | 224 | 133 | 2/3 | 43.4 | 86.3 | 49.1 | 43.4 |
| PCB092 | 3/3 | 27.2 | 158 | 78.7 | 50.6 | 3/3 | 36.9 | 123 | 70.1 | 50.4 | 3/3 | 11.0 | 93.6 | 39.6 | 14.2 | 2/3 | 4.66 | 6.23 | 6.21 | 6.23 |
| PCB093+100 | 3/3 | 46.4 | 128 | 88.0 | 89.6 | 3/3 | 57.9 | 120 | 89.3 | 90.6 | 3/3 | 70.6 | 85.2 | 78.3 | 79.1 | 3/3 | 12.1 | 17.0 | 14.6 | 14.9 |
| PCB094 | 3/3 | 3.00 | 5.89 | 4.74 | 5.32 | 3/3 | 2.99 | 7.68 | 5.72 | 6.50 | 3/3 | 1.99 | 5.80 | 3.91 | 3.95 | 0/3 | -- | -- | 0.856 | 0.960 |
| PCB095 | 3/3 | 33.7 | 155 | 80.9 | 54.2 | 3/3 | 37.0 | 123 | 69.4 | 48.4 | 3/3 | 19.9 | 91.6 | 45.4 | 24.7 | 1/3 | 25.8 | 25.8 | 13.5 | 8.04 |
| PCB096 | 0/3 | -- | -- | 0.818 | 0.829 | 0/3 | -- | -- | 0.607 | 0.544 | 0/3 | -- | -- | 0.418 | 0.338 | 0/3 | -- | -- | 0.560 | 0.620 |
| PCB098+102 | 3/3 | 5.40 | 20.8 | 12.2 | 10.3 | 2/3 | 7.48 | 16.8 | 9.09 | 7.48 | 0/3 | -- | -- | 2.57 | 1.63 | 1/3 | 0.933 | 0.933 | 0.970 | 0.933 |
| PCB103 | 2/3 | 4.05 | 12.6 | 5.85 | 4.05 | 2/3 | 4.05 | 10.9 | 5.28 | 4.05 | 1/3 | 6.50 | 6.50 | 2.52 | 0.771 | 0/3 | -- | -- | 0.691 | 0.754 |
| PCB104 | 0/3 | -- | -- | 0.731 | 0.735 | 0/3 | -- | -- | 0.545 | 0.500 | 0/3 | -- | -- | 0.362 | 0.282 | 0/3 | -- | -- | 0.492 | 0.582 |
| PCB105 | 3/3 | 418 | 964 | 691 | 690 | 3/3 | 490 | 991 | 740 | 740 | 3/3 | 519 | 800 | 618 | 535 | 3/3 | 53.8 | 83.8 | 70.7 | 74.3 |
| PCB106 | 0/3 | -- | -- | 1.33 | 1.25 | 0/3 | -- | -- | 1.07 | 1.09 | 0/3 | -- | -- | 0.964 | 0.749 | 0/3 | -- | -- | 0.914 | 0.723 |
| PCB107 | 3/3 | 80.9 | 248 | 166 | 168 | 3/3 | 116 | 209 | 175 | 201 | 3/3 | 122 | 133 | 126 | 122 | 3/3 | 18.0 | 25.8 | 21.7 | 21.3 |
| PCB108+124 | 2/3 | 8.61 | 18.9 | 9.85 | 8.61 | 3/3 | 8.87 | 20.8 | 13.2 | 10.0 | 2/3 | 2.99 | 15.0 | 6.57 | 2.99 | 0/3 | -- | -- | 1.22 | 1.43 |
| PCB110+115 | 3/3 | 137 | 500 | 296 | 251 | 3/3 | 187 | 576 | 333 | 235 | 3/3 | 91.7 | 425 | 208 | 106 | 2/3 | 31.9 | 68.5 | 38.9 | 31.9 |
| PCB111 | 1/3 | 8.27 | 8.27 | 3.92 | 2.35 | 2/3 | 5.09 | 6.42 | 4.20 | 5.09 | 2/3 | 3.08 | 4.09 | 2.65 | 3.08 | 1/3 | 0.986 | 0.986 | 0.865 | 0.843 |
| PCB112 | 0/3 | -- | -- | 1.29 | 1.23 | 0/3 | -- | -- | 0.971 | 1.02 | 0/3 | -- | -- | 0.699 | 0.775 | 0/3 | -- | -- | 0.561 | 0.517 |
| PCB114 | 3/3 | 28.0 | 63.6 | 45.0 | 43.3 | 3/3 | 30.5 | 58.7 | 45.8 | 48.2 | 3/3 | 28.3 | 55.9 | 40.0 | 35.8 | 3/3 | 4.35 | 6.32 | 5.50 | 5.83 |
| PCB117 | 3/3 | 18.6 | 56.0 | 42.6 | 53.3 | 3/3 | 23.5 | 58.0 | 35.9 | 26.2 | 2/3 | 1.70 | 35.9 | 12.8 | 1.70 | 2/3 | 1.93 | 6.18 | 3.32 | 1.93 |
| PCB118 | 3/3 | 1420 | 3200 | 2320 | 2350 | 3/3 | 1,630 | 3,000 | 2,400 | 2,570 | 3/3 | 1,800 | 2,480 | 2,080 | 1950 | 3/3 | 260 | 361 | 319 | 337 |

**Table C-30**
**Summary Statistics for Polychlorinated Biphenyls in Whole Blue Crab Tissue by FCA, Wet Weight**

| | FCA1 | | | | | FCA2 | | | | | FCA3 | | | | | Background | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] |
| PCB120 | 3/3 | 14.9 | 40.0 | 27.5 | 27.5 | 2/3 | 29.1 | 29.6 | 22.4 | 29.1 | 3/3 | 19.8 | 26.7 | 23.1 | 22.9 | 3/3 | 5.85 | 7.44 | 6.85 | 7.27 |
| PCB121 | 0/3 | -- | -- | 1.51 | 1.61 | 0/3 | -- | -- | 1.38 | 1.23 | 0/3 | -- | -- | 1.20 | 1.09 | 0/3 | -- | -- | 0.587 | 0.550 |
| PCB122 | 0/3 | -- | -- | 1.45 | 1.36 | 0/3 | -- | -- | 1.14 | 1.14 | 0/3 | -- | -- | 1.05 | 0.811 | 0/3 | -- | -- | 1.00 | 0.801 |
| PCB123 | 3/3 | 26.9 | 56.5 | 43.4 | 46.8 | 3/3 | 27.4 | 55.0 | 43.1 | 46.8 | 2/3 | 32.1 | 51.4 | 33.3 | 32.1 | 3/3 | 3.54 | 6.03 | 5.09 | 5.70 |
| PCB126 | 1/3 | 8.53 | 8.53 | 4.98 | 4.58 | 2/3 | 5.79 | 10.6 | 6.36 | 5.79 | 2/3 | 6.48 | 6.86 | 5.04 | 6.48 | 0/3 | -- | -- | 0.896 | 0.786 |
| PCB127 | 0/3 | -- | -- | 1.42 | 1.32 | 1/3 | 3.80 | 3.80 | 1.92 | 1.08 | 1/3 | 3.39 | 3.39 | 1.95 | 1.68 | 0/3 | -- | -- | 0.962 | 0.751 |
| PCB128+166 | 3/3 | 206 | 473 | 353 | 380 | 3/3 | 220 | 458 | 367 | 423 | 3/3 | 270 | 328 | 300 | 303 | 3/3 | 37.1 | 50.0 | 44.7 | 47.1 |
| PCB129+138+163 | 3/3 | 1690 | 3760 | 2820 | 3000 | 3/3 | 1,800 | 3,770 | 2,980 | 3,360 | 3/3 | 2,220 | 2,600 | 2,380 | 2,310 | 3/3 | 319 | 409 | 371 | 384 |
| PCB130 | 3/3 | 32.6 | 81.5 | 64.3 | 78.9 | 3/3 | 42.3 | 91.8 | 74.3 | 88.8 | 3/3 | 25.2 | 59.3 | 41.7 | 40.6 | 2/3 | 6.08 | 6.75 | 6.02 | 6.08 |
| PCB131 | 0/3 | -- | -- | 1.54 | 1.47 | 1/3 | 4.02 | 4.02 | 2.08 | 1.49 | 0/3 | -- | -- | 0.867 | 0.912 | 0/3 | -- | -- | 0.592 | 0.606 |
| PCB132 | 2/3 | 3.54 | 34.4 | 13.0 | 3.54 | 1/3 | 32.6 | 32.6 | 14.0 | 6.97 | 1/3 | 24.1 | 24.1 | 9.47 | 2.60 | 1/3 | 11.3 | 11.3 | 5.51 | 2.81 |
| PCB133 | 3/3 | 33.5 | 75.3 | 54.5 | 54.8 | 3/3 | 39.2 | 78.0 | 60.5 | 64.1 | 3/3 | 44.3 | 57.1 | 51.6 | 53.3 | 3/3 | 10.1 | 12.8 | 11.1 | 10.3 |
| PCB134 | 1/3 | 8.54 | 8.54 | 3.72 | 1.61 | 0/3 | -- | -- | 1.27 | 1.33 | 1/3 | 1.72 | 1.72 | 1.14 | 0.917 | 0/3 | -- | -- | 0.610 | 0.654 |
| PCB135+151 | 3/3 | 34.8 | 159 | 81.3 | 50.2 | 3/3 | 43.9 | 137 | 78.1 | 53.4 | 2/3 | 13.2 | 106 | 42.4 | 13.2 | 3/3 | 7.04 | 22.8 | 13.9 | 11.8 |
| PCB136 | 2/3 | 2.76 | 6.40 | 3.39 | 2.76 | 3/3 | 2.59 | 7.56 | 4.52 | 3.42 | 3/3 | 1.16 | 6.74 | 3.30 | 1.99 | 3/3 | 1.32 | 3.52 | 2.25 | 1.91 |
| PCB137 | 3/3 | 62.3 | 135 | 103 | 111 | 3/3 | 60.7 | 156 | 110 | 114 | 3/3 | 83.3 | 118 | 95.2 | 84.0 | 3/3 | 10.4 | 17.4 | 14.2 | 14.7 |
| PCB139+140 | 3/3 | 30.1 | 61.7 | 47.6 | 51.0 | 3/3 | 29.7 | 69.8 | 50.7 | 52.7 | 3/3 | 36.3 | 51.7 | 43.5 | 42.4 | 3/3 | 6.83 | 8.92 | 7.84 | 7.78 |
| PCB141 | 2/3 | 16.8 | 80.7 | 35.8 | 16.8 | 3/3 | 24.3 | 73.9 | 41.3 | 25.6 | 3/3 | 9.31 | 54.8 | 24.7 | 9.92 | 2/3 | 3.98 | 10.1 | 4.87 | 3.98 |
| PCB142 | 0/3 | -- | -- | 1.39 | 1.50 | 0/3 | -- | -- | 1.02 | 0.881 | 0/3 | -- | -- | 0.858 | 0.917 | 0/3 | -- | -- | 0.594 | 0.621 |
| PCB143 | 0/3 | -- | -- | 1.26 | 1.33 | 0/3 | -- | -- | 0.924 | 0.845 | 0/3 | -- | -- | 0.827 | 0.897 | 0/3 | -- | -- | 0.566 | 0.569 |
| PCB144 | 2/3 | 4.98 | 15.1 | 8.23 | 4.98 | 3/3 | 5.22 | 10.5 | 8.59 | 10.1 | 2/3 | 6.27 | 11.6 | 6.24 | 6.27 | 2/3 | 1.23 | 1.39 | 1.29 | 1.25 |
| PCB145 | 0/3 | -- | -- | 0.557 | 0.517 | 0/3 | -- | -- | 0.583 | 0.603 | 0/3 | -- | -- | 0.366 | 0.298 | 0/3 | -- | -- | 0.403 | 0.493 |
| PCB146 | 3/3 | 317 | 777 | 566 | 606 | 3/3 | 379 | 690 | 569 | 637 | 3/3 | 417 | 466 | 448 | 461 | 3/3 | 85.9 | 113 | 99.0 | 97.7 |
| PCB147+149 | 3/3 | 157 | 586 | 338 | 272 | 3/3 | 212 | 488 | 328 | 284 | 3/3 | 71.0 | 343 | 175 | 111 | 3/3 | 28.8 | 72.2 | 44.6 | 32.8 |
| PCB148 | 3/3 | 6.29 | 16.6 | 11.5 | 11.7 | 3/3 | 5.89 | 13.4 | 10.4 | 11.9 | 2/3 | 11.7 | 11.7 | 8.95 | 11.7 | 2/3 | 2.58 | 4.11 | 2.71 | 2.58 |
| PCB150 | 0/3 | -- | -- | 0.670 | 0.624 | 1/3 | 1.63 | 1.63 | 0.965 | 0.681 | 1/3 | 1.19 | 1.19 | 0.654 | 0.501 | 0/3 | -- | -- | 0.391 | 0.479 |
| PCB152 | 0/3 | -- | -- | 0.500 | 0.470 | 0/3 | -- | -- | 0.527 | 0.559 | 0/3 | -- | -- | 0.331 | 0.273 | 0/3 | -- | -- | 0.364 | 0.441 |
| PCB153+168 | 3/3 | 2170 | 4400 | 3370 | 3540 | 3/3 | 2,350 | 4,100 | 3460 | 3940 | 3/3 | 2670 | 3510 | 3,120 | 3,180 | 3/3 | 607 | 746 | 661 | 629 |
| PCB154 | 3/3 | 79.1 | 192 | 134 | 131 | 3/3 | 97.4 | 176 | 133 | 124 | 3/3 | 108 | 153 | 125 | 114 | 3/3 | 36.8 | 40.5 | 38.8 | 39.1 |
| PCB155 | 3/3 | 3.88 | 12.6 | 8.24 | 8.23 | 3/3 | 4.95 | 7.70 | 6.67 | 7.36 | 3/3 | 4.89 | 5.66 | 5.40 | 5.64 | 3/3 | 1.28 | 1.57 | 1.46 | 1.52 |
| PCB156+157 | 3/3 | 156 | 350 | 259 | 272 | 3/3 | 160 | 344 | 259 | 273 | 3/3 | 193 | 292 | 227 | 196 | 3/3 | 29.2 | 42.0 | 35.7 | 36.0 |
| PCB158 | 3/3 | 135 | 295 | 221 | 233 | 3/3 | 126 | 316 | 226 | 235 | 3/3 | 170 | 251 | 199 | 177 | 3/3 | 22.2 | 32.4 | 28.0 | 29.4 |
| PCB159 | 0/3 | -- | -- | 1.26 | 1.53 | 1/3 | 2.47 | 2.47 | 1.61 | 1.38 | 0/3 | -- | -- | 0.869 | 0.923 | 0/3 | -- | -- | 0.628 | 0.715 |
| PCB160 | 0/3 | -- | -- | 1.05 | 1.17 | 0/3 | -- | -- | 0.745 | 0.620 | 0/3 | -- | -- | 0.638 | 0.687 | 0/3 | -- | -- | 0.464 | 0.473 |
| PCB161 | 0/3 | -- | -- | 0.990 | 1.07 | 0/3 | -- | -- | 0.719 | 0.630 | 0/3 | -- | -- | 0.606 | 0.645 | 0/3 | -- | -- | 0.422 | 0.429 |
| PCB162 | 3/3 | 6.47 | 18.3 | 12.8 | 13.6 | 3/3 | 8.17 | 17.6 | 13.3 | 14.2 | 3/3 | 9.82 | 12.5 | 11.1 | 10.9 | 3/3 | 2.59 | 3.44 | 2.98 | 2.90 |
| PCB164 | 1/3 | 36.4 | 36.4 | 16.5 | 7.57 | 3/3 | 15.3 | 46.6 | 26.6 | 18.1 | 1/3 | 31.8 | 31.8 | 12.8 | 4.58 | 2/3 | 1.32 | 5.84 | 2.84 | 1.36 |
| PCB165 | 0/3 | -- | -- | 1.10 | 1.20 | 1/3 | 3.19 | 3.19 | 1.63 | 1.16 | 1/3 | 2.28 | 2.28 | 1.25 | 0.770 | 0/3 | -- | -- | 0.463 | 0.482 |
| PCB167 | 3/3 | 83.7 | 173 | 129 | 131 | 3/3 | 90.6 | 162 | 134 | 150 | 3/3 | 106 | 127 | 116 | 115 | 3/3 | 14.0 | 19.2 | 17.2 | 18.5 |
| PCB169 | 0/3 | -- | -- | 1.17 | 1.21 | 0/3 | -- | -- | 1.17 | 1.05 | 0/3 | -- | -- | 0.782 | 0.657 | 0/3 | -- | -- | 0.645 | 0.719 |
| PCB170 | 3/3 | 124 | 520 | 323 | 324 | 3/3 | 160 | 347 | 273 | 312 | 3/3 | 212 | 259 | 237 | 240 | 3/3 | 31.1 | 58.6 | 45.6 | 47.1 |
| PCB171+173 | 3/3 | 66.1 | 201 | 135 | 139 | 3/3 | 82.6 | 152 | 125 | 140 | 3/3 | 98.5 | 131 | 110 | 101 | 3/3 | 12.9 | 22.5 | 17.7 | 17.6 |
| PCB172 | 3/3 | 29.5 | 121 | 77.5 | 81.7 | 3/3 | 43.5 | 96.1 | 71.1 | 73.6 | 3/3 | 49.8 | 71.5 | 59.6 | 57.5 | 3/3 | 10.7 | 15.5 | 13.6 | 14.7 |
| PCB174 | 3/3 | 4.97 | 50.7 | 23.6 | 15.2 | 3/3 | 11.6 | 46.8 | 24.9 | 16.3 | 2/3 | 7.60 | 37.5 | 15.8 | 7.60 | 2/3 | 3.38 | 5.08 | 4.41 | 4.76 |
| PCB175 | 3/3 | 7.73 | 23.6 | 16.6 | 18.5 | 3/3 | 8.77 | 21.7 | 15.5 | 16.0 | 3/3 | 10.3 | 17.3 | 13.5 | 12.8 | 2/3 | 2.73 | 3.43 | 2.40 | 2.73 |
| PCB176 | 1/3 | 6.61 | 6.61 | 2.63 | 0.674 | 1/3 | 2.48 | 2.48 | 1.93 | 2.46 | 2/3 | 0.866 | 4.15 | 1.83 | 0.866 | 1/3 | 0.627 | 0.627 | 0.532 | 0.556 |

**Table C-30**
**Summary Statistics for Polychlorinated Biphenyls in Whole Blue Crab Tissue by FCA, Wet Weight**

| | FCA1 | | | | | FCA2 | | | | | FCA3 | | | | | Background | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] |
| PCB177 | 3/3 | 72.5 | 163 | 129 | 152 | 3/3 | 91.3 | 185 | 145 | 160 | 3/3 | 60.2 | 131 | 87.7 | 72.2 | 3/3 | 10.3 | 20.1 | 16.4 | 18.7 |
| PCB178 | 3/3 | 84.6 | 192 | 139 | 140 | 3/3 | 83.0 | 200 | 149 | 165 | 3/3 | 113 | 138 | 122 | 115 | 3/3 | 19.6 | 27.4 | 24.7 | 26.9 |
| PCB179 | 1/3 | 21.1 | 21.1 | 7.96 | 1.50 | 3/3 | 2.59 | 17.7 | 9.44 | 8.02 | 3/3 | 1.04 | 15.4 | 5.95 | 1.40 | 3/3 | 0.810 | 4.54 | 2.50 | 2.15 |
| PCB180+193 | 3/3 | 455 | 1620 | 1040 | 1040 | 3/3 | 607 | 1,190 | 924 | 974 | 3/3 | 767 | 990 | 843 | 773 | 3/3 | 126 | 185 | 162 | 176 |
| PCB181 | 2/3 | 4.56 | 6.47 | 4.12 | 4.56 | 0/3 | -- | -- | 2.00 | 2.23 | 2/3 | 3.08 | 4.72 | 3.15 | 3.08 | 0/3 | -- | -- | 0.833 | 0.719 |
| PCB182 | 1/3 | 10.2 | 10.2 | 3.94 | 0.948 | 1/3 | 6.28 | 6.28 | 3.68 | 3.07 | 2/3 | 5.33 | 5.85 | 4.38 | 5.33 | 0/3 | -- | -- | 0.560 | 0.714 |
| PCB183 | 3/3 | 148 | 411 | 302 | 347 | 3/3 | 200 | 386 | 296 | 300 | 3/3 | 206 | 304 | 258 | 265 | 3/3 | 38.4 | 55.3 | 48.6 | 52.2 |
| PCB184 | 2/3 | 4.10 | 4.42 | 3.15 | 4.10 | 3/3 | 1.76 | 3.57 | 2.75 | 2.91 | 3/3 | 2.16 | 2.52 | 2.30 | 2.20 | 2/3 | 0.622 | 0.820 | 0.666 | 0.622 |
| PCB185 | 0/3 | -- | -- | 2.28 | 2.29 | 1/3 | 14.3 | 14.3 | 5.51 | 1.21 | 0/3 | -- | -- | 0.945 | 0.957 | 1/3 | 1.48 | 1.48 | 1.11 | 1.43 |
| PCB186 | 0/3 | -- | -- | 0.637 | 0.662 | 0/3 | -- | -- | 0.580 | 0.542 | 0/3 | -- | -- | 0.365 | 0.355 | 0/3 | -- | -- | 0.409 | 0.449 |
| PCB187 | 3/3 | 520 | 1290 | 946 | 1030 | 3/3 | 596 | 1150 | 941 | 1070 | 3/3 | 690 | 763 | 730 | 737 | 3/3 | 133 | 177 | 154 | 151 |
| PCB188 | 3/3 | 2.89 | 8.86 | 5.82 | 5.71 | 3/3 | 4.03 | 6.27 | 5.38 | 5.83 | 3/3 | 3.86 | 4.78 | 4.31 | 4.30 | 1/3 | 1.44 | 1.44 | 1.05 | 0.910 |
| PCB189 | 3/3 | 6.60 | 21.7 | 14.2 | 14.5 | 3/3 | 7.74 | 15.5 | 12.3 | 13.7 | 3/3 | 11.1 | 15.1 | 13.0 | 12.9 | 2/3 | 3.49 | 3.99 | 2.93 | 3.49 |
| PCB190 | 3/3 | 20.8 | 102 | 62.9 | 65.4 | 3/3 | 29.2 | 58.6 | 48.0 | 56.0 | 3/3 | 40.1 | 55.9 | 46.0 | 42.1 | 3/3 | 4.60 | 13.4 | 9.70 | 11.0 |
| PCB191 | 2/3 | 7.70 | 26.2 | 14.2 | 8.61 | 3/3 | 8.55 | 18.7 | 15.1 | 18.1 | 3/3 | 12.9 | 17.6 | 14.5 | 13.2 | 3/3 | 2.20 | 3.63 | 2.82 | 2.63 |
| PCB192 | 0/3 | -- | -- | 1.98 | 1.95 | 0/3 | -- | -- | 0.958 | 1.01 | 0/3 | -- | -- | 0.774 | 0.771 | 0/3 | -- | -- | 0.705 | 0.604 |
| PCB194 | 3/3 | 42.7 | 195 | 119 | 120 | 3/3 | 53.9 | 104 | 87.4 | 104 | 3/3 | 79.8 | 106 | 93.9 | 95.7 | 3/3 | 20.6 | 32.5 | 27.7 | 30.0 |
| PCB195 | 3/3 | 10.3 | 53.8 | 36.4 | 45.2 | 3/3 | 15.2 | 36.5 | 27.6 | 31.0 | 3/3 | 27.1 | 37.1 | 31.5 | 30.4 | 3/3 | 5.02 | 10.3 | 7.82 | 8.10 |
| PCB196 | 3/3 | 32.8 | 118 | 83.4 | 99.5 | 3/3 | 45.2 | 91.3 | 73.3 | 83.3 | 3/3 | 60.5 | 102 | 76.9 | 67.7 | 3/3 | 13.8 | 19.1 | 16.6 | 16.8 |
| PCB197 | 2/3 | 19.8 | 20.3 | 14.3 | 19.8 | 3/3 | 7.06 | 16.1 | 12.9 | 15.5 | 3/3 | 11.7 | 15.1 | 12.9 | 11.9 | 2/3 | 1.92 | 4.03 | 2.58 | 1.92 |
| PCB198+199 | 3/3 | 68.3 | 284 | 185 | 203 | 3/3 | 102 | 222 | 168 | 180 | 3/3 | 128 | 200 | 154 | 134 | 3/3 | 28.7 | 44.5 | 39.2 | 44.2 |
| PCB200 | 1/3 | 2.59 | 2.59 | 1.36 | 1.00 | 0/3 | -- | -- | 0.854 | 0.664 | 0/3 | -- | -- | 0.556 | 0.541 | 0/3 | -- | -- | 0.530 | 0.580 |
| PCB201 | 3/3 | 11.9 | 35.2 | 24.8 | 27.1 | 3/3 | 15.7 | 33.5 | 24.3 | 23.7 | 3/3 | 16.6 | 22.8 | 19.7 | 19.7 | 2/3 | 3.47 | 6.07 | 4.01 | 3.47 |
| PCB202 | 3/3 | 35.8 | 94.6 | 66.2 | 68.2 | 3/3 | 44.7 | 81.9 | 66.7 | 73.4 | 3/3 | 46.1 | 59.8 | 52.0 | 50.1 | 3/3 | 7.31 | 11.8 | 8.93 | 7.64 |
| PCB203 | 3/3 | 24.0 | 111 | 80.5 | 106 | 3/3 | 37.8 | 85.7 | 66.0 | 74.4 | 3/3 | 60.1 | 96.8 | 73.4 | 63.2 | 3/3 | 18.7 | 28.9 | 24.1 | 24.6 |
| PCB204 | 1/3 | 1.61 | 1.61 | 1.10 | 1.20 | 1/3 | 1.57 | 1.57 | 0.944 | 0.635 | 0/3 | -- | -- | 0.534 | 0.541 | 0/3 | -- | -- | 0.535 | 0.594 |
| PCB205 | 2/3 | 2.08 | 3.88 | 2.17 | 2.08 | 2/3 | 2.30 | 2.58 | 1.86 | 2.30 | 3/3 | 2.13 | 2.51 | 2.35 | 2.41 | 1/3 | 1.91 | 1.91 | 1.00 | 0.763 |
| PCB206 | 3/3 | 11.1 | 51.5 | 36.4 | 46.5 | 3/3 | 24.1 | 37.7 | 32.7 | 36.3 | 3/3 | 31.8 | 44.4 | 36.8 | 34.2 | 3/3 | 9.78 | 16.5 | 13.2 | 13.3 |
| PCB207 | 3/3 | 8.22 | 32.6 | 24.0 | 31.2 | 3/3 | 11.6 | 24.1 | 19.2 | 21.8 | 3/3 | 16.0 | 29.3 | 22.1 | 21.0 | 3/3 | 6.18 | 8.59 | 7.35 | 7.28 |
| PCB208 | 3/3 | 13.2 | 50.0 | 35.9 | 44.5 | 3/3 | 23.5 | 36.0 | 31.1 | 34.0 | 3/3 | 29.4 | 38.7 | 32.9 | 30.4 | 3/3 | 9.15 | 17.1 | 13.1 | 13.1 |
| PCB209 | 3/3 | 142 | 582 | 390 | 447 | 3/3 | 343 | 398 | 378 | 392 | 3/3 | 306 | 394 | 345 | 334 | 3/3 | 46.1 | 99.9 | 68.9 | 60.7 |

**Notes**

-- = not applicable, no detected values
FCA = fish collection area
PCB = polychlorinated biphenyl
ww = wet weight

a - Mean and median calculations include detected and non-detected values. Non-detected values were set at one-half the detection limit.
b - PCB###+#### indicates a co-elution of two or more PCB congeners.

**Table C-31**
**Summary Statistics for Polychlorinated Biphenyls in Fillet Hardhead Catfish Tissue by FCA, Wet Weight**

| | FCA1 | | | | | FCA2 | | | | | FCA3 | | | | | Background | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] |
| Catfish - Fillet | | | | | | | | | | | | | | | | | | | | |
| **Polychlorinated Biphenyls [b] (ng/kg - ww)** | | | | | | | | | | | | | | | | | | | | |
| PCB001 | 4/10 | 2.74 | 4.74 | 2.33 | NA | 5/10 | 3.63 | 12.5 | 4.57 | NA | 2/10 | 4.7 | 4.87 | 2.28 | NA | 0/10 | -- | -- | 1.06 | NA |
| PCB002 | 0/10 | -- | -- | 0.957 | NA | 0/10 | -- | -- | 1.02 | NA | 0/10 | -- | -- | 0.994 | NA | 0/10 | -- | -- | 1.04 | NA |
| PCB003 | 0/10 | -- | -- | 1.08 | NA | 1/10 | 1.83 | 1.83 | 1.3 | NA | 0/10 | -- | -- | 1.2 | NA | 0/10 | -- | -- | 1.22 | NA |
| PCB004 | 1/10 | 19.4 | 19.4 | 10.8 | NA | 4/10 | 16 | 40.3 | 18.2 | NA | 3/10 | 20.8 | 22.9 | 19.2 | NA | 0/10 | -- | -- | 7.11 | NA |
| PCB005 | 0/10 | -- | -- | 6.15 | NA | 0/10 | -- | -- | 5.85 | NA | 0/10 | -- | -- | 7.15 | NA | 0/10 | -- | -- | 4.64 | NA |
| PCB006 | 0/10 | -- | -- | 5.67 | NA | 2/10 | 4.66 | 5.57 | 5.99 | NA | 0/10 | -- | -- | 5.95 | NA | 1/10 | 5.85 | 5.85 | 4.47 | NA |
| PCB007 | 0/10 | -- | -- | 5.72 | NA | 0/10 | -- | -- | 5.51 | NA | 0/10 | -- | -- | 6.35 | NA | 0/10 | -- | -- | 4.24 | NA |
| PCB008 | 1/10 | 8.12 | 8.12 | 5.83 | NA | 0/10 | -- | -- | 5.76 | NA | 0/10 | -- | -- | 7.02 | NA | 1/10 | 6.69 | 6.69 | 4.29 | NA |
| PCB009 | 0/10 | -- | -- | 5.38 | NA | 0/10 | -- | -- | 5.26 | NA | 0/10 | -- | -- | 6.28 | NA | 0/10 | -- | -- | 4.02 | NA |
| PCB010 | 0/10 | -- | -- | 6.11 | NA | 0/10 | -- | -- | 6.72 | NA | 0/10 | -- | -- | 9.89 | NA | 0/10 | -- | -- | 5.05 | NA |
| PCB011 | 0/10 | -- | -- | 35.2 | NA | 0/10 | -- | -- | 45.6 | NA | 0/10 | -- | -- | 48 | NA | 0/10 | -- | -- | 32.7 | NA |
| PCB012+013 | 0/10 | -- | -- | 5.53 | NA | 0/10 | -- | -- | 5.31 | NA | 0/10 | -- | -- | 6.33 | NA | 0/10 | -- | -- | 4.05 | NA |
| PCB014 | 0/10 | -- | -- | 5.32 | NA | 0/10 | -- | -- | 5.08 | NA | 0/10 | -- | -- | 6.15 | NA | 0/10 | -- | -- | 3.87 | NA |
| PCB015 | 0/10 | -- | -- | 5.92 | NA | 1/10 | 6.04 | 6.04 | 6.67 | NA | 0/10 | -- | -- | 6.98 | NA | 0/10 | -- | -- | 4.51 | NA |
| PCB016 | 9/10 | 29.8 | 57.9 | 39.9 | NA | 10/10 | 30.2 | 90.2 | 44.4 | NA | 9/10 | 12.6 | 109 | 43.1 | NA | 7/10 | 6.25 | 23.6 | 11.4 | NA |
| PCB017 | 3/10 | 13.2 | 19.1 | 7.34 | NA | 8/10 | 7.38 | 19.4 | 10.1 | NA | 8/10 | 5.95 | 32.7 | 12.8 | NA | 7/10 | 3.98 | 8.91 | 4.77 | NA |
| PCB018+030 | 9/10 | 35.9 | 113 | 52.3 | NA | 10/10 | 36 | 115 | 60.1 | NA | 9/10 | 24.2 | 207 | 74.7 | NA | 10/10 | 7.91 | 31.7 | 17.3 | NA |
| PCB019 | 9/10 | 26.3 | 72.9 | 41.7 | NA | 10/10 | 35.8 | 91.2 | 55.8 | NA | 10/10 | 17.6 | 93 | 56 | NA | 7/10 | 4.92 | 13.8 | 7.27 | NA |
| PCB020+028 | 10/10 | 118 | 878 | 646 | NA | 10/10 | 400 | 1,000 | 665 | NA | 10/10 | 220 | 1,370 | 754 | NA | 10/10 | 183 | 534 | 303 | NA |
| PCB021+033 | 8/10 | 3.91 | 25.8 | 11.8 | NA | 0/10 | -- | -- | 4.06 | NA | 4/10 | 8.27 | 14 | 7.36 | NA | 6/10 | 4.72 | 8.68 | 4.78 | NA |
| PCB022 | 1/10 | 13.8 | 13.8 | 4.6 | NA | 1/10 | 13.4 | 13.4 | 5.24 | NA | 3/10 | 13.8 | 26.7 | 8.73 | NA | 1/10 | 4.41 | 4.41 | 1.79 | NA |
| PCB023 | 0/10 | -- | -- | 1.02 | NA | 0/10 | -- | -- | 0.821 | NA | 0/10 | -- | -- | 0.932 | NA | 0/10 | -- | -- | 0.921 | NA |
| PCB024 | 5/10 | 5.53 | 9 | 5.12 | NA | 9/10 | 4.23 | 10.7 | 6.71 | NA | 6/10 | 2.26 | 6.63 | 4.78 | NA | 3/10 | 1.62 | 1.81 | 1.23 | NA |
| PCB025 | 5/10 | 4.86 | 16.7 | 6.97 | NA | 5/10 | 3.64 | 16 | 8.49 | NA | 8/10 | 4.38 | 30.9 | 13.3 | NA | 8/10 | 5.86 | 19.9 | 10.3 | NA |
| PCB026+029 | 10/10 | 5.83 | 67.3 | 44 | NA | 10/10 | 34.8 | 93.8 | 55.1 | NA | 10/10 | 19 | 130 | 61.2 | NA | 9/10 | 21 | 54.3 | 31.7 | NA |
| PCB027 | 5/10 | 4.29 | 11.8 | 4.55 | NA | 7/10 | 3.93 | 12.6 | 5.35 | NA | 7/10 | 2.12 | 21.6 | 6.75 | NA | 2/10 | 1.56 | 1.91 | 1 | NA |
| PCB031 | 7/10 | 33.4 | 57.5 | 32.2 | NA | 10/10 | 28.5 | 86.1 | 52.7 | NA | 9/10 | 25.3 | 135 | 59.3 | NA | 10/10 | 23.1 | 83.2 | 46.9 | NA |
| PCB032 | 1/10 | 12 | 12 | 4.02 | NA | 10/10 | 4.29 | 12.1 | 6.99 | NA | 8/10 | 3.81 | 16.1 | 6.9 | NA | 7/10 | 2.27 | 4.99 | 2.66 | NA |
| PCB034 | 2/10 | 2.32 | 5.28 | 2.2 | NA | 5/10 | 3.46 | 6.89 | 3.14 | NA | 3/10 | 3.31 | 8.64 | 2.93 | NA | 0/10 | -- | -- | 1.24 | NA |
| PCB035 | 0/10 | -- | -- | 0.922 | NA | 0/10 | -- | -- | 0.778 | NA | 0/10 | -- | -- | 0.843 | NA | 0/10 | -- | -- | 0.842 | NA |
| PCB036 | 0/10 | -- | -- | 0.83 | NA | 0/10 | -- | -- | 0.678 | NA | 0/10 | -- | -- | 0.767 | NA | 0/10 | -- | -- | 0.764 | NA |
| PCB037 | 0/10 | -- | -- | 2.48 | NA | 4/10 | 5.64 | 10.3 | 4.09 | NA | 4/10 | 3.28 | 7.83 | 4.21 | NA | 3/10 | 3.52 | 4.02 | 1.9 | NA |
| PCB038 | 0/10 | -- | -- | 0.913 | NA | 0/10 | -- | -- | 0.763 | NA | 1/10 | 1.55 | 1.55 | 0.946 | NA | 0/10 | -- | -- | 0.845 | NA |
| PCB039 | 0/10 | -- | -- | 0.89 | NA | 0/10 | -- | -- | 0.74 | NA | 0/10 | -- | -- | 0.833 | NA | 0/10 | -- | -- | 0.831 | NA |
| PCB040+041+071 | 8/10 | 36 | 86.3 | 44.6 | NA | 10/10 | 36.7 | 92.7 | 54.2 | NA | 10/10 | 17 | 148 | 63.1 | NA | 7/10 | 9.67 | 31.5 | 15.1 | NA |
| PCB042 | 9/10 | 79.9 | 270 | 128 | NA | 10/10 | 87.2 | 228 | 137 | NA | 10/10 | 38.1 | 328 | 145 | NA | 10/10 | 15.3 | 65.5 | 36.8 | NA |
| PCB043+073 | 2/10 | 13.7 | 19.9 | 4.38 | NA | 6/10 | 8.65 | 20.2 | 11.4 | NA | 1/10 | 17.1 | 17.1 | 2.67 | NA | 4/10 | 4.08 | 10 | 3.19 | NA |
| PCB044+047+065 | 10/10 | 448 | 4,960 | 3150 | NA | 10/10 | 1,720 | 4,420 | 2,950 | NA | 10/10 | 961 | 5,320 | 3,280 | NA | 10/10 | 572 | 1,990 | 1,030 | NA |
| PCB045+051 | 10/10 | 11.8 | 153 | 96.5 | NA | 10/10 | 60.2 | 175 | 96.9 | NA | 10/10 | 31.8 | 197 | 105 | NA | 10/10 | 16.1 | 47.3 | 27.9 | NA |
| PCB046 | 5/10 | 7.73 | 16.4 | 7.11 | NA | 6/10 | 5.43 | 19 | 7.94 | NA | 4/10 | 4.13 | 21.9 | 6.73 | NA | 3/10 | 2.44 | 3.45 | 1.92 | NA |
| PCB048 | 1/10 | 28.2 | 28.2 | 3.48 | NA | 1/10 | 8.72 | 8.72 | 2.86 | NA | 3/10 | 5.54 | 32.6 | 5.72 | NA | 1/10 | 3.85 | 3.85 | 1.43 | NA |
| PCB049+069 | 10/10 | 244 | 3,150 | 2,070 | NA | 10/10 | 1,250 | 2,920 | 1,950 | NA | 10/10 | 658 | 4,000 | 2,210 | NA | 10/10 | 425 | 1,450 | 756 | NA |
| PCB050+053 | 10/10 | 18.2 | 340 | 192 | NA | 10/10 | 183 | 430 | 273 | NA | 10/10 | 57.1 | 476 | 282 | NA | 10/10 | 29.3 | 99.3 | 52.2 | NA |
| PCB052 | 10/10 | 304 | 4,100 | 2,620 | NA | 10/10 | 1,770 | 3,840 | 2,570 | NA | 10/10 | 819 | 5,550 | 2,940 | NA | 10/10 | 516 | 1,630 | 851 | NA |
| PCB054 | 7/10 | 4.66 | 14.3 | 7.84 | NA | 7/10 | 7.95 | 18.9 | 9.9 | NA | 9/10 | 3.36 | 14.5 | 9.64 | NA | 5/10 | 1.73 | 2.56 | 1.42 | NA |
| PCB055 | 0/10 | -- | -- | 0.576 | NA | 0/10 | -- | -- | 0.73 | NA | 0/10 | -- | -- | 0.692 | NA | 0/10 | -- | -- | 0.58 | NA |
| PCB056 | 5/10 | 7.61 | 28.3 | 8.43 | NA | 6/10 | 10.2 | 16.4 | 9.98 | NA | 8/10 | 5.23 | 50.4 | 17.2 | NA | 2/10 | 2.57 | 4.61 | 1.91 | NA |
| PCB057 | 0/10 | -- | -- | 0.649 | NA | 0/10 | -- | -- | 0.738 | NA | 1/10 | 4.11 | 4.11 | 1.11 | NA | 3/10 | 1.63 | 1.99 | 1.16 | NA |

**Table C-31**
**Summary Statistics for Polychlorinated Biphenyls in Fillet Hardhead Catfish Tissue by FCA, Wet Weight**

| | FCA1 | | | | | FCA2 | | | | | FCA3 | | | | | Background | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] |
| PCB058 | 2/10 | 3.65 | 6.89 | 1.78 | NA | 1/10 | 3.19 | 3.19 | 0.931 | NA | 0/10 | -- | -- | 0.99 | NA | 5/10 | 7.86 | 19.3 | 6.43 | NA |
| PCB059+062+075 | 10/10 | 22.6 | 292 | 186 | NA | 10/10 | 125 | 270 | 179 | NA | 10/10 | 51.2 | 413 | 208 | NA | 10/10 | 29.7 | 96.9 | 54.7 | NA |
| PCB060 | 10/10 | 68 | 712 | 402 | NA | 10/10 | 262 | 641 | 418 | NA | 10/10 | 117 | 645 | 470 | NA | 10/10 | 58.1 | 368 | 138 | NA |
| PCB061+070+074+076 | 10/10 | 272 | 2,950 | 1,750 | NA | 10/10 | 1,260 | 2,760 | 1,880 | NA | 10/10 | 547 | 2,810 | 2,070 | NA | 10/10 | 390 | 1,460 | 731 | NA |
| PCB063 | 10/10 | 14.8 | 167 | 110 | NA | 10/10 | 71.4 | 167 | 112 | NA | 10/10 | 31.8 | 173 | 121 | NA | 10/10 | 23.2 | 85.1 | 41.7 | NA |
| PCB064 | 10/10 | 36.3 | 707 | 383 | NA | 10/10 | 264 | 672 | 415 | NA | 10/10 | 120 | 1,180 | 508 | NA | 10/10 | 48.7 | 167 | 96.3 | NA |
| PCB066 | 10/10 | 458 | 4,810 | 2,860 | NA | 10/10 | 1,780 | 4,420 | 2,860 | NA | 10/10 | 861 | 4,390 | 3,160 | NA | 10/10 | 513 | 1,940 | 1,020 | NA |
| PCB067 | 0/10 | -- | -- | 1.02 | NA | 0/10 | -- | -- | 0.6 | NA | 0/10 | -- | -- | 0.783 | NA | 5/10 | 5.35 | 10.3 | 4.51 | NA |
| PCB068 | 9/10 | 30.6 | 77.7 | 50.6 | NA | 10/10 | 37.2 | 77.5 | 52.4 | NA | 9/10 | 19 | 79.5 | 53.1 | NA | 10/10 | 20 | 74 | 34.4 | NA |
| PCB072 | 10/10 | 2.91 | 62 | 39 | NA | 10/10 | 29.5 | 68.7 | 41.2 | NA | 10/10 | 12.9 | 67.2 | 40.8 | NA | 9/10 | 15.5 | 44.7 | 22.4 | NA |
| PCB077 | 8/10 | 3.47 | 13.8 | 6.66 | 7.71 | 7/10 | 7.42 | 23.3 | 10.9 | 10.8 | 7/10 | 3.77 | 29.8 | 12.8 | 13.6 | 8/10 | 4.77 | 14.7 | 7.42 | 7.11 |
| PCB078 | 0/10 | -- | -- | 1.17 | NA | 0/10 | -- | -- | 1.38 | NA | 0/10 | -- | -- | 1.46 | NA | 0/10 | -- | -- | 1.11 | NA |
| PCB079 | 7/10 | 2.26 | 21 | 8.58 | NA | 7/10 | 5.34 | 11.7 | 7.47 | NA | 5/10 | 5.98 | 19.2 | 7.14 | NA | 1/10 | 1.98 | 1.98 | 1.9 | NA |
| PCB080 | 0/10 | -- | -- | 1.04 | NA | 0/10 | -- | -- | 1.24 | NA | 0/10 | -- | -- | 1.3 | NA | 0/10 | -- | -- | 0.96 | NA |
| PCB081 | 1/10 | 3.9 | 3.9 | 1.55 | 1.23 | 0/10 | -- | -- | 1.69 | 1.37 | 4/10 | 3.25 | 5.27 | 2.84 | 2.33 | 0/10 | -- | -- | 1.27 | 1.23 |
| PCB082 | 4/10 | 16.5 | 46.1 | 13.3 | NA | 7/10 | 17.7 | 42.3 | 20.2 | NA | 3/10 | 8.09 | 25.3 | 12.2 | NA | 3/10 | 4.9 | 11.5 | 4.92 | NA |
| PCB083+099 | 10/10 | 1,830 | 13,800 | 7,640 | NA | 10/10 | 4,060 | 12,800 | 7,420 | NA | 10/10 | 2,200 | 11,100 | 7,910 | NA | 10/10 | 1,820 | 6,860 | 3,520 | NA |
| PCB084 | 9/10 | 46.5 | 179 | 92 | NA | 10/10 | 90.7 | 264 | 146 | NA | 9/10 | 58.5 | 210 | 118 | NA | 10/10 | 27 | 106 | 51.2 | NA |
| PCB085+116 | 10/10 | 395 | 2,240 | 1,190 | NA | 10/10 | 522 | 2,070 | 1,190 | NA | 10/10 | 273 | 1,750 | 1,220 | NA | 10/10 | 191 | 719 | 360 | NA |
| PCB086+087+097+109+119 +125 | 10/10 | 219 | 2,140 | 1,270 | NA | 10/10 | 792 | 1,820 | 1,280 | NA | 10/10 | 364 | 2,450 | 1,310 | NA | 10/10 | 250 | 853 | 465 | NA |
| PCB088+091 | 10/10 | 59.2 | 602 | 396 | NA | 10/10 | 317 | 793 | 479 | NA | 10/10 | 130 | 651 | 410 | NA | 10/10 | 134 | 519 | 237 | NA |
| PCB089 | 0/10 | -- | -- | 0.709 | NA | 0/10 | -- | -- | 1.01 | NA | 0/10 | -- | -- | 0.97 | NA | 0/10 | -- | -- | 0.723 | NA |
| PCB090+101+113 | 10/10 | 869 | 7,630 | 4,770 | NA | 10/10 | 2,610 | 7,050 | 4,610 | NA | 10/10 | 1,380 | 8,760 | 4,920 | NA | 10/10 | 1,040 | 3,570 | 1,860 | NA |
| PCB092 | 10/10 | 81 | 895 | 553 | NA | 10/10 | 422 | 842 | 610 | NA | 10/10 | 164 | 1,260 | 644 | NA | 10/10 | 173 | 519 | 266 | NA |
| PCB093+100 | 10/10 | 56.4 | 433 | 246 | NA | 10/10 | 116 | 426 | 253 | NA | 10/10 | 72.1 | 351 | 248 | NA | 10/10 | 61.8 | 246 | 115 | NA |
| PCB094 | 8/10 | 5.04 | 17 | 9.99 | NA | 8/10 | 8.18 | 24.5 | 12.7 | NA | 6/10 | 9.38 | 24.9 | 10.9 | NA | 8/10 | 3.47 | 14.3 | 5.61 | NA |
| PCB095 | 10/10 | 104 | 1,340 | 812 | NA | 10/10 | 693 | 1,840 | 1,050 | NA | 10/10 | 231 | 1,750 | 936 | NA | 10/10 | 219 | 861 | 396 | NA |
| PCB096 | 6/10 | 4.34 | 8.06 | 4.02 | NA | 5/10 | 4.47 | 11.5 | 5.05 | NA | 6/10 | 2.37 | 11.4 | 4.31 | NA | 3/10 | 1.68 | 5.17 | 1.44 | NA |
| PCB098+102 | 3/10 | 32.9 | 44.7 | 18.5 | NA | 10/10 | 19.8 | 59.3 | 33.3 | NA | 8/10 | 7.94 | 79.1 | 29.8 | NA | 7/10 | 8.25 | 21.1 | 10.6 | NA |
| PCB103 | 10/10 | 14.9 | 128 | 88.5 | NA | 10/10 | 51.9 | 156 | 95.2 | NA | 10/10 | 27.7 | 116 | 83.2 | NA | 10/10 | 27.1 | 117 | 50.4 | NA |
| PCB104 | 2/10 | 3.59 | 3.64 | 1.4 | NA | 5/10 | 1.75 | 3.52 | 1.7 | NA | 3/10 | 2.01 | 3.18 | 1.5 | NA | 1/10 | 1.11 | 1.11 | 0.539 | NA |
| PCB105 | 10/10 | 515 | 3,970 | 2140 | 2020 | 10/10 | 1,220 | 4,010 | 2,350 | 2,350 | 10/10 | 569 | 3,610 | 2,470 | 2,760 | 10/10 | 318 | 1,410 | 685 | 533 |
| PCB106 | 0/10 | -- | -- | 2.01 | NA | 0/10 | -- | -- | 1.98 | NA | 0/10 | -- | -- | 1.95 | NA | 0/10 | -- | -- | 1.53 | NA |
| PCB107 | 10/10 | 102 | 758 | 481 | NA | 10/10 | 310 | 820 | 491 | NA | 10/10 | 144 | 788 | 541 | NA | 10/10 | 134 | 529 | 251 | NA |
| PCB108+124 | 6/10 | 12.4 | 37.5 | 18.4 | NA | 9/10 | 21.5 | 60.8 | 36.5 | NA | 9/10 | 6.7 | 81.5 | 39.4 | NA | 9/10 | 14.5 | 40.4 | 21.7 | NA |
| PCB110+115 | 10/10 | 200 | 2,440 | 1,200 | NA | 10/10 | 974 | 2,000 | 1,410 | NA | 10/10 | 334 | 3,970 | 1,630 | NA | 10/10 | 184 | 603 | 365 | NA |
| PCB111 | 6/10 | 5.68 | 25.1 | 10.7 | NA | 5/10 | 7.71 | 19.8 | 10.2 | NA | 7/10 | 5.02 | 18.9 | 10.5 | NA | 6/10 | 6.31 | 15.7 | 7.11 | NA |
| PCB112 | 0/10 | -- | -- | 2.93 | NA | 0/10 | -- | -- | 2.37 | NA | 0/10 | -- | -- | 2.71 | NA | 0/10 | -- | -- | 2.15 | NA |
| PCB114 | 9/10 | 83.5 | 239 | 131 | 119 | 9/10 | 79.3 | 234 | 132 | 141 | 10/10 | 36.8 | 211 | 148 | 164 | 6/10 | 28.6 | 89 | 38.3 | 32.9 |
| PCB117 | 9/10 | 30.4 | 107 | 65.5 | NA | 9/10 | 35.9 | 88.7 | 62.1 | NA | 9/10 | 26.8 | 158 | 76.6 | NA | 7/10 | 26 | 81.9 | 31.4 | NA |
| PCB118 | 10/10 | 1,700 | 12,100 | 6,930 | 6,490 | 10/10 | 3,980 | 12,200 | 7,230 | 6,990 | 10/10 | 1,970 | 10,600 | 7,630 | 8,210 | 10/10 | 1,350 | 5,540 | 2,760 | 2270 |
| PCB120 | 10/10 | 32.4 | 152 | 87.9 | NA | 10/10 | 52.3 | 140 | 82.8 | NA | 10/10 | 24.7 | 120 | 84 | NA | 10/10 | 31.5 | 113 | 59.3 | NA |
| PCB121 | 2/10 | 5.81 | 11.6 | 4.45 | NA | 2/10 | 11.3 | 17.1 | 4.97 | NA | 2/10 | 3.1 | 10.7 | 3.85 | NA | 2/10 | 5.2 | 6.89 | 3.21 | NA |
| PCB122 | 0/10 | -- | -- | 2.27 | NA | 0/10 | -- | -- | 2.1 | NA | 0/10 | -- | -- | 2.02 | NA | 0/10 | -- | -- | 1.7 | NA |
| PCB123 | 9/10 | 72 | 238 | 126 | 117 | 10/10 | 72.8 | 234 | 139 | 136 | 10/10 | 27.5 | 195 | 139 | 160 | 8/10 | 19.9 | 82.6 | 37.1 | 33.7 |
| PCB126 | 6/10 | 6.12 | 16.1 | 8.88 | 7.58 | 6/10 | 8.28 | 16.1 | 8.5 | 9.24 | 4/10 | 10.7 | 22.5 | 9.45 | 7.55 | 5/10 | 2.55 | 6.12 | 3.11 | 3.03 |
| PCB127 | 0/10 | -- | -- | 2.12 | NA | 0/10 | -- | -- | 2.33 | NA | 6/10 | 7.77 | 13.1 | 8.07 | NA | 0/10 | -- | -- | 1.66 | NA |
| PCB128+166 | 10/10 | 349 | 2,360 | 1,300 | NA | 10/10 | 724 | 2,520 | 1,370 | NA | 10/10 | 361 | 2,150 | 1,450 | NA | 10/10 | 275 | 1,190 | 567 | NA |
| PCB129+138+163 | 10/10 | 2,220 | 15,200 | 8,790 | NA | 10/10 | 6,010 | 15,900 | 9,430 | NA | 10/10 | 2,490 | 14,700 | 9,880 | NA | 10/10 | 2,050 | 7,930 | 4,110 | NA |

**Table C-31**
**Summary Statistics for Polychlorinated Biphenyls in Fillet Hardhead Catfish Tissue by FCA, Wet Weight**

| | FCA1 | | | | | FCA2 | | | | | FCA3 | | | | | Background | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] |
| PCB130 | 9/10 | 108 | 265 | 167 | NA | 10/10 | 131 | 277 | 197 | NA | 10/10 | 48.8 | 340 | 198 | NA | 10/10 | 78.4 | 251 | 118 | NA |
| PCB131 | 0/10 | -- | -- | 1.86 | NA | 1/10 | 15.3 | 15.3 | 3.38 | NA | 0/10 | -- | -- | 1.64 | NA | 2/10 | 4.14 | 5.56 | 1.98 | NA |
| PCB132 | 10/10 | 46.5 | 568 | 343 | NA | 10/10 | 294 | 686 | 436 | NA | 10/10 | 97.1 | 672 | 407 | NA | 10/10 | 115 | 391 | 186 | NA |
| PCB133 | 10/10 | 28.9 | 204 | 141 | NA | 10/10 | 87.9 | 216 | 134 | NA | 10/10 | 39.3 | 212 | 137 | NA | 10/10 | 50.4 | 169 | 87.5 | NA |
| PCB134 | 0/10 | -- | -- | 1.87 | NA | 1/10 | 33.9 | 33.9 | 5.41 | NA | 0/10 | -- | -- | 1.73 | NA | 2/10 | 12 | 14.4 | 5.38 | NA |
| PCB135+151 | 10/10 | 56.4 | 604 | 369 | NA | 10/10 | 310 | 749 | 470 | NA | 10/10 | 101 | 1,050 | 477 | NA | 10/10 | 117 | 462 | 222 | NA |
| PCB136 | 9/10 | 16.4 | 73.5 | 35.9 | NA | 10/10 | 40 | 129 | 63.5 | NA | 10/10 | 12.8 | 86.1 | 45.2 | NA | 10/10 | 13.1 | 59.8 | 26.9 | NA |
| PCB137 | 10/10 | 84 | 647 | 376 | NA | 10/10 | 253 | 699 | 394 | NA | 10/10 | 103 | 693 | 452 | NA | 10/10 | 69.6 | 352 | 161 | NA |
| PCB139+140 | 10/10 | 38.8 | 276 | 162 | NA | 10/10 | 90.1 | 291 | 165 | NA | 10/10 | 45.2 | 261 | 177 | NA | 10/10 | 39.5 | 148 | 75 | NA |
| PCB141 | 10/10 | 113 | 1,020 | 638 | NA | 10/10 | 392 | 1,090 | 650 | NA | 10/10 | 179 | 1,140 | 740 | NA | 10/10 | 134 | 473 | 237 | NA |
| PCB142 | 0/10 | -- | -- | 1.8 | NA | 0/10 | -- | -- | 2.01 | NA | 0/10 | -- | -- | 1.63 | NA | 0/10 | -- | -- | 1.2 | NA |
| PCB143 | 0/10 | -- | -- | 1.74 | NA | 0/10 | -- | -- | 1.84 | NA | 0/10 | -- | -- | 1.52 | NA | 0/10 | -- | -- | 1.16 | NA |
| PCB144 | 10/10 | 18.2 | 290 | 150 | NA | 10/10 | 73.3 | 289 | 161 | NA | 10/10 | 50.5 | 262 | 176 | NA | 10/10 | 21 | 69.6 | 37.7 | NA |
| PCB145 | 0/10 | -- | -- | 0.437 | NA | 0/10 | -- | -- | 0.562 | NA | 0/10 | -- | -- | 0.602 | NA | 0/10 | -- | -- | 0.583 | NA |
| PCB146 | 10/10 | 570 | 3,700 | 2,100 | NA | 10/10 | 1,330 | 3,600 | 2,070 | NA | 10/10 | 595 | 3,070 | 2,170 | NA | 10/10 | 563 | 2,260 | 1,140 | NA |
| PCB147+149 | 10/10 | 395 | 3530 | 2250 | NA | 10/10 | 1,590 | 3,800 | 2,520 | NA | 10/10 | 672 | 3,820 | 2,470 | NA | 10/10 | 792 | 2,750 | 1,280 | NA |
| PCB148 | 10/10 | 15.6 | 67.6 | 41.7 | NA | 10/10 | 23.1 | 66.8 | 40.3 | NA | 10/10 | 11.6 | 58.6 | 37.6 | NA | 10/10 | 14.7 | 54.3 | 27.3 | NA |
| PCB150 | 5/10 | 2.85 | 6.37 | 4.2 | NA | 10/10 | 5.2 | 17.6 | 8.7 | NA | 7/10 | 4.27 | 10.2 | 5.47 | NA | 6/10 | 4.91 | 17.4 | 6.73 | NA |
| PCB152 | 6/10 | 1.42 | 2.82 | 1.41 | NA | 3/10 | 1.27 | 2.61 | 1.08 | NA | 3/10 | 1.9 | 3.94 | 1.38 | NA | 0/10 | -- | -- | 0.559 | NA |
| PCB153+168 | 10/10 | 3,470 | 21,600 | 12,200 | NA | 10/10 | 7,700 | 20,300 | 11,900 | NA | 10/10 | 3,350 | 17,500 | 12,400 | NA | 10/10 | 3,040 | 14,100 | 6,450 | NA |
| PCB154 | 10/10 | 149 | 971 | 511 | NA | 10/10 | 296 | 944 | 484 | NA | 10/10 | 147 | 782 | 536 | NA | 10/10 | 145 | 539 | 287 | NA |
| PCB155 | 9/10 | 7.14 | 44.1 | 26.2 | NA | 10/10 | 15.7 | 42.8 | 24.4 | NA | 9/10 | 8.17 | 35 | 23.6 | NA | 9/10 | 6.44 | 28.6 | 13 | NA |
| PCB156+157 | 10/10 | 222 | 1,550 | 876 | 817 | 10/10 | 589 | 1,650 | 951 | 928 | 10/10 | 254 | 1,560 | 1,050 | 1,100 | 10/10 | 189 | 824 | 388 | 308 |
| PCB158 | 10/10 | 168 | 1,260 | 717 | NA | 10/10 | 473 | 1,310 | 749 | NA | 10/10 | 199 | 1270 | 815 | NA | 10/10 | 130 | 592 | 279 | NA |
| PCB159 | 8/10 | 6.24 | 27.3 | 14.6 | NA | 9/10 | 12 | 27.8 | 16.7 | NA | 8/10 | 8.98 | 29.3 | 18.5 | NA | 6/10 | 4.82 | 19.7 | 6.96 | NA |
| PCB160 | 0/10 | -- | -- | 1.37 | NA | 0/10 | -- | -- | 1.49 | NA | 0/10 | -- | -- | 1.17 | NA | 0/10 | -- | -- | 0.945 | NA |
| PCB161 | 0/10 | -- | -- | 1.26 | NA | 0/10 | -- | -- | 1.4 | NA | 0/10 | -- | -- | 1.12 | NA | 0/10 | -- | -- | 0.857 | NA |
| PCB162 | 9/10 | 32 | 88.7 | 50.3 | NA | 9/10 | 29.2 | 79.3 | 45.1 | NA | 10/10 | 14.8 | 80.9 | 54 | NA | 9/10 | 16.7 | 71.2 | 30.8 | NA |
| PCB164 | 10/10 | 35.7 | 369 | 212 | NA | 10/10 | 161 | 374 | 252 | NA | 9/10 | 95.2 | 469 | 262 | NA | 10/10 | 55.3 | 193 | 91.1 | NA |
| PCB165 | 0/10 | -- | -- | 1.42 | NA | 0/10 | -- | -- | 1.57 | NA | 0/10 | -- | -- | 1.27 | NA | 1/10 | 3.21 | 3.21 | 1.74 | NA |
| PCB167 | 10/10 | 59.3 | 490 | 305 | 282 | 10/10 | 193 | 526 | 329 | 319 | 10/10 | 87.2 | 511 | 346 | 380 | 10/10 | 84.9 | 310 | 149 | 129 |
| PCB169 | 2/10 | 4.48 | 4.92 | 2.36 | 1.84 | 0/10 | -- | -- | 3.02 | 1.42 | 0/10 | -- | -- | 2.01 | 2.02 | 0/10 | -- | -- | 1.52 | 1.18 |
| PCB170 | 10/10 | 449 | 3,320 | 1,840 | 1,810 | 10/10 | 1,220 | 3,170 | 1,790 | 1,740 | 10/10 | 582 | 3,200 | 2,160 | 2,260 | 10/10 | 440 | 2,570 | 1,040 | 763 |
| PCB171+173 | 10/10 | 164 | 1,110 | 621 | NA | 10/10 | 423 | 1,030 | 616 | NA | 10/10 | 200 | 995 | 706 | NA | 10/10 | 132 | 774 | 314 | NA |
| PCB172 | 10/10 | 90.9 | 635 | 357 | NA | 10/10 | 216 | 532 | 323 | NA | 10/10 | 115 | 593 | 385 | NA | 10/10 | 100 | 553 | 228 | NA |
| PCB174 | 10/10 | 55.8 | 663 | 357 | NA | 10/10 | 312 | 637 | 453 | NA | 10/10 | 162 | 882 | 510 | NA | 10/10 | 129 | 429 | 193 | NA |
| PCB175 | 10/10 | 16.6 | 95.5 | 64.8 | NA | 10/10 | 45.2 | 110 | 64.9 | NA | 8/10 | 25.5 | 92.3 | 60 | NA | 9/10 | 20.7 | 73.6 | 38.3 | NA |
| PCB176 | 8/10 | 2 | 30.2 | 16.2 | NA | 7/10 | 14.4 | 41.3 | 20.3 | NA | 8/10 | 5.46 | 34.9 | 15.6 | NA | 9/10 | 6.61 | 30.9 | 13.6 | NA |
| PCB177 | 9/10 | 13.4 | 262 | 141 | NA | 10/10 | 104 | 268 | 182 | NA | 9/10 | 50.4 | 426 | 190 | NA | 10/10 | 84.9 | 278 | 125 | NA |
| PCB178 | 10/10 | 56.1 | 435 | 270 | NA | 10/10 | 199 | 395 | 283 | NA | 10/10 | 96.8 | 442 | 272 | NA | 10/10 | 118 | 401 | 197 | NA |
| PCB179 | 9/10 | 5.64 | 98.7 | 51.2 | NA | 10/10 | 47.6 | 139 | 79.2 | NA | 10/10 | 19.8 | 110 | 66.2 | NA | 10/10 | 22.9 | 101 | 44.1 | NA |
| PCB180+193 | 10/10 | 1,160 | 8,400 | 4,720 | 4540 | 10/10 | 3,020 | 6,710 | 4,120 | 3,930 | 10/10 | 1,450 | 7,710 | 4,840 | 5,110 | 10/10 | 1,110 | 6,970 | 2,700 | 1990 |
| PCB181 | 7/10 | 11.4 | 37.1 | 17.7 | NA | 5/10 | 15.8 | 34.6 | 14.6 | NA | 7/10 | 20 | 37 | 21.2 | NA | 7/10 | 3.91 | 23.8 | 8.52 | NA |
| PCB182 | 7/10 | 6.28 | 26.1 | 15 | NA | 8/10 | 13.7 | 38.2 | 19.5 | NA | 9/10 | 7.14 | 36.1 | 22.2 | NA | 7/10 | 8.6 | 29.9 | 11.7 | NA |
| PCB183 | 10/10 | 311 | 2,460 | 1,400 | NA | 10/10 | 1,110 | 2,450 | 1,490 | NA | 10/10 | 548 | 2,190 | 1,540 | NA | 10/10 | 294 | 2,020 | 764 | NA |
| PCB184 | 7/10 | 3.62 | 22.4 | 10.9 | NA | 8/10 | 9.69 | 20.1 | 11.7 | NA | 7/10 | 12.4 | 21.5 | 13.2 | NA | 9/10 | 4.97 | 18 | 8.28 | NA |
| PCB185 | 10/10 | 9.13 | 113 | 68.2 | NA | 8/10 | 34.2 | 97.5 | 59.3 | NA | 9/10 | 33.9 | 141 | 92.6 | NA | 3/10 | 19.6 | 76 | 20 | NA |
| PCB186 | 0/10 | -- | -- | 0.462 | NA | 0/10 | -- | -- | 0.701 | NA | 0/10 | -- | -- | 0.576 | NA | 0/10 | -- | -- | 0.572 | NA |
| PCB187 | 10/10 | 730 | 4,710 | 3,000 | NA | 10/10 | 2,230 | 5,320 | 3,240 | NA | 10/10 | 1,020 | 4,670 | 3,190 | NA | 10/10 | 949 | 3,720 | 1,870 | NA |

**Table C-31**
**Summary Statistics for Polychlorinated Biphenyls in Fillet Hardhead Catfish Tissue by FCA, Wet Weight**

| | FCA1 | | | | | FCA2 | | | | | FCA3 | | | | | Background | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] |
| PCB188 | 10/10 | 5.86 | 32.6 | 19.8 | NA | 9/10 | 11.9 | 36.3 | 18.7 | NA | 10/10 | 6.61 | 25.1 | 19.6 | NA | 10/10 | 9.24 | 39.6 | 18 | NA |
| PCB189 | 10/10 | 17.4 | 111 | 66.4 | 59.5 | 9/10 | 42.2 | 104 | 56.7 | 54.5 | 10/10 | 22 | 120 | 75.4 | 79.5 | 10/10 | 22 | 101 | 42.5 | 32.3 |
| PCB190 | 10/10 | 84.2 | 671 | 371 | NA | 10/10 | 247 | 651 | 367 | NA | 10/10 | 126 | 643 | 436 | NA | 10/10 | 80.8 | 502 | 200 | NA |
| PCB191 | 10/10 | 21.2 | 145 | 83 | NA | 10/10 | 59.9 | 130 | 80.8 | NA | 10/10 | 28.7 | 146 | 97.2 | NA | 10/10 | 18.9 | 104 | 43.2 | NA |
| PCB192 | 0/10 | -- | -- | 1.29 | NA | 0/10 | -- | -- | 1.6 | NA | 0/10 | -- | -- | 1.71 | NA | 0/10 | -- | -- | 1.37 | NA |
| PCB194 | 10/10 | 207 | 1,310 | 789 | NA | 10/10 | 393 | 1,070 | 593 | NA | 10/10 | 235 | 1,400 | 787 | NA | 10/10 | 323 | 1,330 | 605 | NA |
| PCB195 | 10/10 | 77.1 | 553 | 321 | NA | 10/10 | 224 | 582 | 323 | NA | 10/10 | 93.1 | 544 | 377 | NA | 10/10 | 101 | 433 | 205 | NA |
| PCB196 | 10/10 | 120 | 789 | 473 | NA | 10/10 | 313 | 820 | 480 | NA | 10/10 | 150 | 858 | 565 | NA | 10/10 | 135 | 612 | 295 | NA |
| PCB197 | 10/10 | 23.4 | 149 | 89.6 | NA | 10/10 | 66.5 | 156 | 95.1 | NA | 10/10 | 31 | 144 | 102 | NA | 10/10 | 27.9 | 119 | 55.5 | NA |
| PCB198+199 | 10/10 | 160 | 1,340 | 807 | NA | 10/10 | 579 | 1,450 | 863 | NA | 10/10 | 267 | 1,540 | 990 | NA | 10/10 | 305 | 1,150 | 580 | NA |
| PCB200 | 8/10 | 5.36 | 13.6 | 8.57 | NA | 5/10 | 11.3 | 22 | 10.7 | NA | 6/10 | 3.93 | 26 | 11 | NA | 7/10 | 5.76 | 20.4 | 7.74 | NA |
| PCB201 | 10/10 | 19.9 | 153 | 96.1 | NA | 9/10 | 66.7 | 137 | 83.1 | NA | 10/10 | 35.9 | 148 | 95.5 | NA | 10/10 | 45.5 | 169 | 84.2 | NA |
| PCB202 | 10/10 | 26.5 | 198 | 129 | NA | 9/10 | 102 | 167 | 122 | NA | 10/10 | 44.9 | 208 | 134 | NA | 10/10 | 74.5 | 244 | 114 | NA |
| PCB203 | 10/10 | 192 | 1,290 | 749 | NA | 10/10 | 525 | 1,380 | 796 | NA | 10/10 | 242 | 1,330 | 912 | NA | 10/10 | 232 | 1,030 | 494 | NA |
| PCB204 | 9/10 | 2 | 10.8 | 5.66 | NA | 8/10 | 4.55 | 10.9 | 6.17 | NA | 4/10 | 8.33 | 12.6 | 5.67 | NA | 4/10 | 2.01 | 3.71 | 1.85 | NA |
| PCB205 | 10/10 | 10.8 | 64.1 | 38 | NA | 9/10 | 27.6 | 69.5 | 36.9 | NA | 8/10 | 19 | 65 | 42.5 | NA | 8/10 | 15.2 | 65.5 | 25.1 | NA |
| PCB206 | 10/10 | 113 | 663 | 416 | NA | 10/10 | 310 | 748 | 438 | NA | 10/10 | 167 | 722 | 498 | NA | 10/10 | 175 | 750 | 358 | NA |
| PCB207 | 10/10 | 67.3 | 360 | 218 | NA | 10/10 | 139 | 376 | 226 | NA | 10/10 | 79.9 | 370 | 259 | NA | 10/10 | 88.3 | 289 | 161 | NA |
| PCB208 | 10/10 | 76.6 | 489 | 298 | NA | 10/10 | 166 | 484 | 286 | NA | 10/10 | 133 | 466 | 337 | NA | 10/10 | 154 | 538 | 273 | NA |
| PCB209 | 10/10 | 1,340 | 7,210 | 4,590 | NA | 10/10 | 2,850 | 8,300 | 4,910 | NA | 10/10 | 1,960 | 8,230 | 5,270 | NA | 10/10 | 1,370 | 4,310 | 2,290 | NA |

**Notes**

-- = not applicable, no detected values
FCA = fish collection area
NA = data not available
PCB = polychlorinated biphenyl
ww = wet weight

a - Mean and median calculations include detected and non-detected values. Non-detected values were set at one-half the detection limit.
b - PCB###+#### indicates a co-elution of two or more PCB congeners.

**Table C-32**
**Summary Statistics for Polychlorinated Biphenyls in Whole Hardhead Catfish Tissue by FCA, Wet Weight**

| | FCA1 | | | | | FCA2 | | | | | FCA3 | | | | | Background | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] |
| Catfish - Whole | | | | | | | | | | | | | | | | | | | | |
| **Polychlorinated Biphenyls [b] (ng/kg - ww)** | | | | | | | | | | | | | | | | | | | | |
| PCB001 | 3/3 | 10.1 | 19.8 | 13.7 | 11.0 | 3/4 | 11.4 | 18.2 | 13.6 | 12.7 | 3/3 | 14.7 | 24.3 | 19.1 | 18.1 | 4/8 | 3.27 | 5.74 | 2.84 | 2.51 |
| PCB002 | 0/3 | -- | -- | 1.30 | 1.37 | 0/4 | -- | -- | 1.12 | 0.987 | 0/3 | -- | -- | 1.56 | 1.58 | 0/8 | -- | -- | 0.943 | 1.05 |
| PCB003 | 0/3 | -- | -- | 1.43 | 1.52 | 1/4 | 1.04 | 1.04 | 1.30 | 1.16 | 0/3 | -- | -- | 1.79 | 1.80 | 1/8 | 2.12 | 2.12 | 1.26 | 1.23 |
| PCB004 | 3/3 | 83.2 | 126 | 104 | 104 | 4/4 | 56.7 | 129 | 95.1 | 97.5 | 2/3 | 59.5 | 83.9 | 68.8 | 62.9 | 5/8 | 11.9 | 26.2 | 16.6 | 16.7 |
| PCB005 | 0/3 | -- | -- | 4.90 | 4.50 | 0/4 | -- | -- | 4.90 | 3.37 | 0/3 | -- | -- | 15.6 | 14.5 | 4/8 | 13.1 | 15.7 | 10.5 | 11.0 |
| PCB006 | 3/3 | 24.2 | 42.1 | 31.4 | 28.1 | 1/4 | 13.4 | 13.4 | 11.9 | 12.0 | 0/3 | -- | -- | 12.9 | 11.9 | 3/8 | 11.0 | 17.8 | 8.06 | 6.45 |
| PCB007 | 0/3 | -- | -- | 4.46 | 3.91 | 1/4 | 7.72 | 7.72 | 6.91 | 6.54 | 0/3 | -- | -- | 13.8 | 12.8 | 2/8 | 8.27 | 9.59 | 5.76 | 5.43 |
| PCB008 | 2/3 | 20.7 | 23.7 | 19.0 | 20.7 | 2/4 | 25.1 | 28.0 | 18.3 | 17.7 | 0/3 | -- | -- | 13.4 | 12.4 | 3/8 | 11.1 | 19.8 | 8.32 | 6.04 |
| PCB009 | 1/3 | 13.0 | 13.0 | 10.3 | 13.0 | 2/4 | 10.7 | 19.1 | 12.1 | 10.5 | 0/3 | -- | -- | 13.7 | 12.9 | 2/8 | 9.44 | 9.74 | 6.06 | 5.41 |
| PCB010 | 0/3 | -- | -- | 7.29 | 5.53 | 0/4 | -- | -- | 7.06 | 4.05 | 0/3 | -- | -- | 19.3 | 9.81 | 0/8 | -- | -- | 3.39 | 2.84 |
| PCB011 | 0/3 | -- | -- | 35.5 | 33.5 | 0/4 | -- | -- | 54.2 | 52.9 | 0/3 | -- | -- | 40.4 | 25.9 | 0/8 | -- | -- | 37.9 | 35.1 |
| PCB012+013 | 0/3 | -- | -- | 4.31 | 3.86 | 0/4 | -- | -- | 4.44 | 3.08 | 0/3 | -- | -- | 13.8 | 12.9 | 0/8 | -- | -- | 3.61 | 3.05 |
| PCB014 | 0/3 | -- | -- | 4.15 | 3.71 | 0/4 | -- | -- | 4.24 | 2.97 | 0/3 | -- | -- | 13.4 | 12.6 | 0/8 | -- | -- | 3.46 | 2.95 |
| PCB015 | 3/3 | 24.1 | 37.6 | 31.5 | 32.9 | 2/4 | 18.9 | 31.6 | 18.1 | 15.3 | 0/3 | -- | -- | 15.4 | 14.9 | 0/8 | -- | -- | 4.26 | 4.10 |
| PCB016 | 3/3 | 211 | 288 | 253 | 262 | 4/4 | 112 | 271 | 190 | 189 | 3/3 | 174 | 256 | 228 | 252 | 8/8 | 31.0 | 78.1 | 52.6 | 53.3 |
| PCB017 | 3/3 | 49.5 | 86.8 | 63.1 | 53.1 | 3/4 | 26.0 | 73.4 | 39.8 | 32.2 | 3/3 | 54.2 | 79.4 | 66.7 | 66.6 | 8/8 | 10.1 | 25.3 | 19.5 | 19.7 |
| PCB018+030 | 3/3 | 309 | 482 | 368 | 315 | 4/4 | 149 | 449 | 273 | 246 | 3/3 | 239 | 485 | 366 | 372 | 8/8 | 29.3 | 94.3 | 64.6 | 64.1 |
| PCB019 | 3/3 | 229 | 316 | 267 | 257 | 4/4 | 166 | 333 | 264 | 279 | 3/3 | 197 | 299 | 255 | 269 | 8/8 | 25.3 | 45.8 | 36.1 | 35.5 |
| PCB020+028 | 3/3 | 2,560 | 3,680 | 2,960 | 2,650 | 4/4 | 1,780 | 3,360 | 2,710 | 2,850 | 3/3 | 2,860 | 3,330 | 3,150 | 3,260 | 8/8 | 760 | 1,600 | 974 | 921 |
| PCB021+033 | 3/3 | 27.1 | 33.2 | 29.7 | 28.8 | 3/4 | 24.9 | 31.9 | 22.6 | 25.5 | 3/3 | 38.7 | 42.6 | 41.1 | 41.9 | 6/8 | 2.56 | 23.4 | 11.7 | 11.8 |
| PCB022 | 3/3 | 39.5 | 60.4 | 47.7 | 43.3 | 4/4 | 24.8 | 51.4 | 36.4 | 34.8 | 3/3 | 42.6 | 66.7 | 55.4 | 56.8 | 2/8 | 11.0 | 12.7 | 6.59 | 5.34 |
| PCB023 | 0/3 | -- | -- | 2.07 | 1.95 | 0/4 | -- | -- | 2.21 | 2.41 | 0/3 | -- | -- | 1.73 | 1.78 | 0/8 | -- | -- | 1.69 | 1.25 |
| PCB024 | 3/3 | 32.9 | 43.3 | 37.7 | 36.7 | 4/4 | 17.9 | 38.7 | 31.3 | 34.2 | 3/3 | 30.6 | 33.9 | 32.4 | 32.8 | 6/8 | 7.07 | 11.9 | 7.79 | 8.34 |
| PCB025 | 3/3 | 44.1 | 55.8 | 48.3 | 45.0 | 4/4 | 41.5 | 85.5 | 63.9 | 64.4 | 3/3 | 49.8 | 79.1 | 62.6 | 58.8 | 8/8 | 34.7 | 77.3 | 50.3 | 49.2 |
| PCB026+029 | 3/3 | 209 | 329 | 256 | 230 | 4/4 | 184 | 292 | 264 | 289 | 3/3 | 251 | 345 | 292 | 280 | 8/8 | 122 | 213 | 154 | 150 |
| PCB027 | 3/3 | 31.1 | 54.9 | 39.7 | 33.0 | 4/4 | 15.2 | 41.4 | 26.5 | 24.8 | 3/3 | 30.2 | 54.9 | 43.9 | 46.8 | 7/8 | 4.97 | 10.1 | 7.25 | 7.93 |
| PCB031 | 3/3 | 176 | 225 | 201 | 201 | 4/4 | 219 | 280 | 248 | 246 | 3/3 | 188 | 355 | 263 | 247 | 8/8 | 147 | 327 | 205 | 190 |
| PCB032 | 3/3 | 27.5 | 48.0 | 36.5 | 33.9 | 4/4 | 14.4 | 32.5 | 24.0 | 24.6 | 3/3 | 31.9 | 35.4 | 33.7 | 33.7 | 8/8 | 5.66 | 14.5 | 8.97 | 8.83 |
| PCB034 | 3/3 | 9.53 | 28.4 | 18.6 | 17.7 | 4/4 | 8.84 | 21.3 | 16.2 | 17.2 | 3/3 | 17.9 | 24.1 | 21.9 | 23.9 | 3/8 | 9.25 | 20.7 | 8.16 | 5.82 |
| PCB035 | 0/3 | -- | -- | 1.90 | 1.77 | 0/4 | -- | -- | 2.06 | 2.21 | 0/3 | -- | -- | 1.56 | 1.69 | 0/8 | -- | -- | 1.56 | 1.14 |
| PCB036 | 0/3 | -- | -- | 1.73 | 1.64 | 0/4 | -- | -- | 1.81 | 1.96 | 0/3 | -- | -- | 1.42 | 1.55 | 0/8 | -- | -- | 1.40 | 1.04 |
| PCB037 | 2/3 | 23.5 | 26.3 | 21.6 | 23.5 | 4/4 | 17.8 | 35.3 | 28.2 | 29.9 | 2/3 | 19.3 | 35.9 | 23.5 | 19.3 | 4/8 | 8.45 | 14.5 | 7.74 | 7.24 |
| PCB038 | 0/3 | -- | -- | 2.10 | 1.78 | 0/4 | -- | -- | 2.04 | 2.20 | 1/3 | 8.76 | 8.76 | 3.91 | 1.71 | 0/8 | -- | -- | 1.57 | 1.14 |
| PCB039 | 0/3 | -- | -- | 1.84 | 1.73 | 0/4 | -- | -- | 1.98 | 2.14 | 0/3 | -- | -- | 1.54 | 1.66 | 0/8 | -- | -- | 1.53 | 1.13 |
| PCB040+041+071 | 3/3 | 285 | 432 | 340 | 302 | 4/4 | 148 | 305 | 243 | 260 | 3/3 | 204 | 371 | 305 | 341 | 8/8 | 45.9 | 104 | 75.3 | 76.4 |
| PCB042 | 3/3 | 748 | 1,080 | 861 | 752 | 4/4 | 407 | 861 | 644 | 654 | 3/3 | 485 | 781 | 682 | 778 | 8/8 | 85.7 | 218 | 159 | 158 |
| PCB043+073 | 1/3 | 55.0 | 55.0 | 30.1 | 34.4 | 2/4 | 2.58 | 37.5 | 10.6 | 1.98 | 0/3 | -- | -- | 1.15 | 1.04 | 4/8 | 1.28 | 20.2 | 7.28 | 3.81 |
| PCB044+047+065 | 3/3 | 17,200 | 22,600 | 20,100 | 20,600 | 4/4 | 6910 | 22,400 | 15,300 | 15,900 | 3/3 | 12,800 | 20,900 | 18,000 | 20,300 | 8/8 | 3,250 | 7,530 | 4,890 | 4,680 |
| PCB045+051 | 3/3 | 440 | 537 | 501 | 527 | 4/4 | 252 | 566 | 425 | 440 | 3/3 | 400 | 476 | 438 | 438 | 8/8 | 79.3 | 169 | 110 | 103 |
| PCB046 | 3/3 | 54.9 | 58.7 | 56.7 | 56.4 | 3/4 | 27.0 | 62.2 | 40.5 | 41.1 | 1/3 | 54.5 | 54.5 | 19.0 | 1.32 | 5/8 | 1.36 | 15.5 | 8.18 | 8.24 |
| PCB048 | 2/3 | 38.9 | 87.1 | 42.3 | 38.9 | 0/4 | -- | -- | 0.922 | 0.941 | 2/3 | 2.04 | 72.3 | 25.2 | 2.04 | 3/8 | 7.07 | 10.7 | 4.13 | 1.19 |
| PCB049+069 | 3/3 | 12,600 | 15,100 | 13,900 | 13,900 | 4/4 | 5040 | 14,700 | 10,400 | 11,000 | 3/3 | 9,420 | 14,400 | 11,900 | 12,100 | 8/8 | 2,540 | 5,540 | 3,500 | 3,410 |
| PCB050+053 | 3/3 | 732 | 1,150 | 990 | 1,080 | 4/4 | 804 | 1,850 | 1,340 | 1,340 | 3/3 | 769 | 1,240 | 1,000 | 1,010 | 8/8 | 170 | 354 | 222 | 209 |
| PCB052 | 3/3 | 15,900 | 19,000 | 17,300 | 17,000 | 4/4 | 7,030 | 18,400 | 13,600 | 14,400 | 3/3 | 11,000 | 19,800 | 15,200 | 14,900 | 8/8 | 2,830 | 6,150 | 3,960 | 3,820 |
| PCB054 | 3/3 | 20.0 | 56.7 | 41.3 | 47.1 | 4/4 | 32.7 | 64.5 | 55.3 | 62.0 | 3/3 | 38.0 | 54.4 | 43.7 | 38.7 | 8/8 | 5.53 | 10.5 | 8.04 | 7.93 |
| PCB055 | 0/3 | -- | -- | 0.657 | 0.665 | 0/4 | -- | -- | 0.752 | 0.772 | 0/3 | -- | -- | 0.944 | 0.824 | 0/8 | -- | -- | 0.687 | 0.718 |
| PCB056 | 3/3 | 60.7 | 122 | 82.3 | 64.1 | 4/4 | 52.6 | 83.7 | 66.3 | 64.5 | 3/3 | 55.3 | 145 | 108 | 123 | 6/8 | 9.74 | 21.3 | 13.6 | 15.5 |
| PCB057 | 1/3 | 10.8 | 10.8 | 5.41 | 4.72 | 0/4 | -- | -- | 1.34 | 0.731 | 0/3 | -- | -- | 2.19 | 1.06 | 6/8 | 7.58 | 16.7 | 8.60 | 9.48 |
| PCB058 | 2/3 | 18.0 | 164 | 61.0 | 18.0 | 0/4 | -- | -- | 0.701 | 0.730 | 0/3 | -- | -- | 0.879 | 0.765 | 6/8 | 8.79 | 44.5 | 23.8 | 20.3 |

**Table C-32**
**Summary Statistics for Polychlorinated Biphenyls in Whole Hardhead Catfish Tissue by FCA, Wet Weight**

| | FCA1 | | | | | FCA2 | | | | | FCA3 | | | | | Background | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] |
| PCB059+062+075 | 3/3 | 1,150 | 1,280 | 1,230 | 1,240 | 4/4 | 495 | 1,120 | 901 | 995 | 3/3 | 711 | 1,390 | 1,080 | 1,130 | 8/8 | 175 | 346 | 242 | 235 |
| PCB060 | 3/3 | 2,140 | 2,940 | 2,460 | 2,290 | 4/4 | 1,080 | 3,300 | 2,350 | 2,520 | 3/3 | 1,720 | 3,300 | 2,520 | 2,550 | 8/8 | 289 | 1,060 | 610 | 600 |
| PCB061+070+074+076 | 3/3 | 10,100 | 12,500 | 11,200 | 10,900 | 4/4 | 5,170 | 14,900 | 10,600 | 11,200 | 3/3 | 8,240 | 14,200 | 11,400 | 11,800 | 8/8 | 2,130 | 5,000 | 3510 | 3,480 |
| PCB063 | 3/3 | 667 | 852 | 739 | 700 | 4/4 | 278 | 887 | 620 | 657 | 3/3 | 506 | 811 | 690 | 751 | 8/8 | 116 | 302 | 200 | 194 |
| PCB064 | 3/3 | 2,160 | 3,160 | 2,590 | 2,450 | 4/4 | 1,260 | 2,560 | 1,970 | 2,030 | 3/3 | 1,410 | 3,370 | 2,470 | 2,630 | 8/8 | 287 | 575 | 424 | 422 |
| PCB066 | 3/3 | 15,700 | 21,000 | 18,300 | 18,100 | 4/4 | 6990 | 23,000 | 15,900 | 16,800 | 3/3 | 13,000 | 20,800 | 17,700 | 19,100 | 8/8 | 2,820 | 7,290 | 4,900 | 4,880 |
| PCB067 | 2/3 | 34.5 | 35.3 | 23.5 | 34.5 | 0/4 | -- | -- | 0.621 | 0.649 | 0/3 | -- | -- | 0.777 | 0.672 | 8/8 | 12.4 | 32.3 | 24.8 | 28.1 |
| PCB068 | 3/3 | 10.6 | 401 | 259 | 366 | 4/4 | 166 | 441 | 306 | 309 | 3/3 | 262 | 357 | 316 | 330 | 8/8 | 5.10 | 273 | 146 | 138 |
| PCB072 | 3/3 | 201 | 244 | 229 | 241 | 4/4 | 134 | 272 | 211 | 220 | 3/3 | 166 | 238 | 210 | 227 | 8/8 | 66.2 | 176 | 106 | 93.5 |
| PCB077 | 3/3 | 38.1 | 61.0 | 49.2 | 48.3 | 4/4 | 52.2 | 78.5 | 64.6 | 63.8 | 3/3 | 16.8 | 81.4 | 55.1 | 67.0 | 8/8 | 28.8 | 52.5 | 37.4 | 36.6 |
| PCB078 | 0/3 | -- | -- | 2.56 | 2.46 | 0/4 | -- | -- | 4.09 | 3.67 | 0/3 | -- | -- | 3.87 | 3.67 | 0/8 | -- | -- | 1.70 | 1.47 |
| PCB079 | 3/3 | 32.2 | 81.1 | 55.3 | 52.7 | 4/4 | 11.3 | 68.7 | 45.8 | 51.6 | 3/3 | 47.8 | 55.3 | 52.7 | 55.1 | 8/8 | 15.7 | 29.9 | 20.7 | 20.4 |
| PCB080 | 0/3 | -- | -- | 2.28 | 2.16 | 0/4 | -- | -- | 3.80 | 3.52 | 0/3 | -- | -- | 3.46 | 3.26 | 0/8 | -- | -- | 1.48 | 1.29 |
| PCB081 | 2/3 | 5.70 | 14.2 | 8.24 | 5.70 | 2/4 | 18.1 | 20.4 | 12.3 | 12.5 | 2/3 | 9.15 | 19.1 | 12.2 | 9.15 | 2/8 | 5.88 | 15.1 | 4.86 | 3.09 |
| PCB082 | 2/3 | 47.7 | 208 | 89.6 | 47.7 | 4/4 | 63.2 | 157 | 111 | 112 | 2/3 | 142 | 142 | 100 | 142 | 2/8 | 17.8 | 25.6 | 11.6 | 8.90 |
| PCB083+099 | 3/3 | 43,600 | 46,400 | 45,200 | 45,600 | 4/4 | 18,000 | 73,300 | 43,600 | 41,500 | 3/3 | 34,700 | 48,500 | 40,900 | 39,600 | 8/8 | 9290 | 34,500 | 19,900 | 17,400 |
| PCB084 | 3/3 | 434 | 606 | 542 | 584 | 4/4 | 378 | 794 | 634 | 682 | 3/3 | 419 | 597 | 489 | 451 | 8/8 | 149 | 363 | 214 | 201 |
| PCB085+116 | 3/3 | 6,480 | 8,490 | 7,290 | 6,900 | 4/4 | 2,330 | 9,670 | 6,370 | 6,740 | 3/3 | 4,630 | 9,960 | 8,100 | 9,700 | 8/8 | 982 | 3,410 | 2,040 | 1,770 |
| PCB086+087+097+109+119 +125 | 3/3 | 8,100 | 9210 | 8,600 | 8,500 | 4/4 | 3,400 | 8,730 | 6,940 | 7,820 | 3/3 | 5,700 | 9,270 | 7,670 | 8,030 | 8/8 | 1,460 | 3,070 | 2,250 | 2,200 |
| PCB088+091 | 3/3 | 2,420 | 2,850 | 2,620 | 2,610 | 4/4 | 1,300 | 3,150 | 2,430 | 2,630 | 3/3 | 2,100 | 2,210 | 2,140 | 2,130 | 8/8 | 816 | 1,880 | 1,090 | 993 |
| PCB089 | 0/3 | -- | -- | 1.89 | 0.676 | 0/4 | -- | -- | 1.42 | 0.916 | 0/3 | -- | -- | 1.65 | 1.32 | 0/8 | -- | -- | 0.955 | 0.940 |
| PCB090+101+113 | 3/3 | 26,700 | 33,000 | 30,000 | 30,300 | 4/4 | 11,500 | 43,200 | 27,900 | 28,400 | 3/3 | 21,800 | 31,700 | 27,500 | 29,100 | 8/8 | 6,300 | 14,200 | 9620 | 9,110 |
| PCB092 | 3/3 | 3,080 | 4,130 | 3,760 | 4,070 | 4/4 | 1,890 | 4,350 | 3,320 | 3,520 | 3/3 | 2,440 | 5,240 | 3,680 | 3,370 | 8/8 | 947 | 1,940 | 1,330 | 1,240 |
| PCB093+100 | 3/3 | 1,480 | 1,860 | 1,640 | 1,570 | 4/4 | 515 | 2,430 | 1,450 | 1,430 | 3/3 | 1,210 | 1,930 | 1,650 | 1,800 | 8/8 | 343 | 997 | 616 | 534 |
| PCB094 | 3/3 | 57.2 | 73.7 | 65.4 | 65.4 | 4/4 | 31.8 | 99.5 | 65.3 | 65.0 | 3/3 | 38.2 | 82.4 | 62.1 | 65.7 | 7/8 | 11.2 | 46.7 | 21.8 | 18.4 |
| PCB095 | 3/3 | 3,590 | 5,400 | 4,740 | 5,240 | 4/4 | 2,820 | 6,480 | 4,880 | 5,110 | 3/3 | 3,260 | 4,940 | 4,300 | 4,690 | 8/8 | 1,160 | 2,820 | 1,630 | 1,450 |
| PCB096 | 3/3 | 18.8 | 29.8 | 24.9 | 26.0 | 4/4 | 17.6 | 35.2 | 30.1 | 33.8 | 3/3 | 6.34 | 24.2 | 16.5 | 18.9 | 6/8 | 4.90 | 15.6 | 7.76 | 7.48 |
| PCB098+102 | 3/3 | 136 | 207 | 174 | 180 | 4/4 | 85.6 | 240 | 163 | 163 | 3/3 | 96.1 | 192 | 156 | 181 | 7/8 | 22.2 | 63.2 | 40.5 | 46.2 |
| PCB103 | 3/3 | 547 | 660 | 608 | 616 | 4/4 | 234 | 770 | 525 | 548 | 3/3 | 469 | 510 | 495 | 507 | 8/8 | 162 | 417 | 247 | 223 |
| PCB104 | 3/3 | 4.28 | 9.34 | 7.59 | 9.14 | 3/4 | 5.47 | 14.1 | 7.51 | 5.55 | 1/3 | 4.20 | 4.20 | 2.99 | 4.18 | 2/8 | 1.81 | 1.90 | 1.24 | 1.18 |
| PCB105 | 3/3 | 11,700 | 17,100 | 14,000 | 13,200 | 4/4 | 5,230 | 19,500 | 12,900 | 13,400 | 3/3 | 9,060 | 18,900 | 15,300 | 18,000 | 8/8 | 1,700 | 7,130 | 3,890 | 3,250 |
| PCB106 | 0/3 | -- | -- | 5.63 | 6.43 | 0/4 | -- | -- | 5.97 | 5.42 | 0/3 | -- | -- | 5.88 | 6.12 | 0/8 | -- | -- | 3.63 | 2.66 |
| PCB107 | 3/3 | 3,080 | 3,380 | 3,230 | 3,250 | 4/4 | 1,400 | 3,810 | 2,770 | 2,930 | 3/3 | 2,360 | 4,810 | 3,620 | 3,690 | 8/8 | 718 | 2,220 | 1,390 | 1,210 |
| PCB108+124 | 3/3 | 134 | 166 | 153 | 159 | 4/4 | 169 | 256 | 211 | 208 | 3/3 | 111 | 240 | 194 | 231 | 8/8 | 83.4 | 167 | 112 | 111 |
| PCB110+115 | 3/3 | 6,400 | 11,000 | 8,550 | 8,300 | 4/4 | 4,500 | 8,960 | 7,190 | 7,660 | 3/3 | 4,540 | 13,300 | 9,110 | 9,440 | 8/8 | 1,140 | 2,340 | 1,740 | 1,710 |
| PCB111 | 3/3 | 93.5 | 109 | 99.6 | 96.3 | 4/4 | 71.1 | 121 | 92.6 | 89.1 | 3/3 | 59.4 | 122 | 89.2 | 86.3 | 8/8 | 16.8 | 83.0 | 48.4 | 43.0 |
| PCB112 | 0/3 | -- | -- | 11.2 | 10.3 | 0/4 | -- | -- | 7.71 | 7.26 | 0/3 | -- | -- | 12.2 | 11.3 | 0/8 | -- | -- | 3.63 | 3.16 |
| PCB114 | 3/3 | 716 | 1,120 | 909 | 891 | 4/4 | 338 | 1,110 | 769 | 816 | 3/3 | 586 | 1,170 | 945 | 1,080 | 8/8 | 113 | 451 | 255 | 212 |
| PCB117 | 3/3 | 353 | 582 | 457 | 435 | 4/4 | 268 | 394 | 319 | 308 | 3/3 | 290 | 1,120 | 584 | 341 | 8/8 | 120 | 216 | 161 | 157 |
| PCB118 | 3/3 | 38,100 | 42,500 | 39,900 | 39,100 | 4/4 | 17,600 | 64,300 | 38,800 | 36,600 | 3/3 | 31,200 | 40,100 | 34,800 | 33,100 | 8/8 | 7,240 | 27,400 | 15,900 | 13,300 |
| PCB120 | 3/3 | 561 | 654 | 604 | 597 | 4/4 | 258 | 730 | 499 | 505 | 3/3 | 425 | 785 | 619 | 646 | 8/8 | 162 | 611 | 351 | 297 |
| PCB121 | 2/3 | 58.5 | 72.2 | 46.8 | 58.5 | 1/4 | 71.8 | 71.8 | 25.2 | 11.2 | 0/3 | -- | -- | 13.1 | 12.1 | 3/8 | 23.3 | 51.2 | 18.1 | 7.40 |
| PCB122 | 1/3 | 62.1 | 62.1 | 24.6 | 7.15 | 0/4 | -- | -- | 6.39 | 5.97 | 0/3 | -- | -- | 6.04 | 6.17 | 1/8 | 13.5 | 13.5 | 6.34 | 5.11 |
| PCB123 | 3/3 | 672 | 1,080 | 840 | 772 | 4/4 | 340 | 1,110 | 749 | 773 | 3/3 | 493 | 1,040 | 855 | 1,040 | 8/8 | 58.3 | 404 | 223 | 193 |
| PCB126 | 3/3 | 64.5 | 71.3 | 67.6 | 67.0 | 3/4 | 27.8 | 72.8 | 45.6 | 49.7 | 2/3 | 42.9 | 91.5 | 58.0 | 42.9 | 6/8 | 7.92 | 24.7 | 16.4 | 17.2 |
| PCB127 | 0/3 | -- | -- | 11.6 | 6.66 | 2/4 | 31.2 | 48.8 | 24.0 | 20.0 | 3/3 | 36.7 | 103 | 58.9 | 37.3 | 3/8 | 14.1 | 32.6 | 10.7 | 7.66 |
| PCB128+166 | 3/3 | 7,550 | 10,500 | 9,050 | 9,090 | 4/4 | 3,560 | 11,900 | 8,210 | 8,700 | 3/3 | 5,680 | 14,700 | 10,600 | 11,300 | 8/8 | 1,510 | 6,230 | 3,510 | 2,790 |
| PCB129+138+163 | 3/3 | 55,900 | 66,400 | 61,100 | 60,900 | 4/4 | 28,800 | 87,000 | 62,300 | 66,600 | 3/3 | 46,100 | 72,300 | 56,200 | 50,300 | 8/8 | 11,100 | 55,700 | 27,400 | 19,800 |
| PCB130 | 3/3 | 1,060 | 1,510 | 1,320 | 1,380 | 4/4 | 668 | 1,420 | 1,130 | 1,210 | 3/3 | 887 | 1,720 | 1,220 | 1,060 | 8/8 | 429 | 984 | 617 | 590 |
| PCB131 | 1/3 | 35.8 | 35.8 | 16.3 | 7.26 | 0/4 | -- | -- | 5.38 | 5.70 | 0/3 | -- | -- | 7.06 | 6.31 | 2/8 | 14.5 | 20.1 | 7.25 | 4.28 |

**Table C-32**
**Summary Statistics for Polychlorinated Biphenyls in Whole Hardhead Catfish Tissue by FCA, Wet Weight**

| | FCA1 | | | | | FCA2 | | | | | FCA3 | | | | | Background | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] |
| PCB132 | 3/3 | 1,810 | 2,670 | 2,260 | 2,290 | 4/4 | 1,320 | 2,590 | 2,230 | 2,510 | 3/3 | 1,540 | 2,400 | 2,000 | 2,060 | 8/8 | 697 | 1,400 | 873 | 788 |
| PCB133 | 3/3 | 918 | 1,150 | 1,040 | 1,060 | 4/4 | 399 | 1,130 | 778 | 791 | 3/3 | 703 | 1,390 | 1,010 | 937 | 8/8 | 267 | 754 | 496 | 418 |
| PCB134 | 1/3 | 157 | 157 | 56.7 | 7.30 | 0/4 | -- | -- | 5.80 | 6.19 | 0/3 | -- | -- | 7.68 | 7.07 | 4/8 | 4.20 | 64.3 | 24.7 | 6.01 |
| PCB135+151 | 3/3 | 1,820 | 2,830 | 2,330 | 2,340 | 4/4 | 1,620 | 2,890 | 2,490 | 2,720 | 3/3 | 1,630 | 3,500 | 2,550 | 2,510 | 8/8 | 790 | 1,600 | 1,060 | 952 |
| PCB136 | 3/3 | 162 | 256 | 216 | 231 | 4/4 | 181 | 371 | 303 | 330 | 3/3 | 157 | 225 | 187 | 180 | 8/8 | 76.7 | 196 | 118 | 111 |
| PCB137 | 3/3 | 2,170 | 3,460 | 2,790 | 2,730 | 4/4 | 1110 | 3,400 | 2,340 | 2,430 | 3/3 | 1,850 | 4,700 | 3,330 | 3,450 | 8/8 | 385 | 1,860 | 1,020 | 865 |
| PCB139+140 | 3/3 | 991 | 1,340 | 1,150 | 1,130 | 4/4 | 413 | 1,440 | 962 | 996 | 3/3 | 786 | 1,760 | 1,300 | 1,350 | 8/8 | 204 | 809 | 454 | 369 |
| PCB141 | 3/3 | 4,160 | 5,390 | 4,920 | 5,230 | 4/4 | 1,700 | 5,490 | 3,810 | 4,020 | 3/3 | 3,280 | 7,250 | 5,250 | 5,220 | 8/8 | 710 | 1,910 | 1,310 | 1,210 |
| PCB142 | 0/3 | -- | -- | 7.17 | 7.12 | 0/4 | -- | -- | 5.49 | 5.82 | 0/3 | -- | -- | 7.03 | 6.28 | 0/8 | -- | -- | 3.06 | 2.57 |
| PCB143 | 0/3 | -- | -- | 6.84 | 6.90 | 0/4 | -- | -- | 5.06 | 5.27 | 0/3 | -- | -- | 6.48 | 5.87 | 0/8 | -- | -- | 2.93 | 2.51 |
| PCB144 | 3/3 | 626 | 1,230 | 894 | 822 | 4/4 | 525 | 1,280 | 940 | 974 | 3/3 | 905 | 1,210 | 1,090 | 1,150 | 8/8 | 130 | 484 | 207 | 168 |
| PCB145 | 0/3 | -- | -- | 0.456 | 0.386 | 0/4 | -- | -- | 0.685 | 0.644 | 0/3 | -- | -- | 0.675 | 0.529 | 0/8 | -- | -- | 0.627 | 0.583 |
| PCB146 | 3/3 | 12,800 | 15,900 | 14,300 | 14,100 | 4/4 | 6190 | 17,600 | 12,400 | 13,000 | 3/3 | 10,200 | 21,500 | 15,900 | 16,000 | 8/8 | 3110 | 12,000 | 6980 | 5590 |
| PCB147+149 | 3/3 | 13,400 | 16,400 | 15,400 | 16,400 | 4/4 | 7060 | 19,200 | 13,800 | 14,500 | 3/3 | 11,500 | 18,700 | 14,800 | 14,200 | 8/8 | 4470 | 10,200 | 6530 | 5670 |
| PCB148 | 3/3 | 236 | 313 | 266 | 247 | 4/4 | 108 | 357 | 233 | 235 | 3/3 | 199 | 320 | 269 | 287 | 8/8 | 77.3 | 277 | 154 | 124 |
| PCB150 | 3/3 | 33.1 | 40.5 | 37.4 | 38.6 | 4/4 | 28.3 | 51.2 | 41.5 | 43.4 | 3/3 | 23.4 | 39.5 | 32.1 | 33.3 | 8/8 | 23.7 | 58.3 | 34.1 | 29.6 |
| PCB152 | 3/3 | 1.90 | 11.3 | 7.77 | 10.1 | 3/4 | 5.08 | 10.2 | 7.91 | 8.16 | 1/3 | 3.62 | 3.62 | 3.39 | 3.62 | 5/8 | 2.26 | 5.44 | 2.29 | 2.44 |
| PCB153+168 | 3/3 | 80,200 | 85,600 | 82,700 | 82,400 | 4/4 | 40,900 | 121,000 | 85,700 | 90,600 | 3/3 | 65,600 | 94,600 | 75,900 | 67,500 | 8/8 | 16,300 | 95,500 | 45,400 | 26,200 |
| PCB154 | 3/3 | 2,780 | 3,450 | 3,120 | 3,130 | 4/4 | 1,490 | 3,910 | 3,000 | 3,300 | 3/3 | 2,830 | 5,270 | 4,030 | 4,000 | 8/8 | 750 | 3,950 | 1,760 | 1,350 |
| PCB155 | 3/3 | 162 | 211 | 194 | 208 | 4/4 | 72.4 | 203 | 142 | 147 | 3/3 | 162 | 228 | 188 | 173 | 8/8 | 37.6 | 149 | 79.8 | 63.9 |
| PCB156+157 | 3/3 | 5,020 | 7,560 | 6,330 | 6,400 | 4/4 | 2,640 | 7,910 | 5,520 | 5770 | 3/3 | 4,240 | 10,000 | 7,340 | 7,760 | 8/8 | 1,010 | 4,420 | 2,400 | 1,920 |
| PCB158 | 3/3 | 4,150 | 6,140 | 5,130 | 5,110 | 4/4 | 2,120 | 6,150 | 4,330 | 4,520 | 3/3 | 3,280 | 8,560 | 5,980 | 6,100 | 8/8 | 682 | 3,110 | 1,720 | 1,400 |
| PCB159 | 3/3 | 109 | 132 | 120 | 118 | 4/4 | 49.3 | 149 | 85.4 | 71.8 | 3/3 | 84.8 | 190 | 135 | 129 | 8/8 | 11.8 | 76.0 | 45.5 | 43.0 |
| PCB160 | 0/3 | -- | -- | 5.30 | 5.56 | 0/4 | -- | -- | 4.12 | 4.27 | 0/3 | -- | -- | 5.01 | 4.45 | 0/8 | -- | -- | 2.41 | 2.08 |
| PCB161 | 0/3 | -- | -- | 5.11 | 5.20 | 0/4 | -- | -- | 3.79 | 3.97 | 0/3 | -- | -- | 4.81 | 4.28 | 0/8 | -- | -- | 2.21 | 1.84 |
| PCB162 | 3/3 | 295 | 448 | 370 | 368 | 4/4 | 169 | 453 | 316 | 320 | 3/3 | 246 | 537 | 394 | 398 | 8/8 | 83.1 | 378 | 200 | 163 |
| PCB164 | 3/3 | 1,500 | 1,870 | 1,680 | 1,690 | 4/4 | 716 | 1,900 | 1,420 | 1,530 | 3/3 | 1,070 | 2,770 | 1,820 | 1,630 | 8/8 | 287 | 755 | 485 | 416 |
| PCB165 | 2/3 | 54.4 | 60.5 | 39.8 | 54.4 | 0/4 | -- | -- | 4.26 | 4.48 | 0/3 | -- | -- | 5.53 | 5.00 | 3/8 | 22.5 | 55.8 | 15.0 | 4.02 |
| PCB167 | 3/3 | 1,900 | 2,580 | 2,240 | 2,240 | 4/4 | 899 | 2,590 | 1,920 | 2,100 | 3/3 | 1,440 | 3,000 | 2,340 | 2,570 | 8/8 | 455 | 1,250 | 866 | 798 |
| PCB169 | 1/3 | 32.8 | 32.8 | 13.8 | 5.37 | 0/4 | -- | -- | 7.24 | 4.73 | 1/3 | 32.7 | 32.7 | 13.5 | 3.90 | 1/8 | 32.7 | 32.7 | 9.87 | 5.32 |
| PCB170 | 3/3 | 11,800 | 16,300 | 14,000 | 13,800 | 4/4 | 6040 | 14,600 | 11,500 | 12,700 | 3/3 | 9750 | 24,000 | 17,100 | 17,700 | 8/8 | 2810 | 16,100 | 7170 | 5,900 |
| PCB171+173 | 3/3 | 3,730 | 5,360 | 4,620 | 4,760 | 4/4 | 2,030 | 5,420 | 3,950 | 4170 | 3/3 | 3,100 | 7,260 | 5,320 | 5,580 | 8/8 | 816 | 4,590 | 2,140 | 1,730 |
| PCB172 | 3/3 | 2,400 | 3,250 | 2,890 | 3,000 | 4/4 | 1,210 | 2,780 | 2,160 | 2,320 | 3/3 | 1,970 | 4,650 | 3,300 | 3,270 | 8/8 | 664 | 3,400 | 1,610 | 1,460 |
| PCB174 | 3/3 | 2,420 | 3,710 | 3,040 | 2,990 | 4/4 | 1,520 | 3,300 | 2,630 | 2,850 | 3/3 | 2,120 | 4,460 | 3,220 | 3,080 | 8/8 | 728 | 1,760 | 1,090 | 1,020 |
| PCB175 | 3/3 | 462 | 564 | 516 | 522 | 4/4 | 217 | 545 | 415 | 450 | 3/3 | 365 | 654 | 515 | 526 | 8/8 | 118 | 437 | 255 | 217 |
| PCB176 | 3/3 | 106 | 122 | 112 | 110 | 4/4 | 93.6 | 151 | 122 | 122 | 2/3 | 39.8 | 83.8 | 50.0 | 39.8 | 8/8 | 52.0 | 127 | 73.0 | 68.3 |
| PCB177 | 3/3 | 752 | 1,470 | 1,050 | 946 | 4/4 | 791 | 1,240 | 1,010 | 1,000 | 3/3 | 698 | 1,510 | 1,070 | 990 | 8/8 | 486 | 1,100 | 648 | 589 |
| PCB178 | 3/3 | 1,740 | 2,350 | 2,070 | 2,140 | 4/4 | 1,070 | 2,300 | 1,770 | 1,860 | 3/3 | 1,410 | 2,590 | 1,930 | 1,790 | 8/8 | 691 | 1,650 | 1,160 | 1,010 |
| PCB179 | 3/3 | 252 | 403 | 341 | 369 | 4/4 | 318 | 500 | 430 | 451 | 3/3 | 264 | 369 | 314 | 309 | 8/8 | 167 | 379 | 221 | 200 |
| PCB180+193 | 3/3 | 28,000 | 36,200 | 31,600 | 30,600 | 4/4 | 15,600 | 32,600 | 26,700 | 29,200 | 3/3 | 23,700 | 35,600 | 28,000 | 24,500 | 8/8 | 7,030 | 33,700 | 17,600 | 16,600 |
| PCB181 | 3/3 | 125 | 184 | 151 | 144 | 4/4 | 67.0 | 166 | 119 | 122 | 3/3 | 104 | 291 | 197 | 197 | 7/8 | 29.2 | 153 | 68.2 | 52.6 |
| PCB182 | 3/3 | 108 | 181 | 147 | 152 | 4/4 | 76.6 | 182 | 134 | 138 | 3/3 | 100 | 244 | 176 | 183 | 7/8 | 23.3 | 159 | 74.8 | 52.8 |
| PCB183 | 3/3 | 8,100 | 12,800 | 10,700 | 11,200 | 4/4 | 5,640 | 12,600 | 9,590 | 10,000 | 3/3 | 7,020 | 15,400 | 11,400 | 11,600 | 8/8 | 1,890 | 12,800 | 5,520 | 4,530 |
| PCB184 | 3/3 | 98.0 | 136 | 112 | 102 | 4/4 | 44.6 | 130 | 86.0 | 84.7 | 3/3 | 83.2 | 164 | 123 | 121 | 8/8 | 22.7 | 101 | 55.5 | 43.7 |
| PCB185 | 3/3 | 23.6 | 594 | 370 | 493 | 4/4 | 312 | 759 | 501 | 467 | 3/3 | 455 | 941 | 761 | 888 | 7/8 | 59.9 | 312 | 154 | 146 |
| PCB186 | 0/3 | -- | -- | 0.808 | 0.866 | 0/4 | -- | -- | 0.914 | 0.826 | 0/3 | -- | -- | 0.938 | 0.848 | 0/8 | -- | -- | 0.723 | 0.748 |
| PCB187 | 3/3 | 19,200 | 25,100 | 22,800 | 24,100 | 4/4 | 10,500 | 25,100 | 19,800 | 21,900 | 3/3 | 15,500 | 33,300 | 24,300 | 24,000 | 8/8 | 5780 | 20,000 | 11,900 | 10,100 |
| PCB188 | 3/3 | 141 | 174 | 154 | 149 | 4/4 | 80.9 | 151 | 121 | 125 | 3/3 | 122 | 172 | 147 | 147 | 8/8 | 56.6 | 202 | 114 | 96.2 |
| PCB189 | 3/3 | 399 | 620 | 511 | 513 | 4/4 | 210 | 551 | 391 | 401 | 3/3 | 360 | 895 | 619 | 601 | 8/8 | 126 | 599 | 285 | 237 |
| PCB190 | 3/3 | 2,310 | 3,360 | 2,840 | 2,870 | 4/4 | 1,330 | 2,870 | 2,370 | 2,640 | 3/3 | 1,910 | 4,900 | 3,500 | 3,690 | 8/8 | 528 | 3,160 | 1,380 | 1,170 |
| PCB191 | 3/3 | 505 | 731 | 634 | 665 | 4/4 | 275 | 681 | 518 | 557 | 3/3 | 422 | 1,110 | 781 | 815 | 8/8 | 117 | 628 | 292 | 244 |

**Table C-32**
**Summary Statistics for Polychlorinated Biphenyls in Whole Hardhead Catfish Tissue by FCA, Wet Weight**

| | FCA1 | | | | | FCA2 | | | | | FCA3 | | | | | Background | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] |
| PCB192 | 0/3 | -- | -- | 4.80 | 3.91 | 0/4 | -- | -- | 5.11 | 5.21 | 0/3 | -- | -- | 5.09 | 5.22 | 0/8 | -- | -- | 2.55 | 2.49 |
| PCB194 | 3/3 | 4,500 | 6,760 | 5,380 | 4,890 | 4/4 | 2260 | 4,840 | 3,740 | 3,930 | 3/3 | 4,160 | 9,320 | 6,670 | 6,520 | 8/8 | 1810 | 7,600 | 3,710 | 3,200 |
| PCB195 | 3/3 | 2,000 | 3,130 | 2,590 | 2,660 | 4/4 | 1,070 | 2,800 | 2,140 | 2,350 | 3/3 | 1,900 | 4,360 | 3,210 | 3,360 | 8/8 | 619 | 2,640 | 1,400 | 1,230 |
| PCB196 | 3/3 | 2980 | 4,570 | 3,830 | 3,960 | 4/4 | 1,640 | 4,300 | 32,30 | 3,490 | 3/3 | 2,920 | 6,740 | 4,880 | 4,970 | 8/8 | 914 | 3,940 | 2,060 | 1,730 |
| PCB197 | 3/3 | 589 | 928 | 757 | 755 | 4/4 | 359 | 910 | 658 | 681 | 3/3 | 527 | 1,170 | 866 | 906 | 8/8 | 165 | 745 | 389 | 318 |
| PCB198+199 | 3/3 | 5,390 | 7,850 | 6,950 | 7,600 | 4/4 | 3,020 | 7,480 | 5,660 | 6,080 | 3/3 | 5,020 | 11,900 | 8,330 | 8,040 | 8/8 | 2,000 | 6,280 | 3,810 | 3,490 |
| PCB200 | 3/3 | 65.5 | 90.6 | 78.7 | 80.1 | 4/4 | 53.4 | 115 | 83.2 | 82.1 | 3/3 | 75.4 | 81.7 | 77.8 | 76.3 | 8/8 | 21.2 | 70.8 | 43.3 | 41.2 |
| PCB201 | 3/3 | 707 | 928 | 829 | 851 | 4/4 | 347 | 829 | 601 | 615 | 3/3 | 585 | 1080 | 820 | 796 | 8/8 | 297 | 846 | 540 | 477 |
| PCB202 | 3/3 | 789 | 1,120 | 990 | 1,060 | 4/4 | 516 | 1,120 | 849 | 878 | 3/3 | 785 | 1,070 | 923 | 910 | 8/8 | 448 | 949 | 673 | 607 |
| PCB203 | 3/3 | 4,790 | 7,310 | 6,140 | 6,310 | 4/4 | 2,860 | 6,820 | 5,340 | 5,850 | 3/3 | 4,800 | 10,300 | 7,680 | 7,890 | 8/8 | 1,500 | 6,660 | 3,500 | 3,030 |
| PCB204 | 3/3 | 41.6 | 70.2 | 54.6 | 52.1 | 4/4 | 22.6 | 68.3 | 43.0 | 40.6 | 3/3 | 42.7 | 99.1 | 71.1 | 71.6 | 8/8 | 5.26 | 40.9 | 20.3 | 18.1 |
| PCB205 | 3/3 | 229 | 372 | 303 | 309 | 4/4 | 146 | 327 | 254 | 272 | 3/3 | 237 | 476 | 361 | 370 | 8/8 | 91.6 | 409 | 195 | 160 |
| PCB206 | 3/3 | 2,420 | 3,770 | 3,060 | 2,990 | 4/4 | 1,680 | 3,110 | 2,550 | 2,700 | 3/3 | 2,690 | 4,640 | 3,710 | 3,810 | 8/8 | 1,080 | 4,340 | 2,310 | 2,040 |
| PCB207 | 3/3 | 1,360 | 1,960 | 1,600 | 1,490 | 4/4 | 717 | 1,930 | 1,370 | 1,410 | 3/3 | 1,410 | 2,680 | 2,080 | 2,140 | 8/8 | 483 | 1,460 | 955 | 905 |
| PCB208 | 3/3 | 2,140 | 2,900 | 2,420 | 2,230 | 4/4 | 979 | 2,430 | 1,760 | 1,820 | 3/3 | 2,210 | 3,240 | 2,690 | 2,620 | 8/8 | 951 | 2,770 | 1,750 | 1,630 |
| PCB209 | 3/3 | 28,000 | 35,100 | 31,300 | 30,700 | 4/4 | 16,300 | 41,100 | 28,800 | 28,800 | 3/3 | 27,300 | 35,800 | 31,600 | 31,600 | 8/8 | 7,670 | 24,200 | 14,500 | 13,100 |

**Notes**

-- = not applicable, no detected values
FCA = fish collection area
PCB = polychlorinated biphenyl
ww = wet weight

a - Mean and median calculations include detected and non-detected values. Non-detected values were set at one-half the detection limit.
b - PCB###+#### indicates a co-elution of two or more PCB congeners.

**Table C-33**
**Summary Statistics for Polychlorinated Biphenyls in Edible Clam Tissue by FCA, Wet Weight**

| | FCA1 | | | | | FCA2 | | | | | FCA3 | | | | | Background | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] |
| Clam - Edible | | | | | | | | | | | | | | | | | | | | |
| **Polychlorinated Biphenyls [b] (ng/kg - ww)** | | | | | | | | | | | | | | | | | | | | |
| PCB001 | 0/5 | -- | -- | 2.43 | NA | 7/15 | 29.5 | 90.3 | 29.5 | NA | 5/5 | 7.79 | 12.6 | 9.98 | NA | 9/10 | 4.4 | 6.23 | 4.85 | NA |
| PCB002 | 0/5 | -- | -- | 0.657 | NA | 2/15 | 2.29 | 2.35 | 0.994 | NA | 0/5 | -- | -- | 0.987 | NA | 0/10 | -- | -- | 1.14 | NA |
| PCB003 | 0/5 | -- | -- | 1.24 | NA | 1/15 | 6.22 | 6.22 | 3 | NA | 3/5 | 5.13 | 5.44 | 3.7 | NA | 1/10 | 4.43 | 4.43 | 1.72 | NA |
| PCB004 | 2/5 | 22.8 | 25.8 | 15.7 | NA | 15/15 | 26.7 | 311 | 122 | NA | 3/5 | 27.5 | 51.8 | 28.5 | NA | 0/10 | -- | -- | 32.2 | NA |
| PCB005 | 0/5 | -- | -- | 1.87 | NA | 0/15 | -- | -- | 2.58 | NA | 0/5 | -- | -- | 2.45 | NA | 0/10 | -- | -- | 6.81 | NA |
| PCB006 | 2/5 | 6.43 | 8.14 | 4.36 | NA | 11/15 | 9.13 | 26.7 | 14.4 | NA | 5/5 | 17.2 | 26.8 | 20.5 | NA | 1/10 | 11.7 | 11.7 | 7.19 | NA |
| PCB007 | 0/5 | -- | -- | 1.73 | NA | 5/15 | 9.9 | 14.8 | 5.95 | NA | 0/5 | -- | -- | 2.39 | NA | 0/10 | -- | -- | 6.36 | NA |
| PCB008 | 5/5 | 33 | 40.5 | 36.4 | NA | 15/15 | 56.8 | 569 | 235 | NA | 4/5 | 77.7 | 112 | 79.4 | NA | 10/10 | 44.9 | 67.4 | 54.7 | NA |
| PCB009 | 0/5 | -- | -- | 1.7 | NA | 5/15 | 4.43 | 14.2 | 5.36 | NA | 0/5 | -- | -- | 2.31 | NA | 0/10 | -- | -- | 6.12 | NA |
| PCB010 | 0/5 | -- | -- | 4.74 | NA | 0/15 | -- | -- | 3.94 | NA | 0/5 | -- | -- | 4.72 | NA | 0/10 | -- | -- | 23.1 | NA |
| PCB011 | 0/5 | -- | -- | 107 | NA | 0/15 | -- | -- | 101 | NA | 0/5 | -- | -- | 172 | NA | 0/10 | -- | -- | 131 | NA |
| PCB012+013 | 0/5 | -- | -- | 2 | NA | 2/15 | 5.46 | 6.1 | 3.12 | NA | 0/5 | -- | -- | 3.55 | NA | 0/10 | -- | -- | 6.11 | NA |
| PCB014 | 0/5 | -- | -- | 1.67 | NA | 0/15 | -- | -- | 2.25 | NA | 0/5 | -- | -- | 2.27 | NA | 0/10 | -- | -- | 5.95 | NA |
| PCB015 | 0/5 | -- | -- | 27 | NA | 7/15 | 115 | 333 | 122 | NA | 0/5 | -- | -- | 31.1 | NA | 0/10 | -- | -- | 17 | NA |
| PCB016 | 3/5 | 40.4 | 46.5 | 33.5 | NA | 12/15 | 40.4 | 71.4 | 45.9 | NA | 5/5 | 42 | 61.5 | 47.8 | NA | 9/10 | 27.5 | 47.3 | 37.9 | NA |
| PCB017 | 5/5 | 47.3 | 60 | 53.4 | NA | 15/15 | 51.4 | 109 | 68.7 | NA | 5/5 | 71 | 113 | 86.2 | NA | 9/10 | 53.4 | 67.3 | 58 | NA |
| PCB018+030 | 5/5 | 96 | 128 | 112 | NA | 15/15 | 87.2 | 220 | 137 | NA | 5/5 | 125 | 214 | 155 | NA | 10/10 | 84.7 | 127 | 113 | NA |
| PCB019 | 5/5 | 54.1 | 97.2 | 80.4 | NA | 15/15 | 37.4 | 136 | 70.3 | NA | 5/5 | 71.8 | 141 | 91.2 | NA | 10/10 | 46.6 | 73.7 | 57.6 | NA |
| PCB020+028 | 3/5 | 258 | 316 | 222 | NA | 15/15 | 257 | 571 | 356 | NA | 5/5 | 510 | 756 | 607 | NA | 9/10 | 236 | 331 | 264 | NA |
| PCB021+033 | 5/5 | 52.8 | 71.8 | 60.7 | NA | 14/15 | 51.9 | 110 | 68.3 | NA | 2/5 | 99.3 | 121 | 70 | NA | 0/10 | -- | -- | 34.8 | NA |
| PCB022 | 0/5 | -- | -- | 34.2 | NA | 5/15 | 92 | 147 | 60.9 | NA | 5/5 | 141 | 205 | 166 | NA | 0/10 | -- | -- | 34.2 | NA |
| PCB023 | 0/5 | -- | -- | 1.42 | NA | 0/15 | -- | -- | 1.96 | NA | 0/5 | -- | -- | 2.63 | NA | 0/10 | -- | -- | 1.62 | NA |
| PCB024 | 1/5 | 2.03 | 2.03 | 1.17 | NA | 8/15 | 1.71 | 3.29 | 2.05 | NA | 1/5 | 5.49 | 5.49 | 2.39 | NA | 1/10 | 2.47 | 2.47 | 1.46 | NA |
| PCB025 | 5/5 | 22.6 | 29 | 25.6 | NA | 14/15 | 19.6 | 52.2 | 28.2 | NA | 4/5 | 44.7 | 57.5 | 46.3 | NA | 10/10 | 13.3 | 25.8 | 22.2 | NA |
| PCB026+029 | 5/5 | 32.7 | 51.3 | 40.4 | NA | 15/15 | 36.3 | 81.5 | 48.9 | NA | 5/5 | 59.5 | 93.1 | 71.4 | NA | 10/10 | 19.9 | 44 | 35.4 | NA |
| PCB027 | 5/5 | 13.9 | 18.5 | 16.6 | NA | 15/15 | 14.3 | 30.7 | 19 | NA | 5/5 | 18.2 | 27.1 | 21.4 | NA | 9/10 | 12.2 | 18.9 | 14.3 | NA |
| PCB031 | 4/5 | 136 | 173 | 136 | NA | 15/15 | 129 | 303 | 181 | NA | 5/5 | 216 | 328 | 253 | NA | 7/10 | 144 | 168 | 124 | NA |
| PCB032 | 2/5 | 57.4 | 62.4 | 39.2 | NA | 9/15 | 55.2 | 92.3 | 49.6 | NA | 5/5 | 76.9 | 123 | 92.6 | NA | 0/10 | -- | -- | 17.4 | NA |
| PCB034 | 0/5 | -- | -- | 1.3 | NA | 0/15 | -- | -- | 1.77 | NA | 0/5 | -- | -- | 2.27 | NA | 0/10 | -- | -- | 1.51 | NA |
| PCB035 | 1/5 | 3.16 | 3.16 | 2.01 | NA | 3/15 | 2.78 | 5.25 | 2.55 | NA | 2/5 | 5.11 | 6.9 | 4.4 | NA | 0/10 | -- | -- | 1.49 | NA |
| PCB036 | 0/5 | -- | -- | 1.18 | NA | 0/15 | -- | -- | 1.7 | NA | 0/5 | -- | -- | 2.31 | NA | 0/10 | -- | -- | 1.44 | NA |
| PCB037 | 1/5 | 65.7 | 65.7 | 30.6 | NA | 6/15 | 57.9 | 86.1 | 41.1 | NA | 5/5 | 124 | 178 | 144 | NA | 0/10 | -- | -- | 19.4 | NA |
| PCB038 | 0/5 | -- | -- | 1.26 | NA | 0/15 | -- | -- | 1.79 | NA | 0/5 | -- | -- | 2.41 | NA | 0/10 | -- | -- | 1.51 | NA |
| PCB039 | 0/5 | -- | -- | 1.25 | NA | 1/15 | 1.53 | 1.53 | 1.83 | NA | 0/5 | -- | -- | 2.33 | NA | 0/10 | -- | -- | 1.53 | NA |
| PCB040+041+071 | 5/5 | 216 | 310 | 259 | NA | 15/15 | 190 | 444 | 300 | NA | 5/5 | 359 | 532 | 424 | NA | 10/10 | 103 | 196 | 151 | NA |
| PCB042 | 5/5 | 124 | 174 | 144 | NA | 15/15 | 106 | 255 | 176 | NA | 5/5 | 176 | 274 | 215 | NA | 10/10 | 58 | 119 | 89.5 | NA |
| PCB043+073 | 5/5 | 12.7 | 18.1 | 15.1 | NA | 12/15 | 14 | 26.9 | 15.9 | NA | 4/5 | 20.6 | 30.5 | 22 | NA | 3/10 | 10.3 | 15.5 | 5.92 | NA |
| PCB044+047+065 | 5/5 | 590 | 853 | 704 | NA | 15/15 | 550 | 1,360 | 896 | NA | 5/5 | 724 | 1,080 | 858 | NA | 10/10 | 305 | 598 | 453 | NA |
| PCB045+051 | 5/5 | 77.7 | 107 | 89.8 | NA | 15/15 | 66.5 | 147 | 102 | NA | 5/5 | 97.1 | 149 | 116 | NA | 10/10 | 34.3 | 69.9 | 54.4 | NA |
| PCB046 | 5/5 | 20.8 | 27.9 | 24.5 | NA | 15/15 | 18.4 | 41.1 | 28.1 | NA | 5/5 | 28.9 | 45 | 34.8 | NA | 9/10 | 10 | 21 | 14.4 | NA |
| PCB048 | 5/5 | 57.9 | 79.5 | 66.5 | NA | 15/15 | 56.2 | 114 | 80.1 | NA | 5/5 | 93.2 | 139 | 112 | NA | 10/10 | 29.5 | 61 | 47 | NA |
| PCB049+069 | 5/5 | 432 | 635 | 521 | NA | 15/15 | 395 | 1,030 | 661 | NA | 5/5 | 531 | 795 | 624 | NA | 10/10 | 217 | 446 | 334 | NA |
| PCB050+053 | 5/5 | 388 | 516 | 466 | NA | 15/15 | 248 | 663 | 426 | NA | 5/5 | 424 | 766 | 523 | NA | 10/10 | 188 | 332 | 261 | NA |
| PCB052 | 5/5 | 725 | 1,010 | 860 | NA | 15/15 | 713 | 2,370 | 1,300 | NA | 5/5 | 856 | 1,300 | 1,030 | NA | 9/10 | 451 | 726 | 528 | NA |
| PCB054 | 4/5 | 4.67 | 7.18 | 5.27 | NA | 15/15 | 3.66 | 8.77 | 5.79 | NA | 5/5 | 4 | 6.83 | 5.09 | NA | 7/10 | 3.24 | 5.54 | 3.71 | NA |

**Table C-33**
**Summary Statistics for Polychlorinated Biphenyls in Edible Clam Tissue by FCA, Wet Weight**

| | FCA1 | | | | | FCA2 | | | | | FCA3 | | | | | Background | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] |
| PCB055 | 0/5 | -- | -- | 1.26 | NA | 2/15 | 11.6 | 18.4 | 3.41 | NA | 0/5 | -- | -- | 0.668 | NA | 0/10 | -- | -- | 0.847 | NA |
| PCB056 | 5/5 | 149 | 198 | 172 | NA | 15/15 | 144 | 343 | 228 | NA | 5/5 | 393 | 599 | 472 | NA | 10/10 | 81.1 | 150 | 109 | NA |
| PCB057 | 2/5 | 1.36 | 2.03 | 1.17 | NA | 2/15 | 2.5 | 2.95 | 1.08 | NA | 1/5 | 3.01 | 3.01 | 1.78 | NA | 1/10 | 1.98 | 1.98 | 0.899 | NA |
| PCB058 | 0/5 | -- | -- | 0.97 | NA | 4/15 | 3.27 | 6.37 | 2 | NA | 1/5 | 4.55 | 4.55 | 1.63 | NA | 0/10 | -- | -- | 0.963 | NA |
| PCB059+062+075 | 5/5 | 49.6 | 71 | 58.3 | NA | 15/15 | 45.5 | 103 | 70.6 | NA | 5/5 | 79.2 | 121 | 96.3 | NA | 10/10 | 24.8 | 52.8 | 39.8 | NA |
| PCB060 | 5/5 | 53.6 | 76.6 | 65.5 | NA | 15/15 | 47.4 | 142 | 85.5 | NA | 5/5 | 197 | 298 | 241 | NA | 10/10 | 39.7 | 76.6 | 54.8 | NA |
| PCB061+070+074+076 | 5/5 | 711 | 909 | 809 | NA | 15/15 | 670 | 1,780 | 1,130 | NA | 5/5 | 1,220 | 1,780 | 1,440 | NA | 10/10 | 387 | 719 | 522 | NA |
| PCB063 | 5/5 | 16.8 | 22.8 | 19.9 | NA | 15/15 | 17.9 | 41.4 | 27.4 | NA | 5/5 | 35.6 | 52.7 | 41.8 | NA | 9/10 | 11.3 | 20.9 | 15 | NA |
| PCB064 | 5/5 | 208 | 288 | 241 | NA | 15/15 | 190 | 482 | 314 | NA | 5/5 | 351 | 532 | 422 | NA | 10/10 | 105 | 206 | 157 | NA |
| PCB066 | 5/5 | 462 | 597 | 522 | NA | 15/15 | 413 | 929 | 648 | NA | 5/5 | 932 | 1,370 | 1,100 | NA | 10/10 | 257 | 506 | 363 | NA |
| PCB067 | 4/5 | 5.1 | 7.59 | 5.4 | NA | 9/15 | 4.75 | 12.5 | 6.08 | NA | 4/5 | 11.8 | 17.3 | 12.4 | NA | 3/10 | 3.04 | 3.87 | 1.99 | NA |
| PCB068 | 5/5 | 10.9 | 16.7 | 13.8 | NA | 11/15 | 9.52 | 22.5 | 13.7 | NA | 3/5 | 8.09 | 11.9 | 7.98 | NA | 9/10 | 6.84 | 11.3 | 8.16 | NA |
| PCB072 | 5/5 | 11.4 | 17.9 | 14.7 | NA | 14/15 | 9.47 | 27.7 | 16.4 | NA | 3/5 | 10.8 | 12.9 | 8.86 | NA | 8/10 | 5.16 | 11.2 | 6.4 | NA |
| PCB077 | 5/5 | 27.9 | 37.1 | 32.4 | 32.2 | 15/15 | 27 | 104 | 44.8 | 41.1 | 5/5 | 83.4 | 125 | 99.2 | 95.2 | 8/10 | 15.4 | 30.8 | 18.5 | 16.8 |
| PCB078 | 0/5 | -- | -- | 0.837 | NA | 0/15 | -- | -- | 1.25 | NA | 0/5 | -- | -- | 1.56 | NA | 0/10 | -- | -- | 1.03 | NA |
| PCB079 | 4/5 | 5.45 | 7.82 | 5.69 | NA | 9/15 | 4.95 | 33.2 | 11 | NA | 3/5 | 7.02 | 15.3 | 7.07 | NA | 1/10 | 4.11 | 4.11 | 1.45 | NA |
| PCB080 | 0/5 | -- | -- | 0.772 | NA | 0/15 | -- | -- | 1.13 | NA | 0/5 | -- | -- | 1.47 | NA | 0/10 | -- | -- | 0.914 | NA |
| PCB081 | 1/5 | 1.94 | 1.94 | 1.17 | 1.09 | 3/15 | 1.42 | 3.25 | 1.97 | 1.33 | 1/5 | 4.38 | 4.38 | 2.39 | 2.26 | 0/10 | -- | -- | 1.09 | 1.04 |
| PCB082 | 5/5 | 65.5 | 100 | 79.6 | NA | 15/15 | 79.7 | 488 | 215 | NA | 5/5 | 139 | 200 | 167 | NA | 2/10 | 60.5 | 65.2 | 29.2 | NA |
| PCB083+099 | 5/5 | 896 | 1100 | 1,030 | NA | 15/15 | 800 | 3,840 | 1,860 | NA | 5/5 | 1,100 | 1,530 | 1,270 | NA | 10/10 | 413 | 755 | 547 | NA |
| PCB084 | 5/5 | 181 | 255 | 209 | NA | 15/15 | 191 | 1,210 | 498 | NA | 5/5 | 240 | 349 | 281 | NA | 0/10 | -- | -- | 50.6 | NA |
| PCB085+116 | 5/5 | 117 | 164 | 140 | NA | 15/15 | 138 | 756 | 345 | NA | 5/5 | 231 | 337 | 274 | NA | 10/10 | 60.3 | 120 | 81.8 | NA |
| PCB086+087+097+109+119 +125 | 5/5 | 465 | 681 | 542 | NA | 15/15 | 512 | 3,230 | 1,380 | NA | 5/5 | 751 | 1,100 | 896 | NA | 0/10 | -- | -- | 144 | NA |
| PCB088+091 | 5/5 | 195 | 232 | 213 | NA | 15/15 | 158 | 881 | 396 | NA | 4/5 | 205 | 287 | 192 | NA | 7/10 | 80.1 | 140 | 68.6 | NA |
| PCB089 | 3/5 | 7.91 | 9.13 | 6.36 | NA | 11/15 | 8.36 | 34.7 | 14 | NA | 4/5 | 11.5 | 15.7 | 12 | NA | 4/10 | 2.43 | 5.62 | 2.46 | NA |
| PCB090+101+113 | 5/5 | 1,070 | 1,330 | 1,180 | NA | 15/15 | 991 | 5,830 | 2,590 | NA | 5/5 | 1,410 | 2,040 | 1,650 | NA | 4/10 | 635 | 763 | 436 | NA |
| PCB092 | 5/5 | 198 | 255 | 229 | NA | 15/15 | 208 | 1,170 | 526 | NA | 5/5 | 282 | 404 | 330 | NA | 10/10 | 96.8 | 175 | 128 | NA |
| PCB093+100 | 4/5 | 36 | 40.2 | 34 | NA | 15/15 | 25.6 | 89.7 | 50.4 | NA | 5/5 | 24.9 | 34.8 | 30.1 | NA | 10/10 | 17.2 | 32.9 | 23.7 | NA |
| PCB094 | 4/5 | 8.69 | 9.45 | 8.39 | NA | 13/15 | 7.33 | 32.1 | 14.8 | NA | 4/5 | 8.97 | 14.2 | 9.87 | NA | 8/10 | 3.85 | 7.99 | 4.91 | NA |
| PCB095 | 5/5 | 720 | 944 | 812 | NA | 15/15 | 717 | 4,480 | 1,880 | NA | 5/5 | 851 | 1,250 | 1,010 | NA | 3/10 | 514 | 545 | 281 | NA |
| PCB096 | 5/5 | 7.2 | 8.56 | 7.89 | NA | 14/15 | 5.84 | 30.1 | 13.3 | NA | 5/5 | 8.31 | 12.4 | 10.3 | NA | 6/10 | 2.66 | 4.5 | 2.76 | NA |
| PCB098+102 | 5/5 | 45.1 | 53.9 | 49.2 | NA | 15/15 | 36.1 | 176 | 82.8 | NA | 5/5 | 48.3 | 72.8 | 58.3 | NA | 7/10 | 14.3 | 25.8 | 17.1 | NA |
| PCB103 | 5/5 | 26.9 | 31.5 | 29.2 | NA | 14/15 | 17.2 | 75.1 | 37.9 | NA | 5/5 | 17 | 24.9 | 19.3 | NA | 10/10 | 9.75 | 18.2 | 13.5 | NA |
| PCB104 | 1/5 | 1.51 | 1.51 | 0.655 | NA | 3/15 | 1.26 | 2.24 | 0.733 | NA | 0/5 | -- | -- | 0.375 | NA | 0/10 | -- | -- | 0.496 | NA |
| PCB105 | 5/5 | 225 | 301 | 266 | 266 | 15/15 | 277 | 1,310 | 627 | 436 | 5/5 | 540 | 736 | 620 | 611 | 4/10 | 216 | 294 | 145 | 84.5 |
| PCB106 | 0/5 | -- | -- | 1.49 | NA | 0/15 | -- | -- | 1.77 | NA | 0/5 | -- | -- | 2.38 | NA | 0/10 | -- | -- | 1.2 | NA |
| PCB107 | 5/5 | 72.3 | 97.2 | 88.4 | NA | 15/15 | 79 | 354 | 173 | NA | 5/5 | 126 | 162 | 137 | NA | 10/10 | 37.8 | 81.1 | 53.2 | NA |
| PCB108+124 | 5/5 | 26.9 | 37 | 34.1 | NA | 13/15 | 35.3 | 173 | 76.9 | NA | 5/5 | 66.6 | 85.3 | 73.3 | NA | 6/10 | 19.1 | 29.3 | 18.9 | NA |
| PCB110+115 | 5/5 | 1,010 | 1,330 | 1,150 | NA | 15/15 | 1,110 | 6,130 | 2,740 | NA | 5/5 | 1,720 | 2,430 | 2,000 | NA | 4/10 | 744 | 913 | 494 | NA |
| PCB111 | 0/5 | -- | -- | 1.06 | NA | 0/15 | -- | -- | 2.03 | NA | 0/5 | -- | -- | 2.13 | NA | 0/10 | -- | -- | 1.43 | NA |
| PCB112 | 0/5 | -- | -- | 0.988 | NA | 0/15 | -- | -- | 1.86 | NA | 0/5 | -- | -- | 1.91 | NA | 0/10 | -- | -- | 1.31 | NA |
| PCB114 | 5/5 | 14.2 | 20 | 17.1 | 17.7 | 13/15 | 17.9 | 92.6 | 40.5 | 24.9 | 4/5 | 31.8 | 41.3 | 30.9 | 32.4 | 8/10 | 10.4 | 19.3 | 12 | 11.9 |
| PCB117 | 1/5 | 23.7 | 23.7 | 12.8 | NA | 9/15 | 24 | 143 | 47.3 | NA | 3/5 | 39.3 | 56.1 | 37.1 | NA | 6/10 | 11.3 | 22.6 | 13.8 | NA |
| PCB118 | 5/5 | 741 | 967 | 877 | 882 | 15/15 | 790 | 3,550 | 1,720 | 1,170 | 5/5 | 1,430 | 1,870 | 1,600 | 1,560 | 10/10 | 418 | 818 | 556 | 498 |
| PCB120 | 4/5 | 11.5 | 12.5 | 10.9 | NA | 12/15 | 6.79 | 21.1 | 11.9 | NA | 4/5 | 7.51 | 8.65 | 7.02 | NA | 6/10 | 4.32 | 6.8 | 4.47 | NA |
| PCB121 | 0/5 | -- | -- | 1.09 | NA | 0/15 | -- | -- | 2.05 | NA | 0/5 | -- | -- | 2.09 | NA | 0/10 | -- | -- | 1.42 | NA |

**Table C-33**
**Summary Statistics for Polychlorinated Biphenyls in Edible Clam Tissue by FCA, Wet Weight**

| | FCA1 | | | | | FCA2 | | | | | FCA3 | | | | | Background | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] |
| PCB122 | 3/5 | 8.79 | 12.9 | 8.31 | NA | 8/15 | 9.99 | 46.2 | 18.3 | NA | 4/5 | 20.9 | 30.2 | 20.4 | NA | 4/10 | 6.67 | 12.9 | 4.78 | NA |
| PCB123 | 5/5 | 15.4 | 19.4 | 17.9 | 18.3 | 13/15 | 14.5 | 62.5 | 34.1 | 24.8 | 4/5 | 32.9 | 42.7 | 32.2 | 33.5 | 8/10 | 8.83 | 15.3 | 10.6 | 10.1 |
| PCB126 | 0/5 | -- | -- | 1.44 | 1.5 | 4/15 | 2.08 | 7.43 | 3.42 | 2.08 | 0/5 | -- | -- | 2.41 | 2.52 | 0/10 | -- | -- | 1.28 | 1.18 |
| PCB127 | 0/5 | -- | -- | 1.52 | NA | 0/15 | -- | -- | 1.86 | NA | 0/5 | -- | -- | 2.68 | NA | 0/10 | -- | -- | 1.35 | NA |
| PCB128+166 | 5/5 | 152 | 181 | 172 | NA | 15/15 | 88.8 | 1,250 | 503 | NA | 5/5 | 322 | 393 | 352 | NA | 6/10 | 110 | 187 | 105 | NA |
| PCB129+138+163 | 5/5 | 1,120 | 1,400 | 1,320 | NA | 15/15 | 1,230 | 8,070 | 3,540 | NA | 5/5 | 2,160 | 2,570 | 2,290 | NA | 10/10 | 614 | 1,280 | 873 | NA |
| PCB130 | 5/5 | 58.2 | 71.4 | 67.2 | NA | 15/15 | 64.8 | 426 | 187 | NA | 5/5 | 98.7 | 133 | 115 | NA | 9/10 | 32.2 | 56.5 | 39.7 | NA |
| PCB131 | 3/5 | 8.24 | 11.9 | 7.36 | NA | 11/15 | 10.5 | 86.3 | 34.5 | NA | 4/5 | 15.5 | 20 | 16 | NA | 5/10 | 4.05 | 6.17 | 3.51 | NA |
| PCB132 | 5/5 | 222 | 346 | 287 | NA | 15/15 | 279 | 2,480 | 997 | NA | 5/5 | 461 | 639 | 544 | NA | 1/10 | 196 | 196 | 87.4 | NA |
| PCB133 | 5/5 | 19.9 | 26.6 | 23.3 | NA | 15/15 | 17.8 | 92.1 | 46.3 | NA | 4/5 | 24.4 | 27.6 | 23 | NA | 8/10 | 10 | 17.6 | 11.4 | NA |
| PCB134 | 5/5 | 33.9 | 46.1 | 38.5 | NA | 15/15 | 46 | 353 | 142 | NA | 5/5 | 60 | 108 | 76.5 | NA | 0/10 | -- | -- | 11.2 | NA |
| PCB135+151 | 5/5 | 343 | 427 | 404 | NA | 15/15 | 388 | 2,510 | 1,080 | NA | 5/5 | 457 | 625 | 537 | NA | 10/10 | 171 | 268 | 212 | NA |
| PCB136 | 5/5 | 117 | 144 | 131 | NA | 15/15 | 120 | 878 | 364 | NA | 5/5 | 131 | 202 | 166 | NA | 4/10 | 63.4 | 66.5 | 40.5 | NA |
| PCB137 | 5/5 | 34.5 | 49.7 | 43.9 | NA | 15/15 | 44.4 | 386 | 155 | NA | 5/5 | 91.3 | 108 | 101 | NA | 4/10 | 33.1 | 41.8 | 23.7 | NA |
| PCB139+140 | 4/5 | 17.6 | 22.9 | 19.3 | NA | 15/15 | 19.8 | 157 | 67.5 | NA | 5/5 | 31.3 | 40.4 | 35.7 | NA | 8/10 | 9.28 | 14.9 | 10.7 | NA |
| PCB141 | 5/5 | 138 | 167 | 156 | NA | 15/15 | 157 | 1,040 | 445 | NA | 5/5 | 255 | 299 | 272 | NA | 7/10 | 85.2 | 127 | 87.2 | NA |
| PCB142 | 0/5 | -- | -- | 1.44 | NA | 0/15 | -- | -- | 2.68 | NA | 0/5 | -- | -- | 2.17 | NA | 0/10 | -- | -- | 1.04 | NA |
| PCB143 | 0/5 | -- | -- | 1.35 | NA | 3/15 | 17.2 | 18.9 | 5.24 | NA | 1/5 | 10.8 | 10.8 | 3.61 | NA | 0/10 | -- | -- | 0.933 | NA |
| PCB144 | 5/5 | 36.8 | 98.1 | 77.5 | NA | 15/15 | 40.1 | 619 | 251 | NA | 5/5 | 110 | 162 | 136 | NA | 0/10 | -- | -- | 22.5 | NA |
| PCB145 | 0/5 | -- | -- | 0.389 | NA | 0/15 | -- | -- | 0.543 | NA | 0/5 | -- | -- | 0.39 | NA | 0/10 | -- | -- | 0.53 | NA |
| PCB146 | 5/5 | 219 | 284 | 266 | NA | 15/15 | 213 | 1,110 | 530 | NA | 5/5 | 284 | 345 | 305 | NA | 10/10 | 101 | 191 | 136 | NA |
| PCB147+149 | 5/5 | 837 | 1,090 | 1,010 | NA | 15/15 | 884 | 5,680 | 2,470 | NA | 5/5 | 1,080 | 1,570 | 1,320 | NA | 10/10 | 380 | 579 | 467 | NA |
| PCB148 | 5/5 | 3.63 | 5.8 | 5 | NA | 12/15 | 3.83 | 13.1 | 6.61 | NA | 3/5 | 2.87 | 3.35 | 2.35 | NA | 3/10 | 2.02 | 2.83 | 1.25 | NA |
| PCB150 | 5/5 | 7.43 | 9.71 | 9.06 | NA | 14/15 | 4.67 | 14.8 | 8.82 | NA | 5/5 | 3.35 | 5.68 | 4.74 | NA | 8/10 | 2.04 | 4.25 | 2.81 | NA |
| PCB152 | 2/5 | 1.38 | 1.91 | 0.989 | NA | 7/15 | 1.51 | 9.07 | 3.29 | NA | 4/5 | 1.75 | 2.15 | 1.61 | NA | 2/10 | 1.18 | 1.27 | 0.635 | NA |
| PCB153+168 | 5/5 | 1,250 | 1,580 | 1,450 | NA | 15/15 | 1,210 | 6,460 | 3,080 | NA | 5/5 | 1,780 | 2,080 | 1,900 | NA | 10/10 | 603 | 1,180 | 832 | NA |
| PCB154 | 5/5 | 48.2 | 82.6 | 71.1 | NA | 15/15 | 44.1 | 180 | 94.5 | NA | 5/5 | 43.1 | 56 | 49.6 | NA | 7/10 | 26 | 40.8 | 25.7 | NA |
| PCB155 | 4/5 | 3.96 | 5.33 | 4.17 | NA | 7/15 | 1.69 | 3.68 | 1.97 | NA | 1/5 | 1.79 | 1.79 | 0.851 | NA | 3/10 | 1.14 | 1.46 | 0.887 | NA |
| PCB156+157 | 5/5 | 92.8 | 122 | 110 | 112 | 15/15 | 103 | 640 | 295 | 167 | 5/5 | 202 | 250 | 223 | 217 | 4/10 | 94.1 | 112 | 60.3 | 37.5 |
| PCB158 | 5/5 | 87.5 | 109 | 100 | NA | 15/15 | 101 | 744 | 317 | NA | 5/5 | 187 | 234 | 207 | NA | 6/10 | 60.4 | 101 | 59.1 | NA |
| PCB159 | 3/5 | 6.72 | 7.2 | 5.47 | NA | 14/15 | 6.08 | 43.9 | 18.4 | NA | 3/5 | 9.15 | 9.69 | 7.42 | NA | 5/10 | 3.2 | 5.6 | 3.09 | NA |
| PCB160 | 0/5 | -- | -- | 1.05 | NA | 0/15 | -- | -- | 1.96 | NA | 0/5 | -- | -- | 1.58 | NA | 0/10 | -- | -- | 0.785 | NA |
| PCB161 | 0/5 | -- | -- | 0.988 | NA | 0/15 | -- | -- | 1.84 | NA | 0/5 | -- | -- | 1.49 | NA | 0/10 | -- | -- | 0.745 | NA |
| PCB162 | 3/5 | 5.09 | 6.11 | 4.1 | NA | 9/15 | 4.43 | 21.6 | 9.36 | NA | 2/5 | 7.66 | 8.65 | 5.47 | NA | 3/10 | 2.48 | 4.83 | 2.22 | NA |
| PCB164 | 5/5 | 61.4 | 75.1 | 68.5 | NA | 15/15 | 56.5 | 435 | 186 | NA | 5/5 | 115 | 146 | 127 | NA | 6/10 | 39.8 | 64.6 | 38.5 | NA |
| PCB165 | 0/5 | -- | -- | 1.09 | NA | 0/15 | -- | -- | 2.08 | NA | 0/5 | -- | -- | 1.66 | NA | 0/10 | -- | -- | 0.848 | NA |
| PCB167 | 5/5 | 46.2 | 56.9 | 52.8 | 52.8 | 15/15 | 48.6 | 240 | 116 | 70.5 | 5/5 | 86.8 | 103 | 91 | 86.9 | 10/10 | 25.8 | 50.2 | 35.8 | 33.6 |
| PCB169 | 0/5 | -- | -- | 1.07 | 0.99 | 1/15 | 3.6 | 3.6 | 2.33 | 0.92 | 0/5 | -- | -- | 1.19 | 1.02 | 0/10 | -- | -- | 0.865 | 0.81 |
| PCB170 | 5/5 | 196 | 242 | 223 | 235 | 15/15 | 176 | 1,070 | 499 | 286 | 5/5 | 280 | 346 | 308 | 314 | 10/10 | 99.2 | 208 | 150 | 140 |
| PCB171+173 | 5/5 | 79 | 97.3 | 88 | NA | 15/15 | 76.7 | 483 | 221 | NA | 5/5 | 115 | 138 | 123 | NA | 10/10 | 37 | 70.1 | 53.7 | NA |
| PCB172 | 5/5 | 33.8 | 43.8 | 40.3 | NA | 15/15 | 28.1 | 155 | 77.4 | NA | 5/5 | 42.2 | 51.8 | 47.2 | NA | 6/10 | 20.4 | 31.4 | 20.6 | NA |
| PCB174 | 5/5 | 161 | 202 | 188 | NA | 15/15 | 165 | 1230 | 542 | NA | 5/5 | 238 | 292 | 262 | NA | 10/10 | 87.1 | 162 | 122 | NA |
| PCB175 | 3/5 | 9.62 | 11 | 7.8 | NA | 14/15 | 6.69 | 37.3 | 18.3 | NA | 5/5 | 9.24 | 11.5 | 10.4 | NA | 6/10 | 4.09 | 6.29 | 4.05 | NA |
| PCB176 | 5/5 | 24.1 | 31.2 | 27.1 | NA | 15/15 | 22.2 | 157 | 67.1 | NA | 5/5 | 29.1 | 30 | 29.7 | NA | 8/10 | 9.51 | 14.1 | 10.9 | NA |
| PCB177 | 5/5 | 130 | 152 | 142 | NA | 15/15 | 115 | 751 | 343 | NA | 5/5 | 159 | 201 | 175 | NA | 10/10 | 59.3 | 107 | 82.2 | NA |
| PCB178 | 5/5 | 56.8 | 68.2 | 63.5 | NA | 15/15 | 56 | 264 | 133 | NA | 5/5 | 62.1 | 81.8 | 69 | NA | 10/10 | 27.1 | 51.7 | 39.3 | NA |
| PCB179 | 5/5 | 93.8 | 112 | 106 | NA | 15/15 | 96.5 | 559 | 259 | NA | 5/5 | 97 | 133 | 114 | NA | 10/10 | 42.8 | 67.7 | 53.9 | NA |

**Table C-33**
**Summary Statistics for Polychlorinated Biphenyls in Edible Clam Tissue by FCA, Wet Weight**

| | FCA1 | | | | | FCA2 | | | | | FCA3 | | | | | Background | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] |
| PCB180+193 | 5/5 | 421 | 548 | 485 | 509 | 15/15 | 311 | 2,100 | 969 | 574 | 5/5 | 552 | 677 | 603 | 592 | 10/10 | 255 | 412 | 321 | 320 |
| PCB181 | 3/5 | 2.57 | 3.18 | 2.3 | NA | 8/15 | 3.3 | 19 | 6.65 | NA | 1/5 | 3.61 | 3.61 | 2.19 | NA | 0/10 | -- | -- | 1.31 | NA |
| PCB182 | 2/5 | 3.32 | 3.63 | 2.08 | NA | 10/15 | 3.03 | 14.1 | 5.78 | NA | 1/5 | 4.94 | 4.94 | 1.59 | NA | 2/10 | 3.44 | 3.58 | 1.3 | NA |
| PCB183 | 5/5 | 155 | 199 | 181 | NA | 15/15 | 150 | 893 | 427 | NA | 5/5 | 226 | 258 | 241 | NA | 10/10 | 87.6 | 166 | 126 | NA |
| PCB184 | 4/5 | 2.41 | 4.05 | 2.92 | NA | 4/15 | 0.923 | 2.68 | 0.971 | NA | 0/5 | -- | -- | 0.47 | NA | 0/10 | -- | -- | 0.483 | NA |
| PCB185 | 4/5 | 15.6 | 22.1 | 17.5 | NA | 12/15 | 20.4 | 135 | 50.5 | NA | 4/5 | 26.9 | 31.6 | 25.3 | NA | 7/10 | 9.25 | 17.2 | 10.8 | NA |
| PCB186 | 0/5 | -- | -- | 0.418 | NA | 0/15 | -- | -- | 0.517 | NA | 0/5 | -- | -- | 0.485 | NA | 0/10 | -- | -- | 0.499 | NA |
| PCB187 | 5/5 | 451 | 541 | 498 | NA | 15/15 | 209 | 2,100 | 995 | NA | 5/5 | 513 | 612 | 561 | NA | 10/10 | 233 | 436 | 326 | NA |
| PCB188 | 3/5 | 2.54 | 4.03 | 2.43 | NA | 6/15 | 1.47 | 3.16 | 1.48 | NA | 0/5 | -- | -- | 0.455 | NA | 2/10 | 1.56 | 2.06 | 0.762 | NA |
| PCB189 | 3/5 | 8.54 | 9.15 | 6.92 | 8.54 | 13/15 | 6.91 | 28 | 14.9 | 10.1 | 4/5 | 9.21 | 11.6 | 9.37 | 10.2 | 4/10 | 4.58 | 6.21 | 3.17 | 2.45 |
| PCB190 | 5/5 | 38.5 | 48.4 | 43.7 | NA | 15/15 | 39.1 | 232 | 106 | NA | 5/5 | 53.2 | 72 | 61.6 | NA | 8/10 | 22.3 | 49.9 | 31.6 | NA |
| PCB191 | 5/5 | 10 | 12.4 | 10.9 | NA | 12/15 | 9.22 | 52.4 | 22.7 | NA | 4/5 | 13.3 | 17.5 | 14.1 | NA | 5/10 | 4.62 | 10.6 | 5.39 | NA |
| PCB192 | 0/5 | -- | -- | 0.807 | NA | 0/15 | -- | -- | 1.66 | NA | 0/5 | -- | -- | 1.14 | NA | 0/10 | -- | -- | 1.11 | NA |
| PCB194 | 5/5 | 56.4 | 81.3 | 70.6 | NA | 15/15 | 35.3 | 239 | 109 | NA | 5/5 | 65 | 108 | 77.7 | NA | 10/10 | 37.2 | 62.1 | 47 | NA |
| PCB195 | 5/5 | 39.7 | 55 | 43.5 | NA | 15/15 | 29.5 | 247 | 99.8 | NA | 5/5 | 52.8 | 67.8 | 59.9 | NA | 10/10 | 25.3 | 49.8 | 37.2 | NA |
| PCB196 | 5/5 | 62.5 | 82 | 73.6 | NA | 15/15 | 60.8 | 321 | 152 | NA | 5/5 | 74.6 | 90.4 | 84.2 | NA | 10/10 | 37.8 | 74.1 | 51.5 | NA |
| PCB197 | 4/5 | 22.9 | 29.6 | 23.3 | NA | 13/15 | 12.5 | 42.1 | 22.1 | NA | 3/5 | 12.5 | 14.9 | 10.5 | NA | 9/10 | 6.58 | 10.9 | 8.01 | NA |
| PCB198+199 | 5/5 | 130 | 157 | 145 | NA | 15/15 | 124 | 597 | 288 | NA | 5/5 | 160 | 186 | 172 | NA | 10/10 | 79.4 | 149 | 113 | NA |
| PCB200 | 3/5 | 12.5 | 15.9 | 10.8 | NA | 14/15 | 11 | 72.3 | 33 | NA | 5/5 | 14.4 | 18.9 | 16.6 | NA | 8/10 | 7.24 | 12.2 | 8.43 | NA |
| PCB201 | 5/5 | 14 | 20.9 | 17.9 | NA | 14/15 | 9.68 | 55.4 | 24.5 | NA | 3/5 | 12.4 | 14 | 10.6 | NA | 6/10 | 6.78 | 11.8 | 6.88 | NA |
| PCB202 | 4/5 | 36.6 | 42.6 | 34.8 | NA | 15/15 | 27.7 | 110 | 60.5 | NA | 5/5 | 35 | 38.5 | 36.8 | NA | 9/10 | 18.1 | 33.3 | 23 | NA |
| PCB203 | 5/5 | 101 | 123 | 114 | NA | 15/15 | 99.6 | 465 | 228 | NA | 5/5 | 131 | 153 | 144 | NA | 10/10 | 66.6 | 126 | 91.3 | NA |
| PCB204 | 2/5 | 1.73 | 2.85 | 1.61 | NA | 2/15 | 1.72 | 2 | 0.831 | NA | 0/5 | -- | -- | 0.583 | NA | 0/10 | -- | -- | 0.493 | NA |
| PCB205 | 3/5 | 4.96 | 6.19 | 4.47 | NA | 13/15 | 4.88 | 21.6 | 9.76 | NA | 5/5 | 5.86 | 6.74 | 6.31 | NA | 3/10 | 4.57 | 4.96 | 2.5 | NA |
| PCB206 | 5/5 | 69.1 | 94.9 | 82.1 | NA | 14/15 | 55.7 | 176 | 107 | NA | 5/5 | 83.3 | 96.6 | 88.1 | NA | 10/10 | 36 | 73.9 | 51.2 | NA |
| PCB207 | 5/5 | 65.5 | 104 | 83 | NA | 14/15 | 35.2 | 109 | 67.8 | NA | 5/5 | 36.9 | 45.6 | 41.6 | NA | 10/10 | 16.7 | 38 | 24 | NA |
| PCB208 | 5/5 | 80.2 | 106 | 93.8 | NA | 14/15 | 41.7 | 93.5 | 69.5 | NA | 5/5 | 46.7 | 56.1 | 49.8 | NA | 10/10 | 17.9 | 47.9 | 31 | NA |
| PCB209 | 5/5 | 1,230 | 1,660 | 1,460 | NA | 15/15 | 683 | 1,900 | 1,280 | NA | 5/5 | 722 | 868 | 771 | NA | 10/10 | 161 | 522 | 306 | NA |

**Notes**

-- = not applicable, no detected values
FCA = fish collection area
NA = data not available
PCB = polychlorinated biphenyl
ww = wet weight

a - Mean and median calculations include detected and non-detected values. Non-detected values were set at one-half the detection limit.
b - PCB###+#### indicates a co-elution of two or more PCB congeners.

**Table C-34**
**Summary Statistics for Polychlorinated Biphenyls in Whole Gulf Killifish Tissue by FCA, Wet Weight**

| | FCA1 | | | | | FCA2 | | | | | FCA3 | | | | | Background | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] |
| Gulf Killifish - Whole | | | | | | | | | | | | | | | | | | | | |
| **Polychlorinated Biphenyls [b] (ng/kg - ww)** | | | | | | | | | | | | | | | | | | | | |
| PCB001 | 2/2 | 6.63 | 8.12 | 7.38 | NA | 6/6 | 5.4 | 178 | 91.2 | NA | 1/2 | 6.18 | 6.18 | 4.45 | NA | 7/8 | 2.66 | 5.45 | 3.31 | NA |
| PCB002 | 0/2 | -- | -- | 0.633 | NA | 0/6 | -- | -- | 0.518 | NA | 0/2 | -- | -- | 0.963 | NA | 3/8 | 1.85 | 2.24 | 1.3 | NA |
| PCB003 | 0/2 | -- | -- | 0.878 | NA | 4/6 | 2.25 | 13.5 | 4.58 | NA | 0/2 | -- | -- | 1.07 | NA | 5/8 | 2.29 | 2.72 | 1.94 | NA |
| PCB004 | 1/2 | 36.4 | 36.4 | 25 | NA | 4/6 | 145 | 390 | 174 | NA | 1/2 | 19.7 | 19.7 | 42.9 | NA | 0/8 | -- | -- | 8.73 | NA |
| PCB005 | 0/2 | -- | -- | 0.715 | NA | 0/6 | -- | -- | 1.02 | NA | 0/2 | -- | -- | 6.67 | NA | 0/8 | -- | -- | 1.8 | NA |
| PCB006 | 2/2 | 9.78 | 12.3 | 11 | NA | 6/6 | 10.3 | 36.3 | 23.8 | NA | 0/2 | -- | -- | 8.65 | NA | 5/8 | 7.52 | 8.71 | 6.33 | NA |
| PCB007 | 0/2 | -- | -- | 0.915 | NA | 3/6 | 6.63 | 9.6 | 5.33 | NA | 0/2 | -- | -- | 6.27 | NA | 1/8 | 1.67 | 1.67 | 1.84 | NA |
| PCB008 | 0/2 | -- | -- | 37 | NA | 4/6 | 294 | 773 | 348 | NA | 2/2 | 39.9 | 54.9 | 47.4 | NA | 1/8 | 32.8 | 32.8 | 24.9 | NA |
| PCB009 | 1/2 | 3.19 | 3.19 | 1.96 | NA | 3/6 | 10.8 | 19.3 | 8.34 | NA | 0/2 | -- | -- | 6.06 | NA | 1/8 | 2.19 | 2.19 | 1.84 | NA |
| PCB010 | 1/2 | 3.03 | 3.03 | 2.25 | NA | 2/6 | 6.82 | 9.44 | 4.84 | NA | 0/2 | -- | -- | 24.4 | NA | 0/8 | -- | -- | 1.83 | NA |
| PCB011 | 0/2 | -- | -- | 112 | NA | 0/6 | -- | -- | 95.9 | NA | 0/2 | -- | -- | 60.5 | NA | 0/8 | -- | -- | 93.6 | NA |
| PCB012+013 | 0/2 | -- | -- | 0.645 | NA | 0/6 | -- | -- | 0.899 | NA | 0/2 | -- | -- | 6.01 | NA | 0/8 | -- | -- | 1.67 | NA |
| PCB014 | 0/2 | -- | -- | 0.615 | NA | 0/6 | -- | -- | 0.863 | NA | 0/2 | -- | -- | 5.82 | NA | 0/8 | -- | -- | 1.57 | NA |
| PCB015 | 1/2 | 24 | 24 | 17.6 | NA | 5/6 | 28.3 | 109 | 48.2 | NA | 0/2 | -- | -- | 6.43 | NA | 4/8 | 18.3 | 23.4 | 13.8 | NA |
| PCB016 | 2/2 | 53.4 | 67.5 | 60.5 | NA | 6/6 | 51.2 | 76.4 | 60.6 | NA | 2/2 | 32 | 39 | 35.5 | NA | 7/8 | 23.9 | 31.8 | 27.1 | NA |
| PCB017 | 2/2 | 69.3 | 89.1 | 79.2 | NA | 6/6 | 70.3 | 113 | 85.7 | NA | 2/2 | 51.2 | 59.7 | 55.5 | NA | 0/8 | -- | -- | 21.8 | NA |
| PCB018+030 | 2/2 | 136 | 175 | 156 | NA | 5/6 | 134 | 169 | 130 | NA | 2/2 | 89.7 | 103 | 96.4 | NA | 0/8 | -- | -- | 36.5 | NA |
| PCB019 | 0/2 | -- | -- | 11.6 | NA | 0/6 | -- | -- | 12.3 | NA | 1/2 | 24.2 | 24.2 | 15.8 | NA | 2/8 | 12.9 | 18.9 | 9.08 | NA |
| PCB020+028 | 2/2 | 422 | 605 | 514 | NA | 6/6 | 459 | 619 | 524 | NA | 2/2 | 373 | 720 | 547 | NA | 1/8 | 239 | 239 | 132 | NA |
| PCB021+033 | 0/2 | -- | -- | 23.9 | NA | 0/6 | -- | -- | 32 | NA | 0/2 | -- | -- | 16.1 | NA | 0/8 | -- | -- | 15.2 | NA |
| PCB022 | 0/2 | -- | -- | 41.1 | NA | 0/6 | -- | -- | 45.2 | NA | 1/2 | 122 | 122 | 78.7 | NA | 0/8 | -- | -- | 21.3 | NA |
| PCB023 | 0/2 | -- | -- | 0.935 | NA | 0/6 | -- | -- | 1.15 | NA | 0/2 | -- | -- | 2.2 | NA | 0/8 | -- | -- | 1.07 | NA |
| PCB024 | 2/2 | 2.67 | 3.42 | 3.05 | NA | 4/6 | 1.89 | 4.9 | 2.49 | NA | 0/2 | -- | -- | 1.09 | NA | 3/8 | 1.11 | 1.46 | 1.01 | NA |
| PCB025 | 2/2 | 15.2 | 19.6 | 17.4 | NA | 4/6 | 16.9 | 28.7 | 16.6 | NA | 2/2 | 16.6 | 23.9 | 20.3 | NA | 2/8 | 7.35 | 9.39 | 5.74 | NA |
| PCB026+029 | 2/2 | 50.9 | 68.9 | 59.9 | NA | 6/6 | 41 | 81.7 | 55 | NA | 2/2 | 41.1 | 57 | 49.1 | NA | 2/8 | 20.8 | 26.5 | 15.3 | NA |
| PCB027 | 2/2 | 20.6 | 30.4 | 25.5 | NA | 6/6 | 17.1 | 30.4 | 22.7 | NA | 2/2 | 13.9 | 17.9 | 15.9 | NA | 2/8 | 9.61 | 11.7 | 6.51 | NA |
| PCB031 | 1/2 | 208 | 208 | 142 | NA | 2/6 | 195 | 231 | 122 | NA | 1/2 | 195 | 195 | 133 | NA | 0/8 | -- | -- | 45 | NA |
| PCB032 | 1/2 | 109 | 109 | 74.2 | NA | 2/6 | 85 | 93.3 | 55.2 | NA | 2/2 | 51.5 | 87.6 | 69.6 | NA | 0/8 | -- | -- | 14.1 | NA |
| PCB034 | 0/2 | -- | -- | 0.883 | NA | 1/6 | 2.51 | 2.51 | 1.33 | NA | 0/2 | -- | -- | 2 | NA | 0/8 | -- | -- | 0.963 | NA |
| PCB035 | 0/2 | -- | -- | 0.883 | NA | 0/6 | -- | -- | 1.06 | NA | 0/2 | -- | -- | 1.97 | NA | 0/8 | -- | -- | 0.979 | NA |
| PCB036 | 0/2 | -- | -- | 0.845 | NA | 0/6 | -- | -- | 0.993 | NA | 0/2 | -- | -- | 1.9 | NA | 0/8 | -- | -- | 0.905 | NA |
| PCB037 | 0/2 | -- | -- | 13.2 | NA | 0/6 | -- | -- | 13 | NA | 0/2 | -- | -- | 10.8 | NA | 0/8 | -- | -- | 8 | NA |
| PCB038 | 0/2 | -- | -- | 0.883 | NA | 0/6 | -- | -- | 1.09 | NA | 0/2 | -- | -- | 2.02 | NA | 0/8 | -- | -- | 0.977 | NA |
| PCB039 | 0/2 | -- | -- | 0.888 | NA | 0/6 | -- | -- | 1.09 | NA | 0/2 | -- | -- | 2.01 | NA | 0/8 | -- | -- | 0.969 | NA |
| PCB040+041+071 | 2/2 | 212 | 281 | 247 | NA | 6/6 | 174 | 285 | 243 | NA | 2/2 | 159 | 312 | 236 | NA | 2/8 | 90.4 | 101 | 53.3 | NA |
| PCB042 | 2/2 | 103 | 140 | 122 | NA | 6/6 | 97.7 | 155 | 127 | NA | 2/2 | 82.2 | 141 | 112 | NA | 7/8 | 39.4 | 58.7 | 42.5 | NA |
| PCB043+073 | 2/2 | 13.8 | 18.1 | 16 | NA | 3/6 | 11.3 | 18.5 | 11.6 | NA | 1/2 | 20.8 | 20.8 | 13.3 | NA | 4/8 | 5.18 | 9.44 | 5.24 | NA |
| PCB044+047+065 | 2/2 | 825 | 1,180 | 1,000 | NA | 6/6 | 690 | 1150 | 901 | NA | 2/2 | 471 | 836 | 654 | NA | 8/8 | 326 | 399 | 357 | NA |
| PCB045+051 | 2/2 | 60.4 | 65.4 | 62.9 | NA | 6/6 | 55 | 76.2 | 66.7 | NA | 2/2 | 47.1 | 80.1 | 63.6 | NA | 7/8 | 21.5 | 28.5 | 22.8 | NA |
| PCB046 | 2/2 | 10.6 | 12.3 | 11.5 | NA | 3/6 | 10.5 | 12.8 | 8.32 | NA | 1/2 | 11.8 | 11.8 | 8.12 | NA | 4/8 | 4.5 | 5.62 | 3.59 | NA |
| PCB048 | 2/2 | 40.1 | 41.7 | 40.9 | NA | 5/6 | 34.4 | 58.9 | 39.9 | NA | 1/2 | 52.1 | 52.1 | 34.1 | NA | 4/8 | 17.5 | 23.6 | 14 | NA |
| PCB049+069 | 2/2 | 594 | 771 | 683 | NA | 6/6 | 482 | 1,050 | 720 | NA | 2/2 | 363 | 665 | 514 | NA | 8/8 | 241 | 305 | 270 | NA |
| PCB050+053 | 2/2 | 89.4 | 99.6 | 94.5 | NA | 6/6 | 88.8 | 111 | 101 | NA | 2/2 | 61.3 | 87.3 | 74.3 | NA | 8/8 | 35.7 | 80.7 | 54.2 | NA |
| PCB052 | 2/2 | 1,010 | 1,350 | 1,180 | NA | 6/6 | 814 | 2,750 | 1,530 | NA | 2/2 | 583 | 1,100 | 842 | NA | 6/8 | 425 | 501 | 387 | NA |

**Table C-34**
**Summary Statistics for Polychlorinated Biphenyls in Whole Gulf Killifish Tissue by FCA, Wet Weight**

| | FCA1 | | | | | FCA2 | | | | | FCA3 | | | | | Background | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] |
| PCB054 | 1/2 | 1.99 | 1.99 | 1.44 | NA | 6/6 | 1.78 | 2.79 | 2.27 | NA | 0/2 | -- | -- | 0.535 | NA | 1/8 | 1.14 | 1.14 | 0.642 | NA |
| PCB055 | 0/2 | -- | -- | 0.478 | NA | 0/6 | -- | -- | 0.605 | NA | 0/2 | -- | -- | 0.641 | NA | 0/8 | -- | -- | 0.511 | NA |
| PCB056 | 2/2 | 58.9 | 70.8 | 64.9 | NA | 6/6 | 48 | 117 | 68.8 | NA | 2/2 | 63.7 | 130 | 96.9 | NA | 0/8 | -- | -- | 13.1 | NA |
| PCB057 | 0/2 | -- | -- | 0.426 | NA | 1/6 | 1.65 | 1.65 | 0.725 | NA | 0/2 | -- | -- | 0.583 | NA | 0/8 | -- | -- | 0.46 | NA |
| PCB058 | 0/2 | -- | -- | 0.444 | NA | 3/6 | 1.75 | 112 | 19.6 | NA | 0/2 | -- | -- | 0.6 | NA | 0/8 | -- | -- | 0.473 | NA |
| PCB059+062+075 | 2/2 | 70.7 | 102 | 86.4 | NA | 6/6 | 61 | 101 | 78.8 | NA | 2/2 | 50.2 | 102 | 76.1 | NA | 8/8 | 29 | 36 | 31.9 | NA |
| PCB060 | 2/2 | 111 | 150 | 131 | NA | 6/6 | 92.6 | 201 | 129 | NA | 2/2 | 148 | 399 | 274 | NA | 8/8 | 46 | 53.8 | 51.5 | NA |
| PCB061+070+074+076 | 2/2 | 840 | 1,180 | 1,010 | NA | 6/6 | 660 | 1,200 | 874 | NA | 2/2 | 702 | 1,430 | 1,070 | NA | 8/8 | 340 | 424 | 370 | NA |
| PCB063 | 2/2 | 30.2 | 43.3 | 36.8 | NA | 6/6 | 24 | 58.4 | 34.1 | NA | 2/2 | 27.5 | 60 | 43.8 | NA | 7/8 | 13.1 | 16.3 | 13.2 | NA |
| PCB064 | 2/2 | 276 | 389 | 333 | NA | 6/6 | 244 | 577 | 381 | NA | 2/2 | 224 | 489 | 357 | NA | 8/8 | 107 | 159 | 127 | NA |
| PCB066 | 2/2 | 857 | 1,180 | 1,020 | NA | 6/6 | 561 | 1,180 | 772 | NA | 2/2 | 676 | 1,690 | 1,180 | NA | 8/8 | 309 | 364 | 342 | NA |
| PCB067 | 0/2 | -- | -- | 1.18 | NA | 3/6 | 3.32 | 7.61 | 2.87 | NA | 0/2 | -- | -- | 1.66 | NA | 0/8 | -- | -- | 0.58 | NA |
| PCB068 | 2/2 | 14.8 | 25.8 | 20.3 | NA | 6/6 | 11.8 | 20.1 | 15.2 | NA | 1/2 | 7.76 | 7.76 | 6.27 | NA | 7/8 | 6.12 | 10.7 | 7.86 | NA |
| PCB072 | 2/2 | 16.5 | 24.4 | 20.5 | NA | 6/6 | 11.9 | 21.2 | 15.1 | NA | 2/2 | 8.18 | 12.6 | 10.4 | NA | 7/8 | 5.15 | 8.76 | 6.02 | NA |
| PCB077 | 2/2 | 21.1 | 29.1 | 25.1 | 25.1 | 6/6 | 18.4 | 32.7 | 23.1 | 22.5 | 2/2 | 27 | 69.5 | 48.3 | 48.3 | 0/8 | -- | -- | 4.67 | 4.58 |
| PCB078 | 0/2 | -- | -- | 0.725 | NA | 0/6 | -- | -- | 0.895 | NA | 0/2 | -- | -- | 1.42 | NA | 0/8 | -- | -- | 0.719 | NA |
| PCB079 | 2/2 | 3.42 | 4.09 | 3.76 | NA | 4/6 | 2.71 | 22.5 | 8.76 | NA | 2/2 | 7.17 | 9.88 | 8.53 | NA | 4/8 | 1.57 | 4.24 | 1.69 | NA |
| PCB080 | 0/2 | -- | -- | 0.65 | NA | 0/6 | -- | -- | 0.783 | NA | 0/2 | -- | -- | 1.28 | NA | 0/8 | -- | -- | 0.641 | NA |
| PCB081 | 0/2 | -- | -- | 0.815 | 0.815 | 0/6 | -- | -- | 0.938 | 0.95 | 0/2 | -- | -- | 1.5 | 1.5 | 0/8 | -- | -- | 0.787 | 0.715 |
| PCB082 | 0/2 | -- | -- | 14.5 | NA | 4/6 | 52.8 | 154 | 68.3 | NA | 1/2 | 61.2 | 61.2 | 38.7 | NA | 0/8 | -- | -- | 5.98 | NA |
| PCB083+099 | 2/2 | 1,750 | 2,390 | 2,070 | NA | 6/6 | 935 | 7,400 | 3,340 | NA | 2/2 | 1,170 | 2,220 | 1,700 | NA | 8/8 | 532 | 728 | 598 | NA |
| PCB084 | 0/2 | -- | -- | 45 | NA | 3/6 | 164 | 360 | 159 | NA | 0/2 | -- | -- | 40.5 | NA | 0/8 | -- | -- | 19.2 | NA |
| PCB085+116 | 2/2 | 206 | 323 | 265 | NA | 6/6 | 146 | 1,720 | 723 | NA | 2/2 | 277 | 579 | 428 | NA | 8/8 | 80.9 | 131 | 100 | NA |
| PCB086+087+097+109+119 +125 | 2/2 | 446 | 638 | 542 | NA | 6/6 | 341 | 3,800 | 1,660 | NA | 2/2 | 511 | 1,080 | 796 | NA | 1/8 | 334 | 334 | 141 | NA |
| PCB088+091 | 2/2 | 141 | 206 | 174 | NA | 6/6 | 111 | 931 | 415 | NA | 2/2 | 121 | 228 | 175 | NA | 6/8 | 64.7 | 97.2 | 64.6 | NA |
| PCB089 | 1/2 | 4.25 | 4.25 | 2.9 | NA | 3/6 | 5.07 | 11.4 | 5.14 | NA | 1/2 | 3.81 | 3.81 | 3.42 | NA | 0/8 | -- | -- | 0.536 | NA |
| PCB090+101+113 | 2/2 | 1,200 | 1,610 | 1,410 | NA | 6/6 | 938 | 10,800 | 4,530 | NA | 2/2 | 1,350 | 2,490 | 1,920 | NA | 7/8 | 547 | 820 | 600 | NA |
| PCB092 | 2/2 | 287 | 320 | 304 | NA | 6/6 | 168 | 2,270 | 948 | NA | 2/2 | 241 | 507 | 374 | NA | 8/8 | 102 | 161 | 124 | NA |
| PCB093+100 | 2/2 | 41.2 | 66.8 | 54 | NA | 6/6 | 26.5 | 92 | 52.3 | NA | 2/2 | 18.6 | 28 | 23.3 | NA | 8/8 | 17.1 | 24.6 | 20.4 | NA |
| PCB094 | 2/2 | 4.9 | 7 | 5.95 | NA | 5/6 | 3.07 | 15.4 | 7.09 | NA | 0/2 | -- | -- | 2.02 | NA | 4/8 | 1.89 | 2.51 | 1.52 | NA |
| PCB095 | 1/2 | 693 | 693 | 484 | NA | 5/6 | 546 | 4,300 | 1,790 | NA | 1/2 | 867 | 867 | 542 | NA | 0/8 | -- | -- | 144 | NA |
| PCB096 | 1/2 | 2.51 | 2.51 | 1.77 | NA | 3/6 | 1.73 | 7.61 | 3.03 | NA | 0/2 | -- | -- | 0.905 | NA | 1/8 | 1.44 | 1.44 | 0.555 | NA |
| PCB098+102 | 2/2 | 23.1 | 32.6 | 27.9 | NA | 5/6 | 16.7 | 105 | 47.8 | NA | 2/2 | 18.5 | 36.3 | 27.4 | NA | 5/8 | 9.54 | 13.8 | 8.32 | NA |
| PCB103 | 2/2 | 21.5 | 27.1 | 24.3 | NA | 6/6 | 14.9 | 77.7 | 37.4 | NA | 2/2 | 12.3 | 14.8 | 13.6 | NA | 7/8 | 9.97 | 15.1 | 10.6 | NA |
| PCB104 | 0/2 | -- | -- | 0.284 | NA | 0/6 | -- | -- | 0.349 | NA | 0/2 | -- | -- | 0.374 | NA | 0/8 | -- | -- | 0.287 | NA |
| PCB105 | 2/2 | 515 | 633 | 574 | 574 | 6/6 | 299 | 2,980 | 1,290 | 632 | 2/2 | 703 | 1,270 | 987 | 987 | 8/8 | 194 | 329 | 229 | 219 |
| PCB106 | 0/2 | -- | -- | 0.539 | NA | 0/6 | -- | -- | 1.51 | NA | 0/2 | -- | -- | 2.42 | NA | 0/8 | -- | -- | 0.845 | NA |
| PCB107 | 2/2 | 110 | 183 | 147 | NA | 6/6 | 90 | 792 | 337 | NA | 2/2 | 155 | 274 | 215 | NA | 8/8 | 48.6 | 73.6 | 59.7 | NA |
| PCB108+124 | 1/2 | 22.8 | 22.8 | 14.5 | NA | 5/6 | 15.1 | 49.9 | 28.1 | NA | 1/2 | 35.4 | 35.4 | 22.1 | NA | 1/8 | 11.9 | 11.9 | 5.48 | NA |
| PCB110+115 | 2/2 | 835 | 1,220 | 1,030 | NA | 6/6 | 701 | 9,190 | 3,750 | NA | 2/2 | 1,110 | 2,270 | 1,690 | NA | 2/8 | 599 | 706 | 334 | NA |
| PCB111 | 1/2 | 5.42 | 5.42 | 3.43 | NA | 1/6 | 4.9 | 4.9 | 2.26 | NA | 0/2 | -- | -- | 1.95 | NA | 0/8 | -- | -- | 0.93 | NA |
| PCB112 | 0/2 | -- | -- | 1.06 | NA | 0/6 | -- | -- | 1.39 | NA | 0/2 | -- | -- | 1.81 | NA | 0/8 | -- | -- | 0.849 | NA |
| PCB114 | 2/2 | 38.2 | 42.4 | 40.3 | 40.3 | 6/6 | 18.5 | 203 | 84.3 | 38.4 | 2/2 | 42.9 | 76.8 | 59.9 | 59.9 | 6/8 | 13 | 22.1 | 13.6 | 14 |
| PCB117 | 2/2 | 48.4 | 64.9 | 56.7 | NA | 4/6 | 37.7 | 398 | 157 | NA | 2/2 | 44 | 106 | 75 | NA | 5/8 | 18 | 21.8 | 15.6 | NA |
| PCB118 | 2/2 | 1,860 | 2,200 | 2,030 | 2,030 | 6/6 | 950 | 7,950 | 3,510 | 1,840 | 2/2 | 2,000 | 3,620 | 2,810 | 2,810 | 8/8 | 583 | 941 | 693 | 680 |

**Table C-34**
**Summary Statistics for Polychlorinated Biphenyls in Whole Gulf Killifish Tissue by FCA, Wet Weight**

| | FCA1 | | | | | FCA2 | | | | | FCA3 | | | | | Background | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] |
| PCB120 | 2/2 | 17.2 | 29.1 | 23.2 | NA | 6/6 | 10.7 | 47.5 | 25.7 | NA | 1/2 | 15.7 | 15.7 | 10.1 | NA | 6/8 | 5.7 | 8.37 | 5.66 | NA |
| PCB121 | 0/2 | -- | -- | 1.17 | NA | 0/6 | -- | -- | 1.48 | NA | 0/2 | -- | -- | 2 | NA | 0/8 | -- | -- | 0.926 | NA |
| PCB122 | 0/2 | -- | -- | 0.598 | NA | 0/6 | -- | -- | 1.67 | NA | 0/2 | -- | -- | 2.64 | NA | 0/8 | -- | -- | 0.906 | NA |
| PCB123 | 2/2 | 30.8 | 31.3 | 31.1 | 31.1 | 4/6 | 18.9 | 141 | 52.5 | 25.9 | 2/2 | 28.9 | 61.6 | 45.3 | 45.3 | 4/8 | 9.72 | 15.7 | 8.12 | 7.51 |
| PCB126 | 1/2 | 6.1 | 6.1 | 4.01 | 4.01 | 5/6 | 3.56 | 24.4 | 10.3 | 6.42 | 0/2 | -- | -- | 3.26 | 3.25 | 3/8 | 2.07 | 5.9 | 2.39 | 1.37 |
| PCB127 | 0/2 | -- | -- | 0.577 | NA | 2/6 | 17.5 | 26.3 | 7.98 | NA | 0/2 | -- | -- | 2.52 | NA | 0/8 | -- | -- | 0.892 | NA |
| PCB128+166 | 2/2 | 401 | 448 | 425 | NA | 6/6 | 187 | 3,550 | 1,420 | NA | 2/2 | 450 | 748 | 599 | NA | 8/8 | 129 | 183 | 151 | NA |
| PCB129+138+163 | 2/2 | 3,070 | 3,420 | 3,250 | NA | 6/6 | 1,410 | 23,800 | 9,440 | NA | 2/2 | 3,150 | 5,470 | 4,310 | NA | 8/8 | 923 | 1,330 | 1,080 | NA |
| PCB130 | 2/2 | 113 | 151 | 132 | NA | 6/6 | 70.7 | 1,400 | 544 | NA | 2/2 | 142 | 261 | 202 | NA | 8/8 | 39.3 | 64.7 | 49.4 | NA |
| PCB131 | 0/2 | -- | -- | 0.803 | NA | 0/6 | -- | -- | 2.09 | NA | 0/2 | -- | -- | 1.82 | NA | 0/8 | -- | -- | 0.758 | NA |
| PCB132 | 1/2 | 183 | 183 | 124 | NA | 4/6 | 279 | 2,000 | 786 | NA | 2/2 | 207 | 405 | 306 | NA | 0/8 | -- | -- | 43.5 | NA |
| PCB133 | 2/2 | 65 | 72.3 | 68.7 | NA | 6/6 | 30.5 | 474 | 182 | NA | 2/2 | 53 | 91.2 | 72.1 | NA | 8/8 | 18.2 | 24.7 | 21.6 | NA |
| PCB134 | 0/2 | -- | -- | 9.73 | NA | 4/6 | 37.2 | 227 | 88.2 | NA | 1/2 | 40.6 | 40.6 | 26.2 | NA | 0/8 | -- | -- | 5.64 | NA |
| PCB135+151 | 2/2 | 373 | 442 | 408 | NA | 6/6 | 212 | 4,730 | 1,710 | NA | 2/2 | 363 | 852 | 608 | NA | 6/8 | 158 | 222 | 161 | NA |
| PCB136 | 0/2 | -- | -- | 28.8 | NA | 3/6 | 110 | 445 | 169 | NA | 1/2 | 76.3 | 76.3 | 48.6 | NA | 0/8 | -- | -- | 13.7 | NA |
| PCB137 | 2/2 | 116 | 128 | 122 | NA | 6/6 | 56.1 | 1,320 | 512 | NA | 2/2 | 165 | 295 | 230 | NA | 8/8 | 42.8 | 66 | 49 | NA |
| PCB139+140 | 2/2 | 36 | 49 | 42.5 | NA | 6/6 | 18.8 | 422 | 162 | NA | 2/2 | 43.8 | 79 | 61.4 | NA | 7/8 | 12.5 | 17.9 | 13.6 | NA |
| PCB141 | 2/2 | 175 | 199 | 187 | NA | 6/6 | 117 | 2,570 | 1,000 | NA | 2/2 | 264 | 498 | 381 | NA | 4/8 | 104 | 139 | 79.5 | NA |
| PCB142 | 0/2 | -- | -- | 0.833 | NA | 0/6 | -- | -- | 2.1 | NA | 0/2 | -- | -- | 1.86 | NA | 0/8 | -- | -- | 0.784 | NA |
| PCB143 | 0/2 | -- | -- | 0.72 | NA | 0/6 | -- | -- | 1.94 | NA | 0/2 | -- | -- | 1.74 | NA | 0/8 | -- | -- | 0.703 | NA |
| PCB144 | 2/2 | 38.4 | 44.9 | 41.7 | NA | 5/6 | 33.8 | 569 | 201 | NA | 1/2 | 193 | 193 | 109 | NA | 0/8 | -- | -- | 11.7 | NA |
| PCB145 | 0/2 | -- | -- | 0.368 | NA | 0/6 | -- | -- | 0.282 | NA | 0/2 | -- | -- | 0.435 | NA | 0/8 | -- | -- | 0.366 | NA |
| PCB146 | 2/2 | 629 | 741 | 685 | NA | 6/6 | 280 | 4,190 | 1,600 | NA | 2/2 | 535 | 786 | 661 | NA | 8/8 | 182 | 236 | 203 | NA |
| PCB147+149 | 2/2 | 622 | 890 | 756 | NA | 6/6 | 493 | 7,700 | 3,130 | NA | 2/2 | 805 | 1,580 | 1,190 | NA | 2/8 | 399 | 412 | 222 | NA |
| PCB148 | 2/2 | 6.03 | 10.4 | 8.22 | NA | 4/6 | 4.42 | 30.4 | 12.3 | NA | 2/2 | 4.12 | 5.23 | 4.68 | NA | 7/8 | 2.37 | 3.76 | 2.7 | NA |
| PCB150 | 2/2 | 3.24 | 4.2 | 3.72 | NA | 6/6 | 2.78 | 9.91 | 5.56 | NA | 0/2 | -- | -- | 0.95 | NA | 4/8 | 1.36 | 2.9 | 1.26 | NA |
| PCB152 | 1/2 | 1.1 | 1.1 | 0.751 | NA | 1/6 | 5.24 | 5.24 | 1.3 | NA | 0/2 | -- | -- | 0.397 | NA | 0/8 | -- | -- | 0.33 | NA |
| PCB153+168 | 2/2 | 3,840 | 4,230 | 4,040 | NA | 6/6 | 1,560 | 23,500 | 9530 | NA | 2/2 | 3,170 | 5,110 | 4,140 | NA | 8/8 | 1,090 | 1,380 | 1,210 | NA |
| PCB154 | 2/2 | 85.4 | 119 | 102 | NA | 6/6 | 40.9 | 305 | 134 | NA | 2/2 | 44.6 | 72.7 | 58.7 | NA | 8/8 | 27.7 | 35.6 | 31.2 | NA |
| PCB155 | 2/2 | 5.28 | 7.02 | 6.15 | NA | 3/6 | 2.61 | 3.78 | 2.04 | NA | 0/2 | -- | -- | 0.526 | NA | 5/8 | 1.32 | 2.08 | 1.22 | NA |
| PCB156+157 | 2/2 | 266 | 281 | 274 | 274 | 6/6 | 119 | 2,010 | 813 | 298 | 2/2 | 349 | 570 | 460 | 460 | 8/8 | 83.5 | 140 | 102 | 97.3 |
| PCB158 | 2/2 | 239 | 254 | 247 | NA | 6/6 | 102 | 2,130 | 831 | NA | 2/2 | 251 | 449 | 350 | NA | 8/8 | 74.8 | 122 | 89.8 | NA |
| PCB159 | 2/2 | 4.48 | 5.51 | 5 | NA | 5/6 | 2.77 | 53.2 | 21.4 | NA | 1/2 | 5.03 | 5.03 | 4.62 | NA | 4/8 | 1.83 | 3.02 | 1.74 | NA |
| PCB160 | 0/2 | -- | -- | 0.63 | NA | 0/6 | -- | -- | 1.74 | NA | 0/2 | -- | -- | 1.36 | NA | 0/8 | -- | -- | 0.588 | NA |
| PCB161 | 0/2 | -- | -- | 0.576 | NA | 0/6 | -- | -- | 1.52 | NA | 0/2 | -- | -- | 1.32 | NA | 0/8 | -- | -- | 0.549 | NA |
| PCB162 | 1/2 | 14.5 | 14.5 | 9.71 | NA | 5/6 | 9.02 | 75.9 | 31.3 | NA | 2/2 | 15 | 27.1 | 21.1 | NA | 3/8 | 3.93 | 5.28 | 2.97 | NA |
| PCB164 | 2/2 | 61.2 | 85.4 | 73.3 | NA | 6/6 | 49 | 888 | 342 | NA | 2/2 | 96.3 | 190 | 143 | NA | 5/8 | 32.8 | 48.2 | 31.2 | NA |
| PCB165 | 0/2 | -- | -- | 0.648 | NA | 0/6 | -- | -- | 1.72 | NA | 0/2 | -- | -- | 1.59 | NA | 0/8 | -- | -- | 0.644 | NA |
| PCB167 | 2/2 | 145 | 146 | 146 | 146 | 6/6 | 58.5 | 826 | 345 | 144 | 2/2 | 162 | 255 | 209 | 209 | 8/8 | 42.8 | 60.5 | 47.6 | 45.5 |
| PCB169 | 0/2 | -- | -- | 0.913 | 0.913 | 0/6 | -- | -- | 1.57 | 0.665 | 0/2 | -- | -- | 1.4 | 1.4 | 0/8 | -- | -- | 0.75 | 0.638 |
| PCB170 | 2/2 | 612 | 669 | 641 | 641 | 6/6 | 254 | 4,220 | 1540 | 583 | 2/2 | 549 | 830 | 690 | 690 | 8/8 | 156 | 238 | 191 | 190 |

**Table C-34**
**Summary Statistics for Polychlorinated Biphenyls in Whole Gulf Killifish Tissue by FCA, Wet Weight**

| | FCA1 | | | | | FCA2 | | | | | FCA3 | | | | | Background | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] |
| PCB171+173 | 2/2 | 180 | 200 | 190 | NA | 6/6 | 82.3 | 1,470 | 538 | NA | 2/2 | 148 | 232 | 190 | NA | 8/8 | 45.2 | 72.8 | 55.3 | NA |
| PCB172 | 2/2 | 121 | 122 | 122 | NA | 6/6 | 51.4 | 759 | 309 | NA | 2/2 | 66.4 | 140 | 103 | NA | 8/8 | 30.5 | 38.1 | 33.6 | NA |
| PCB174 | 2/2 | 122 | 154 | 138 | NA | 6/6 | 89.5 | 1,790 | 662 | NA | 2/2 | 138 | 297 | 218 | NA | 6/8 | 53.4 | 75.3 | 55.4 | NA |
| PCB175 | 2/2 | 21.1 | 23.1 | 22.1 | NA | 5/6 | 7.65 | 157 | 59.5 | NA | 2/2 | 21.4 | 29.4 | 25.4 | NA | 5/8 | 6.43 | 7.76 | 5.64 | NA |
| PCB176 | 1/2 | 16.9 | 16.9 | 11.1 | NA | 6/6 | 8.76 | 155 | 62.5 | NA | 2/2 | 16.1 | 24 | 20.1 | NA | 4/8 | 5.99 | 8 | 4.77 | NA |
| PCB177 | 2/2 | 259 | 292 | 276 | NA | 6/6 | 141 | 3,090 | 1,060 | NA | 2/2 | 188 | 326 | 257 | NA | 8/8 | 62.7 | 83.6 | 70.9 | NA |
| PCB178 | 2/2 | 174 | 194 | 184 | NA | 6/6 | 83.9 | 1,350 | 536 | NA | 2/2 | 123 | 201 | 162 | NA | 8/8 | 47.2 | 73 | 57.6 | NA |
| PCB179 | 2/2 | 45.7 | 63.2 | 54.5 | NA | 6/6 | 39 | 625 | 255 | NA | 2/2 | 48.6 | 89.9 | 69.3 | NA | 5/8 | 18.5 | 29.8 | 21 | NA |
| PCB180+193 | 2/2 | 1,790 | 1,880 | 1,840 | 1,840 | 6/6 | 674 | 11,300 | 4,240 | 1640 | 2/2 | 1,290 | 2,130 | 1,710 | 1,710 | 8/8 | 396 | 614 | 508 | 509 |
| PCB181 | 1/2 | 7.41 | 7.41 | 4.89 | NA | 5/6 | 4.79 | 92.1 | 31.8 | NA | 1/2 | 7.66 | 7.66 | 6.46 | NA | 4/8 | 3.12 | 3.21 | 2.21 | NA |
| PCB182 | 1/2 | 8.09 | 8.09 | 5.3 | NA | 4/6 | 5.06 | 48.6 | 17.5 | NA | 2/2 | 7.3 | 10.8 | 9.05 | NA | 4/8 | 3.13 | 4.5 | 2.4 | NA |
| PCB183 | 2/2 | 464 | 492 | 478 | NA | 6/6 | 187 | 3,590 | 1,300 | NA | 2/2 | 342 | 645 | 494 | NA | 8/8 | 115 | 192 | 146 | NA |
| PCB184 | 1/2 | 4.87 | 4.87 | 2.98 | NA | 2/6 | 1.67 | 6.97 | 1.76 | NA | 0/2 | -- | -- | 0.685 | NA | 1/8 | 1.13 | 1.13 | 0.496 | NA |
| PCB185 | 2/2 | 15.8 | 21.5 | 18.7 | NA | 6/6 | 15.9 | 212 | 85.3 | NA | 1/2 | 31.5 | 31.5 | 16.5 | NA | 4/8 | 6.97 | 9.63 | 5.97 | NA |
| PCB186 | 0/2 | -- | -- | 0.374 | NA | 0/6 | -- | -- | 0.328 | NA | 0/2 | -- | -- | 0.538 | NA | 0/8 | -- | -- | 0.32 | NA |
| PCB187 | 2/2 | 1,260 | 1,460 | 1,360 | NA | 6/6 | 570 | 9,110 | 3,670 | NA | 2/2 | 890 | 1,520 | 1,210 | NA | 8/8 | 331 | 558 | 419 | NA |
| PCB188 | 2/2 | 4.02 | 5.35 | 4.69 | NA | 5/6 | 1.94 | 7.86 | 3.34 | NA | 1/2 | 2.33 | 2.33 | 1.42 | NA | 4/8 | 1.25 | 2.31 | 1.13 | NA |
| PCB189 | 2/2 | 16.7 | 19.4 | 18.1 | 18.1 | 6/6 | 6.07 | 84 | 33.6 | 16.7 | 2/2 | 12.6 | 19 | 15.8 | 15.8 | 5/8 | 3.95 | 6.53 | 4.13 | 4.34 |
| PCB190 | 2/2 | 90.8 | 97 | 93.9 | NA | 6/6 | 34.5 | 494 | 200 | NA | 2/2 | 48.7 | 103 | 75.9 | NA | 8/8 | 23.9 | 31.8 | 27.5 | NA |
| PCB191 | 2/2 | 31.9 | 32 | 32 | NA | 6/6 | 11.6 | 200 | 74.8 | NA | 2/2 | 27.9 | 41 | 34.5 | NA | 5/8 | 7.76 | 12.4 | 8.27 | NA |
| PCB192 | 0/2 | -- | -- | 1.06 | NA | 0/6 | -- | -- | 1.64 | NA | 0/2 | -- | -- | 2.27 | NA | 0/8 | -- | -- | 0.743 | NA |
| PCB194 | 2/2 | 170 | 239 | 205 | NA | 6/6 | 60.9 | 954 | 380 | NA | 2/2 | 139 | 197 | 168 | NA | 8/8 | 54.6 | 122 | 74.6 | NA |
| PCB195 | 2/2 | 97.1 | 117 | 107 | NA | 6/6 | 38.1 | 638 | 242 | NA | 2/2 | 77.2 | 110 | 93.6 | NA | 8/8 | 34.1 | 54.3 | 42 | NA |
| PCB196 | 2/2 | 209 | 211 | 210 | NA | 6/6 | 81.5 | 1,360 | 498 | NA | 2/2 | 142 | 203 | 173 | NA | 8/8 | 52.9 | 105 | 75.2 | NA |
| PCB197 | 2/2 | 36 | 41.2 | 38.6 | NA | 6/6 | 14.9 | 126 | 53.2 | NA | 2/2 | 19.6 | 24.7 | 22.2 | NA | 7/8 | 7.61 | 15.7 | 9.83 | NA |
| PCB198+199 | 2/2 | 432 | 449 | 441 | NA | 6/6 | 188 | 2,800 | 1,140 | NA | 2/2 | 298 | 437 | 368 | NA | 8/8 | 123 | 224 | 167 | NA |
| PCB200 | 1/2 | 6.6 | 6.6 | 4.56 | NA | 5/6 | 4.78 | 50.7 | 20.9 | NA | 2/2 | 4.25 | 9.39 | 6.82 | NA | 4/8 | 1.9 | 2.75 | 1.86 | NA |
| PCB201 | 2/2 | 53.4 | 54.7 | 54.1 | NA | 6/6 | 22.3 | 322 | 129 | NA | 2/2 | 33 | 51.9 | 42.5 | NA | 7/8 | 12.8 | 26.4 | 16.1 | NA |
| PCB202 | 2/2 | 88.3 | 90.3 | 89.3 | NA | 6/6 | 39.5 | 462 | 182 | NA | 2/2 | 60.5 | 81.4 | 71 | NA | 8/8 | 24.5 | 46.5 | 34.5 | NA |
| PCB203 | 2/2 | 211 | 233 | 222 | NA | 6/6 | 82.9 | 1,050 | 445 | NA | 2/2 | 114 | 205 | 160 | NA | 8/8 | 74.8 | 93 | 85.2 | NA |
| PCB204 | 2/2 | 2.22 | 2.77 | 2.5 | NA | 2/6 | 1.53 | 3.88 | 1.31 | NA | 0/2 | -- | -- | 0.823 | NA | 0/8 | -- | -- | 0.522 | NA |
| PCB205 | 2/2 | 5.39 | 6.25 | 5.82 | NA | 3/6 | 6.66 | 21.5 | 8.02 | NA | 0/2 | -- | -- | 1.26 | NA | 1/8 | 2.22 | 2.22 | 0.912 | NA |
| PCB206 | 2/2 | 67 | 67.1 | 67.1 | NA | 5/6 | 22.3 | 138 | 67 | NA | 2/2 | 29.5 | 53.6 | 41.6 | NA | 7/8 | 33.7 | 42.9 | 34.9 | NA |
| PCB207 | 2/2 | 75.5 | 87.7 | 81.6 | NA | 6/6 | 31.7 | 89 | 55.3 | NA | 2/2 | 36.1 | 45.1 | 40.6 | NA | 7/8 | 23.1 | 37.5 | 25 | NA |
| PCB208 | 2/2 | 90.9 | 92.3 | 91.6 | NA | 6/6 | 38.8 | 97.1 | 62.7 | NA | 2/2 | 36.7 | 46.1 | 41.4 | NA | 6/8 | 23.7 | 35.7 | 26 | NA |
| PCB209 | 2/2 | 873 | 893 | 883 | NA | 6/6 | 343 | 492 | 420 | NA | 2/2 | 297 | 300 | 299 | NA | 8/8 | 166 | 300 | 227 | NA |

**Notes**

-- = not applicable, no detected values
FCA = fish collection area
NA = data not available
PCB = polychlorinated biphenyl
ww = wet weight

a - Mean and median calculations include detected and non-detected values. Non-detected values were set at one-half the detection limit.
b - PCB###+#### indicates a co-elution of two or more PCB congeners.

**Table C-35**
**Summary Statistics for Metals and SVOCs Edible Blue Crab Tissue by FCA, Wet Weight**

| | FCA1 | | | | | FCA2 | | | | | FCA3 | | | | | Cedar Bayou | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] |
| Blue Crab - Edible | | | | | | | | | | | | | | | | | | | | |
| **Metals (mg/kg - ww)** | | | | | | | | | | | | | | | | | | | | |
| Arsenic | 10/10 | 0.315 | 0.646 | 0.466 | 0.458 | 10/10 | 0.347 | 0.596 | 0.467 | 0.461 | 10/10 | 0.288 | 0.546 | 0.386 | 0.391 | 10/10 | 0.448 | 1.03 | 0.638 | 0.539 |
| Cadmium | 10/10 | 0.0097 | 0.0276 | 0.0158 | 0.0127 | 10/10 | 0.0042 | 0.0494 | 0.0154 | 0.0107 | 10/10 | 0.0045 | 0.025 | 0.01 | 0.00915 | 10/10 | 0.0033 | 0.0127 | 0.00542 | 0.0043 |
| Chromium | 9/10 | 0.02 | 0.1 | 0.047 | 0.045 | 8/10 | 0.01 | 0.09 | 0.031 | 0.02 | 0/10 | -- | -- | 0.019 | 0.015 | 9/10 | 0.01 | 0.04 | 0.0215 | 0.02 |
| Copper | 10/10 | 9.34 | 16.2 | 11.2 | 10.6 | 10/10 | 7.06 | 15.4 | 10.4 | 9.91 | 10/10 | 8.29 | 12.8 | 10.4 | 10.6 | 10/10 | 6.72 | 8.27 | 7.37 | 7.29 |
| Mercury | 10/10 | 0.0419 | 0.0652 | 0.0527 | 0.0531 | 10/10 | 0.0171 | 0.0498 | 0.0292 | 0.0245 | 10/10 | 0.0276 | 0.0522 | 0.0386 | 0.0354 | 10/10 | 0.0149 | 0.0364 | 0.0205 | 0.0189 |
| Nickel | 0/10 | -- | -- | 0.042 | 0.041 | 0/10 | -- | -- | 0.0382 | 0.0353 | 0/10 | -- | -- | 0.0314 | 0.026 | 0/10 | -- | -- | 0.0387 | 0.0383 |
| Zinc | 10/10 | 48.5 | 54.7 | 50.4 | 49.8 | 10/10 | 35.7 | 59.1 | 46.5 | 46.8 | 10/10 | 39.8 | 52.7 | 48.7 | 50.8 | 10/10 | 41.5 | 47.6 | 45.1 | 44.9 |
| **Semivolatile Organic Compounds (µg/kg - ww)** | | | | | | | | | | | | | | | | | | | | |
| Bis(2-ethylhexyl)phthalate | 0/10 | -- | -- | 105 | 105 | 0/10 | -- | -- | 105 | 105 | 0/10 | -- | -- | 105 | 105 | 0/10 | -- | -- | 105 | 105 |

**Notes**

-- = not applicable, no detected values
FCA = fish collection area
SVOC = semivolatile organic compound
ww = wet weight

a - Mean and median calculations include detected and nondetected values. Nondetected values were set at one-half the detection limit.

**Table C-36**
**Summary Statistics for Metals and SVOCs in Whole Blue Crab Tissue by FCA, Wet Weight**

| | FCA1 | | | | | FCA2 | | | | | FCA3 | | | | | Cedar Bayou | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] |
| Blue Crab - Whole | | | | | | | | | | | | | | | | | | | | |
| **Metals (mg/kg - ww)** | | | | | | | | | | | | | | | | | | | | |
| Arsenic | 3/3 | 0.525 | 0.757 | 0.669 | 0.724 | 3/3 | 0.771 | 0.938 | 0.829 | 0.777 | 3/3 | 0.546 | 0.618 | 0.584 | 0.588 | 3/3 | 0.695 | 0.837 | 0.746 | 0.706 |
| Cadmium | 3/3 | 0.0704 | 0.0879 | 0.0807 | 0.0840 | 3/3 | 0.0835 | 0.115 | 0.0959 | 0.0887 | 3/3 | 0.0560 | 0.0723 | 0.0622 | 0.0583 | 3/3 | 0.00820 | 0.0153 | 0.0121 | 0.0129 |
| Chromium | 3/3 | 0.568 | 2.34 | 1.48 | 1.53 | 3/3 | 0.197 | 0.313 | 0.264 | 0.281 | 3/3 | 0.266 | 1.06 | 0.542 | 0.300 | 3/3 | 0.105 | 0.305 | 0.219 | 0.246 |
| Copper | 3/3 | 9.69 | 16.3 | 13.4 | 14.1 | 3/3 | 12.5 | 18.4 | 14.5 | 12.7 | 3/3 | 12.1 | 13.7 | 12.9 | 12.9 | 3/3 | 7.18 | 7.87 | 7.58 | 7.71 |
| Mercury | 3/3 | 0.0240 | 0.0286 | 0.0263 | 0.0262 | 3/3 | 0.0144 | 0.0217 | 0.0171 | 0.0153 | 3/3 | 0.0199 | 0.0257 | 0.0218 | 0.0199 | 3/3 | 0.0101 | 0.0193 | 0.0137 | 0.0117 |
| Nickel | 3/3 | 0.334 | 1.11 | 0.748 | 0.799 | 3/3 | 0.208 | 0.289 | 0.248 | 0.246 | 3/3 | 0.216 | 0.519 | 0.324 | 0.238 | 3/3 | 0.158 | 0.274 | 0.204 | 0.180 |
| Zinc | 3/3 | 33.0 | 35.8 | 34.7 | 35.3 | 3/3 | 28.4 | 38.0 | 34.0 | 35.8 | 3/3 | 27.1 | 33.5 | 30.2 | 30.0 | 3/3 | 26.1 | 31.5 | 29.5 | 31.0 |
| **Semivolatile Organic Compounds (µg/kg - ww)** | | | | | | | | | | | | | | | | | | | | |
| Bis(2-ethylhexyl)phthalate | 3/3 | 223 | 262 | 241 | 238 | 2/3 | 216 | 361 | 394 | 361 | 3/3 | 193 | 352 | 256 | 224 | 0/3 | -- | -- | 246 | 105 |

**Notes**

-- = not applicable, no detected values
FCA = fish collection area
SVOC = semivolatile organic compound
ww = wet weight

a - Mean and median calculations include detected and nondetected values. Nondetected values were set at one-half the detection limit.

**Table C-37**
**Summary Statistics for Metals and SVOCs in Fillet Hardhead Catfish Tissue by FCA, Wet Weight**

| | FCA1 | | | | | FCA2 | | | | | FCA3 | | | | | Cedar Bayou | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] |
| Catfish - Fillet | | | | | | | | | | | | | | | | | | | | |
| **Metals (mg/kg - ww)** | | | | | | | | | | | | | | | | | | | | |
| Arsenic | 10/10 | 0.312 | 0.698 | 0.484 | 0.449 | 10/10 | 0.228 | 0.896 | 0.461 | 0.444 | 10/10 | 0.119 | 1.42 | 0.425 | 0.325 | 10/10 | 0.206 | 0.461 | 0.29 | 0.273 |
| Cadmium | 2/10 | 0.001 | 0.0039 | 0.000925 | 0.00055 | 0/10 | -- | -- | 0.00056 | 0.00055 | 2/10 | 0.0014 | 0.002 | 0.0008 | 0.000575 | 1/10 | 0.0037 | 0.0037 | 0.0009 | 0.00055 |
| Chromium | 5/10 | 0.02 | 0.14 | 0.033 | 0.015 | 4/10 | 0.02 | 0.03 | 0.016 | 0.01 | 4/10 | 0.02 | 0.08 | 0.026 | 0.01 | 0/10 | -- | -- | 0.014 | 0.01 |
| Copper | 10/10 | 0.251 | 0.612 | 0.359 | 0.321 | 10/10 | 0.217 | 0.301 | 0.267 | 0.262 | 10/10 | 0.204 | 0.381 | 0.264 | 0.254 | 2/10 | 2 | 2.39 | 0.618 | 0.183 |
| Mercury | 10/10 | 0.104 | 0.266 | 0.159 | 0.137 | 10/10 | 0.069 | 0.264 | 0.114 | 0.0942 | 10/10 | 0.0408 | 0.188 | 0.0856 | 0.075 | 10/10 | 0.0801 | 0.197 | 0.126 | 0.117 |
| Nickel | 10/10 | 0.012 | 0.076 | 0.0324 | 0.024 | 10/10 | 0.011 | 0.027 | 0.0169 | 0.015 | 9/10 | 0.013 | 0.064 | 0.0256 | 0.0205 | 1/10 | 0.067 | 0.067 | 0.0182 | 0.0115 |
| Zinc | 10/10 | 15.6 | 39.7 | 20.7 | 17.9 | 10/10 | 12.8 | 23.1 | 16.9 | 16.8 | 10/10 | 10.5 | 26.2 | 15.9 | 13.5 | 10/10 | 9.37 | 20.2 | 13.9 | 13.2 |
| **Semivolatile Organic Compounds (µg/kg - ww)** | | | | | | | | | | | | | | | | | | | | |
| Bis(2-ethylhexyl)phthalate | 0/10 | -- | -- | 105 | 105 | 0/10 | -- | -- | 105 | 105 | 0/10 | -- | -- | 105 | 105 | 0/10 | -- | -- | 105 | 105 |

**Notes**

-- = not applicable, no detected values
FCA = fish collection area
SVOC = semivolatile organic compound
ww = wet weight

a - Mean and median calculations include detected and nondetected values. Nondetected values were set at one-half the detection limit.

**Table C-38**
**Summary Statistics for Metals and SVOCs in Whole Hardhead Catfish Tissue by FCA, Wet Weight**

| | FCA1 | | | | | FCA2 | | | | | FCA3 | | | | | Cedar Bayou | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] |
| Catfish - Whole | | | | | | | | | | | | | | | | | | | | |
| **Metals (mg/kg - ww)** | | | | | | | | | | | | | | | | | | | | |
| Arsenic | 3/3 | 0.359 | 0.464 | 0.405 | 0.392 | 4/4 | 0.380 | 0.421 | 0.404 | 0.408 | 3/3 | 0.362 | 0.785 | 0.530 | 0.442 | 8/8 | 0.273 | 0.462 | 0.355 | 0.341 |
| Cadmium | 3/3 | 0.00673 | 0.0133 | 0.00901 | 0.00705 | 3/4 | 0.00593 | 0.00963 | 0.00683 | 0.00695 | 2/3 | 0.00603 | 0.0122 | 0.00718 | 0.00603 | 8/8 | 0.00258 | 0.131 | 0.0206 | 0.00382 |
| Chromium | 3/3 | 0.232 | 0.702 | 0.429 | 0.353 | 4/4 | 0.188 | 0.674 | 0.405 | 0.379 | 3/3 | 0.442 | 2.36 | 1.23 | 0.886 | 2/8 | 0.148 | 2.32 | 0.375 | 0.0963 |
| Copper | 3/3 | 0.468 | 0.752 | 0.580 | 0.522 | 4/4 | 0.380 | 0.613 | 0.465 | 0.434 | 3/3 | 0.501 | 1.61 | 0.895 | 0.572 | 3/8 | 0.326 | 0.521 | 0.332 | 0.317 |
| Mercury | 3/3 | 0.0760 | 0.118 | 0.102 | 0.112 | 4/4 | 0.0423 | 0.137 | 0.0830 | 0.0764 | 3/3 | 0.0329 | 0.0868 | 0.0607 | 0.0626 | 8/8 | 0.0532 | 0.372 | 0.125 | 0.0961 |
| Nickel | 3/3 | 0.147 | 0.416 | 0.265 | 0.233 | 4/4 | 0.136 | 0.472 | 0.280 | 0.256 | 3/3 | 0.255 | 1.35 | 0.719 | 0.547 | 8/8 | 0.0679 | 0.796 | 0.239 | 0.150 |
| Zinc | 3/3 | 234 | 307 | 259 | 235 | 4/4 | 125 | 249 | 177 | 166 | 3/3 | 202 | 276 | 240 | 243 | 8/8 | 137 | 308 | 198 | 198 |
| **Semivolatile Organic Compounds (µg/kg - ww)** | | | | | | | | | | | | | | | | | | | | |
| Bis(2-ethylhexyl)phthalate | 2/3 | 308 | 383 | 541 | 383 | 2/4 | 214 | 278 | 380 | 246 | 0/3 | -- | -- | 927 | 929 | 0/8 | -- | -- | 816 | 918 |

**Notes**

-- = not applicable, no detected values
FCA = fish collection area
SVOC = semivolatile organic compound
ww = wet weight

a - Mean and median calculations include detected and nondetected values. Nondetected values were set at one-half the detection limit.

**Table C-39**
**Summary Statistics for Metals and SVOCs in Edible Clam Tissue by FCA, Wet Weight**

| | FCA1 | | | | | FCA2 | | | | | FCA3 | | | | | Background | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] |
| Clam - Edible | | | | | | | | | | | | | | | | | | | | |
| **Metals (mg/kg - ww)** | | | | | | | | | | | | | | | | | | | | |
| Arsenic | 5/5 | 0.419 | 0.522 | 0.455 | 0.451 | 15/15 | 0.406 | 0.741 | 0.546 | 0.547 | 5/5 | 0.487 | 0.604 | 0.527 | 0.506 | 10/10 | 0.389 | 0.576 | 0.491 | 0.511 |
| Cadmium | 5/5 | 0.0236 | 0.0284 | 0.0257 | 0.026 | 15/15 | 0.0216 | 0.0351 | 0.0274 | 0.0263 | 5/5 | 0.0212 | 0.0297 | 0.0248 | 0.0243 | 10/10 | 0.0093 | 0.0159 | 0.0127 | 0.0127 |
| Chromium | 5/5 | 0.09 | 0.29 | 0.174 | 0.17 | 15/15 | 0.11 | 0.295 | 0.166 | 0.145 | 5/5 | 0.14 | 0.22 | 0.164 | 0.16 | 10/10 | 0.09 | 0.24 | 0.14 | 0.125 |
| Copper | 5/5 | 1.66 | 1.84 | 1.74 | 1.74 | 15/15 | 1.6 | 4.8 | 2.81 | 2.21 | 5/5 | 2.86 | 3.37 | 3.02 | 2.98 | 10/10 | 1.03 | 1.87 | 1.46 | 1.44 |
| Mercury | 5/5 | 0.0066 | 0.0124 | 0.00942 | 0.0092 | 13/15 | 0.0042 | 0.0154 | 0.00957 | 0.0104 | 5/5 | 0.0106 | 0.0178 | 0.0127 | 0.012 | 10/10 | 0.0046 | 0.008 | 0.00617 | 0.00615 |
| Nickel | 5/5 | 1.41 | 1.87 | 1.64 | 1.74 | 15/15 | 0.768 | 1.6 | 1.18 | 1.24 | 5/5 | 0.867 | 1.34 | 1.14 | 1.25 | 10/10 | 0.717 | 1.39 | 1.19 | 1.22 |
| Zinc | 5/5 | 9.57 | 12.7 | 10.8 | 10.3 | 15/15 | 8.54 | 14 | 10.8 | 10.7 | 5/5 | 8.21 | 9.23 | 8.72 | 8.76 | 10/10 | 5.8 | 12 | 9.42 | 9.55 |
| **Semivolatile Organic Compounds (µg/kg - ww)** | | | | | | | | | | | | | | | | | | | | |
| Bis(2-ethylhexyl)phthalate | 0/5 | -- | -- | 105 | 105 | 0/15 | -- | -- | 105 | 105 | 0/5 | -- | -- | 105 | 105 | 0/10 | -- | -- | 105 | 105 |

**Notes**

-- = not applicable, no detected values
FCA = fish collection area
SVOC = semivolatile organic compound
ww = wet weight

a - Mean and median calculations include detected and nondetected values. Nondetected values were set at one-half the detection limit.

**Table C-40**
**Summary Statistics for Metals and SVOCs in Whole Gulf Killifish Tissue by FCA, Wet Weight**

| | FCA1 | | | | | FCA2 | | | | | FCA3 | | | | | Background | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] | Detection Frequency | Minimum Detected Value | Maximum Detected Value | Mean [a] | Median [a] |
| Gulf Killifish - Whole | | | | | | | | | | | | | | | | | | | | |
| **Metals (mg/kg - ww)** | | | | | | | | | | | | | | | | | | | | |
| Arsenic | 2/2 | 0.222 | 0.234 | 0.228 | 0.228 | 6/6 | 0.176 | 0.24 | 0.205 | 0.202 | 2/2 | 0.164 | 0.175 | 0.17 | 0.17 | 8/8 | 0.182 | 0.215 | 0.198 | 0.197 |
| Cadmium | 0/2 | -- | -- | 0.00225 | 0.00225 | 1/6 | 0.00275 | 0.00275 | 0.00222 | 0.0023 | 0/2 | -- | -- | 0.00158 | 0.00158 | 1/8 | 0.0089 | 0.0089 | 0.00239 | 0.00153 |
| Chromium | 2/2 | 0.22 | 0.33 | 0.275 | 0.275 | 6/6 | 0.22 | 0.61 | 0.359 | 0.305 | 2/2 | 0.22 | 0.84 | 0.53 | 0.53 | 8/8 | 0.19 | 0.45 | 0.291 | 0.29 |
| Copper | 2/2 | 1.25 | 1.35 | 1.3 | 1.3 | 6/6 | 0.973 | 1.81 | 1.4 | 1.4 | 2/2 | 1.43 | 1.53 | 1.48 | 1.48 | 8/8 | 0.894 | 1.5 | 1.24 | 1.32 |
| Mercury | 2/2 | 0.0231 | 0.0328 | 0.028 | 0.028 | 6/6 | 0.0221 | 0.09 | 0.0501 | 0.0384 | 2/2 | 0.0568 | 0.0762 | 0.0665 | 0.0665 | 8/8 | 0.0225 | 0.0694 | 0.0393 | 0.0314 |
| Nickel | 2/2 | 0.37 | 0.386 | 0.378 | 0.378 | 6/6 | 0.385 | 0.492 | 0.439 | 0.44 | 2/2 | 0.494 | 0.813 | 0.654 | 0.654 | 8/8 | 0.41 | 0.55 | 0.485 | 0.506 |
| Zinc | 2/2 | 38.8 | 41.8 | 40.3 | 40.3 | 6/6 | 40.1 | 43.9 | 41.6 | 41.4 | 2/2 | 44.8 | 46.7 | 45.8 | 45.8 | 8/8 | 35.8 | 43.6 | 41.1 | 41.5 |
| **Semivolatile Organic Compounds (µg/kg - ww)** | | | | | | | | | | | | | | | | | | | | |
| Bis(2-ethylhexyl)phthalate | 0/2 | -- | -- | 105 | 105 | 0/6 | -- | -- | 105 | 105 | 0/2 | -- | -- | 105 | 105 | 0/8 | -- | -- | 105 | 105 |

**Notes**

-- = not applicable, no detected values
FCA = fish collection area
SVOC = semivolatile organic compound
ww = wet weight

a - Mean and median calculations include detected and nondetected values. Nondetected values were set at one-half the detection limit.

# APPENDIX D

# DRAFT BASELINE ECOLOGICAL RISK ASSESSMENT FOR THE PENINSULA SOUTH OF I-10

# SAN JACINTO RIVER WASTE PITS SUPERFUND SITE

# TABLE OF CONTENTS


1 INTRODUCTION ..... D1-1
1.1 Purpose ..... D1-2
1.2 Document Organization ..... D1-2
2 BACKGROUND INFORMATION ..... D2-1
2.1 Environmental Setting and General Conceptual Site Models ..... D2-1
2.2 Baseline Risk Assessment Datasets and Data Treatment Rules ..... D2-2
2.2.1 Baseline Dataset ..... D2-2
2.2.2 Data Treatment Rules ..... D2-3
2.2.3 TEQ Nomenclature ..... D2-6
3 PROBLEM FORMULATION ..... D3-1
3.1 Chemicals of Potential Ecological Concern ..... D3-1
3.1.1 Identification of COIs for Soil Investigation Area 4 ..... D3-2
3.1.2 Identification of COPCEs ..... D3-3
3.1.3 Screening of VOCs in Soils ..... D3-4
3.2 Overview of Ecological Effects ..... D3-5
3.3 Fate and Transport of Chemicals of Potential Ecological Concern ..... D3-6
3.4 Ecosystems Potentially at Risk ..... D3-7
3.5 Ecological Receptors and Receptor Surrogates ..... D3-8
3.6 Assessment Endpoints ..... D3-9
3.7 Ecological Conceptual Site Model ..... D3-10
3.8 Ecological Risk Analysis Plan ..... D3-10
3.8.1 Ecological Risk Assessment Approach ..... D3-11
3.8.2 Exposure Assessment ..... D3-12
3.8.2.1 Measures of Exposure ..... D3-12
3.8.2.2 Exposure Units and EPCs ..... D3-13
3.8.2.3 Exposure Algorithms ..... D3-13
3.8.2.4 Exposure Assumptions ..... D3-14
3.8.3 Effects Assessment ..... D3-14
3.8.4 Risk Characterization and Uncertainty Analysis ..... D3-15
3.8.4.1 Calculation of Hazard Quotients ..... D3-15
3.8.4.2 Probabilistic Risk Evaluation ..... D3-17

3.8.4.3 Risks to Receptor Populations ..... D3-17
3.8.4.4 Comparison of Risks to Background ..... D3-17

**4 EXPOSURE ASSESSMENT ..... D4-1**
4.1 Exposure of Reptiles, Mammals and Birds ..... D4-1
4.1.1 Wildlife Exposure Model: Ingestion ..... D4-1
4.1.1.1 Ingestion of Multiple Prey Types ..... D4-2
4.1.1.2 Relative Bioavailability Adjustment Factor ..... D4-3
4.1.1.3 Unit Conversions ..... D4-4
4.1.1.4 Estimating Concentrations of COPCEs in Foods of Wildlife ..... D4-4
4.1.1.5 Wildlife Exposure Units ..... D4-10
4.1.1.6 Calculation of Exposure Point Concentrations ..... D4-11
4.1.1.7 Data Used ..... D4-12
4.1.1.8 Results ..... D4-12
4.1.2 Probabilistic Exposure Assessment ..... D4-12
4.1.2.1 Parameters to be Estimated in a Probabilistic Analysis ..... D4-13
4.1.2.2 Derivation of Parameter Distributions ..... D4-14

**5 EFFECTS CHARACTERIZATION ..... D5-1**
5.1 Types of Toxicity Information Used ..... D5-1
5.2 Methods Used for Aggregation of Toxicity Data ..... D5-2
5.3 Reptiles ..... D5-3
5.4 Birds and Mammals ..... D5-4
5.4.1 Overview of Available Information ..... D5-4
5.4.2 HPAH TRVs for Birds ..... D5-5
5.4.3 HPAH TRVs for Mammals ..... D5-6

**6 RISK CHARACTERIZATION ..... D6-1**
6.1 Overview of Risk Characterization ..... D6-1
6.2 Risks to Birds ..... D6-2
6.2.1 Cadmium ..... D6-2
6.2.2 Chromium ..... D6-3
6.2.3 Copper ..... D6-4
6.2.4 Lead ..... D6-5
6.2.5 Zinc ..... D6-6

6.2.6 HPAH ..... D6-7
6.2.7 Probability that Exposure Exceeds Effects Thresholds ..... D6-7
6.2.8 Risks to Birds in Background Areas ..... D6-8
6.2.9 Summary: Lines of Evidence for Birds ..... D6-9
6.3 Risks to Mammals ..... D6-10
6.3.1 Estimated Daily Ingestion Rates Relative to TRVs ..... D6-10
6.3.2 Probability that Exposure Exceeds Effects Thresholds ..... D6-11
6.3.3 Risks to Mammals in Background Areas ..... D6-11
6.3.4 Summary: Lines of Evidence for Mammals ..... D6-11
6.4 Risks to Reptiles ..... D6-11

**7 UNCERTAINTY ANALYSIS ..... D7-1**
7.1 Data Gaps and Data Limitations ..... D7-1
7.1.1 Tissue Chemistry for Plants and Terrestrial Invertebrates ..... D7-1
7.1.2 Sample Numbers and Locations ..... D7-2
7.1.3 Methodology to Calculate Total PCB EPCs ..... D7-2
7.2 Model Uncertainty ..... D7-3
7.2.1 Prediction Using Regression Models ..... D7-3
7.2.1.1 Soil-to-Invertebrate Tissue Models for Dioxins and Furans and PCBs ..... D7-4
7.2.2 RM Exposure and the Risk Profile ..... D7-4
7.2.3 Wildlife Exposure Model ..... D7-5
7.3 Use of Probabilistic Exposure Models ..... D7-6
7.4 Toxicity Information ..... D7-6
7.4.1 Use of Uncertainty Factors for Deriving TRVs ..... D7-7
7.4.2 Toxicity of Mixtures ..... D7-7
7.4.3 Toxicity to Reptiles ..... D7-8
7.5 Summary of Uncertainties ..... D7-8

**8 SUMMARY OF ECOLOGICAL RISKS AND RISK CONCLUSIONS ..... D8-1**
8.1 Characterization of Risks to Terrestrial Birds ..... D8-1
8.2 Characterization of Risks to Mammals ..... D8-2
8.3 Characterization of Risks to Reptiles ..... D8-2
8.4 Ecological Risk Assessment Conclusions ..... D8-2

**9 REFERENCES ..... D9-1**

## List of Tables


Table D-1 Toxicity Equivalency Factors for Dioxins and Furans and Dioxin-Like PCBs

Table D-2 Chemicals of Potential Ecological Concern for the Area of Investigation South of I-10

Table D-3 COI Detection Frequency in All Soil Samples from Soil Investigation Area 4 Soil and Adjacent Sampled Areas

Table D-4 $COI_{SI}$ Detection Frequency in Soil Samples from Soil Investigation Area 4, 0- to 6-Inch Depth Interval

Table D-5 $COI_{SI}$ Detection Frequency in Soil Samples from Soil Investigation Area 4, 0- to 24-Inch Depth Interval

Table D-6 Ecological Risk Screening Levels for Soils

Table D-7 Comparison to Ecological Risk-Based Screening Levels, 0- to 6-Inch Depth Interval

Table D-8 Comparison to Ecological Risk-Based Screening Levels, 0- to 24-Inch Depth Interval

Table D-9 $COPC_E$ Determination, 0- to 6-Inch Depth Interval

Table D-10 $COPC_E$ Determination, 0- to 24-Inch Depth Interval

Table D-11 Comparison of Volatile Organic Compound Concentrations in Soils with Ecological Risk-Based Screening Concentrations

Table D-12 Summary of Ecological Receptor Surrogates

Table D-13 Summary of Assessment Endpoints and Risk Questions for the BERA

Table D-14 Life History Parameters for Wildlife Receptors Used for the Ingestion-Based Exposure Model

Table D-15 Summary of Lines of Evidence for Each Receptor and Assessment Endpoint

Table D-16 Assumptions for Parameterizing the Wildlife Exposure Model

Table D-17 Relative Bioavailability Adjustment Factors for TCDD in Soil and Food Ingested by Birds

Table D-18 Bioaccumulation Relationships for Soil-to-Invertebrate and Soil-to-Plant Tissue

Table D-19 Regression Equations Used to Estimate Dioxin and Furan Congener Concentrations in Terrestrial Invertebrate Tissue from Soils
Table D-20 Area Use Factors Used to Evaluate Exposure of Wildlife Receptors
Table D-21 Estimated Daily Ingestion Rates of COPCEs for Upland Wildlife Receptors
Table D-22 Parameter Distributions Used for Probabilistic Exposure and Risk Assessment for Wildlife Receptors
Table D-23 Toxicity Reference Values for Birds
Table D-24 Toxicity Reference Values for Mammals
Table D-25 Hazard Quotients for Bird and Mammal Receptors
Table D-26 Hazard Quotients for Killdeer in the Area of Investigation South of I-10 and in Background Areas

## List of Figures

Figure D-1 Overview of Soil Investigation Area 4
Figure D-2 Conceptual Site Model Pathways for the Southern Impoundment
Figure D-3 Screening Process for Soil Investigation Area 4 Soils
Figure D-4 Conceptual Site Model for Ecological Exposures: Exposure Details for Receptor Feeding Guilds and Habitat Associations
Figure D-5 Box Plots of Dioxin and Furan Congener Concentrations in Cass Lake and Soil Investigation Area 4 and Adjacent Surface Soils
Figure D-6 Concentrations of 2,3,7,8-TCDF and Three Other Congeners Evaluated as Correlates for Estimating Tissue Concentrations from Soil Investigation Area 4 Soil Data
Figure D-7 Exposure Area and Samples Used for Estimating Exposures to Killdeer, Virginia Opossum, Pocket Gopher and Common Garter Snake
Figure D-8 Probability Distribution of Cadmium Hazard Quotients for Killdeer
Figure D-9 Probability Distribution of Chromium Hazard Quotients for Killdeer
Figure D-10 Probability Distribution of Copper Hazard Quotients for Killdeer
Figure D-11 Probability Distribution of Lead Hazard Quotients for Killdeer
Figure D-12 Probability Distribution of Zinc Hazard Quotients for Killdeer

## List of Attachments

Attachment A Exposure Point Concentrations Used for Exposure Assessment
Attachment B Methodology for Assessing Inhalation of Volatile Organic Compounds by Burrowing Mammals– Soil Investigation Area 4

## LIST OF ACRONYMS AND ABBREVIATIONS

| Abbreviation | Definition |
|---|---|
| 95UCL | 95 percent upper confidence limit on the mean |
| BAF | bioaccumulation factor |
| BEHP | bis(2-ethylhexyl)phthalate |
| BERA | baseline ecological risk assessment |
| bw | body weight |
| CERCLA | Comprehensive Environmental Response, Compensation and Liability Act of 1980 |
| COI | chemical of interest |
| $COI_{SI}$ | COI for Soil Investigation Area 4 |
| COPC | chemical of potential concern |
| $COPC_E$ | chemical of potential ecological concern |
| CSM | conceptual site model |
| CT | central tendency |
| DMP | data management plan |
| DQO | data quality objective |
| dw | dry weight |
| EcoSSL | ecological soil screening level |
| EPC | exposure point concentration |
| ESL | ecological screening level |
| HPAH | high molecular weight PAH |
| HQ | hazard quotient |
| $HQ_L$ | HQ calculated using a lowest-observed-adverse-effects level |
| $HQ_N$ | HQ calculated using a no-observed-adverse-effects level |
| I-10 | Interstate Highway 10 |
| IPC | International Paper Company |
| $K_{ow}$ | octanol–water partition coefficient |
| LOAEL | lowest-observed-adverse-effect level |
| LPAH | low molecular weight PAH |
| MIMC | McGinnes Industrial Maintenance Corporation |
| NOAEL | no-observed-adverse-effects level |

| Abbreviation | Definition |
|---|---|
| OCDD | octachlorinated dibenzo-*p*-dioxin |
| PAH | polycyclic aromatic hydrocarbon |
| PCB | polychlorinated biphenyl |
| PCDD | polychlorinated dibenzo-*p*-dioxin |
| PCDF | polychlorinated dibenzofuran |
| PSCR | Preliminary Site Characterization Report |
| RBA | relative bioavailability adjustment |
| RI/FS | Remedial Investigation and Feasibility Study |
| RM | reasonable maximum |
| RMin | reasonable minimum |
| SAP | sampling and analysis plan |
| Site | San Jacinto River Waste Pits site in Harris County, Texas |
| SLERA | Screening Level Ecological Risk Assessment |
| SVOC | semivolatile organic compound |
| TCDD | tetrachlorinated dibenzo-*p*-dioxin |
| TCDF | tetrachlorinated dibenzofuran |
| TCEQ | Texas Commission on Environmental Quality |
| TEF | toxicity equivalency factor |
| TEQ | toxicity equivalent |
| $TEQ_{DF}$ | TEQ concentrations calculated using only dioxins and furans |
| $TEQ_{DF,B}$ | TEQ concentration calculated for dioxin and furan congeners using avian toxicity equivalency factors |
| $TEQ_{DF,M}$ | TEQ concentration calculated for dioxin and furan congeners using mammalian toxicity equivalency factors |
| $TEQ_{DFP}$ | TEQ concentrations calculated using dioxins and furans and dioxin-like PCBs |
| $TEQ_{DFP,B}$ | TEQ concentration calculated for dioxins and furans and dioxin-like PCB congeners using avian toxicity equivalency factors |
| $TEQ_{DFP,M}$ | TEQ concentration calculated for dioxin and furan and dioxin-like PCB congeners using mammalian toxicity equivalency factors |
| $TEQ_{P}$ | TEQ concentrations calculated using only dioxin-like PCBs |

| Abbreviation | Definition |
|---|---|
| $TEQ_{P,B}$ | TEQ concentration calculated for dioxin-like PCB congeners using avian toxicity equivalency factors |
| $TEQ_{P,M}$ | TEQ concentration calculated for dioxin-like PCB congeners using mammalian toxicity equivalency factors |
| TRV | toxicity reference value |
| UAO | Unilateral Administrative Order |
| UCL | upper confidence limit on the mean |
| USEPA | U.S. Environmental Protection Agency |
| VOC | volatile organic compound |
| ww | wet weight |

# 1 INTRODUCTION

This draft baseline ecological risk assessment (BERA), conducted using data for soils collected from the western half of the peninsula south of Interstate Highway 10 (I-10) at the San Jacinto River Waste Pits site (the Site), was prepared on behalf of International Paper Company (IPC) in fulfillment of the Unilateral Administrative Order (UAO), Docket No. 06-03-10, issued by the U.S. Environmental Protection Agency (USEPA) on November 20, 2009 (USEPA 2009). The UAO directs IPC and McGinnes Industrial Maintenance Corporation (MIMC) to perform a Remedial Investigation and Feasibility Study (RI/FS) that includes a BERA.

The remedial investigation (RI) addresses the area within the "preliminary perimeter" identified in the UAO (USEPA's Preliminary Site Perimeter). For purposes of the RI, impoundments north of Interstate Highway 10 (I-10), the surrounding upland area, and the aquatic environment are addressed separately from the area of investigation on the peninsula south of I-10, where USEPA has identified a possible southern impoundment. A final BERA for the area north of I-10 and aquatic environment was submitted on August 22, 2012 (Integral 2012b). This document fulfills the UAO requirement for a BERA that addresses chemicals in soils and any related ecological risks in the area of investigation south of I-10. It builds on the conceptual site models (CSMs) for the southern impoundment described in the Preliminary Site Characterization Report (PSCR) (Integral and Anchor QEA 2012).

In March 2011, an initial set of soil samples was collected from within an area on the peninsula south of I-10 identified as Soil Investigation Area 4 (Figure D-1) and analyzed for chemicals of interest (COIs.)[1] The resulting data were used to perform a screening level ecological risk assessment (SLERA) for Soil Investigation Area 4, presented as Appendix E to the BERA for the area north of I-10 and aquatic environment (Integral 2012b). Subsequently, USEPA required that additional studies be conducted in and adjoining Soil Investigation Area 4. Additional sampling then took place in May 2012.

[1] COIs in paper mill wastes within the northern impoundments were determined on the basis of an analysis of data developed prior to issuance of the UAO, and a review of the literature. The process for selection of COIs is presented in Section 1 of the Sediment SAP (Integral and Anchor QEA 2010).

This document uses information collected in 2011 and the additional samples collected in 2012 to perform the BERA for the area of investigation on the peninsula south of I-10, which includes Soil Investigation Area 4 and adjacent sampled areas to the south and to the west. The SLERA for Soil Investigation Area 4 presents the problem formulation and includes the selection of receptors and assessment endpoints, analysis of the soil data collected in 2011, and identification of chemicals of potential ecological concern (COPCEs) for ecological receptors that may use the area of investigation south of I-10. The present document updates the SLERA for Soil Investigation Area 4 to identify final COPCEs, using the additional data collected in 2012 and thereby completes the baseline ecological risk evaluation required by the UAO.

## 1.1 Purpose

The Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) guidance requires that remedies at contaminated sites be protective of human health and the environment (USEPA 1988). The baseline risk assessments evaluate potential threats to human health and the environment in the absence of any remedial action, help determine whether remedial action is needed, and serve as the basis for the evaluation of the effectiveness of any subsequent remedial action. Ecological risk assessment addresses the likelihood that adverse effects on the environment, and to specific ecological receptors, may occur or are occurring as a result of exposure to one or more stressors (USEPA 1997).

The purpose of this BERA is to determine the nature and magnitude of risks to ecological receptors that result from any COPCEs that may be present in soils of the area of investigation south of I-10. Results of the baseline risk assessments support risk managers by providing a point of reference for evaluation of the no-action alternative in the feasibility study, and for quantification of risk reduction that can be achieved by each remedial alternative considered in the feasibility study.

## 1.2 Document Organization

The approaches and methodologies presented in this BERA are consistent with USEPA guidance for conducting ecological risk assessments (USEPA 1997, 1998), and with data quality objectives (DQOs) and related statements and information presented in the sampling

and analysis plans (SAPs) for sediment (Integral and Anchor QEA 2010), tissue (Integral 2010c), and soil (Integral 2010a), and in the RI/FS Work Plan (Anchor QEA and Integral 2010). The document is organized according to specifications in the *Guidelines for Ecological Risk Assessment* (USEPA 1998), and includes the following sections:

- Section 2 – Background Information
- Section 3 – Problem Formulation
- Section 4 – Exposure Assessment
- Section 5 – Effects Characterization
- Section 6 – Risk Characterization
- Section 7 – Uncertainty Analysis
- Section 8 – Summary of Ecological Risks and Risk Conclusions
- Section 9 – References.

This appendix to the RI Report also includes two Attachments:

- Attachment A – Exposure Point Concentrations Used for Exposure Assessment
- Attachment B – Methodology for Assessing Inhalation of Volatile Organic Compounds by Burrowing Mammals– Soil Investigation Area 4.

# 2 BACKGROUND INFORMATION

This BERA is presented to USEPA following completion of several studies and documents and provides a key component of the analyses required for the RI Report. Relevant background information on the environmental setting, CSMs, and information supporting determination of the baseline dataset is described in the body of the main RI Report. This section briefly reviews information relevant to the BERA that has been presented in earlier, approved documents. The problem formulation is presented in Section 3.

## 2.1 Environmental Setting and General Conceptual Site Models

The environmental setting was described in the RI/FS Work Plan (Anchor QEA and Integral 2010) and later updated in the PSCR (Integral and Anchor QEA 2012), as well as in the main RI Report. These descriptions provide details of topography, hydrology, hydrogeology, and hydrodynamic environment within USEPA's Preliminary Site Perimeter. The Chemical Fate and Transport Modeling Study (Anchor QEA 2012) provides additional detail on the hydrodynamics and sediment physical environment, as well the fate of 2,3,7,8-tetrachlorinated dibenzo-*p*-dioxin (TCDD), 2,3,7,8-tetrachlorinated dibenzofuran (TCDF), and octachlorinated dibenzo-*p*-dioxin (OCDD).

Also described in the RI Report are two CSMs that provide the basis for the ecological exposure and risk analyses. These most recent iterations of the CSMs form the conceptual framework of chemical transport and exposure pathways that could lead to exposure of ecological receptors. Existing CSMs recognize a distinction between the northern impoundments and aquatic environment, and the southern impoundment. Although the precise location of the southern impoundment is uncertain, a CSM for the "southern impoundment" is intended to describe the potential chemical sources, potential release mechanisms and transport pathways, and potential receptors associated with the "southern impoundment," regardless of its specific location. For the purposes of this document, an impoundment may be present south of I–10, on the peninsula of land south of I-10 and within USEPA's Preliminary Site Perimeter (Figure D-1). Portions of the peninsula are believed to have been used in the 1960s as a disposal area for paper mill waste similar to that disposed of in the impoundments north of I-10. Currently available information about the impoundment south of I-10 described in the RI Report indicates that wastes other than those

originating from the Champion Paper Inc. paper mill were also deposited there, but the specific origins of the other waste and debris in that area are unknown. The CSM for the southern impoundment primarily addresses the terrestrial environment (Figure D-2).

The problem formulation (Section 3) integrates available information to describe specific pathways and exposure routes of interest to ecological receptors that may use the area of investigation south of I-10. The CSM describing ecological exposures, and from which the analysis steps in this BERA are determined, are detailed in Section 3.8.

## 2.2 Baseline Risk Assessment Datasets and Data Treatment Rules

Determination of an appropriate baseline dataset, which was used to describe the current conditions, is a key step of the RI/FS process. Once the appropriate data are identified, calculations are performed using a specified set of data treatment rules.

### *2.2.1 Baseline Dataset*

The RI/FS Work Plan describes the rationale for selection of data to be used in the baseline risk assessments. Data to be used in the baseline risk assessments should be of known quality, which includes only Category 1 data (as described in Section 3 of the RI/FS Work Plan) and should reflect the current pre-remediation condition.

Both data related to Soil Investigation Area 4and background areas are used in this ecological risk assessment. Analysis of background information allows for consideration of potential background risk, which is relevant to both risk assessment and evaluation of remedial alternatives. Background conditions provide the basis for understanding the incremental risks due to the conditions in Soil Investigation Area 4 and adjacent soils sampled for the RI. Such context informs risk management by ensuring that remedial actions will result in reduction of exposure and risk originating from sources within USEPA's Preliminary Site Perimeter. The baseline dataset used for this BERA consists of soil data collected from Soil Investigation Area 4 in 2011 and 2012[2] for the RI/FS.

[2] Sampling conducted in 2012 was conducted according to specifications of Soil SAP Addendum 3 (Integral 2012a), Sediment SAP Addendum 2 (Integral 2011b), and Groundwater SAP Addendum 1 (Anchor QEA 2011).

Only baseline data for soils south of I-10 are used in this document; risks associated with sediments and the aquatic environment are addressed in the BERA for the area north of I-10 and aquatic environment.

The background soils dataset developed for the RI consists of background soil samples (0- to 6-inch and 6- to 12-inch depth intervals) from 10 locations in Burnet Park and from 10 locations in the I-10 Beltway 8 East Green Space (see Figures 2-16 and 2-17, respectively, of the RI Report to which this BERA is an appendix).

The ecological risk assessment uses different data types and uses data differently than does the human health risk assessment. The baseline dataset described above is comprehensive.

### *2.2.2 Data Treatment Rules*

RI/FS data are managed according to the project Data Management Plan (DMP), which is provided as Appendix A to the RI/FS Work Plan (Anchor QEA and Integral 2010). Section 6.5 of the DMP also describes data averaging rules such as the averaging of results for replicates and treatment of qualified data. Data accessed for analyses in this BERA were prepared according to those rules. For performance of various analyses in this BERA, general data treatment rules are as follows:

- Nondetects were estimated at one-half the detection limit for use in all calculations, unless otherwise specified.
- 2,3,7,8-TCDD toxicity equivalent (TEQ) concentrations were calculated using the toxicity equivalency factors (TEFs) most appropriate for the receptor being analyzed. These are discussed further in Section 3.2.
- TEQ concentrations in samples for which one or more dioxin and furan congeners were not detected were calculated using nondetects equal to one-half the detection limit.
- TEQ concentrations for polychlorinated biphenyl (PCB) congeners for which one or more PCB congeners was not detected were calculated using nondetects equal to one-half the detection limit. If one or more congener concentration was estimated in calculation of a TEQ concentration, the TEQ is reported as estimated (J-qualified) in

the database. If all congeners were not detected in a sample, the TEQ is reported as not detected (U–qualified).

- Any nondetects for a given analyte and medium that were higher than the maximum detected concentration for the same analyte and medium were considered "high-biasing nondetects," and were removed prior to use of the dataset in the BERA, following USEPA (1989) guidance.

In the calculation of exposure point concentrations (EPCs) and in statistical evaluations of the datasets (e.g., characterization of data distributions), specific rules were applied for estimating values for the censored data. Procedures for substituting values for censored data varied, depending on the sample size and the detection frequency, as follows.

For each dataset used in calculation of an EPC or in evaluating the data distribution, the detection frequency was calculated as the percentage of values flagged with a "U" qualifier (not detected).

- Nondetects in datasets with sample sizes equal to or greater than 10 and detection frequencies equal to or greater than 50 percent were set to one-half the detection limit and included in all calculations.
- Datasets with sample sizes equal to or greater than 10 and detection frequencies between 20 and 50 percent were addressed using statistical substitution methods. The substitution method used depends on the distribution of the dataset. For normally or lognormally distributed data, upper confidence limits on the mean (UCLs) were estimated using robust regression on order statistics (Helsel 2005); for datasets with unknown data distributions (those that could not be defined as normal or lognormal), a nonparametric Kaplan Meier approach for imputing nondetects was used (Helsel 2005; Singh et al. 2006).
- Nondetects in datasets with sample sizes less than 10, regardless of detection frequency, or in datasets with detection frequencies less than 20 percent, regardless of sample size, were not subject to statistically derived substitutions. This treatment was applied because the pool from which information about the data distribution can be drawn is insufficient for robust substitution methods. These datasets were treated with nondetects substituted at one-half the detection limit.

PCBs in soils sampled for the RI are reported in various ways. In background soils, PCBs were measured only as Aroclors. In soil samples from Soil Investigation Area 4 analyzed for PCBs, either PCB congener or Aroclor data are reported. For samples in which all 209 PCB congeners were analyzed, total PCBs is calculated as the sum of 43 congeners commonly detected in environmental samples. This method of calculating total PCBs was used at the request of USEPA (see comment 6 in Appendix C of the Tissue SAP [Integral 2010c]). For samples analyzed only for Aroclors, total PCBs was calculated as the sum of detected Aroclors. When no Aroclors were detected, total PCBs was calculated as one-half the highest Aroclor detection limit. Data treatment rules for calculation of aggregate variables for PCBs (total PCBs and $TEQ_{P,M}$) using PCB congener data are consistent with those laid out above.

Finally, polycyclic aromatic hydrocarbon (PAH) compounds are not addressed individually for ecological receptors. PAHs analyzed in a subset of Soil Investigation Area 4 samples were sorted into low molecular weight PAHs (LPAHs) and high molecular weight PAHs (HPAHs) for screening, as follows:

- LPAHs
  - Acenaphthene
  - Acenaphthylene
  - Anthracene
  - Fluorene
  - 2-Methylnaphthalene
  - Naphthalene
  - Phenanthrene
- HPAHs
  - Benzo(a)anthracene
  - Benzo(a)pyrene
  - Benzo(b)fluoranthene
  - Benzo(g,h,i)perylene
  - Benzo(k)fluoranthene
  - Chrysene
  - Dibenzo(a,h)anthracene

- Fluoranthene
- Indeno(1,2,3-cd)pyrene
- Pyrene.

LPAHs are those PAHs with three or fewer rings, while the HPAHs are those with four or more rings (USEPA 2007f).

### *2.2.3 TEQ Nomenclature*

The approach used in this document to address risks to ecological receptors exposed to dioxins and furans and dioxin-like PCBs is consistent with USEPA's (2008a) *Framework for Application of the Toxicity Equivalence Methodology for Polychlorinated Dioxins, Furans, and Biphenyls in Ecological Risk Assessment*, and uses the recommended TEFs (Table D-1). TEQ concentrations were calculated and presented in several different ways for ecological risk assessment. To simplify presentation of these concepts, the term "TEQ" is qualified using subscripts to indicate the congeners included in its calculation and the TEF scheme applied:

- TEQ concentrations calculated using only dioxins and furans are referred to as $TEQ_{DF}$.
- TEQ concentrations calculated using only dioxin-like PCBs are referred to as $TEQ_{P}$.
- TEQ concentrations calculated using dioxins and furans and dioxin-like PCBs are referred to as $TEQ_{DFP}$.

To specify the TEF scheme used, an additional subscript is applied: "M" for the use of TEFs for mammals and "B" for the use of TEFs for birds. For example, using this notation scheme, the term "$TEQ_{DFP,B}$" indicates a TEQ calculated for dioxins and furans and dioxin-like PCBs using TEFs for birds. If the term "TEQ" is used with no subscript notation, it is to reference a general concept and not a specific concentration. TEFs for birds are taken from Van den Berg et al. (1998); TEFs for mammals are taken from Van den Berg et al. (2006).

# 3 PROBLEM FORMULATION

This section presents information on the selection of COPCEs, the environmental setting of Soil Investigation Area 4, chemical fate and transport mechanisms relevant to developing the CSM, receptors potentially present in Soil Investigation Area 4, and the surrogates to be used for risk assessment. This section also defines the assessment endpoints for this baseline risk analysis. A detailed discussion of the toxicity of dioxins and furans is provided in the BERA for the area north of I-10 and aquatic environment (Integral 2012b). The resulting CSM synthesizes pathways and mechanisms of exposure and effects that may result in risks to ecological receptors from exposures to COPCEs. The CSM presented in the PSCR (Integral and Anchor QEA 2012) has been refined as a result of this problem formulation to better reflect exposures and risks evaluated herein.

## 3.1 Chemicals of Potential Ecological Concern

A preliminary evaluation of COPCEs based on samples collected through 2011 was presented in the SLERA for the Soil Investigation Area 4 (see Appendix E of Integral 2012b). The results of the preliminary SLERA screening were that six metals, bis(2-ethylhexyl)phthalate (BEHP), PCBs, and dioxins and furans were considered COPCEs for evaluation in this BERA (Table E-8, Appendix E of Integral 2012b). Because additional soil sampling was conducted in May 2012 after the SLERA analysis was prepared, reassessment of the COPCEs is required. For the 2012 soil samples, USEPA required analysis for volatile organic compounds (VOCs) and semivolatile organic compounds (SVOCs), in addition to analysis for COPCs identified in the COPC Technical Memorandum (COPC Tech Memo; Integral 2011a). Soil samples were also analyzed for PCB congeners, as required by USEPA.

In this section, a complete set of chemistry data for soils collected from Soil Investigation Area 4 and adjacent sampled areas in 2011 and in 2012 is evaluated, first to identify COIs and then to select COPCEs from the COI list. Among the soil analytes, VOCs required a screening approach not previously used for the RI, because pathways of exposure to ecological receptors (volatilization from soils) and the exposure route for VOCs (inhalation) are unique for that class of chemicals.

Groundwater quality did not factor into the selection of COIs for the ecological risk evaluation for Soil Investigation Area 4 because there is no pathway by which ecological receptors can be exposed to chemicals in groundwater. Exposure to COPCES in sediment is addressed by the BERA for the area north of I-10 and aquatic environment (Integral 2012b); for this reason, the sediment data generated in 2012 are also not addressed in this document.

A summary of the final COPCES for Soil Investigation Area 4 is given in Table D-2. Exposure of terrestrial mammals, reptiles, and birds to COPCES identified in this section, and related risk evaluations, are addressed in detail in Sections 4 through 8.

### *3.1.1 Identification of COIs for Soil Investigation Area 4*

COIs potentially associated with paper mill wastes, and therefore applicable to both the northern and southern impoundments, were identified in the Sediment SAP (Integral and Anchor QEA 2010), as described in Section 2.1 of the RI Report.[3] COPCs were later identified on the basis of an analysis of sediment data collected for the RI in 2010, as described in the COPC Tech Memo (Integral 2011a). This section describes how the complete soils dataset for Soil Investigation Area 4 was used to identify any additional COPCES specific to that area. The process used in making these decisions is summarized in Figure D-3.

Initially, the detection frequency (percent) was calculated for each chemical analyzed in all soil samples (surface and subsurface soils) from Soil Investigation Area 4 (Table D-3). Those chemicals detected in 5 percent or less of soil samples are not considered COIs for Soil Investigation Area 4 (COISIS). Those detected in more than 5 percent of samples underwent additional evaluation, as described below.

The detection frequencies of chemicals detected in more than 5 percent of all soil samples from Soil Area Investigation 4 were further evaluated at different soil depths:

[3] As addressed in the RI Report, the fact that certain chemicals, such as PCBs, may be associated with paper mill wastes does not mean that the specific PCBs that may be detected in areas in which paper mill waste is deposited would necessarily be associated with such wastes.

- Birds and omnivorous mammals are expected to encounter soils in only the top 6 inches. The detection frequency for each COI in soil samples from the 0- to 6-inch depth interval is listed in Table D-4.
- Burrowing herbivorous mammals could use the top 2 feet of soil. The detection frequency for each COI in soil samples from the 0- to 24-inch depth interval is listed in Table D-5.

For both depth intervals, COIsis are defined as those chemicals detected in more than 5 percent of samples (Tables D-4 and D-5). Those chemicals considered COIsis were further evaluated to determine if they should be considered COPCEs for the area of investigation on the peninsula south of I-10.

### 3.1.2 Identification of COPCEs

The maximum detected concentration[4] of those chemicals identified as COIsis were first compared to soil benchmarks derived for the protection of birds[5] and mammals, if available. For those chemicals lacking pre-existing benchmarks, concentrations were compared to median background concentrations calculated using background data for this RI, if available, or to Texas median background concentrations, if available. This approach is consistent with Texas Commission on Environmental Quality (TCEQ) (2006) guidance, which states that "if the concentration of a COC…is at or below the median Texas background or an approved site-specific background, the benchmark value can be ignored." Soil benchmark and background values are shown in Table D-6. Comparisons of COIsis in the top 6 inches and the top 2 feet to benchmark criteria and soil background values are provided in Table D-7 (upper depth interval) and Table D-8 (lower depth interval). Chemicals for which the maximum concentration was below corresponding soil benchmarks or background are not considered COPCEs and were not evaluated further.

Chemicals for which the maximum concentration exceeded soil benchmarks or background, along with chemicals for which no criteria are available, were then evaluated for bioaccumulation potential (Table D-9 for depth interval of 0 to 6 inches and Table D-10 for

[4] For the 0- to 24-inch depth interval, the maximum concentration among samples collected from this depth interval was used for the screening, rather than the depth-weighted average maximum concentration.

[5] Avian screening is being considered representative of reptiles.

depth interval of 0 to 24 inches). Bioaccumulation potential was evaluated using each COIsi's octanol–water partition coefficient ($K_{ow}$), with log $K_{ow}$ values of 5 or greater suggesting bioaccumulation potential (USEPA 2008b). Results are consistent with the list of bioaccumulative chemicals identified by TCEQ (2006) guidance.

For birds and omnivorous mammals (which are exposed to the top 6 inches of soil), chemicals that are not bioaccumulative are not considered COPCEs and were not evaluated further in this BERA. Bioaccumulative COIsis are considered to be COPCEs (Figure D-3; Table D-9). Detailed risk evaluation for bioaccumulative COPCEs includes analysis of exposures via both soil and food.

Inhalation risk that could result from VOCs in soil was evaluated for burrowing mammals only. VOCs underwent additional screening to identify analytes for which the inhalation pathway is relevant for burrowing mammals, as described below.

### *3.1.3 Screening of VOCs in Soils*

A separate screening step was performed to assess VOCs in soils to determine whether vapor inhalation by burrowing mammals represents a potentially significant exposure. Attachment B summarizes the approach used to identify VOC ecological screening levels (ESLs) for the purposes of this screening. This attachment also describes toxicity reference values (TRVs) for the VOCs that were used to derive the ESLs, and an approach to estimate the burrow VOC concentrations based on measured soil concentrations. The latter were calculated using the methodology from Hope (1995), as recommended by Sample et al. (1997), to estimate burrow air concentrations in the absence of field measurements of burrow air or a surrogate (e.g., soil vapor measurements).

Soil VOC results for all samples collected within the upper 24 inches of the soil surface were used. Depending on the sample location, data for VOCs in Soil Investigation Area 4 samples may have been collected from two or three finer depth intervals (e.g., 0 to 6 inches, 6 to 12 inches, 12 to 24 inches). The maximum concentrations from each of the individual depth intervals were used for this evaluation as a more conservative approach than using the maximum depth-weighted concentration. For example, the maximum concentration for

benzene from the 32 individual samples collected within the 0- to 24-inch depth interval is 73 µg/kg (Station SJSSB02, 6 to 12 inches depth) while the maximum depth-weighted concentration is 36.7 µg/kg (Station SJSSB02) across this series. Although the maximum depth-weighted concentration would be more representative of the potential exposures in the 0- to 24-inch depth interval soils, the maximum individual depth values were used for screening purposes. This approach minimizes the potential for a false-negative conclusion that the observed chemical concentrations are below the screening benchmark.

Table D-11 compares the estimated burrow VOC concentrations (based on the maximum observed soil concentrations) to the ESLs. In all cases, the ratio of the predicted burrow concentration and ESL value is less than 1 (range of $2x10^{-8}$ to $7 x10^{-3}$), indicating that the VOCs in the soils from Soil Investigation Area 4 do not represent a significant inhalation risk to burrowing mammals, and are not considered $COPC_E$s. Based on these results, the inhalation pathway for this receptor group was not evaluated further.

## 3.2 Overview of Ecological Effects

This document supplements the BERA for the area north of I-10 and aquatic environment, submitted to USEPA on August 22, 2012 (Integral 2012b). Information about the types of effects associated with each $COPC_E$ evaluated in that document, for the taxa addressed, and the information used to interpret exposure estimates for ecological receptors in the BERA was provided in Appendix B of that document. A general discussion of the approach to evaluation of the toxicity of dioxins and furans and dioxin-like PCBs for ecological receptors as part of the RI is also provided in the Problem Formulation of that document, and in prior publications.

Toxicity information presented in the BERA for the area north of I-10 and aquatic environment (Integral 2012b) is used in this BERA, but not repeated here. However, because USEPA required analysis of VOCs and SVOCs in certain soil samples from Soil Investigation Area 4, this BERA addresses several chemicals not previously discussed as part of the RI. Detailed information to support the effects evaluation for the $COPC_E$s for the Soil Investigation Area 4 is provided in this BERA in Section 5 for SVOCs and in Attachment B for VOCs.

## 3.3 Fate and Transport of Chemicals of Potential Ecological Concern

Fate and transport processes for COPCEs in soils of Soil Investigation Area 4 are discussed in Section 6 of the RI Report. The fate and transport processes important to the ecological risk assessment for the terrestrial environment of Soil Investigation Area 4 are those that occur at the soil surface. For burrowing mammals, fate and transport to a soil depth of 2 feet is also relevant. A fate and transport evaluation including physical and chemical measurements to evaluate chemical fate in the terrestrial environment has not been conducted. However, the fate and transport processes of interest to this BERA are those that affect bioavailability, bioaccumulation, and toxicity:

- Chemical binding to the soil matrix including mineral components (e.g., clays) and organic carbon – Binding to various elements in the soil matrix tends to reduce bioavailability and uptake of chemicals from soil.
- Metals speciation in soils – Metals geochemistry is complex and dynamic in the natural environment. Although total metals can be extracted from soils in the laboratory and reported, not all metal forms actually present in soils are toxic to the same degree that they may appear on the basis of toxicity studies.
- Biological uptake, retention, and detoxification – In addition to physical and chemical controls on bioavailability, biological controls strongly affect uptake of dioxin and furan congeners (Integral 2010b). Metallothioneins in animal cells can also bind to and effectively detoxify metals. Also important are processes of bioaccumulation and biomagnification, which impact ecological risks due to certain metals (e.g., mercury) and PCBs.
- Volatilization and degradation – VOCs can be released from soils into burrow air. However, evaporation of VOCs from surface soils mitigates risk associated with VOCs over time. Similarly, SVOCs may degrade or be dispersed over time, and many can be metabolized by vertebrates and invertebrates, mitigating risks to higher trophic levels.

Although an in-depth fate and transport evaluation has not been conducted for COPCEs in the terrestrial environment of Soil Investigation Area 4, this BERA uses conservative approaches to compensate for related uncertainties. For example, the total concentration of each metal in soils forms the basis for exposure estimates, when this approach likely

overestimates both the bioavailable and the toxic fractions present. Similarly, bioaccumulation models applied in this risk assessment make conservative assumptions about uptake and retention of each $COPC_E$.

## 3.4 Ecosystems Potentially at Risk

USEPA's Preliminary Site Perimeter includes a low-gradient tidal estuary near the confluence of the San Jacinto River and the Houston Ship Channel. The information below on upland habitats, wildlife that could occur there, and aquatic habitats and receptors is a summary of that presented in the BERA for the area north of I-10 and aquatic environment (Integral 2012b).

Upland natural habitat adjacent to the San Jacinto River in the vicinity is generally of low elevation with little topographic variation, and consists primarily of clay and sand that supports riverbank forest communities of loblolly pine-sweetgum, loblolly pine-shortleaf pine, water oak-elm, pecan-elm, and willow oak-blackgum (TSHA 2009). Upland natural habitat occurs along narrow sections of land on either side of the river, as well as on several small islands to the north and south of I-10, along the eastern bank of the San Jacinto River. Most of these islands are vegetated with a mixture of shrubs and trees, with fringing shallow waters. These habitats could support mammals such as marsh rice rats and deer that could migrate to the islands close to mainland areas. They also support passerines that could use the vegetated uplands for nesting and foraging, and shoreline birds such as sandpipers and herons that could wade and forage in the shallow areas adjacent to the islands.

On the peninsula to the south of I-10, most of the upland habitat is zoned for commercial or industrial use, with the exception of a narrow segment of land on the western edge south of I-10. The upland vegetation present on the southern peninsula is primarily low-lying grasses, with a few shrubs and trees adjacent to the shoreline.

There are no data describing wildlife uses of the upland portions of the area within USEPA's Preliminary Site Perimeter. Based on local wildlife lists and the types of habitat and land uses present, it is reasonable to expect a suite of generalist terrestrial species that are not highly specialized in their habitat requirements and are adapted to moderate levels of

disturbance. Terrestrial reptiles that could occur in the vicinity include snakes and toads (Anchor QEA and Integral 2010, Appendix B, Attachment 1). Avian taxa using upland habitats may include sparrows and other generalist passerines, starlings, pigeons and doves, corvids, and killdeer. Mammals expected in this sort of semi-urban environment include rodents, skunks, raccoons, coyotes, and opossums.

Protected species including bald eagles and the threatened and endangered species that could occur within USEPA's Preliminary Site Perimeter are addressed in the BERA for the area north of I-10 and aquatic environment (Integral 2012b). That assessment was included as part of the BERA's discussion of the aquatic environment because these species tend to forage predominantly in the estuary or in close association with shoreline sediments, preying on aquatic or sediment-dwelling species. There are no known or suspected threatened or endangered species that primarily use the terrestrial environment of Soil Investigation Area 4. Therefore, there is no further discussion of the threatened and endangered species in this BERA.

## 3.5 Ecological Receptors and Receptor Surrogates

Ecological receptor surrogates were selected to be representative of the trophic and ecological relationships known or expected in the habitat type addressed by this BERA. In the selection of receptor surrogates for evaluation in this BERA, the following criteria were considered:

- The receptor is or could potentially be present.
- The receptor is representative of one or more feeding guilds.
- The receptor is known to be either sensitive or potentially highly exposed to COPCEs under the habitat conditions evaluated.

Life history information is available in the literature or is available for a similar species that can be used to inform life history parameters for the receptor.

Based on the species that could use the peninsula south of I-10, field observations of habitats available, information compiled to support the BERA for the area north of I-10 and aquatic environment (Integral 2012b), and the SLERA for the area of investigation south of I-10

(Appendix E of Integral 2012b ), the following receptor surrogates for this risk evaluation were identified (Table D-12):

- Common garter snake (*Thamnophis sirtalis*)
- Killdeer (*Charadrius vociferous*)
- Baird's pocket gopher (*Geomys breviceps*)
- Virginia opossum (*Didelphis virginiana*).

These species meet the criteria for selection of surrogate receptors. Species closely associated with the aquatic environment are not evaluated, consistent with the CSMs developed as part of the RI.

## 3.6 Assessment Endpoints

An assessment endpoint is "an explicit expression of the environmental value to be protected, operationally defined as an ecological entity and its attributes" (USEPA 2003b). An assessment endpoint addresses a value of ecological significance, has an unambiguous operational definition, and is readily measured or predicted (Suter 1993). Ecological properties identified in assessment endpoints should be those which are susceptible to the chemical stressors and relevant to management goals. Clearly defined assessment endpoints help structure the assessment to address risk management and the primary concerns of stakeholders. Assessment endpoints discussed in this section were derived to conform to these guidelines. A summary of assessment endpoints and risk questions for each receptor group addressed by this BERA is provided in Table D-13.

The available literature, and the specific types of information it provides, determine to some extent how the assessment endpoints are defined. For example, although a wildlife *population* is often the level of ecological organization of significance to management, literature to provide measures of effects generally reports effects on *individuals*. Metrics to assess attributes of individuals (i.e., individual survival, growth, and reproduction) are more generally available in the literature used to support ecological risk assessment than are metrics to address populations. As a result, some of the assessment endpoints presented in the SLERA have been slightly modified to more closely reflect the ecological attributes that are more commonly reported in the available toxicity literature for the COPCᴇs, and to link

the attributes addressed (i.e., individual-level) to the attributes relevant to risk management (i.e., population- or community-level). The fundamental ecological values expressed by the assessment endpoints have not been changed.

In the absence of site-specific population data, is often impractical to perform a series of actual population assessments for an ERA at a site. Because assessment of exposure and effects in this BERA relies on models, the assessment endpoints generally are a stable or increasing population as indicated by survival, growth, and reproduction of individuals (Table D-13). Units for exposure estimates are selected to match the expression of exposure used in the available toxicity literature.

## 3.7 Ecological Conceptual Site Model

The CSM from the SLERA for Soil Investigation Area 4 (see Appendix E of Integral 2012b) was re-evaluated in the light of the additional field collections and understanding of potential fate and transport pathways. Most of the pathways associated directly or indirectly with soil contact are unchanged. However, the CSM was updated to include the vapor inhalation pathway (Figure D-2), although it was determined to be a *de minimis* potential exposure pathway (Attachment B).

## 3.8 Ecological Risk Analysis Plan

This BERA uses standard approaches provided by USEPA guidance (USEPA 1997, 1998, 2008a), including evaluation of uncertainty for results that reflect both reasonably conservative assumptions and realism when site-specific information is available. This section provides a synopsis of the risk assessment approach and methods used to address the assessment endpoints and risk questions listed in Table D-13.

This section summarizes the overall approach to the BERA for Soil Investigation Area 4, identifies the measures of exposure and effects used, outlines the analytical steps for each selected analysis tool, describes the approach to compilation of information on potential effects to ecological receptors, and identifies the means to characterize risk and evaluate uncertainty. Subsequent sections report the specific calculations, assumptions and related

selection of data for the computation of exposure parameter estimates, supporting rationale, and the outcome of each analysis step.

### *3.8.1 Ecological Risk Assessment Approach*

According to USEPA guidance, a baseline risk assessment should be realistic, so that results accurately represent risks prior to remedial action (USEPA 1988). Unlike a screening level evaluation, the conclusions of a BERA should reflect realistic representations of exposure and toxicity, and the supporting analysis should not be overly conservative. This approach is appropriate because the baseline risk assessment results are used to inform selection of a risk management approach that is cost-effective.

This BERA uses a tiered approach to the analysis and characterization of risks under baseline conditions: an initial assessment of risk is performed using a deterministic model for each receptor and each $COPC_E$ to which that receptor may be significantly exposed via a major exposure pathway ("receptor–$COPC_E$ pair"). The initial assessment employs reasonably conservative but realistic assumptions for each receptor and exposure pathway. This reasonable worst-case analysis provides a gross evaluation of risk, resulting in a hazard quotient (HQ) for each receptor–$COPC_E$ pair. HQs are calculated for each receptor–$COPC_E$ pair using a no-observed-adverse-effects level (NOAEL) for the $COPC_E$ to derive the $HQ_N$, and a lowest-observed-adverse-effect level (LOAEL) for the $HQ_L$. HQs are reported to one significant figure.

For each receptor–$COPC_E$ pair, the need for risk analyses subsequent to calculation of the HQ depends on the value of the $HQ_L$, with one of two possible outcomes. When the $HQ_L$ is equal to or greater than 1, subsequent analyses include probabilistic exposure evaluation and consideration of background. A discussion of the specific means used to interpret HQs appears in Section 3.8.4.1, below.

These analyses are performed to support risk management decision-making. Probabilistic assessment tools provide a more complete and transparent characterization of risks and uncertainties than is possible with an HQ alone. Background ecological risks are

characterized to describe the incremental risks. An overview of each step in the analytical approach is provided below, with additional details provided in subsequent sections.

### *3.8.2 Exposure Assessment*

According to the updated CSM (Figures D-2 and D-4), receptors addressed for the area of investigation south of I-10 may be exposed to COPCEs via ingestion of prey that have bioaccumulated COPCEs and via incidental ingestion of soils. Exposures to birds, mammals, and reptiles occurring through respiration (inhalation) or dermal absorption are not evaluated in the BERA as these are generally considered to be minor pathways of exposure relative to the ingestion pathway (USEPA 2003a), and conservative screening evaluation for VOCs (see Attachment B) indicates that there are no inhalation risks to burrowing mammals due to VOCs in soils of Soil Investigation Area 4.

#### *3.8.2.1 Measures of Exposure*

Measures of exposure selected to address bird, reptile, and mammal receptors are the concentrations of COPCEs in the following media:

- Measured concentrations in soils (mg/kg dry weight [dw])
- Estimated concentrations in soil invertebrate tissues (mg/kg dw), calculated using soil data and bioaccumulation factors (BAFs) or regression models
- Estimated concentrations in plant tissues (mg/kg dw), calculated using soil data and BAFs or regression models

Surface water ingestion is not included in this evaluation because there is no permanent standing fresh water in Soil Investigation Area 4. The adjoining waterway is estuarine and is not considered a source of drinking water for terrestrial birds and mammals.

Empirical data for soil chemistry collected in Soil Investigation Area 4 for this BERA were used to compute the EPCs for each of these measures of exposure, and provide the basis for modeling concentrations in tissue and in air. Models are used to estimate COPCE concentrations for the terrestrial invertebrate prey and plant foods ingested by killdeer, Baird's pocket gopher, and opossum. The specific models and datasets used to derive estimates for these parameters are presented in Section 4.

### 3.8.2.2 Exposure Units and EPCs

Consistent with Integral (2012b), exposure units were identified for each ecological receptor prior to calculation of EPCs. An exposure unit reflects the area within which a receptor may contact an exposure medium. Spatially defined exposure areas are used to identify the specific set of samples needed to calculate the EPCs for each exposure unit. The entire area of Soil Investigation Area 4 sampled for the RI and areas sampled to the west and to the south of Soil Investigation Area 4 are treated as a single exposure unit for all of the evaluated receptors (Figure D-7).

For each $COPC_E$ in each exposure medium within the single exposure unit, an expression of the central tendency (CT) of the dataset and an expression of the reasonable maximum (RM) concentration were prepared. The method to estimate these two expressions of concentration depends on the distribution of the dataset, and may include the mean, median, or other expression for the CT; and the 95 percent UCL (95UCL), 95th percentile, or maximum for the RM. Using these two expressions of the EPC for any given $COPC_E$ enables presentation of the most likely (CT) exposure along with the upper-bound (RM) exposure condition, and reflects the middle and upper extent of the exposure profile for receptors. This profile is biased high, because the reasonable minimum (RMin) calculated as the 95 percent lower confidence limit on the mean (or a similar statistic) is just as likely to occur as the RM.

For the probabilistic exposure assessment, the probability distribution of the chemical concentration is derived from data used to calculate EPCs. For parameters estimated probabilistically but which were not measured for this project (i.e., body weight of a receptor surrogate species), simple assumptions were made about the data distributions using information from the literature. Details are provided in Section 4.

### 3.8.2.3 Exposure Algorithms

Following derivation of EPCs for soil, concentrations in various exposure media are integrated for an individual receptor to compute a cumulative (for all exposure media) total daily ingestion rate.

Standard exposure algorithms commonly used in ecological risk assessments were used, as described in detail in Section 4. If a probabilistic evaluation of exposure is required, data collected for the RI are used to define the probability distribution of several exposure parameters, including life history parameters and the concentrations of the $COPC_E$ in each exposure medium within each exposure unit. The best-fit distribution (i.e., normal or lognormal) and the calculated mean and standard deviations of the data for each $COPC_E$ in each exposure medium are used.

#### *3.8.2.4 Exposure Assumptions*

Exposure algorithms for birds and mammals require assumptions about the aspects of receptor biology that affect $COPC_E$ exposure, such as body weight, food or soil ingestion rate, and home range area. Estimates of relevant exposure parameters were taken from the primary literature or from USEPA's (1993) Wildlife Exposure Factors Handbook. Information on the habits and life history of each receptor is provided in Appendix A of Integral (2012b). A summary of exposure parameters used in exposure algorithms is provided in Table D-14.

### *3.8.3 Effects Assessment*

This BERA relies on published literature to identify and describe toxicity of $COPC_E$s to ecological receptors. No toxicity studies were conducted in support of this BERA. The effects assessment therefore consists of a review and compilation of TRVs and benchmarks. For the purposes of this document, a TRV is a species-specific value derived from a controlled experimental study at environmentally realistic exposure levels. The study underlying the TRV defines the specific type of toxic effect at a defined exposure level and exposure route or condition. A TRV can be either a NOAEL or analogous metric (e.g., no-observed-effects concentration) at which no effect is expected, or a LOAEL or analogous metric, which is the threshold level at or above which effects are expected. A TRV is considered a measure of effect.

The individual effects measures derived from the literature were those that could clearly be related to population- or community-level effects, consistent with the selected assessment

endpoints (Table D-13). Each selected measure of effect on ecological receptors addresses changes in survival, growth, or reproduction resulting from exposure to one or more $COPC_E$. Survival, growth, and reproduction (including developmental inhibition leading to juvenile mortality) can clearly be related to population impacts.

When using published toxicity literature to establish measures of effect, the specific effects measure depends on the experimental design that was used. For example, a toxicity study may provide a threshold dose above which a reduction in the hatchability of bird eggs occurs. In this case, the effect category is reproduction, and the measure is the LOAEL at or above which effects are observed. TRVs, which encompass both LOAEL and NOAEL values, can be expressed in several ways. The methods for selecting TRVs and benchmarks as well as the values used in this BERA are summarized in Section 5 and described in detail in Appendix B of the BERA for the area north of I-10 (Integral 2012b). Information supporting selection of TRVs for those chemicals not evaluated for the area north of I-10 is provided in Section 5. For chemicals that are $COPC_E$s for both the southern and northern impoundment areas, detailed information on effects is provided in Appendix B of Integral (2012b).

Attachment B summarizes the derivation of the screening-level TRVs for VOCs that were used to assess the inhalation pathway for burrowing mammals.

### *3.8.4 Risk Characterization and Uncertainty Analysis*

One or more measures of exposure and one or more measures of effects are used to address each assessment endpoint and address the risk questions related to that endpoint. Measures of exposure and effect together define each line of evidence to address each assessment endpoint. Table D-15 provides a summary of each receptor, assessment endpoint, and the measures of exposure and effects used for each line of evidence.

#### *3.8.4.1 Calculation of Hazard Quotients*

For each receptor–$COPC_E$ pair, risks are initially described using an HQ, calculated as the estimated exposure as an environmental concentration or daily dose based on the CT of the exposure data distribution, divided by the measure of effect. The ratio of the exposure estimate to the TRV or benchmark is calculated using the following equation:

$$HQ = E \div TRV \qquad \text{(Eq. 3-1)}$$

Where:

| | | |
|---|---|---|
| HQ | = | hazard quotient |
| E | = | estimated exposure |
| TRV | = | toxicity reference value or benchmark |

Units used for the exposure estimate and for the TRV may vary among lines of evidence, but must be the same for the numerator and denominator in the HQ equation. Individual HQs are calculated for each chemical or TEQ.

To interpret results of HQ calculations, the following guidelines are used:

- Risk to individuals of any receptor from any $COPC_E$ to which the receptor is exposed at a level lower than the NOAEL (i.e., $HQ_N < 1$) is characterized as negligible.
- Risk to individuals of any receptor from any $COPC_E$ to which the receptor is exposed at a level between the NOAEL and LOAEL (i.e., $HQ_N > 1 > HQ_L$) is characterized as very low, and is discussed in the context of the toxicity data supporting the NOAEL and LOAEL values.
- Risk to individuals of any receptor from any $COPC_E$ to which the receptor is exposed at a level higher than the LOAEL (i.e., $HQ_L > 1$) is considered to be present. Risk to the assessment endpoint, which may be a population or community, is evaluated and discussed further in the context of the data supporting the TRV.

Measures of effect (TRVs) typically describe effects on individuals. To inform the risk assessment, HQs must be interpreted to describe risk to the assessment endpoint, which is generally a community or population of organisms (Table D-15). Therefore, the process of interpreting $HQ_N > 1$ when $HQ_L < 1$ involves professional judgment and is informed by the basis for the TRV used in the HQ calculation. In these cases, conclusions about risk incorporate relevant context about assumptions and the toxicity information supporting the calculation. Supporting information is described in risk conclusions in Section 6.

Additivity of toxicity and risk for an individual receptor exposed to multiple chemicals (other than dioxin-like compounds) is not systematically considered or reported in this BERA. The absence of relevant information to address this issue is discussed in the uncertainty analysis (Section 7).

#### *3.8.4.2 Probabilistic Risk Evaluation*

A probabilistic evaluation of exposures is performed for ecological receptors that are potentially exposed at levels equal to or greater than the effects threshold according to one or more lines of evidence in the deterministic evaluation. The probabilistic assessment assigns probability distributions for exposure parameters to yield an output probability distribution for the exposure estimate. Risks to receptors with $HQ_L > 1$ are characterized as the probability that an individual (conforming to the exposure scenario represented by the exposure assumptions) is exposed at or above a level known to have a specified effect. This method allows risk to be expressed as the likelihood that exposures associated with adverse effects can occur under the exposure assumptions. An example of a risk statement of this type is: "there is a 3 percent probability that raccoons will be exposed to iron at a level that has been observed to result in the reduced growth of juvenile mammals."

#### *3.8.4.3 Risks to Receptor Populations*

Population-level and community-level assessment endpoints have been selected for the BERA, consistent with USEPA guidance (USEPA 2003b), but TRVs from the available literature providing measures of effect generally represent individual-level endpoints (i.e., those related to survival, growth, and reproduction of individual organisms), particularly for birds and mammals. Population-level assessment endpoints are addressed qualitatively in the risk conclusions.

#### *3.8.4.4 Comparison of Risks to Background*

Background ecological risks are characterized using data from background areas to provide perspective on risks associated with the area under study, and to gain an assessment of the incremental risks due to the exposures to chemicals in soil within Soil Investigation Area 4. Only the incremental increase in risk relative to background can potentially be directly affected by remedial action or other controls.

Background risks are not calculated for all receptors and COPCEs, but are performed when it is concluded that there is a baseline risk to an assessment endpoint from a COPCE. Evaluation of risks in background areas was conducted using the same general lines of evidence as for evaluation of risks identified for this RI. The background dataset generated for this RI was used (see RI Report, Section 2).

# 4 EXPOSURE ASSESSMENT

Measures of exposure include concentrations of individual COPCEs in soils; estimated concentrations in prey items; and daily ingestion rates of COPCEs for reptiles, birds, and mammals. Each subsection below presents methods including algorithms and supporting assumptions, provides a summary statement of the data used, and presents results of the exposure assessment to address each line of evidence for the receptor. Summary information to describe the results of the exposure assessment is presented for each receptor group at the end of each subsection, or in an appendix.

## 4.1 Exposure of Reptiles, Mammals and Birds

Exposure of reptiles, mammals, and birds was evaluated via calculation of an individual's cumulative daily ingested dose of each bioaccumulative COPCE, expressed as mg COPCE/kg body weight (bw) per day (mg/kg-day). The calculated result was then compared to a TRV expressed in the same terms.

Potential exposures to fossorial (i.e., burrowing) mammals were determined to be *de minimis* based on the comparisons of the calculated VOC COPCE burrow air concentrations and TRVs expressed in the same terms (Attachment B). Therefore, this exposure pathway was not evaluated further in this BERA.

### *4.1.1 Wildlife Exposure Model: Ingestion*

To estimate the cumulative daily dose for reptiles, mammals, and birds through ingestion of food, including incidental soil ingestion, the following general equation was used:

$$Daily\ Dose = \left[\left(FIR \times C_{food} \times RBA_{food}\right) + \left(SIR \times C_s \times RBA_{soil}\right)\right] \times AUF \qquad \text{(Eq. 4-1)}$$

Where:

| | | |
|---|---|---|
| Daily Dose | = | COPCE ingested per day via food, water, and soil (mg/kg bw/day) |
| FIR | = | food ingestion rate (kg food dw/kg bw-day) |
| $C_{food}$ | = | concentration in the overall diet (mg/kg food dw) |
| $RBA_{food}$ | = | bioavailable fraction absorbed from ingested prey items (unitless) |
| SIR | = | soil ingestion rate (kg soil dw/kg bw-day) |

| | | |
|---|---|---|
| $C_s$ | = | concentration in soil (mg/kg dw) |
| $RBA_{soil}$ | = | bioavailable fraction absorbed from ingested soil (unitless) |
| AUF | = | area use factor (unitless); fraction of time that a receptor spends in Soil Investigation Area 4 relative to the entire home range |

Estimated values for those exposure parameters pertaining to receptor life histories were identified for each species using data compiled in the USEPA's Wildlife Exposure Factors Handbook (USEPA 1993) and other ecological risk assessments conducted within USEPA Region 6. Food ingestion rates were estimated using allometric equations presented in Nagy (2001) and USEPA (1993). Receptor profiles detailing the life history information that provides the basis for wildlife exposure assumptions for the avian and mammalian receptors are available in Appendix A of the BERA for the area north of I-10 and aquatic environment (Integral 2012b). A summary of the selected exposure assumptions for use in the wildlife exposure model is presented in Table D-16.

#### *4.1.1.1 Ingestion of Multiple Prey Types*

For those receptors likely to eat more than one prey type, the portion of the dose derived from the diet reflects the relative proportions of each prey type within a typical diet for that receptor. This apportionment was performed by weighting the $COPC_E$ concentration in each component of the diet by the fraction of the total diet consisting of that prey type. For example, the concentration of a $COPC_E$ in the diet of a receptor that ingests benthic invertebrates and plants is estimated as follows:

$$C_{food} = (C_i \times F_i) + (C_p \times F_p) \qquad \text{(Eq. 4-2)}$$

Where:

| | | |
|---|---|---|
| $C_{food}$ | = | concentration of the $COPC_E$ in the overall diet (mg $COPC_E$/kg food dw) |
| $C_i$ | = | concentration in invertebrate tissue (mg $COPC_E$/kg tissue dw) |
| $F_i$ | = | fraction of the diet consisting of terrestrial invertebrates (kg invertebrates/kg food) |
| $C_p$ | = | concentration in plant tissue (mg $COPC_E$/kg tissue dw) |
| $F_p$ | = | fraction of the diet consisting of plants (kg plants/kg food) |

Receptor-specific assumptions about the fraction of each prey type in the diet and the information sources supporting each assumption are shown in Table D-14. It is recognized that individuals of these receptor species may ingest prey types in proportions different from those shown here. The proportion of each type of food in the diet of any given receptor is intended to broadly represent the receptor and its feeding guild.

#### *4.1.1.2 Relative Bioavailability Adjustment Factor*

Except for the calculation of daily ingestion rates of dioxins and furans by birds, wildlife exposure calculations for all $COPC_{ES}$ conservatively assume that bioavailability in all media ingested in the field is the same as in the laboratory toxicity study that provides the basis for the TRV. This is a conservative assumption because laboratory toxicity studies are often conducted using a highly soluble or dissolved form of the chemical in water or food, while the exposure in the field is to the chemical bound in a particular matrix (e.g., food or sediment), in multiple compartments within ingested prey species (such as muscle, bones, and blood), or otherwise in a form that is not analogous to the laboratory exposure. However, given the variety of mechanisms used to administer test substances in laboratory studies, it is not appropriate to apply a single adjustment factor for all aspects of exposure and all chemicals. For chemicals other than the dioxins and furans, and in the absence of compelling information for individual chemicals in specific ingested media, this exposure assessment assumes relative bioavailability adjustment ($RBA_{food}$ and $RBA_s$) factors of 1 in the wildlife exposure model.

Integral 2012b (Section 4.3.1.2) summarizes the studies that were used to develop the RBA values applied to TCDD in the bird exposure model, including information provided in response to USEPA comments requesting greater detail regarding such studies. Overall, the weight of evidence presented by Opperhuizen and Sijm (1990), USEPA (2010b), Budinsky et al. (2008), Stephens et al. (1995), and Nosek et al. (1992) clearly supports application of a bioavailability adjustment factor for TCDD. The values presented by Nosek et al. (1992) and used in this risk assessment are technically robust and appropriately conservative. The RBA factors for 2,3,7,8-TCDD in soil and invertebrate tissue are summarized in Table D-17.

#### *4.1.1.3 Unit Conversions*

It is conventional for laboratories to report analytical results for tissue in wet-weight concentrations. However, total food ingestion rates, which form the basis for the wildlife exposure model, are estimated on the basis of energy requirements; these energy requirements are computed from the dry mass of different food types. To convert concentrations expressed as wet weight (ww) to dry weight for tissue, the following equation is used:

$$\text{mg COPC}_E\text{/kg dw} = \text{mg COPC}_E\text{/kg ww} \div (1 - \text{fractional moisture content}) \quad \text{(Eq. 4-3)}$$

Before calculating EPCs for tissue on a dry-weight basis, wet-weight concentrations in individual samples are first converted to dry-weight concentrations using the fractional solids data for the same sample if available; if solids data are not available, the average fraction of solids data for the given species is used.

#### *4.1.1.4 Estimating Concentrations of COPC$_E$s in Foods of Wildlife*

Ecological receptors consume soil invertebrates and plant forage that have the potential to accumulate COPCEs from soil. Since tissue data are not available for the terrestrial environment south of I-10, their COPCE concentrations were estimated using different modeling approaches, which are discussed below.

Bioaccumulation estimates were performed by first adjusting the soil concentration to units of mg/kg for all of the COPCEs. This was done to be consistent with the studies used to develop tissue estimates (e.g., PCB regression model for PCB uptake by earthworms from Sample et al. 1998). An estimated plant or soil invertebrate concentration was first calculated for each individual soil sample, and then all estimates were used to calculate the EPC for each COPCE.

##### 4.1.1.4.1 Estimating COPCE Concentrations in Plants

To estimate metals concentrations in plant tissue, BAFs or regression models from USEPA (2007c) for cadmium, chromium, copper, lead, nickel, zinc, and HPAH were used (Table D-18). Plant BAFs were not available from USEPA (2007c) for mercury, dioxins and

furans, PCBs, or BEHP. For mercury, soil-to-plant BAFs were selected from USEPA (1999b). The BAF for mercury is the recommended BAF for mercuric chloride.

For dioxins and furans, PCBs, and BEHP, uptake from sediments into plants is considered negligible (Wild and Jones 1992; Bromilow and Chamberlain 1995; Staples et al. 1997). Plants are exposed to COPCEs in soils primarily through porewater (Kabata-Pendias and Pendias 1992). Chemicals with low water solubility (e.g., lead) may adsorb to the roots of plants, but uptake into the plant's vascular system and transport to leaves and fruit is limited for low-solubility chemicals. Lipophilic compounds are taken up by the roots or by foliage, and are transported in plant xylem. This transport is slowed by partitioning of lipophilic compounds to the lipid-like matter in plant tissue (Bromilow and Chamberlain 1995), and fruits are not affected. If taken up by plants, lipophilic chemicals tend to accumulate in the leaf margins and interveinal spaces. As a general indicator of the transport of lipophilic compounds within plants, Travis and Arms (1988) reviewed BAFs for plant foliage for 29 chemicals with log $K_{ow}$ values ranging from 1 to 10, and found that the BAF was inversely proportional to the square root of the $K_{ow}$.

Although USEPA (1999b) provides a relationship for BEHP based on its $K_{ow}$, these types of simplified relationships based solely on chemical hydrophobicity are limited because they do not take into account processes such as metabolism that play an important role in modulating phthalate bioaccumulation (Staples et al. 1997). Staples et al. (1997) indicate that most soil-to-plant BAFs for phthalates are <0.1 and typical soil-to-plant BAFs from their literature review are <0.01. Staples et al. (1997) also note that these BAF values are based on studies with radio-labeled carbon and exposures to multiple phthalates. As such, resulting BAFs overestimate final tissue concentrations of the phthalate because metabolites in tissues are not distinguishable from the parent compound using this method. Other studies discussed by Staples et al. (1997) suggest there is no appreciable uptake of BEHP to plants from soils.

Much of the data concerning plant uptake of organic chemicals from soil comes from studies investigating soil-to-plant transfers of chemicals derived from sludge-amended soils. Regarding these studies, Wild and Jones (1992) provide the following general comments including PCBs, PAHs, and other organochlorine compounds typically studied: "these compounds are generally not taken up into the aboveground portion of crop plants," and

"there is some evidence of slight enrichment of some compounds in some root crops, but the transfers are very inefficient, and consequently the BCFs [bioconcentration factors] are very low." They also note that enrichments are generally confined to the root, skin, or peels, and not the fruits, leaves, and stems that may be eaten by wildlife (Wild and Jones 1992).

For these reasons, plant tissue concentrations of dioxins and furans, PCBs, and BEHP are assumed to be zero in the wildlife exposure model.

#### 4.1.1.4.2 Estimating $COPC_E$ Concentrations in Soil Invertebrates

BAFs to estimate terrestrial invertebrate tissue concentrations were available from USEPA (2007c) for cadmium, chromium, copper, lead, mercury, zinc, and HPAH (Table D-18). BAFs or regressions for the remaining $COPC_E$s that were used to estimate soil invertebrate concentrations are discussed below.

##### Mercury

Sample et al. (1998) and other compendia do not provide robust regression relationships for mercury, so Burton et al. (2006) was used to establish BAFs for estimating tissue concentrations from soils in Soil Investigation Area 4. Burton et al. (2006) conducted a 28-day study evaluating uptake by earthworms of total and organic mercury from soils across a range of mercury concentrations. Their study established that mercury concentrations in earthworm tissue were higher relative to concentrations in soils at lower soil concentrations, and lower relative to concentrations in soils at higher soil concentrations. Burton et al. (2006) report a BAF of 3.1 for low soil concentrations (0.156 mg/kg) and BAFs of 0.6 and 0.7 for intermediate (2.83 mg/kg) and high (11.54 mg/kg) soil concentrations, respectively.

Burton et al. (2006) did not establish a measure of variance around their surface soil concentrations, so the division between low and intermediate concentrations was established as the median value between 0.156 and 2.83 mg/kg, or 1.5 mg/kg. Therefore, to estimate concentrations of mercury in terrestrial invertebrates for the wildlife exposure model, the BAF of 3.1 was applied at stations with mercury concentrations below 1.5 mg/kg. All Soil Investigation Area 4 surface soil samples used to estimate invertebrate tissue concentrations

are lower than 1.5 mg/kg (Attachment A, Table A-1), so only the higher BAF was used for this BERA.

At least one recent study both supports the use of this approach and illustrates that the use of a BAF simplifies a likely complex system. Fengxiang et al. (2012) report on earthworm bioaccumulation studies using soils with and without cinnabar mercury (i.e., mercury sulfide), and using mature and immature worms. They report that cinnabar mercury, tightly bound to sulfur, does not correlate with mercury in worm tissue, while non-cinnabar mercury correlates well. This example illustrates the importance of the chemical form and local soil conditions. Fengxiang et al.'s (2012) soil-to-earthworm BAFs for mercury range from 0.32 to 1.75, indicating that the BAFs selected for this BERA are conservative (i.e., above the upper end of that range for uptake from soils with low concentrations of mercury).

#### *BEHP*

Staples et al. (1997) present information to indicate that BEHP does not bioaccumulate in soil invertebrate tissue at environmentally realistic concentrations in soil. Only one study (Hu et al. 2005) reported biological transfer of BEHP from soils to soil invertebrates, but exposure concentrations were much higher than the range of BEHP concentrations in soils from Soil Investigation Area 4. Therefore, the soil-to-invertebrate bioaccumulation relationship reported by Hu et al. (2005) is not appropriate for application in this RI. On the basis of the review provided by Staples et al. (1997), invertebrate tissue concentrations of BEHP are assumed to be zero in the wildlife exposure model.

#### PCBs

For PCBs, a regression equation from Sample et al. (1998) was selected to estimate total PCB concentrations in soil invertebrates from soil concentrations. This was an appropriate approach since soil-to-invertebrate BAFs for PCB congeners are limited in the scientific and risk assessment literature. For example, Matscheko et al. (2002) evaluated the uptake of only the dioxin-like PCB congeners from sewage sludge by earthworms.

#### Dioxins and Furans

None of the literature sources listed above provides sufficient information for use in estimating concentrations of dioxin and furan congeners in terrestrial invertebrates.

Although Sample et al. (1998) present a model for TCDD, important details are missing from the analysis, and only one congener is addressed. To develop soil-to-invertebrate relationships for predicting dioxin and furan concentrations in tissue, data from a bioaccumulation study using earthworms (*Eisinia fetida*) at a Superfund site in Minnesota were used. In two locations from this study, naïve earthworms were exposed for 28 days to samples of field-collected soils contaminated with dioxins and furans. At the end of the test, animals were purged and tissues were analyzed for dioxins and furans. The study was conducted according to specifications of the American Society for Testing and Materials Method 1976–04. In an additional five locations, co-located soils and earthworm tissue were collected. One worm froze in transit and could not be depurated, and therefore was not used for developing soil-to-tissue relationships. All worms used from this dataset were depurated prior to analysis. All worm and co-located soils were analyzed for dioxins and furans using USEPA Method 8290. All chemistry data were validated according to CERCLA validation protocols. This approach is described in detail in Appendix D of Integral (2012b), which includes the analytical approach for identifying and applying congener-specific regression models in order to generate EPCs that estimate concentrations in terrestrial invertebrate tissue.

Supplementary analyses to this approach were needed to evaluate soil data collected within and adjacent to Soil Investigation Area 4 for use in estimating tissue concentrations. Specifically, the similarity between soil dioxin and furan congener profiles of Cass Lake soils and those of samples collected for the RI south of I-10 was evaluated, and an appropriate correlate for the 2,3,7,8-TCDF congener for Soil Investigation Area 4 soils data was identified.

Paralleling the approach taken in Appendix D to the BERA for the area north of I-10 and aquatic environment (Integral 2012b), Soil Investigation Area 4 and Cass Lake surface soil congener profiles were compared. The ranges of most dioxin and furan congener concentrations in soil at the Cass Lake site were similar to the ranges of concentrations in soils of Soil Investigation Area 4 (Figure D-5). In particular, most dioxin and furan congener distributions in soils of Cass Lake have maxima that are similar to or higher than those in the ranges of concentrations of congeners in Soil Investigation Area 4 and adjacent soils. Therefore, for the majority of congeners, predictions made on the basis of Cass Lake soil

concentration data are not outside of the range of soils in Soil Investigation Area 4, supporting the premise that the Cass Lake dataset is appropriate for use in generating regression relationships that can be applied for this BERA.

There are two exceptions to this observed similarity of congener profiles: 2,3,7,8-TCDD and 2,3,7,8-TCDF, the maximum concentrations of which in Soil Investigation Area 4 soils are higher than those from Cass Lake. This pattern was also observed for soils collected in the TxDOT right-of-way and north of I-10 (Appendix D in Integral 2012b). As described in Appendix D, 2,3,7,8-TCDD had a low frequency of detection in soil and earthworm tissues from the Cass Lake site; however, a significant regression relationship was derived. The presence of 2,3,7,8-TCDD in soil and its absence in co-located tissue samples suggests that the uptake rate from soil to earthworm tissues is low for this congener.

A significant and strong correlation was found between 2,3,7,8-TCDF in Cass Lake soils and three congeners in Cass Lake tissues (1,2,3,6,7,8-HxCDD, 1,2,3,4,7,8-HxCDF, and 1,2,3,7,8-PCDF) (Appendix D, Integral 2012b). Among these three congeners, 1,2,3,6,7,8-HxCDD has one of the strongest correlations with 2,3,7,8-TCDF tissue concentrations in the Cass Lake dataset, and its concentration in Soil Investigation Area 4 soils is the most similar to that of 2,3,7,8-TCDF (Figure D-6). On the basis of these findings, the probability that this congener will underpredict tissue concentrations when used as a correlate is lower than that for the other two congeners. Therefore, this congener was applied as the selected correlate for 2,3,7,8-TCDF for Soil Investigation Area 4 soil samples. Estimated tissue concentrations of 1,2,3,6,7,8-HxCDD were multiplied by a congener correlation ratio to estimate concentrations of 2,3,7,8-TCDF in soil invertebrate tissue.

The results of this approach and the supplementary analyses described above include a series of regression and correlation relationships for dioxin and furan congeners, summarized in Table D-19. From these results, dioxin and furan concentrations in soil invertebrate tissue were estimated and then used in the wildlife exposure model for killdeer and Virginia opossum. Additional methodological details and results of statistical evaluations and resulting tissue concentration estimates are provided in Appendix D of Integral (2012b). The soil-to-earthworm BAFs or regression relationships are summarized in Table D-18.

#### *4.1.1.5 Wildlife Exposure Units*

An exposure unit is the area in which a receptor may be exposed to chemicals in environmental media. The exposure unit provides an organizing concept for selection of data to be used in estimating wildlife exposures. It defines the spatial area from which data are selected for calculation of EPCs for each medium, using samples collected according to the DQOs presented in relevant SAPs. An individual receptor is assumed to be equally likely to be exposed to media within all subareas of the exposure unit. The exposure unit for reptiles, birds, and mammals is the entire upland habitat south of I-10 that was sampled for the RI. It was used for all evaluated receptors, including soils and estimated plant and prey concentrations.

When using the peninsula south of I-10, a given receptor may be present in one or more habitats, depending on its life history and foraging habits. Although receptors would use an area according to its habitat quality and resources provided by the habitat (e.g., prey, refugia), the approach used to establish EPCs conservatively assumes that receptors will be more likely to encounter areas containing chemical hazards than other areas within Soil Investigation Area 4, regardless of habitat quality. Concentrations in exposure media were not spatially weighted; instead, each sample was given equal weight, even though there is a high spatial density of samples within Soil Investigation Area 4. Samples were not collected evenly across all habitats. This spatial distribution of samples reflects DQOs described by approved SAPs.

Table D-16 outlines the way in which exposure units and media are assigned to each receptor for the wildlife exposure assessment. As noted, all of Soil Investigation Area 4 and adjacent sampled areas was treated as a single exposure unit for all of the receptors (Figure D-7). This figure also shows the soil sample locations used for calculating EPCs for the estimate of exposure to each wildlife receptor. Because most samples were collected in locations near or adjacent to Soil Investigation Area 4 regardless of habitat quality, and because all samples were given equal weight in exposure statistics regardless of the spatial area represented, the selection and definition of exposure units is conservative.

Data for calculating exposures in terrestrial areas were selected by conservatively assuming that the entire western half of the peninsula south of I-10 could provide useable habitat for

the evaluated receptors; this exposure area is inclusive of all RI soil samples collected from and adjacent to Soil Investigation Area 4. Soils collected from 0 to 6 inches depth were used to evaluate exposures of killdeer, garter snake, and Virginia opossum; soils from 0 to 24 inches depth were used to evaluate exposures of pocket gopher (Table D-16). The habitat area calculations were used to estimate exposure unit sizes for each receptor (Table D-20).

#### *4.1.1.6 Calculation of Exposure Point Concentrations*

Consistent with USEPA (1997) guidance directing ecological risk assessors to consider an exposure profile for each receptor, EPCs were generated for each exposure medium within each exposure unit for use in the wildlife exposure model described above. CT and RM exposure concentrations were generated for each $COPC_E$. Selection of the appropriate statistic to represent the CT and RM for each EPC was based on the statistical distribution of the data supporting that EPC for each $COPC_E$ within a given medium (soil and tissue) and exposure unit. All analyses of data distributions and generation of distribution parameters were performed using the software R for Windows version 2.10.1 (R Development Core Team 2008). Summary information for the soil EPC development is presented in Attachment A.

Treatment of censored data in EPC calculations is discussed in Section 2.2.2. Decisions for generation of the statistical representations of the EPCs for a given data distribution were made as follows:

- For normal data distributions, the arithmetic mean was chosen as the CT and the 95UCL based on a Gaussian data distribution (i.e., calculated using the t-statistic) was selected as the RM.
- For lognormal distributions, the geometric mean was chosen as the CT and the 95UCL based on a lognormal data distribution was selected as the RM.
- For unknown data distributions (i.e., those distributions that were not normal and could not be transformed to a log-normal distribution), the arithmetic mean was chosen as the CT and 95UCL was calculated using nonparametric statistics, consistent with ProUCL (USEPA 2007b).

In all cases, if the 95UCL was greater than the maximum value for the dataset, the maximum was selected as the RM. The maximum observed surface soil concentrations for total PCBs and $TEQ_{P,M}$, and maximum subsurface soil concentrations for total PCBs were used in lieu of the calculated UCLs since the UCLs for these parameters were greater than the maximum concentrations. Results of all EPC calculations are presented in Attachment A.

To estimate concentrations of $COPC_Es$ in terrestrial invertebrate and plant tissue, the individual soil concentrations were multiplied by the BAFs (Table D-18) or were used in the regression equations (Table D-19) to generate the sample-specific terrestrial invertebrate and plant tissue concentrations, which were then used to calculate the CT and RM EPCs for input to the wildlife exposure model.

#### *4.1.1.7 Data Used*

Soil samples collected from depths of 0 to 6 inches and 0 to 24 inches (Figure D-7) were used in the wildlife exposure model. Soil collected from the 0- to 6-inch depth interval was used from the background study conducted for the purpose of the RI, but only when the $HQ_L \geq 1$ (Section 3.8).

#### *4.1.1.8 Results*

Summary presentations of results of the wildlife exposure model and supporting calculations are provided as follows:

- The soil and estimated tissue EPCs used in the ingestion model are presented in Attachment A, Table A-1.
- Final estimates of the daily ingestion rate of each $COPC_E$ for each bird, mammal, and reptile receptor surrogate are shown in Table D-21.

### *4.1.2 Probabilistic Exposure Assessment*

Probabilistic exposure assessment was performed for receptors whose estimated exposure for one or more $COPC_Es$ equaled or exceeded the associated LOAEL in the deterministic risk assessment (i.e., killdeer). The probabilistic exposure assessment involved assigning probability distributions to certain exposure parameters to yield a probability distribution for

$COPC_E$ exposure. This exposure distribution was then compared to the LOAEL TRV, and the likelihood that exposure exceeded the TRV (under the assumptions used) was determined. Exposure distributions were developed for Soil Investigation Area 4 as a whole for each relevant receptor–$COPC_E$ pair. Ranges and variability of LOAEL values were not included in the probabilistic risk assessment.

Probabilistic analyses of exposure and risk were developed using Oracle® Crystal Ball software (Gentry et al. 2005). Crystal Ball employs Monte Carlo analysis, a commonly used probabilistic numerical technique where the uncertainty and variability in exposure (and HQ) estimates are characterized by estimating the exposure (and HQ) distributions. To develop each exposure distribution, the exposure estimate for a receptor–$COPC_E$ pair is repeatedly calculated by Crystal Ball, with each iteration of the exposure model using different sets of parameter values determined by random sampling of the probability distributions for those input parameters treated probabilistically (USEPA 2001). Those parameters modeled probabilistically and the means used to estimate the exposure probability distributions for applicable receptor–$COPC_E$ pairs are discussed further below.

#### *4.1.2.1 Parameters to be Estimated in a Probabilistic Analysis*

Certain receptor-specific exposure parameters identified on the basis of life histories and EPCs used in the wildlife exposure model were treated probabilistically to increase understanding of the potential ecological risk. Parameters treated with probability distributions included soil and calculated plant and invertebrate tissue EPCs, body weight, prey fraction for each prey type, and rate of incidental soil ingestion. Because body weight also determines food ingestion rate, the food ingestion rate was also variable in the probabilistic risk assessment. Additional life history information from the literature was required to perform the probabilistic analyses because parameter estimates for the probabilistic analyses require measures of variance and range. Results of the information search to obtain the required data are presented in Table D-22.

#### *4.1.2.2 Derivation of Parameter Distributions*

To derive parameters for distributions of EPCs, datasets of relevant $COPC_E$ soil concentrations and calculated plant and invertebrate tissue concentrations with $N \geq 15$[6] were compiled and imported into Crystal Ball for distribution goodness-of-fit testing. Goodness-of-fit testing employed Anderson-Darling, Chi square, and Kolmogorov-Smirnov analyses for ranking the fit of each $COPC_E$ dataset against 14 available distribution types. Distributions selected by Crystal Ball for each dataset were compared to distributions selected by other means (e.g., R [R Development Core Team 2008]), if available. If the distribution recommended by Crystal Ball for a particular dataset differed from the recommendations of other software programs, professional judgment was used to select the best-fitting dataset distribution. Following selection of an appropriate distribution for each soil or tissue concentration dataset, distribution parameters were estimated by Crystal Ball and incorporated into the probabilistic model.

To derive parameter distributions for life history parameters, the CT and range of each parameter were determined from the literature. Where assignment of a normal distribution was appropriate (e.g., for body weight of a receptor), the mean and standard deviation were derived from the literature. For the prey fraction for each prey type and the rate of incidental soil ingestion, a triangular distribution was assigned using the estimates for the CT and the range. A normal distribution is defined by a mean and a variance (or standard deviation). A triangular distribution is defined by a mode, a minimum, and a maximum. The triangular distribution was used when information was limited and the form of the distribution was unknown. For feeding rate, the allometric equation was applied to determine the appropriate value corresponding to the body weight value randomly selected during a given iteration of the Monte Carlo.

Distribution characteristics used in probabilistic risk analysis are summarized in Attachment A for EPCs and in Table D-22 for other exposure parameters.

[6] Crystal Ball does not select distributions or estimate distribution parameters for datasets with $N < 15$, so for these datasets, distributions were selected by R and distribution parameters were calculated by the modeler based on the distribution type selected by R, and manually entered into the probabilistic model.

# 5 EFFECTS CHARACTERIZATION

Lines of evidence in this BERA employ TRVs, which are intended to denote both no-effects thresholds and effects thresholds for survival, growth, and reproduction of individuals. Detailed information on the methods used and data considered in selection or derivation of NOAEL and LOAEL TRVs and benchmarks used in this BERA is provided in Appendix B of Integral (2012b). This section provides an overview of the types of TRVs and benchmarks used in calculating HQs, methods to aggregate toxicity data, approaches to selection of each TRV needed, the general meaning of different types of TRVs or benchmarks, and types of uncertainties common to these approaches.

Because HPAHs were not a $COPC_E$ in the BERA for the area north of I-10 and aquatic environment, Appendix B of Integral (2012b) does not address the toxicity of HPAHs to mammals and birds. To address this data gap, derivation of HPAH TRVs for the avian and mammalian receptors is also presented in this section.

## 5.1 Types of Toxicity Information Used

Selection of TRVs and benchmarks for use in ecological risk assessment involves consideration of several factors: types of receptors under evaluation and assessment endpoints for each, whether the analysis calls for a screening or a more realistic risk description, the data and methods available for estimating exposure to receptors, and the availability of toxicity information that meets basic data quality standards. To address all of the lines of evidence for each receptor to be used in this BERA, effects measures consisting of TRVs or benchmarks expressed as the daily ingested dose NOAELs and LOAELs (mg/kg bw-day) were needed for reptiles, birds, and mammals for all $COPC_ES$.

When published toxicity literature is used to establish measures of effect, the specific meaning of the effects measure depends on the experimental design used and the test endpoints. For example, a toxicity study may provide a threshold dose above which a reduction in the hatchability of bird eggs occurs, or a reduction in the growth of juveniles. Exceedance of TRVs from such studies would have different meanings to the risk assessment. In cases where the estimated exposure to an ecological receptor is greater than a LOAEL and risk to the receptor cannot be considered negligible, the specific endpoint represented by the

TRV or benchmark is considered in the description of risk. A risk estimate based on a TRV representing a LOAEL for effects on survival is interpreted to have a potentially greater effect on the receptor than doses that exceed a TRV representing a LOAEL for individual growth rate or reproduction.

## 5.2 Methods Used for Aggregation of Toxicity Data

As described in Appendix B of Integral (2012b), many TRVs used in this risk assessment were those presented in compendia of values prepared by federal agencies (e.g., Sample et al. 1996; T&N Associates 2002; USEPA 2005a) or those from USEPA-approved final risk assessments conducted for other CERCLA sites. In most cases, the final selected TRV (NOAEL or LOAEL) was either the geometric mean of data from studies of acceptable quality (e.g., the TRVs developed by USEPA and others for the ecological soil screening levels [EcoSSLs]), or in cases where insufficient information was available to calculate a geometric mean, the TRVs were the lowest LOAEL and the highest NOAEL from among studies of acceptable quality. If the highest NOAEL was greater than the lowest LOAEL, then the highest NOAEL that did not exceed the lowest LOAEL was selected.

This approach results in conservative estimates of toxicity and a protective risk assessment overall. For dioxins and furans, and for PCBs because the toxicity of some congeners is considered to be additive with that of TCDD, the relatively extensive literature available was reviewed in greater detail. In both cases, more than one TRV of acceptable quality was often available for certain species. For example, there are several studies of PCB toxicity in mink and several studies of TCDD toxicity to birds following injection into eggs. In cases such as these, if fewer than 10 values with a common endpoint and route of administration were found, the following steps were taken to derive a TRV, for example a LOAEL:

1. Within-species LOAELs are grouped.
2. The geometric means of the within-species LOAELs are calculated.
3. Resulting geometric mean LOAEL values are pooled. No individual species is represented by more than one value, although some values are the results of only one study.
4. The geometric mean of the pool of data for multiple species is calculated, and that value becomes the LOAEL for the $COPC_E$ and receptor.

NOAELs were treated in the same way in cases of more than one acceptable study. This approach is consistent with calculation of TRVs for use in development of EcoSSLs (USEPA 2005a), and generally consistent with derivation of the benchmarks used. It results in values that are both representative of multiple taxa within broad categories of receptors, and reasonably conservative without being overly so.

The RI/FS Work Plan (Anchor QEA and Integral 2010) indicates that cumulative distribution functions derived from multiple effects-level metrics within a species, or species sensitivity distributions, would be developed using multiple literature values for several species. This is a tool that can be used to clearly define the risk and the uncertainty associated with a risk calculation. However, sufficient data for a set of related taxa that have similar exposure and effects metrics were not found for the COPCEs and receptors evaluated in this BERA.

## 5.3 Reptiles

Integral conducted a literature review to identify toxicity information useful for evaluation of risk to reptiles; details of the search methods and resources used are provided in Appendix B of Integral (2012b). The majority of available studies report chemical concentrations in field-collected specimens, and provide no means of interpreting exposure in terms of the potential for harmful effects. There are studies describing the concentrations of PCBs and of dioxins and furans in tissue of turtles in which the authors evaluate correlations of chemical concentrations with embryo deformities. However, the presence of other chemicals in the animals studied, including organochlorine pesticides, confounds interpretation. TRVs for reptiles could not be derived.

Some risk assessments have addressed this data gap by assuming that birds are an appropriate model for reptiles, and that TRVs derived for birds can be used to interpret exposure to reptiles. A recent publication by Weir et al. (2010) examines this assumption by comparing results of controlled laboratory tests on birds and reptiles for chemicals for which representatives of both groups have been tested, mostly pesticides and ordnance compounds (explosives). Weir et al. (2010) found that reptiles were more sensitive than birds in 5 of 15

cases, and less sensitive in 3 of 15. The rest of the comparisons (7 of 15) were inconclusive, or birds and reptiles were approximately equivalent.

For these reasons (the absence of reptile-specific toxicity studies for the COPCEs and the uncertainties about their sensitivities relative to other receptors), this document does not specify TRVs or benchmarks for interpreting estimated reptile exposures. Risks to reptiles are addressed qualitatively by considering their estimated exposures relative to exposures of other receptors, and by considering the overall patterns in risk estimates observed for the other receptors.

## 5.4 Birds and Mammals

This section presents a general discussion of the approach to the effects assessment for birds and mammals, and the strengths and weaknesses of using the literature to develop TRVs. It also provides details supporting the selected TRVs for HPAH that were necessary for this assessment, but that were not presented in earlier documents (Anchor QEA and Integral 2010; Integral 2012b).

### *5.4.1 Overview of Available Information*

Lines of evidence used to evaluate risk to birds and mammals include comparison of estimated daily ingestion rates for individual COPCEs to TRVs expressed in the same terms. The methods to identify measures of effect are detailed in Appendix B of Integral (2012b) and summarized below. Results of the process to identify and select TRVs for birds are summarized in Table D-23; TRVs for mammals are summarized in Table D-24.

The literature available to interpret estimated daily ingestion rates of COPCEs is highly variable in terms of age, quality, numbers and types of species studied, depth, and completeness. Moreover, many other ecological risk assessments have been conducted at CERCLA sites and these tend to draw from the same sets of studies, although there are some differences in the data quality considered acceptable among sites. Finally, USEPA and related federal agencies have compiled toxicity data for use in risk assessment (e.g., Sample et al. 1996) and for development of EcoSSLs (USEPA 2005a).

For all of the COPCEs except dioxins and furans and PCBs, this BERA initially draws from compendia of literature prepared by USEPA or affiliates, including Sample et al. (1996) and USEPA (2005a, 2012), and two recent BERAs accepted by USEPA for CERCLA sites in Portland, Oregon, and Seattle, Washington. These were considered a reasonable starting place for identification of wildlife TRVs. The general literature accessible through standard search tools like PubMed, Biosis, Google Scholar, and others was also consulted when established TRVs were lacking. A detailed description of how these resources were used is provided in Appendix B of Integral (2012b).

Although the assessment endpoints for this BERA are expressed in terms of populations, the vast majority of literature including studies employed by prior risk assessments addresses endpoints on the level of the individual organism. The types of individual effects measures derived from the literature for this BERA were limited to those clearly relating to population-level effects, generally the survival, growth, and reproduction of tested individuals. Effects on reproduction are interpreted to include developmental effects, when it is clearly related to the reduced survival of young. Studies addressing unrelated endpoints (e.g., cellular or biochemical alterations or modified gene expression) were not used to establish TRVs for the BERA because these effects cannot be related to population-level assessment endpoints.

### *5.4.2 HPAH TRVs for Birds*

The data reviewed by USEPA for establishing EcoSSLs for PAHs (USEPA 2007f) are limited to two papers that met acceptability criteria and contained toxicity data for toxicity tests with birds, one of which contained information for HPAHs. This study included NOAEL and LOAEL data for the European starling (*Sturnus vulgaris*), and the test was conducted using a single HPAH compound [7,12-dimethylbenz(a)anthracene]. Juvenile birds were exposed to a control diet, with two treatment groups reflecting two dose levels (2 and 20 mg/kg-day) for 5 days. Growth effects were not observed at the lower dose but were observed at the higher dose. Because the birds were tested for only 5 days, this is considered to be a subchronic exposure, so the NOAEL for this BERA was derived by applying an uncertainty factor of 10 to the study NOAEL, to derive a NOAEL of 0.2 mg/kg-day. The LOAEL was derived by applying an uncertainty factor of 10 to the study LOAEL, resulting in

a LOAEL for this assessment of 2 mg/kg-day. These TRVs were used for evaluating exposure of avian receptors to HPAHs (Table D-23).

### *5.4.3 HPAH TRVs for Mammals*

To develop an EcoSSL for HPAH, USEPA (2007f) reviewed 46 papers containing HPAH toxicity data for mammalian test species. Within these papers were 21 results developed using studies of growth, reproduction, or survival endpoints. The geometric mean NOAEL was calculated, but was found to be higher than the lowest bounded LOAEL for reproduction, growth, or mortality. Therefore, the TRV selected is equal to the highest bounded NOAEL lower than the lowest bounded LOAEL for reproduction, growth or survival and is equal to 0.615 mg/kg-day. The LOAEL from this same study, 3.07 mg/kg-day, was selected as the LOAEL TRV for the purposes of this risk assessment (Table D-24).

# 6 RISK CHARACTERIZATION

Risk characterization combines the information developed in the exposure and effects characterizations to provide quantitative and qualitative descriptions of the likelihood that hazardous materials at a site are causing adverse ecological effects under the baseline condition. According to USEPA (1997) guidance, risk characterization should also present information important to interpreting risks.

## 6.1 Overview of Risk Characterization

This BERA uses a tiered approach to the analysis and characterization of risks: an initial assessment of risk was performed deterministically for each receptor–$COPC_E$ pair. The initial assessment is a reasonable worst-case evaluation, resulting in an HQ for each receptor–$COPC_E$ pair. For each receptor–$COPC_E$ pair, subsequent analyses depend on the value of the $HQ_L$, with one of the following possible outcomes:

- Risk to individuals of any receptor from any $COPC_E$ to which the receptor is exposed at a level lower than the NOAEL (i.e., $HQ_N < 1$) is characterized as negligible.
- Risk to individuals of any receptor from any $COPC_E$ to which the receptor is exposed at a level between the NOAEL and LOAEL (i.e., $HQ_N > 1 > HQ_L$) is characterized as very low, depending on the toxicity data supporting the NOAEL and LOAEL values.
- Risk to individuals of any receptor from any $COPC_E$ to which the receptor is exposed at a level higher than the LOAEL (i.e., $HQ_L > 1$) is considered to be present. Risk to the assessment endpoint, which may be a population or community, is evaluated and discussed further in the context of the data supporting the TRV.

An $HQ_L$ equal to or greater than 1 is interpreted to indicate a need for further evaluation of risk to the receptor using refined methods (e.g., more realistic exposure assumptions or probabilistic analysis), additional data, or both, and is considered in context of the specific toxicity information used to derive the TRV. In this case, subsequent analysis would include probabilistic exposure evaluation and consideration of background.

Deterministic $COPC_E$ and receptor-specific HQs were calculated for the initial evaluation of risk, as described in Section 3.8. Methods to perform the probabilistic exposure analysis are presented in Section 4.1.2, and results are provided below for those receptor–$COPC_E$ pairs for

which the deterministic HQ analysis suggests a potential risk. Evaluation of population-level risks is addressed qualitatively, and incremental risk relative to background is evaluated when the $HQ_L$ is equal to or greater than 1.

## 6.2 Risks to Birds

Risks to birds were evaluated using killdeer as a surrogate receptor, and by comparing the killdeer's estimated daily ingestion rates of each $COPC_E$ to its respective TRV expressed in the same terms. Results are summarized as HQs in Table D-25. Daily ingestion rates for mercury,[7] $TEQ_{DF,B}$, $TEQ_{DFP,B}$, and total PCBs do not exceed NOAELs or LOAELs. The killdeer's daily ingestion rate of BEHP does not exceed the NOAEL (a BEHP LOAEL was not available for birds). Potential risks resulting from exposure to nickel were not evaluated for killdeer because nickel concentrations do not exceed the EcoSSL in surface soils (0 to 6 inches) and was therefore not a $COPC_E$ for birds. The results for the remaining $COPC_E$s are summarized below.

### *6.2.1 Cadmium*

Estimated daily ingestion rates of cadmium for the CT exposure are below the NOAELs, but the RM exposures are greater than the NOAEL and equal to the cadmium LOAEL for birds. The cadmium LOAEL (2.37 mg/kg-day) is less than twice the NOAEL value (1.47 mg/kg-day) and is the minimum bounded LOAEL for the mortality, growth, and reproduction endpoints reported in the literature compilation from USEPA's EcoSSL for cadmium (USEPA 2005b). The selected cadmium LOAEL is based on a single study of bird reproduction using chickens as the test organism and administering cadmium in food as cadmium sulfate. Affected chickens had fewer eggs and fewer progeny than controls. For all studies of the effects of cadmium on survival, growth, and reproduction in birds considered technically robust by USEPA (2005b), LOAELs ranged from 2.37 to 21.1 mg/kg-day, or about an order of magnitude, with a geometric mean of 5.45 mg/kg-day. The LOAEL used here is therefore conservative. Also, cadmium sulphate salt is freely soluble, but cadmium in environmental media is generally in a divalent form and not soluble (USEPA 2005b). This strongly suggests that the bioavailability of cadmium in food used in the study that provides the basis for the LOAEL is not representative of bioavailability in the field, limiting the comparability of the

[7] Although the $HQ_N$ for mercury is shown as "1" in this table the actual value was less than 1 ($HQ_N$ of 0.97).

selected LOAEL with estimated field exposures. Moreover, as a result of conservative assumptions, the exposure evaluation in this risk assessment likely overestimates the actual exposure of killdeer to cadmium. Therefore, the actual exposure of the killdeer (and birds it represents) to bioavailable cadmium in the southern peninsula exposure unit is likely to be substantially lower than the exposure in the study providing the basis for the LOAEL. As a result, and due to the conservatism of the selected LOAEL relative to other results of cadmium toxicity studies in birds, the $HQ_L$ of 1 for the RM exposure scenario is interpreted to indicate no risk to the assessment endpoint of stable or increasing populations of invertivorous birds. Any risk to individual birds from exposure to cadmium in Soil Investigation Area 4 and adjacent sampled areas is considered to be very low to negligible.

### *6.2.2 Chromium*

Estimated daily ingestion rates of chromium for the CT exposure are below the NOAEL and LOAEL, but the RM exposures are greater than the NOAEL and LOAEL. The NOAEL and LOAEL values for chromium are very similar (2.66 and 2.78 mg/kg-day, respectively) and were obtained from the EcoSSL document for chromium (USEPA 2008c). All of the studies presented by USEPA (2008c) are for trivalent chromium (chromium III), the less toxic form. The NOAEL is the geometric mean of 43 studies that examined the reproductive and growth endpoints, mostly from studies using chickens. The LOAEL is the lowest bounded LOAEL for survival, growth, and reproduction endpoints, and was taken from a single, unpublished study using black duck exposed in a simulated field environment. Effects on both reproduction and survival were observed. The study was not peer reviewed; unpublished data were used and were cited as a secondary source by USEPA (2008c). Like the study supporting the cadmium LOAEL, the study supporting the chromium LOAEL was conducted using the metal in a soluble salt (chrome alum dodecahydrate), likely increasing its bioavailability in the tested organisms relative to bioavailability in the environment. However, the geochemistry of chromium in soils is complex, and both chromium III and chromium VI may be present in materials ingested by terrestrial birds on the peninsula south of I-10. None of the toxicity studies used by USEPA (2008c) evaluated chromium VI, which is the more toxic form. Because of uncertainties about the type of chromium to which birds are exposed in soils in the area of investigation south of I-10 and uncertainty about toxicity

of chromium VI to birds, the importance of using a chromium salt in the toxicity study is less clear than it is for cadmium.

Even in the context of these uncertainties, the chromium LOAEL is considered a conservative (low) value, since the EcoSSL document reported bounded LOAELs (i.e., those studies from which both NOAELs and LOAELs could be calculated) ranging from 2.78 to 75.4 mg/kg-day, with a geometric mean of 8.4 mg/kg-day, from three studies. The second-lowest LOAEL, from a peer-reviewed study of growth effects, was 9.91 mg/kg-day, or 3.5 times as high as the selected LOAEL. Using this geometric mean, none of the chromium HQs for birds would exceed 1. Given the uncertainties in exposure conditions and the high bioavailability of chromium associated with the unpublished LOAEL used by USEPA (2008c), the degree to which the selected LOAEL is lower than several NOAELs and all other LOAELs considered technically defensible by USEPA (2008c), and the conservative assumptions in the wildlife exposure model, there is uncertainty associated with the $HQ_L$ presented in Table D-25. Because only the HQ values based on the RM exposure exceed 1, there is some possibility of risk to individual birds from exposure to chromium in soils from Soil Investigation Area 4 and the adjacent sampled area. Whether there is a population-level risk is uncertain, but the risk to the assessment endpoint from chromium is considered low.

### *6.2.3 Copper*

Estimated daily ingestion rates of copper are greater than the NOAELs for the CT and RM exposures, and are greater than the LOAEL for the RM case. The avian TRVs for copper were taken from the literature compilation in USEPA's EcoSSL for copper (USEPA 2007d), which identified over 3,000 papers and generated 393 copper TRVs for birds for a range of endpoints. The selected NOAEL of 4.05 mg/kg-day is the highest bounded NOAEL that is also lower than the lowest bounded LOAEL. The associated LOAEL from the study reporting the NOAEL of 4.05 mg/kg-day is 12.1 mg/kg-day for reproduction in chickens. The selected NOAEL for this risk assessment is from a study in which chickens were administered copper as the soluble copper sulphate or copper acetate in food for 84 days and those exposed at the LOAEL exhibited a reduction in fecundity. In the dataset compiled by USEPA (2007d), this NOAEL is among the lowest overall. The bounded NOAEL values ranged up to 239 mg/kg-day with a geometric mean for growth and reproduction endpoints

reported by USEPA (2007d) of 18.5 mg/kg-day. The selected LOAEL is from the same study and is also one of the lowest of the bounded LOAELs. LOAELs ranged up to 318 mg/kg-day with a geometric mean of 36.8 mg/kg-day from the 69 studies that evaluated survival, growth, and reproduction endpoints in three species. The order-of-magnitude differences between the selected NOAEL and LOAEL values and their corresponding geometric means suggest that the $HQ_N$ and $HQ_L$ results are highly conservative estimates of the potential copper risks to birds.

Important uncertainties in the assessment of risk to birds from exposure to copper in soils include the actual bioavailability of copper in soils relative to the soluble forms used in the toxicity study selected to support the NOAEL and LOAEL, and the relative sensitivity of domestic chickens. Also, the spatial distribution of copper in surface soils is characterized by three locations with relatively elevated copper concentrations in soils (Stations SJSB021, SJSB022, and SJSB023). Concentrations at these three stations range from 838 to 1,990 mg/kg. The next highest concentration is 140 mg/kg. This variability explains why the RM $HQ_L$ is 4 and the CT $HQ_L$ is 0.5. Given that the selected toxicity study likely overestimates bioavailability of copper from soils and toxicity at the LOAEL, risks to individual killdeer resulting from exposure to copper are present. Risk to killdeer populations (and those of the species they represent) due to exposure to copper in soils of Soil Investigation Area 4 is considered to be low.

### *6.2.4 Lead*

Estimated daily ingestion rates of lead are greater than the NOAEL and LOAEL for both the CT and RM exposures. The NOAEL and LOAEL values for lead are very similar (1.63 and 1.94 mg/kg-day, respectively) and are based on a reproduction endpoint (USEPA 2005c). The LOAEL was derived from a study using Japanese quail (*Coturnix japonica*) exposed to lead acetate for 5 weeks, and represents the minimum (most conservative) value of the reported bounded LOAELs that ranged up to 135 mg/kg-day, with a geometric mean of 13.41 mg/kg-day across five studies. Therefore, the calculated $HQ_L$ value is likely an overestimate of the potential risk relative to the LOAEL. However, $HQ_L$ values in excess of 1 for both the CT and RM exposures suggest that there is the potential for lead toxicity to individual birds that conform to the assumptions of the exposure model, i.e., risks to

individual birds due to lead are present. Given the magnitude of the HQ values for lead, risk to the assessment endpoint may be present, but this is uncertain because of unknowns regarding bioavailability of lead in ingested media (especially soil), the relative sensitivities of Japanese quail and terrestrial birds potentially using the area of investigation south of I-10, and actual tissue concentrations in foods of the killdeer.

### *6.2.5 Zinc*

Estimated daily ingestion rates of zinc are greater than the NOAEL and LOAEL values for both the CT and RM exposures. The NOAEL and LOAEL values for zinc are similar (66.1 and 86.6 mg/kg-day, respectively) and were obtained from the EcoSSL document for zinc (USEPA 2007a). The NOAEL is the geometric mean of 43 studies that examined the reproductive endpoint, mostly from studies using chickens. The LOAEL is the lowest bounded LOAEL for survival, growth, and reproduction, and is from a study that evaluated effects on growth of juvenile Japanese quail exposed to zinc carbonate in the diet for 14 days. The LOAEL is a conservative (low) value, since the EcoSSL document reported bounded LOAELs (i.e., those studies from which both NOAELs and LOAELs could be calculated) ranging up to 503 mg/kg-day, with a geometric mean of 161 mg/kg-day, from 34 studies.

As for the other metals, there are important uncertainties about the species of metal found in Soil Investigation Area 4 soils relative to the species administered to test organisms in the toxicity study used to support the LOAEL. Zinc is among the most common elements in the earth's crust and occurs in soils in several forms; only the soluble fractions are bioavailable (USEPA 2007a). According to USEPA (2007a, p.2), "[C]ompared to total zinc content of soils, concentrations of zinc in soil solution are low." Therefore, the calculated $HQ_L$ value likely substantially overstates risk relative to the LOAEL because exposures to zinc in natural soils are not well-represented by the total extractable zinc from the soils. However, $HQ_N$ values in excess of 1 for both the CT and RME cases suggest that there is some potential for a reduction in growth of individual birds from zinc exposures in Soil Investigation Area 4; risk to populations is low to negligible.

### 6.2.6 HPAH

Estimated daily ingestion rates of HPAH exceed the NOAEL for both the CT and RM exposures, but not the LOAEL. The HPAH NOAEL and LOAEL values were obtained from the EcoSSL document (USEPA 2007f). As described in Section 5, they are based on a single study using juvenile European starling (*Sturnus vulgaris*) exposed to a single HPAH [7,12-dimethylbenz(a)anthracene] over a 5-day period (i.e., a subchronic exposure). Growth effects were not observed at the lower dose (2 mg/kg-day) but were observed at the higher dose (20 mg/kg-day). These NOAEL and LOAEL values were adjusted using an uncertainty factor of 10 to yield the chronic NOAEL and LOAEL values, which is a very conservative approach (Chapman et al. 1999). Because only the $HQ_N$ values exceed 1, risks to individuals and populations of killdeer and the species they represent is considered to be negligible.

Additional probabilistic evaluation of the potential risks to killdeer from the $COPC_E$s with RM $HQ_L$ values greater than 1 is provided below.

### 6.2.7 Probability that Exposure Exceeds Effects Thresholds

A probabilistic analysis of exposure for killdeer was conducted for those receptor–$COPC_E$ pairs for which the $HQ_L$ is greater than or equal to 1. Probabilistic exposure analyses were conducted using only the wildlife exposure model, and included five $COPC_E$ metals (cadmium, chromium, copper, lead, and zinc).

The probabilistic exposure model for killdeer was performed using the methods described in Section 4.4. Each of the resulting exposure levels generated by the Monte Carlo analysis (10,000 iterations) was divided by the LOAEL. Results are presented as cumulative probability distributions of the $HQ_L$ for killdeer for each of the evaluated chemicals, and are summarized below:

- Cadmium – There is a 9.7 percent probability that baseline exposures of killdeer to cadmium will exceed the LOAEL (Figure D-8).
- Chromium – There is a 21 percent probability that baseline exposures of killdeer to chromium will exceed the LOAEL (Figure D-9).
- Copper – There is a 35 percent probability that baseline exposures of killdeer to copper will exceed the LOAEL (Figure D-10).

- Lead – There is an 88 percent probability that baseline exposures of killdeer to lead will exceed the LOAEL (Figure D-11).
- Zinc – There is a 68 percent probability that baseline exposures of killdeer to zinc will exceed the LOAEL (Figure D-12).

### *6.2.8 Risks to Birds in Background Areas*

Risks in background areas are presented to provide perspective on the incremental risk to killdeer resulting from exposures to soil in Soil Investigation Area 4 and the adjacent sampled area. Background data were available for all five $COPC_E$ metals. The background risk results are presented in Table D-26, and compared to risks calculated for Soil Investigation Area 4 below:

- Cadmium – The $HQ_L$ for the CT and RM background exposures are both less than 1, and correspond to 25 and 24 percent respectively of the CT and RM $HQ_L$ values calculated for this risk assessment.
- Chromium – The $HQ_L$ for the CT and RM background exposures are both less than 1, and correspond to 39 and 26 percent, respectively of the CT and RM $HQ_L$ values calculated for this risk assessment.
- Copper – The $HQ_L$ for the CT and RM background exposures are both less than 1, and correspond to 14 and 2 percent, respectively, of the CT and RM $HQ_L$ values calculated for this risk assessment.
- Lead – The background $HQ_L$ for the CT exposure was less than 1 while the RM exposure was greater than 1. This implies that the UCL of the background lead has the potential to elicit some risk in terrestrial birds that forage in close proximity to soils. The background $HQ_L$ values correspond to 38 and 22 percent, respectively, of the CT and RM $HQ_L$ values calculated for this risk assessment.
- Zinc – The $HQ_L$ for the CT and RM background exposures are both less than 1, and correspond to 41 and 29 percent, respectively, of the CT and RM $HQ_L$ values calculated for this risk assessment.

Calculation of HQs for background for the $COPC_E$s associated with potential risk to birds illustrates the importance of background metals in the overall risk to birds.

### 6.2.9 Summary: Lines of Evidence for Birds

Baseline risks to individual birds using the terrestrial habitats on the area of investigation south of I-10, and to the assessment endpoint of stable or increasing populations of terrestrial birds, are negligible for mercury, dioxins and furans, BEHP, HPAH, and PCBs.

Exposures to several metals could exceed individual effects thresholds, although for cadmium, chromium, and copper, the average (CT) exposures are not expected to exceed LOAELs. Results of probabilistic exposure evaluation provide an important perspective on the deterministic HQs:

- Baseline risks to individual birds exposed to cadmium and chromium are low to negligible. HQ calculations are based on several conservative assumptions, and the probability of exceeding the conservative LOAELs is only 9.7 and 21 percent for cadmium and chromium, respectively.
- On the basis of the HQ values only, risks to individual birds from exposure to copper in soils of Soil Investigation Area 4 and the adjacent sampled area are present, with a 35 percent chance that exposures of birds will be at or above the LOAEL. Risks to populations are very low, however, because of the conservatism of the exposure assumptions and effects assessment toxicity analyses supporting this analysis.
- Risks to birds from exposures to lead and zinc may be greater than risks associated with the other metals. Both CT and RM exposure estimates for both metals were greater than their corresponding LOAELs in the deterministic evaluation, and the probabilities of exposures in excess of LOAELs are 88 and 68 percent, respectively. Even though there are conservative assumptions and uncertainties about the TRVs that make the risk assessment imprecise, these results suggest some risk to individual birds is present; risks to populations may also result from lead and zinc in surface soils of Soil Investigation Area 4.

Overall, exposures and the risk analyses for terrestrial birds indicate some risk associated with the metals discussed above, with zinc and lead the most substantial risk drivers for birds. Although the TRVs for these metals are fairly conservative and may result in an overstatement of risk, the magnitude of the $HQ_L$ values, the probabilities that exposures will exceed the LOAEL, and the relatively small contribution from background soils suggests that

zinc and lead in surface soils of Soil Investigation Area 4 impart some risks to individual birds, like the killdeer, that forage extensively for soil-dwelling organisms in terrestrial habitats.

Uncertainties associated with conservative TRVs include the relative sensitivity of tested species and wild species and the very high bioavailability of metals administered in laboratory studies relative to metals in environmental soils. Uncertainties associated with modeled concentrations in prey tissues must be taken into account when considering these results. Specific HQ values should not be over-interpreted, given the range of endpoints represented. Also, there is no evidence that effects of these metals are additive, and cumulative effects are not necessarily a concern.

A population model is not possible with available information, and whether these individual level risks are associated with population-level effects is uncertain.

## 6.3 Risks to Mammals

Risks to mammals were evaluated by comparing estimated daily ingestion rate[8] of each $COPC_E$ to its respective TRV expressed in the same terms. The mammalian receptors were Baird's pocket gopher and Virginia opossum. Results are discussed below.

### *6.3.1 Estimated Daily Ingestion Rates Relative to TRVs*

Results of comparisons of estimated daily ingestion rates of the $COPC_E$s to their respective NOAEL- and LOAEL-based TRVs for the pocket gopher and the opossum are summarized in Table D-25.

Except for copper, the estimated daily ingestion rates of all $COPC_E$s by Baird's pocket gopher are below NOAELs for both the CT and RM EPCs. The copper $HQ_N$ is 1, a value not considered to indicate risk. The estimated daily ingestion rates of all $COPC_E$s by the pocket gopher are below LOAELs for both the CT and RM conditions. Therefore, risks to the

[8] The inhalation pathway for burrowing mammals like the Baird's pocket gopher was determined to be *de minimis* (Appendix B).

pocket gopher, and the terrestrial herbivorous mammals that it represents, are negligible for all $COPC_Es$.

For Virginia opossum, estimated daily ingestion rates of cadmium, chromium, lead, mercury, zinc BEHP, HPAH, $TEQ_{DF,M}$, $TEQ_{P,M}$, $TEQ_{DFP,M}$ and Total PCBs for the opossum are all below their respective NOAELs and LOAELs, indicating negligible risk to this species for these $COPC_Es$. Estimated daily ingestion rates of copper are approximately equal to the NOAEL for the RM exposure only, and are less than the LOAEL under both the CT and RM exposure conditions (Table D-25). Therefore, risks to the Virginia opossum, and the terrestrial omnivorous mammals that it represents, are negligible for all $COPC_Es$.

### *6.3.2 Probability that Exposure Exceeds Effects Thresholds*

A probabilistic analysis of exposure of opossums and gophers was not required because all of the $HQ_L$ values were less than 1.

### *6.3.3 Risks to Mammals in Background Areas*

A comparison of the potential risks from background areas was not required because all of the $HQ_L$ values were less than 1 for both the pocket gopher and opossum.

### *6.3.4 Summary: Lines of Evidence for Mammals*

Analyses presented in this section address the following risk question (Table D-13): is the total daily ingested dose (mg/kg-day) of $COPC_Es$ greater than doses known to cause effects on the survival, growth, and reproduction of mammals? Results of the exposure and risk analyses indicate that there is no risk for herbivorous or omnivorous mammals like the pocket gopher and opossum.

## 6.4 Risks to Reptiles

Appendix B of the Integral (2012b) describes the literature search for information to support TRVs for reptiles. No information was found to interpret reptile exposures. Extensive literature searches by other authors corroborate this result. Because TRVs needed to interpret exposure estimates for reptiles could not be developed, HQs cannot be calculated,

and risks to reptiles cannot be addressed using the same approaches used for other receptors. The risk question, "Is the total daily ingested dose (mg/kg-day) of COPCEs greater than doses known to cause effects on the survival, growth, and reproduction of reptiles?" cannot be addressed with the available toxicological information.

However, exposure estimates for reptiles can be compared to those for other receptors. Table D-21 shows the CT and RM exposure in mg/kg-day of all wildlife receptors to each COPCE. The estimated daily ingested dose of common garter snake is included in this summary. Generally speaking, the estimated exposures to this receptor for all of the COPCEs are consistently and substantially lower than those for other receptors. This is a reflection of the ingestion rate assumption, which is based on the field metabolic rate provided by Nagy et al. (1999). Reptile metabolic demands are lower than those of birds and mammals. For this reason, use of an allometric model to estimate ingestion rates and application of those ingestion rates as the basis for exposure estimates for reptiles will generally result in lower estimates of ingested doses, if it is assumed that reptiles eat the same types of foods as birds and mammals.

Because the HQs are generally low for most COPCEs for the other receptors, this general difference in the level of exposure of reptiles would suggest that risks to reptiles are also negligible for mercury, BEHP, HPAH, and PCBs. However, because estimated exposures of birds to some metals, particularly lead and zinc, are above LOAEL values, it is not possible to conclude with confidence that risks to snakes and other reptiles from exposure to metals are also negligible.

Weir et al. (2010) have suggested that dermal exposure may be the most important exposure route in reptiles, contributing significantly more of the daily dose of lipid-soluble compounds than other exposure routes. However, it is unknown whether the COPCE metals readily transfer through the skin, and whether this exposure pathway is or is not likely to be significant for snakes in the area of investigation south of I-10. There are no means to evaluate this aspect of reptile exposure, and there are no toxicity data to interpret resulting exposure estimates.

In conclusion, risks to reptiles from mercury and most other metals, BEHP, HPAH, and PCBs are considered negligible; and risks associated with exposure to lead and zinc are considered low to negligible, based on exposure of snakes relative to that of other receptors evaluated. Risks to reptiles due to dioxins and furans are unknown, because there are no means to estimate reptile exposures and no toxicity information to interpret exposures. Because other receptors are not exposed to dioxins and furans at levels above those associated with effects in laboratory animals, dioxin and furan risks to reptiles using the area addressed in Soil Investigation Area 4 at the same frequency and in the same manner as these other wildlife receptors are also likely to be negligible.

# 7 UNCERTAINTY ANALYSIS

Ecological risk assessments are inherently imprecise and uncertain, and any ecological risk analysis provides only a simplified model of a natural environment that is complex and dynamic. Risk assessors can compensate for uncertainties by using conservative assumptions, but an overly conservative analysis does not effectively inform risk management decisions, and baseline risk assessments should incorporate realism wherever possible. In this section, the following broad categories of uncertainty are described, specific examples from this risk assessment are addressed in detail, and the effects of such uncertainties on the risk evaluation are discussed:

- Data gaps and limitations
- Model uncertainty
- Toxicity information.

Not all of these uncertainties can be addressed by conservatism; the discussion of each includes a clear statement of whether the resulting bias is conservative, not conservative, or unknown. Finally, several underlying methods and assumptions provide an overall conservatism to the analysis, and these are outlined and described within the categories listed above.

## 7.1 Data Gaps and Data Limitations

Although a significant number of analytical samples have been collected for the RI and risk assessments, certain data gaps affect the degree of certainty associated with risk estimates: the absence of data for some tissue types that are potentially ingested by receptors, a limit to the number of samples that can be collected for the RI, and an absence of detailed information about use of the area within USEPA's Preliminary Site Perimeter by the evaluated receptors and certain protected species. Each of these is discussed below.

### *7.1.1 Tissue Chemistry for Plants and Terrestrial Invertebrates*

There are no data to describe concentrations of COPCEs in tissue of terrestrial invertebrates and in plants. To generate concentration estimates for all COPCEs in terrestrial invertebrate tissue except dioxins and furans, simple models derived for use in risk assessments at other

sites and published in the literature, by USEPA, or the Oak Ridge National Laboratory were applied. These "off-the-shelf" models for estimating plant and invertebrate tissue concentrations provide a reasonable estimate of tissue concentrations. However, they cannot account for conditions that affect bioavailability, differences between the particular invertebrate or plant species studied and those used by receptors the area of investigation south of I-10, effects due to seasonality of the data providing the basis for the model, local geochemistry, and other factors that could affect uptake rates in plants and invertebrates. For the most part, the direction of bias created by using these models is unknown because of the complexity of the variables influencing the model outcome.

### *7.1.2 Sample Numbers and Locations*

Designs of all of the studies supporting the RI were developed in collaboration with USEPA; data were collected in accordance with USEPA-approved SAPs, each with its specific DQOs articulated according to the four study elements used to structure the investigation. The sampling design was directed towards characterizing conditions from accessible areas (i.e., those areas not covered with buildings or parking areas) adjacent to and within Soil Investigation Area 4, south of I-10 (Figure D-7). There is some spatial bias of sampling locations towards the northeastern section of this area, resulting in a relative over-representation of chemical conditions in the soil data. Nonetheless, the sampling designs result in a reasonable representation of potential exposures to ecological receptors under current conditions.

### *7.1.3 Methodology to Calculate Total PCB EPCs*

Another potential source of uncertainty is related to the calculation of the total PCB concentrations used in the BERA. The total PCB EPCs are based on the sum of 43 PCB congeners as requested by USEPA (see comment 6 in Appendix C of the Tissue SAP [Integral 2010c)]. This approach was also used for the Baseline Human Health Risk Assessment. Aroclor results are also available for soils from Soil Investigation Area 4 (Table D-3), but were not used in calculating EPCs or in estimates of tissue concentrations. As shown below (see also Attachment A), the CT and RM total PCB concentrations calculated using the sum of the 43 PCB congeners (setting nondetects to one-half the reported detection limit) are greater than the values calculated using the sum of detected Aroclor PCB results:

- EPCs (mg/kg) for total PCBs in surface soils (0 to 6 inches)
  - As the sum of 43 congeners, CT = 0.046, RM = 0.28 (maximum value)
  - As the sum of Aroclors, CT = 0.012, RM = 0.10 mg/kg
- EPCs (mg/kg) for total PCBs in subsurface soils (0 to 2 ft)
  - As the sum of 43 congeners, CT = 0.033, RM = 0.40 (maximum value)
  - As the sum of Aroclors, CT = 0.020, RM = 0.099.

Results for total PCBs as both the sum of the 43 PCB congeners and the sum of Aroclors are not available for any individual sample. However, because the EPCs calculated using the sum of 43 congeners are generally higher than those calculated as the sum of Aroclors, the uncertainty resulting from not using Aroclors is not important; the net effect is a conservative bias.

## 7.2 Model Uncertainty

Various model forms are used to support the risk assessment, including regression models to predict dioxin and furan concentrations in worm tissue and ingested-dose models to estimate exposure of individuals. Each type of model can introduce both bias and inaccuracies. Related uncertainties are discussed by Integral (2012b).

### *7.2.1 Prediction Using Regression Models*

Regression analysis of concentrations in tissue and soil, or between different tissue types (e.g., a consumer and its prey), is a straightforward method using well-established statistical procedures. Regression analysis has several advantages over ratios, specifically the ability to incorporate non-zero intercepts and to produce a statistically sound measure of uncertainty. Because it is a strictly empirical method, regression analysis does not require any information on the mechanisms of exposure and uptake, and thus can be applied to the sort of site characterization data typically collected in an RI/FS. Several guidance documents supporting the use of regression modeling in the process of developing risk assessments and remedial goals have been published (Corl 2001; University of Florida 2005). Application of regression models in this risk assessment avoids the conservative bias introduced by ratios, because regression models produce predictions within the known variance of the dataset used to

build the model. Empirical data for the area under study are preferred for making predictions. In their absence, regression models that limit prediction error on the basis of an empirical dataset are preferred over the use of ratios because they better control the uncertainty, at both the lower and upper ends of the predicted range.

#### *7.2.1.1 Soil-to-Invertebrate Tissue Models for Dioxins and Furans and PCBs*

In modeling dioxin and furan and PCB congener uptake into invertebrate tissue, it cannot be assumed that all congeners behave similarly, and a congener-specific approach is needed (Integral 2010a; Appendix D). For example, the regression approach selected to estimate dioxin and furan concentrations in earthworm tissue from concentrations in co-located soils relies on a small sample size (N=6) of co-located soil and earthworm tissue; there is uncertainty in developing regressions from this limited dataset. The compound 2,3,7,8-TCDD was not detected in several of the soil–earthworm pairs in the small dataset, which also introduces uncertainty in the use of these data. However, uncertainties were reduced by limiting selections to statistically significant relationships on a congener-specific basis, and by selecting congener correlates to minimize underprediction of tissue concentrations in a soil environment characterized by significant spatial variability in concentrations of some dioxin and furan concentrations. This approach affords substantive advantages in terms of providing an empirically based estimation of invertebrate uptake of dioxins and furans over simplified approaches using biota–sediment accumulation factors or extrapolating widely across aggregate variables such as TEQ.

### *7.2.2 RM Exposure and the Risk Profile*

EPCs for both CT and RM conditions were generated for each exposure medium within each exposure unit for use in the wildlife exposure model. Using these two expressions of the EPC for any given $COPC_E$ enables presentation of the most likely (CT) and upper-bound (RM) exposure conditions, and is intended to reflect the "exposure profile" for receptors recommended by USEPA guidance (USEPA 1997, 1998). The RM exposure case is often biased high because the statistical methods to estimate the UCL can yield a value that exceeds the maximum observed concentration. In such cases, the latter is used as the RM (as was the case for total PCBs in soils), causing an unrealistic representation of the potential upper bound of the average soil concentration. This bias is further inflated when the RM values are

used to estimate $COPC_E$ concentrations in other media, such as the estimated concentrations in plants and invertebrates. Moreover, a true exposure profile should also include the reasonable minimum exposure, based on the lower confidence limit on the mean EPC. An exposure profile that does not present the reasonable minimum exposure imparts a conservative bias. This is particularly important to consider in the evaluation of HQ values for the metals in birds, since there are several instances where the only HQ equal to or greater than 1 was calculated using the RM exposure.

### *7.2.3 Wildlife Exposure Model*

The deterministic wildlife exposure model uses fixed parameter values, set at realistic or conservative levels, to make predictions about chemical intake. These parameters are developed based on information available in the literature, which is not always representative of the exposures that could occur at a given site. For example, a key uncertainty in the exposure evaluation is the incidental soil ingestion rates. These rates were derived from the literature, whether laboratory or field studies, and may not be representative of the incidental ingestion rates of the evaluated receptors.

As described for several specific cases in Section 6.2, the bioavailabilities from the exposure media were conservatively assumed to be the same as those from the toxicological studies used to derive the TRVs. Since the bioavailability of the $COPC_E$s from the environmental media is likely lower than that from the toxicological studies, especially for metals, the calculated risks are likely biased high.

At USEPA's request made in comments on the draft version of Integral (2012b), a sensitivity analysis was conducted to evaluate the importance of the RBAs in risk conclusions for birds. For that analysis, exposures of birds to dioxins and furans (as $TEQ_{DF,B}$) were recalculated without using RBAs, (i.e., by assuming that ingested TCDD was 100 percent bioavailable). Risk conclusions for avian receptors were the same with and without use of the RBA.

Finally, the results of the deterministic risk calculation can oversimplify the risk conclusions by suggesting a black-or-white, risk-or-no risk conclusion. To improve the depth of the evaluation, risk was evaluated probabilistically when the deterministic models suggested that

exposures could exceed the LOAEL. Use of the probabilistic exposure model makes the uncertainties associated with exposure assumptions more explicit, but does not address uncertainties associated with the selected TRVs.

## 7.3 Use of Probabilistic Exposure Models

When predicted ingestion exposures exceed LOAELs in this risk assessment, the probabilistic exposure assessment incorporates the variability of the exposure parameters in the deterministic model, providing a more precise statement of probability of adverse outcomes (e.g., a 9.7 percent chance that exposure of killdeer to cadmium will exceed the LOAEL). This statement uses empirical information about the data used in the exposure analysis to more accurately reflect likelihood of an effect on an individual.

## 7.4 Toxicity Information

Ecological risk assessments rely on a very limited set of toxicity information, usually developed with very few species derived from domestic stocks. Often, these domestic species are less fit than wild species, which benefit from greater genetic diversity in each generation. The advantage of using controlled laboratory studies is certainty in the dose-response relationship derived from highly controlled exposures (e.g., injection or oral administration by gavage). However, loss of realism is significant to risk assessment, because toxicity studies cannot represent variability in individual fitness, variable resistance or sensitivity among species, physical controls on bioavailability that exist in the field, and a host of other factors affecting potential toxicity in the environment. Generally, the bias resulting from the use of laboratory-based toxicity studies is conservative.

Toxicity information for PCBs in birds and mammals relies largely on toxicity studies in which the test subjects were administered Aroclor 1254. To achieve a risk assessment protective of the ecological receptors addressed by this BERA, concentrations of total PCBs were used in the exposure estimates. These were calculated as the sum of 43 PCB congeners, treating any nondetect congeners as being present at one-half their reporting limits (for conservatism).

In addition to uncertainty in calculation of sediment EPCs for total PCBs, uncertainty is associated with the use of Aroclor 1254 toxicity information in combination with total PCBs as the exposure metric. The mixture of PCB congeners in soil may not reflect the same congener composition as Aroclor 1254. Dechlorination of PCBs by natural processes would likely lead to mixtures whose toxicity is less than or equal to Aroclor 1254.

### *7.4.1 Use of Uncertainty Factors for Deriving TRVs*

The preferred approach for selecting TRVs is to find values that meet acceptability criteria (Section 1.4 of Appendix B) and are taxonomically relevant and appropriate to the receptors of concern. When data are not available for the receptor and COPC of interest, an uncertainty factor may be applied to conservatively estimate the benchmark or TRV. In a review of the types and uses of uncertainty factors, Chapman et al. (1999) conclude that an uncertainty factor should account for the uncertainty in the extrapolation, but should not be so large that it renders the resultant value meaningless for assessing risk.

Chapman et al.'s (1999) review emphasizes the importance of evaluating the substance and context of the uncertainty. They caution against the extrapolation of LOAELs to NOAELs because there can be substantial uncertainty in moving from effects to no-effects concentrations. They provide several examples that support uncertainty factors of 10 or less for individual extrapolations, including extrapolation of acute lethality toxicity tests to thresholds for sublethal effects in aquatic systems, and ratios of lowest-observed-effect concentration to no-observed-effect concentration for wildlife criteria. The review points out that uncertainty factors are essentially screening tools for which the imprecision cannot be quantified, and should not be regarded as mathematical absolutes. These recommendations were used as a basis for the application of uncertainty factors in deriving TRVs where relevant effects-level values were missing but related values were available.

### *7.4.2 Toxicity of Mixtures*

Organisms inhabiting or using the area of investigation south of I-10 are exposed to more than one chemical. They may be exposed to COPCEs and other chemicals in locations elsewhere. Exposures of organisms to chemicals other than COPCEs in other locations cannot be estimated. Each area and each individual receptor results in a unique exposure

profile, characterized by both the specific chemical mixtures and the magnitude of each chemical. For most chemicals, there are simply no published studies to evaluate these unique mixtures.

Some chemicals have known additivity, such as dioxins and furans, and mixtures are evaluated on the basis of the best available science. For other COPCs, whether effects associated with one COPC are additive with another cannot be addressed without significant effort, and may not be resolved in any case. In the present evaluation, very few COPCEs are associated with risk and a formal evaluation of mixtures other than dioxins and furans and dioxin-like PCBs was not conducted. However, where exposure of terrestrial birds to several metals exceeds possible effects thresholds (Section 6.2), the results are considered together to indicate a potential concern associated with metals in some parts of Soil Investigation Area 4. While the toxicity of these metals is not known to be additive in birds, the consistency in results is interpreted to support the conclusion that there are some risks to birds associated with metals in soils. Overall, uncertainty associated with the inability to formally evaluate the toxicity of mixtures is considered minor for the purposes of this BERA.

### *7.4.3 Toxicity to Reptiles*

The absence of information on COPCE toxicity to reptiles combined with the inability to estimate actual exposures to reptiles for some of the pathways (e.g., dermal uptake even if reptile tissue samples had been collected) precludes a quantitative risk evaluation. Instead, exposure in terms of daily ingested dose was calculated for each COPCE and compared with that for other receptors. For the majority of COPCEs, there is little to no risk for these other receptors, suggesting that there are no risks to reptiles for most COPCEs. However, a remaining uncertainty that cannot be resolved is whether baseline exposures of reptiles to COPCEs are at levels that could result in risks.

## 7.5 Summary of Uncertainties

Uncertainty in an ecological risk assessment is unavoidable because the risk assessment attempts to model the natural environment, which is highly variable and complex. Although a baseline ecological risk assessment should incorporate realism to the maximum extent possible, conservative choices made throughout the process make the risk assessment

generally conservative. Even so, data gaps such as the lack of toxicity information for reptiles cannot be resolved, and their bias cannot be said to be conservative or otherwise. The analyses presented here result in a high level of confidence when there is a conclusion of no risk.

# 8 SUMMARY OF ECOLOGICAL RISKS AND RISK CONCLUSIONS

This section synthesizes the results of the risk characterization and uncertainty analysis to provide an overall conclusion about the ecological risks for Soil Investigation Area 4 and adjacent sampled areas.

## 8.1 Characterization of Risks to Terrestrial Birds

Under baseline conditions, exposure of killdeer to mercury, dioxins and furans, BEHP, HPAH, and PCBs in soils of Soil Investigation Area 4 does not result in risks to the assessment endpoint of stable or increasing populations. These COPCEs present no risk to populations of terrestrial birds represented by killdeer.

Baseline risks to individual birds exposed to cadmium, chromium, copper, lead, and zinc in soils of Soil Investigation Area 4 may be present, particularly for lead and zinc. On the basis of average (CT) exposures, the baseline risks to terrestrial birds resulting from exposure to cadmium, chromium, and copper are negligible. For these three metals, estimated exposures exceed the LOAELs only when the upper-bound estimates of the soil concentrations (i.e., RM exposures) are considered. The probability that exposure will exceed the respective avian LOAEL is 9.7 percent for cadmium, 21 percent for chromium, and 35 percent for copper. Due to uncertainties associated with the conservatism of the TRVs and the methods and models used for exposure assessment, overall risks to individual terrestrial birds associated with cadmium, chromium, and copper are considered low. Baseline risks to the assessment endpoint of stable or increasing populations are considered very low to negligible, primarily because of conservatism in the exposure and toxicity estimates, but also because of the relatively low probabilities that exposures will exceed LOAELs, especially for cadmium and chromium.

Baseline risks to terrestrial birds associated with exposures to lead and zinc in soils of Soil Investigation Area 4are present for individuals, and may be present for the assessment endpoint. The probability that exposure to these metals will exceed the respective LOAEL is 88 percent for lead and 68 percent for zinc. Background exposures to these metals are approximately 25 percent of exposures in the exposure unit evaluated in this BERA.

Uncertainty associated with the exposure and toxicity information is considerable, and should be addressed by risk managers when evaluating remedial alternatives. Nevertheless, terrestrial bird HQs greater than 1 were calculated for several metals, suggesting that risks to individual birds are present and population-level risks may also be present.

## 8.2 Characterization of Risks to Mammals

Under baseline conditions, exposure to COPCEs in soils of Soil Investigation Area 4 does not result in risks to the pocket gopher or opossum, or to other mammals represented by these receptors.

## 8.3 Characterization of Risks to Reptiles

There is insufficient information on the toxicity of COPCEs to reptiles, and about dermal exposures to lipophilic compounds and associated effects on reptiles, to quantitatively address risks to the assessment endpoint of stable or increasing populations of reptiles using Soil Investigation Area 4. Estimated reptile exposure as ingested doses by the common garter snake were compared with those for bird and mammal receptors. The comparison indicates relatively lower potential for oral exposures of reptiles than for birds and mammals to COPCEs under baseline conditions. For this reason, and because risks to COPCEs are low to negligible for birds and mammals, baseline risks to reptiles using Soil Investigation Area 4 are also considered to be low to negligible.

## 8.4 Ecological Risk Assessment Conclusions

There are no risks to burrowing mammals from the presence of VOCs in soils of Soil Investigation Area 4; estimated concentrations in the air of burrows do not reach levels that are toxic to mammals. There are no ecological risks associated with exposures to SVOCs because many were never detected, most are not bioaccumulative, and the most common SVOCs in soils of Soil Investigation Area 4 (LPAH and HPAH) are either below screening values or below levels associated with impediment to the survival, growth, and reproduction in terrestrial birds and mammals. There is no risk to populations of birds, mammals, and reptiles resulting from the presence of most metals, BEHP, HPAHs, PCBs, and dioxins and furans under baseline conditions. For the terrestrial bird, baseline risks are low to negligible for cadmium, chromium, and copper. Baseline risks to individual terrestrial invertivorous

birds represented by the killdeer from exposure to lead and zinc are present, and risks to terrestrial bird populations from exposures to lead and zinc may be present. Risk management approaches should consider the uncertainties associated with exposure estimates and the potential for toxicity under field conditions relative to potential toxicity in the laboratory.

# 9 REFERENCES


Anchor QEA, 2011. Addendum 1 to the Groundwater Study Sampling and Analysis Plan (SAP) for Additional Groundwater Sampling South of Interstate Highway 10 (I-10), San Jacinto River Waste Pits Superfund Site. Prepared for McGinnes Industrial Maintenance Corporation, International Paper Company, and U.S. Environmental Protection Agency, Region 6. Anchor QEA, LLC, Ocean Springs, MS. December 2011.

Anchor QEA, 2012. Chemical Fate and Transport Modeling Study, San Jacinto Waste Pits Superfund Site. Prepared for McGinnes Industrial Maintenance Corporation, International Paper Company, and U.S. Environmental Protection Agency, Region 6. Anchor QEA, LLC, Ocean Springs, MS. February 2012

Anchor QEA and Integral, 2010. Final Remedial Investigation/Feasibility Study Work Plan, San Jacinto Waste Pits Superfund Site. Prepared for McGinnes Industrial Maintenance Corporation, International Paper Company, and U.S. Environmental Protection Agency, Region 6. Anchor QEA, LLC, Ocean Springs, MS, and Integral Consulting Inc., Seattle, WA. November 2010.

Aulerich, R.J., and R.K. Ringer. 1977. Current Status Of PCB Toxicity To Mink, And Effect On Their Reproduction. *Arch. Environ. Contam. Toxicol.* 6:279–292.

Bacci, E., M.J. Cerejeria, C. Gaggi, G. Chemello, D. Calamari, and M. Vighi, 1992. Chlorinated dioxins: volatilization from soils and bioconcentration in plant leaves. *Bull. Environ. Contam. Toxicol.* 48(3):401-408.

Beyer, W. N., E. E. Connor, and S. Gerould. 1994. Estimates of Soil Ingestion by Wildlife. *J. Wildl. Manage*. 58(2):375-382.

Bromilow, R.H., and K. Chamberlain, 1995. Principles Governing Uptake and Transport of Chemicals. In: Plant Contamination Modeling and Simulation of Organic Chemical Processes. S.Trapp, J.C.McFarlone (eds). Lewis Publisher, Boca Raton, FL.

Budinksy, R.A., J.C. Rowlands, S. Casteel, G. Fent, C.A. Cushing, J. Newsted, J.P. Giesy, M.V. Ruby, and L.L. Aylward, 2008. A Pilot Study of Oral Bioavailability of Dioxins and Furans from Contaminated Soils: Impact of Differential Hepatic Enzyme Activity and Species Differences. *Chemosphere* 70:1774-1786.

Burton, D.T., S.D. Turley, D.J. Fisher, D.J. Green, and T.R. Shedd, 2006. Bioaccumulation of Total Mercury and Monomethylmercury in the Earthworm *Eisenia fetida*. *Water Air Soil Poll.* 170:37-54.

California Office of Environmental Health Hazard Assessment (CalOEHHA). 2000. Memorandum: Proposed Action Levels For sec-Butylbenzene and tert-Butylbenzene. 27 October. Available from http://oehha.ca.gov/water/pals/sec_tertBbenz.html.

Carlsen, T.M. 1996. Ecological risks to fossorial vertebrates from volatile organic compounds in soil. *Risk Analysis* 16:211–219.

Chapman, P.M., A. Fairbrother, and D. Brown, 1999. A Critical Evaluation of Safety (Uncertainty) Factors for Ecological Risk Assessment. *Environ. Toxicol. Chem. 17*(1):99-108.

Corl, E., 2001. Bioaccumulation in the Ecological Risk Assessment (ERA) Process. Issue Paper, Navy Guidance for Conducting Ecological Risk Assessments. Available at: http://web.ead.anl.gov/ecorisk/issue/. Naval Facilities Engineering Command, Atlantic Division. August 7, 2001. 12 pp.

Davis, C.D., D.B. Milne, and F.H. Nielsen, 2000. Changes in dietary zinc and copper affect zinc-status indicators of postmenopausal women, notably, extracellular superoxide dismutase and amyloid precursor proteins. *Am. J. Clin. Nutr.* 71:781-788.

Davis, W.B., and D.J. Schmidly, 1994. The Mammals of Texas: Online Edition. Accessed at http://www.nsrl.ttu.edu/tmot1/Default.htm. Accessed on September 27, 2011.

Fengxiang, X.H., Y. Su, Z. Shi, Y. Xia, W. Tian, V. Philips, DL. Monts, M. Gu, and Y. Liang, 2012. Mercury Distribution and Speciation in Floodplain Soils and Uptake into Native Earthworms (Diplocardia spp.). *Geoderma* 170:261-268.

Gallegos, P., J. Lutz, J. Markwiese, R. Ryti, and R. Mirenda. 2007. Wildlife Ecological Screening Levels for Inhalation of Volatile Organic Chemicals. *Environ. Toxicol. Chem*. 26(6):1299–1303.

Gentry, B., E. Wainwright, and D. Blankinship, 2005. Crystal Ball® 7.1 user manual. Decisioneering, Inc., Denver, CO. 357 pp.

Georgia DNR, 2012. Georgia Department of Natural Resources, Wildlife Services Division. Accessed at http://www.georgiawildlife.com/node/937 on July 30, 2012.

Hamilton, Jr., W.J., 1951. The Food of the Opossum in New York State. *J. Wildl. Manage.* 15(3):258-264.

Heinz, G.H., 1979. Methyl Mercury: Reproductive and Behavioral Effects on Three Generations of Mallard Ducks. *J. Wildl. Manage*. 43:394–401.

Helsel, D.R., 2005. Nondetects and Data Analysis: Statistics for Censored Environmental Data. John Wiley & Sons, Inc., Hoboken, NJ.

Hill, E.F., and C.S. Shaffner, 1976. Sexual Maturation And Productivity Of Japanese Quail Fed Graded Concentrations Of Mercuric Chloride. *Poult. Sci*. 55(4):1449–1459.

Hope, B.K. 1995. A Review of Models for Estimating Terrestrial Ecological Receptor Exposure to Chemical Contaminants. *Chemosphere* 30:2267-2287.

Hopkins, D.D., and R.B. Forbes, 1980. Dietary Patterns of the Virginia Opossum in an Urban Environment. *The Murrelet* 61(1):20-30.

Hu, X., B. Wen, S. Zhang, and X. Shan, 2005. Bioavailability of Phthalate Congeners to Earthworms (Eisenia fetida) in Artificially Contaminated Soils. *Ecotoxicol. Environ. Safe.* 62: 26-34.

Integral, 2010a. Sampling and Analysis Plan: Soil Study, San Jacinto Waste Pits Superfund Site. Prepared for McGinnes Industrial Maintenance Corporation, International Paper Company, and U.S. Environmental Protection Agency, Region 6. Integral Consulting Inc., Seattle, WA.

Integral, 2010b. Technical Memorandum on Bioaccumulation Modeling, San Jacinto River Waste Pits Superfund Site. Prepared for McGinnes Industrial Maintenance Corporation, International Paper Company, and U.S. Environmental Protection Agency, Region 6. Integral Consulting Inc., Seattle, WA. September 2010.

Integral, 2010c. Sampling and Analysis Plan: Tissue Study, San Jacinto River Waste Pits Superfund Site. Prepared for McGinnes Industrial Maintenance Corporation, International Paper Company, and U.S. Environmental Protection Agency, Region 6. Integral Consulting Inc., Seattle, WA, September 2010.

Integral, 2011a. COPC Technical Memorandum, San Jacinto River Waste Pits Superfund Site. Prepared for McGinnes Industrial Maintenance Corporation, International Paper

Company, and U.S. Environmental Protection Agency, Region 6. Integral Consulting Inc., Seattle, WA. May 2011.

Integral, 2011b. Draft Addendum 2 to the Sediment Sampling and Analysis Plan (SAP) for Additional Sediment Sampling South of Interstate Highway 10 (I-10), San Jacinto River Waste Pits Superfund Site. Prepared for McGinnes Industrial Maintenance Corporation, International Paper Company, and U.S. Environmental Protection Agency, Region 6. Integral Consulting Inc., Seattle, WA. December, 2011.

Integral, 2012a. Addendum 3 to the Soil Sampling and Analysis Plan (SAP) for Additional Soil Sampling South of Interstate Highway 10 (I-10), San Jacinto River Waste Pits Superfund Site. Prepared for International Paper Company and U.S. Environmental Protection Agency, Region 6. Integral Consulting Inc., Seattle, WA, April 2012.

Integral, 2012b. Baseline Ecological Risk Assessment, San Jacinto River Waste Pits Superfund Site. Prepared for McGinnes Industrial Maintenance Corporation, International Paper Company, and U.S. Environmental Protection Agency, Region 6. Integral Consulting Inc., Seattle, WA. August.

Integral and Anchor QEA, 2010. Sampling and Analysis Plan: Sediment Study. San Jacinto River Waste Pits Superfund Site. Prepared for McGinnes Industrial Maintenance Corporation, International Paper Company, and U.S. Environmental Protection Agency, Region 6. Integral Consulting Inc., Seattle, WA, April 2010.

Integral and Anchor QEA, 2012. Preliminary Site Characterization Report, San Jacinto River Waste Pits Superfund Site. Prepared for McGinnes Industrial Maintenance Corporation, International Paper Company, and U.S. Environmental Protection Agency, Region 6. Integral Consulting Inc., Seattle, WA, and Anchor QEA, LLC, Ocean Springs, MS. July.

Izumi, H., E. Kimura, T. Ota and S. Shimazu. 2005. A Two-Generation Reproductive Study of n-Butylbenzene in Rats. *J. Toxicol. Sci.* 30(Special Issue):21-38.

Jackson, B.J., and J.A. Jackson, 2000. Killdeer (*Charadrius vociferus*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/517.

Kabata-Pendias, A., and H. Pendias, 1992. Trace Elements in Soils and Plants. 2nd edition. CRC Press, Inc., Boca Raton, FL.

Los Alamos National Laboratory (LANL). 2011. ECORISK Database (Release 3.0). LA-UR-11-5460, Los Alamos National Laboratory, Los Alamos, New Mexico. October. Available from http://empress.lanl.gov/reportData/LAUR1105460/LA-UR-11-05460.zip. Accessed 6 September 2012.

Matscheko, M., M. Tysklind, C. de Wit, S. Bergek, R. Andersson, and U. Sellström. 2002. Application of Sewage Sludge to Arable Land–Soil Concentrations of Polybrominated Diphenyl Ethers and Polychorinated Dibenzo-p-dioxins, Dibenzofurans, and Biphenyls, and Their Accumulation in Earthworms. *Environ. Toxicol. Chem*. 21(12):2515–2525.

McCrady, J.K., C. MacFarlane, and L.K. Gander, 1990. The Transport and Fate of 2,3,7,8-TCDD in Soybean and Corn. *Chemosphere* 21(3):359-376.

McCrady, J.J., and S.P. Maggard, 1993. Uptake and Photodegradation of 2,3,7,8-Tetrachlorodibenzo-p-dioxin Sorbed to Grass Foliage. *Environ. Sci. Technol*. 27:343-350.

MNH, 2011. North American Mammals, Online publication. R. Costello and A. Rosenberger, Eds. Smithsonian National Museum of Natural History. Accessed at: http://www.mnh.si.edu/mna/image_info.cfm?species_id=97 on October 19, 2011.

Murray, F.J., F.A. Smith, K.D. Nitschke, C.G. Humiston, R.J. Kociba, and B.A. Schwetz, 1979. Three-Generation Reproduction Study of Rats Given 2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD) in the diet. *Toxicol. Appl. Pharmacol*. 50:241-52.

Nagy, K.A., 2001. Food Requirements of Wild Animals: Predictive Equations for Free-Living Mammals, Reptiles, and Birds. *Nutr. Abs. Rev. Ser. B: Livestock Feeds & Feeding* 71(10):21R–32R.

Nosek, J.A., S.R. Craven, J.R. Sullivan, J.R. Olsen, and R.E. Peterson, 1992. Metabolism and Disposition of 2,3,7,8-Tetrachlorodibenzo-p-dioxin in Ring-Necked Pheasant Hens, Chicks, and Eggs. *J. Toxicol. Environ. Health* 35:153-164.

Opperhuizen, A., and D.T.H.M. Sijm, 1990. Bioaccumulation and Biotransformation of Polychlorinated Dibenzo-p-dioxins and Dibenzofurans in Fish. *Environ. Toxicol. Chem*. 9:175–186.

O'Shea, T. J. and C. J. Stafford. 1980. Phthalate Plasticizers: Accumulation And Effects On Weight And Food Consumption In Captive Starlings. *Bull. Environ. Contam. Toxicol.* 25(1):345-352.

Penn State, 2002. The Virtual Nature Trail at Penn State New Kensington Species Pages: Virginia Opossum. Accessed at http://www.psu.edu/dept/nkbiology/naturetrail/speciespages/opossum.htm on October 3, 2012.

R Core Development Team, 2008. An Introduction to R: Notes on R, A Programming Environment for Data Analysis and Graphics (electronic edition). Accessed at http://cran.r-project.org/doc/manuals/R-intro.pdf. Accessed on December 11, 2011.

Risenbrough, R.W., and D. W. Anderson, 1975. Some Effects of DDE and PCB on Mallards and Their Eggs. *J. Wildl. Mgmt*. 39:508-513.

Sample, B.E., D.M. Opresko, and G.W.I. Suter, 1996. Toxicological Benchmarks for Wildlife: 1996 Revision. ES/ER/TM-86/R3 Contract DE-AC05-84OR21400. Lockheed Martin Energy Systems, Inc., Oak Ridge National Laboratory, Risk Assessment Program, Health Sciences Research Division, Oak Ridge, TN. Appendix A. Available from http://rais.ornl.gov/documents/tm86r3.pdf.

Sample, B.E., M.S. Alpin, R.A. Eforymson, G.W. Suter II, and C.J.E. Welsh. 1997. Methods and Tools for Estimation of the Exposure of Terrestrial Wildlife to Contaminants. Oak Ridge National Laboratory. ORNL/TM-13391. October. Available from http://www.esd.ornl.gov/programs/ecorisk/documents/tm13391.pdf

Sample, B.E., J.J. Beauchamp, R.A. Efroymson, G.W. Suter II, and T.L. Ashwood, 1998. Development and Validation of Bioaccumulation models for Earthworms. ES/ER/TM-220. Prepared for the US Department of Energy, Office of Environmental Management. February 1998.

Singh, A., R. Maichle, and S.E. Lee, 2006. On the Computation of a 95% Upper Confidence Limit of the Unknown Population Mean Based Upon Data Sets with Below Detection

Limit Observations. EPA/600/R-06/022. Lockheed Martin Environmental Services, Contract No. 68-W-04-005. Task Order No. 09. Las Vegas, NV.

Staples, C.A., D.R. Peterson, T.F. Parkerton, and W.J. Adams, 1997. The Environmental Fate of Phthalate Esters: A Literature Review. *Chemosphere* 35:667-749.

Stephens, R.D., M.X. Petreas, and D.G. Hayward, 1995. Biotransfer and Bioaccumulation of Dioxins and Furans from Soil: Chickens as a Model for Foraging Animals. *Sci. Total Environ.* 175:253-273.

Suter, II, G.W. 1993. Ecological Risk Assessment. Lewis Publishers, Chelsea, MI.

T&N Associates, 2002. Dose-Response Assessment from Published Research (1981-1997) of the Toxicity of 2,3,7,8-TCDD and Other Dioxin-like Compounds to Fish and Aquatic-Associated Wildlife - Laboratory Studies. T&N Associates, Inc. Cincinnati, OH. September 2002.

TCEQ, 2006. Update to Guidance for Conducting Ecological Risk Assessments at Remediation Sites in Texas RG-263 (Revised). Remediation Division. January. http://www.tceq.state.tx.us/assets/public/remediation/eco/0106eragupdate.pdf

TPWD. 2012. Rare, Threatened and Endangered Species of Texas. http://www.tpwd.state.tx.us/gis/ris/es/. Accessed September 27, 2012.

Travis, C.C., and A.D. Arms. 1988. Bioconcentration of Organics in Beef, Milk and Vegetation. *Environmental Science and Technology* 22(3):271-274.

TSHA, 2009. The San Jacinto River. Texas State Historical Association. Accessed at: http://www.tshaonline.org/handbook/online/articles/SS/rns9.html. Accessed on December 25, 2009.

UMMZ, 2011. Diversity Web. http://animaldiversity.ummz.umich.edu. Accessed September 26, 2011. University of Michigan, Museum of Zoology, Ann Arbor, MI.

University of Florida, 2005. Microcosm Evaluation of the Bioaccumulation of Organochlorine Pesticides from Soils in the North Shore Restoration Area at Lake Apopka. Final Report. Prepared for the Department of Water Resources, St. Johns River Water Management District, Palatka, FL. University of Florida, Gainesville, FL. July 2005. Available from http://www.sjrwmd.com/technicalreports/pdfs/SP/SJ2005-SP11.pdf.

University of Texas, 1999. Herps of Texas: Frogs and Toads. January 1999. Available at: http://www.zo.utexas.edu/research/txherps/frogs.

US Department of Energy (DOE). 1999. Terrestrial Toxicity Reference Values (TRVs). Environmental Restoration Division. Manual ERD-AG-003, P.7.3. 6 April. Available from http://professionals.pr.doe.gov/srs/soilfiles/rdh/p73.PDF. Accessed 11 September 2012.

USEPA, 1988. Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA. U.S. Environmental Protection Agency, Office of Emergency and Remedial Response, Washington, DC.

USEPA, 1989. Interim Procedures for Estimating Risks Associated with Exposure to Mixtures of Chlorinated Dibenzo-*p*-dioxins and Dibenzofurans (CDDs and CDFs) and 1989 Update. EPA 625/3-89/016. NTIS PB90-145756. U.S. Environmental Protection Agency, Risk Assessment Forum. Washington, DC.

USEPA, 1993. Wildlife Exposure Factors Handbook-Volume 1. General Factors. Office of Research and Development. EPA/600/R-93/187. December. Available from http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=2799.

USEPA, 1997. Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments. EPA 540-R-97-006. U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, Washington, DC.

USEPA, 1998. Guidelines for Ecological Risk Assessment. EPA/630/R-95/002F. U.S. Environmental Protection Agency, Washington, DC.

USEPA, 1999a. Guidance for Conducting Risk Assessments at Hazardous Waste Combustion Sites. U.S. Environmental Protection Agency, Washington, DC.

USEPA, 1999b. Screening Level Ecological Risk Assessment Protocol for Hazardous Waste Combustion Facilities Peer Review Draft, November 1999. Appendix C: Media-to-Receptor Bioconcentration Factors (BCFs). Available at: http://www.epa.gov/osw/hazard/tsd/td/combust/ecorisk.htm. U.S. Environmental Protection Agency, Washington, DC.

USEPA, 2001. Appendix D, Advanced Modeling Approaches for Characterizing Variability and Uncertainty. Risk Assessment Guide for Superfund Volume III - Part A: Process

for Conducting Probabilistic Risk Assessment. EPA 540-R-02-002. Office of Emergency and Remedial Response, U.S. Environmental Protection Agency, Washington, DC.

USEPA, 2003a. Guidance for Developing Ecological Soil Screening Levels (Eco-SSLs). Attachment 1-3. Evaluation of Dermal Contact and Inhalation Exposure Pathways for the Purpose of Setting Eco-SSLs. OSWER Directive 92857-55. November. Available from http://rais.ornl.gov/documents/ecossl_attachment_1-3.pdf.

USEPA, 2003b. Generic Ecological Assessment Endpoints (GEAEs) for Ecological Risk Assessment. EPA/630/P-02/004F. U.S. Environmental Protection Agency, Risk Assessment Forum, Washington, DC. October. Available from http://www.epa.gov/raf/publications/pdfs/GENERIC_ENDPOINTS_2004.PDF

USEPA, 2005a. Guidance for Developing Ecological Soil Screening Levels. OWSER Directive 9285.7-55. Revised February 2005. U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, Washington, DC.

USEPA, 2005b. Ecological Soil Screening Levels for Cadmium. Interim final. OSWER Directive 9285.7-65. U.S. Environmental Protection Agency, Washington, DC.

USEPA, 2005c. Ecological Soil Screening Levels for Lead. Interim final. OSWER Directive 9285.7-70. U.S. Environmental Protection Agency, Washington, DC.

USEPA, 2005d. Ecological Soil Screening Levels for Vanadium. Interim Final. OSWER Directive 9285.7-75. U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, Washington, DC.

USEPA. 2007a. Ecological Soil Screening Levels for Zinc. Interim Final. OSWER Directive 9285.7-73. Office of Solid Waste and Emergency Response. June. Available from http://www.epa.gov/ecotox/ecossl/pdf/eco-ssl_zinc.pdf.

USEPA, 2007b. ProUCL Version 4.0 Technical Guide. U.S. Environmental Protection Agency. Office of Research and Development. EPA/600/R-07/038. April. Available from http://www.epa.gov/osp/hstl/tsc/ProUCL_v4.0_tech.pdf.

USEPA, 2007c. Guidance for Developing Ecological Soil Screening Levels. Attachment 4-1: Exposure Factors and Bioaccumulation Models for Derivation of Wildlife Eco-SSLs.

Table 4a. http://www.epa.gov/ecotox/ecossl/SOPs.htm. U.S. Environmental Protection Agency, Washington, DC.

USEPA. 2007d. Ecological Soil Screening Levels for Copper. Interim Final. OSWER Directive 9285.7-68. Office of Solid Waste and Emergency Response. February. Available from http://www.epa.gov/ecotox/ecossl/pdf/eco-ssl_copper.pdf.

USEPA, 2007e. Framework for Metals Risk Assessment. EPA 120/R-07/001. Office of the Science Advisor, Risk Assessment Forum. U.S. Environmental Protection Agency. Washington D.C. March, 2007.

USEPA.,2007f. Ecological Soil Screening Levels for Polycyclic Aromatic Hydrocarbons (PAHs). Interim Final. OSWER Directive 9285.7-78. Office of Solid Waste and Emergency Response. June. Available from http://www.epa.gov/ecotox/ecossl/pdf/eco-ssl_pah.pdf.

USEPA, 2007g. Ecological Soil Screening Levels for Nickel. Interim final. OSWER Directive 9285.7-76. U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, Washington, DC.

USEPA, 2008a. Framework for Application of the Toxicity Equivalence Methodology for Polychlorinated Dioxins, Furans, and Biphenyls in Ecological Risk Assessment. EPA 100/R-08/004. June 2008. U.S. Environmental Protection Agency, Office of the Science Advisor, Risk Assessment Forum, Washington, DC. Available from http://www.epa.gov/raf/teffframework/pdfs/tefs-draft-052808.pdf.

USEPA, 2008b. Using Fish Tissue Data to Monitor Remedy Effectiveness. OSWER Directive 9200.1-77D. Sediment Assessment and Monitoring Sheet (SAMS) #1. U.S. Environmental Protection Agency, Office of Superfund Remediation and Technology Innovation and Office of Research and Development, Washington, DC. Available from http://www.epa.gov/superfund/health/conmedia/sediment/pdfs/fish_sams.pdf.

USEPA, 2008c. Ecological Soil Screening Levels for Chromium. Interim Final. OSWER Directive 9285.7- 66. U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, Washington DC. April. Available from http://www.epa.gov/ecotox/ecossl/pdf/eco-ssl_chromium.pdf

USEPA, 2009. Unilateral Administrative Order for Remedial Investigation/Feasibility Study. U.S. EPA Region 6 CERCLA Docket No. 06-03-10. In the matter of: San Jacinto River Waste Pits Superfund Site Pasadena, Texas. International Paper Company, Inc. & McGinnes Industrial Management Corporation, respondents.

USEPA, 2010a. Recommended Toxicity Equivalence Factors (TEFs) for Human Health Risk Assessments of 2,3,7,8-Tetrachlorodibenzo-p-Dioxins and Dioxin-Like Compounds. EPA/100/R-10/005. U.S. Environmental Protection Agency, Risk Assessment Forum. Washington, DC.

USEPA, 2010b. Final Report, Bioavailability of Dioxins and Dioxin-Like Compounds in Soil; prepared for U.S. Environmental Protection Agency, Office of Superfund Remediation and Technology Innovation, Environmental Response Team – West, Las Vegas, NV. Prepared by SRC, Inc., Chemical, Biological and Environmental Center, N. Syracuse, NY.

USEPA, 2012. Ecological Soil Screening Levels. Accessed at: http://www.epa.gov/ecotox/ecossl/. Accessed on March 8, 2012. U.S. Environmental Protection Agency, Washington, DC.

USFWS. 2008. Reptiles and Amphibians of the Trinity River National Wildlife Refuge. Updated February 2008. http://www.fws.gov/southwest/refuges/texas/trinityriver/Docs/TrinityRiver85x11Herps2008.pdf. Accessed on September 27, 2012.

Van den Berg, M., L. Bimbaum, A.T. Bosveld, B. Brumstrom, P. Cook, M. Feeley, J.P. Giesy, A. Hanberg, R. Hasegawa, S.W. Kennedy, T. Kubiak, J.C. Larsen, F.X. va Leeuwen, A.K. Liem, C. Nolt, R.E. Peterson, L. Poellinger, S. Safe, D. Schrenk, D. Tillitt, M. Tysklind, M. Younes, F. Waern, and T. Zacharewski, 1998. Toxic Equivalency Factors (TEFs) for PCBs, PCDDs, PCDFs for Humans and Wildlife. *Environ. Health Perspect.* 106:775-792.

Van den Berg, M., L.S. Birnbaum, and M. Denison, 2006. The 2005 World Health Organization Reevaluation of Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-Like Compounds. *Toxicological Sciences* 93(2):223-241.

Weir, S.M., J.G. Suski, and C.J. Salice, 2010. Ecological Risk of Anthropogenic Pollutants to Reptiles: Evaluating Assumptions of Sensitivity and Exposure. *Environ. Pollut.* 158:3596-3606.

WHO, 1998. Assessment of the health risk of dioxins: re¬evaluation of the tolerable daily intake (TDI). World Health Organization European Centre for Environment and Health, International Programme on Chemical Safety.

Wild, S.R., and K.C. Jones, 1992. Organic Chemicals Entering Agricultural Soils in Sewage Sludges: Screening for Their Potential to Transfer to Crop Plants and Livestock. *Sci. Tot. Environ.* 119:85–119.

Zimmerman, R., 2002. Thamnophis sirtalis (On-line), Animal Diversity Web. Accessed at: http://animaldiversity.ummz.umich.edu/site/accounts/information/Thamnophis_sirtalis.html. Accessed on October 24, 2011.

# TABLES

**Table D-1**
**Toxicity Equivalency Factors for Dioxins and Furans and Dioxin-Like PCBs**

| Compound | TEF-M (WHO 2005)[a] | TEF-Bird (WHO 1998) |
|---|---|---|
| **Chlorinated Dibenzo-*p*-dioxins** | | |
| 2,3,7,8-TCDD | 1 | 1 |
| 1,2,3,7,8-PeCDD | 1 | 1 |
| 1,2,3,4,7,8-HxCDD | 0.1 | 0.05 |
| 1,2,3,6,7,8-HxCDD | 0.1 | 0.01 |
| 1,2,3,7,8,9-HxCDD | 0.1 | 0.1 |
| 1,2,3,4,6,7,8-HpCDD | 0.01 | 0.001 |
| OCDD | 0.0003 | 0.0001 |
| **Chlorinated Dibenzofurans** | | |
| 2,3,7,8-TCDF | 0.1 | 1 |
| 1,2,3,7,8-PeCDF | 0.03 | 0.1 |
| 2,3,4,7,8-PeCDF | 0.3 | 1 |
| 1,2,3,4,7,8-HxCDF | 0.1 | 0.1 |
| 1,2,3,6,7,8-HxCDF | 0.1 | 0.1 |
| 1,2,3,7,8,9-HxCDF | 0.1 | 0.1 |
| 2,3,4,6,7,8-HxCDF | 0.1 | 0.1 |
| 1,2,3,4,6,7,8-HpCDF | 0.01 | 0.01 |
| 1,2,3,4,7,8,9-HpCDF | 0.01 | 0.01 |
| OCDF | 0.0003 | 0.0001 |
| **Non-ortho Substituted PCBs** | | |
| 3,3',4,4'-Tetrachlorobiphenyl (PCB 77) | 0.0001 | 0.05 |
| 3,4,4',5-Tetrachlorobiphenyl (PCB 81) | 0.0003 | 0.1 |
| 3,3',4,4',5-Pentachlorobiphenyl (PCB 126) | 0.1 | 0.1 |
| 3,3',4,4',5,5'-Hexachlorobiphenyl (PCB 169) | 0.03 | 0.001 |
| **Mono-ortho Substituted PCBs** | | |
| 2,3,3',4,4'-Pentachlorobiphenyl (PCB 105) | 0.00003 | 0.0001 |
| 2,3,4,4',5-Pentachlorobiphenyl (PCB 114) | 0.00003 | 0.0001 |
| 2,3',4,4',5-Pentachlorobiphenyl (PCB 118) | 0.00003 | 0.000005 |
| 2',3,4,4',5-Pentachlorobiphenyl (PCB 123) | 0.00003 | 0.000005 |
| 2,3,3',4,4',5-Hexachlorobiphenyl (PCB 156) | 0.00003 | 0.0001 |
| 2,3,3',4,4',5'-Hexachlorobiphenyl (PCB 157) | 0.00003 | 0.0001 |
| 2,3',4,4',5,5'-Hexachlorobiphenyl (PCB 167) | 0.00003 | 0.000005 |
| 2,3,3',4,4',5,5'-Heptachlorobiphenyl (PCB 189) | 0.00003 | 0.000005 |

**Sources**

WHO (1998) corresponds to Van den Berg et al. (1997)
WHO (2005) corresponds to Van den Berg et al. (2006)

**Notes**

PCB = polychlorinated biphenyl
TEF-M = mammalian toxicity equivalency factor

a - endorsed by USEPA (2010a)

**Table D-2**
**Chemicals of Potential Ecological Concern for the Area of Investigation South of I-10**

| $COPC_E$s | Southern Impoundment Soil Receptors | |
|---|---|---|
| | Birds, Reptiles, Mammals (0 to 6 Inches) | Burrowing Mammals (0 to 24 Inches) |
| **Metals** | | |
| Cadmium | X | X |
| Chromium | X | X |
| Copper | X | X |
| Lead | X | X |
| Mercury | X | X |
| Nickel | -- | X |
| Zinc | X | X |
| **Polychlorinated Biphenyls** | | |
| Total PCBs | X | X |
| **Organics** | | |
| Dioxins/Furans | X | X |
| **Semivolatile Organic Compounds** | | |
| Bis(2-ethylhexyl) phthalate | X | X |
| Total HPAH | X | X |

**Notes**

-- = not applicable

$COPC_E$s = chemicals of potential ecological concern

HPAH = high molecular weight polycyclic aromatic hydrocarbons

PCBs = polychlorinated biphenyls

**Table D-3**
**COI Detection Frequency in All Soil Samples from Soil Investigation Area 4 and Adjacent Sampled Areas**

| Analyte | Total Number of Samples | Number of Detections | Detection Frequency (percent) | COI[a] | Maximum Detected Concentration | SLERA Southern Impoundment COPC[b] |
|---|---|---|---|---|---|---|
| **Metals (mg/kg dw)** | | | | | | |
| Aluminum | 138 | 138 | 100 | Yes | 17,900 | |
| Arsenic | 138 | 138 | 100 | Yes | 390 | |
| Barium | 138 | 138 | 100 | Yes | 2,280 | |
| Cadmium | 138 | 121 | 87.7 | Yes | 6.96 | Yes |
| Chromium | 138 | 138 | 100 | Yes | 325 | Yes |
| Cobalt | 138 | 138 | 100 | Yes | 67.3 | |
| Copper | 138 | 138 | 100 | Yes | 1,990 | Yes |
| Lead | 138 | 138 | 100 | Yes | 896 | Yes |
| Magnesium | 137 | 137 | 100 | Yes | 14,900 | |
| Manganese | 138 | 138 | 100 | Yes | 33,500 | |
| Mercury | 138 | 136 | 98.6 | Yes | 2.81 | Yes |
| Nickel | 138 | 138 | 100 | Yes | 596 | |
| Thallium | 138 | 54 | 39.1 | Yes | 14 | |
| Vanadium | 138 | 138 | 100 | Yes | 110 | |
| Zinc | 138 | 138 | 100 | Yes | 8,050 | Yes |
| **Polychlorinated Biphenyl Congeners (µg/kg dw)** | | | | | | |
| Total PCBs | | | | | | Yes |
| Total PCB Aroclors | 72 | 42 | 58.3 | Yes | 638 | |
| Total PCB congeners (43) | 75 | 74 | 98.7 | Yes | 3,150 | |
| **Organics** | | | | | | |
| Dioxins/furans (ng/kg dw) | | | | | | Yes |
| $TEQ_{DF,B}$ | 250 | 250 | 100 | Yes | 169,000 | |
| $TEQ_{DF,M}$ | 250 | 250 | 100 | Yes | 50,100 | |
| **Semivolatile Organic Compounds (µg/kg dw)** | | | | | | |
| Benzoic acid | 64 | 0 | 0.0 | No | NA | |
| Benzyl alcohol | 64 | 2 | 3.1 | No | NA | |
| Bis(2-chloroethoxy)methane | 65 | 0 | 0.0 | No | NA | |
| Bis(2-chloroethyl) ether | 65 | 0 | 0.0 | No | NA | |
| Bis(2-chloroisopropyl) ether | 65 | 0 | 0.0 | No | NA | |
| Bis(2-ethylhexyl) phthalate | 137 | 89 | 65.0 | Yes | 26,000 | Yes |
| 4-Bromophenyl phenyl ether | 65 | 0 | 0.0 | No | NA | |

**Table D-3**
**COI Detection Frequency in All Soil Samples from Soil Investigation Area 4 and Adjacent Sampled Areas**

| Analyte | Total Number of Samples | Number of Detections | Detection Frequency (percent) | COI[a] | Maximum Detected Concentration | SLERA Southern Impoundment COPC[b] |
|---|---|---|---|---|---|---|
| Butyl benzyl phthalate | 65 | 28 | 43.1 | Yes | 1,800 | |
| Carbazole | 135 | 47 | 34.8 | Yes | 240 | |
| 4-Chloro-3-methylphenol | 64 | 0 | 0.0 | No | NA | |
| 4-Chloroaniline | 65 | 1 | 1.5 | No | NA | |
| 2-Chloronaphthalene | 65 | 0 | 0.0 | No | NA | |
| 2-Chlorophenol | 64 | 0 | 0.0 | No | NA | |
| 4-Chlorophenyl phenyl ether | 65 | 0 | 0.0 | No | NA | |
| Dibenzofuran | 65 | 5 | 7.7 | Yes | 100 | |
| 3,3'-Dichlorobenzidine | 65 | 0 | 0.0 | No | NA | |
| 2,4-Dichlorophenol | 136 | 0 | 0.0 | No | NA | |
| Diethyl phthalate | 65 | 0 | 0.0 | No | NA | |
| Dimethyl phthalate | 65 | 19 | 29.2 | Yes | 1,900 | |
| 2,4-Dimethylphenol | 64 | 0 | 0.0 | No | NA | |
| Di-*n* -butyl phthalate | 65 | 16 | 24.6 | Yes | 1,100 | |
| 2,4-Dinitrophenol | 64 | 0 | 0.0 | No | NA | |
| 2,4-Dinitrotoluene | 65 | 0 | 0.0 | No | NA | |
| 2,6-Dinitrotoluene | 65 | 0 | 0.0 | No | NA | |
| Di-*n* -octyl phthalate | 65 | 3 | 4.6 | No | NA | |
| Hexachlorobenzene | 135 | 3 | 2.2 | No | NA | |
| Hexachlorocyclopentadiene | 65 | 0 | 0.0 | No | NA | |
| Hexachloroethane | 65 | 0 | 0.0 | No | NA | |
| Isophorone | 65 | 0 | 0.0 | No | NA | |
| 2-Methyl-4,6-dinitrophenol | 64 | 0 | 0.0 | No | NA | |
| 2-Methylphenol | 64 | 0 | 0.0 | No | NA | |
| 4-Methylphenol | 64 | 1 | 1.6 | No | NA | |
| 2-Nitroaniline | 65 | 0 | 0.0 | No | NA | |
| 3-Nitroaniline | 65 | 0 | 0.0 | No | NA | |
| 4-Nitroaniline | 65 | 0 | 0.0 | No | NA | |
| Nitrobenzene | 65 | 0 | 0.0 | No | NA | |
| 2-Nitrophenol | 64 | 0 | 0.0 | No | NA | |
| 4-Nitrophenol | 63 | 0 | 0.0 | No | NA | |
| *N* -Nitrosodi-*n* -propylamine | 65 | 0 | 0.0 | No | NA | |

**Table D-3**
**COI Detection Frequency in All Soil Samples from Soil Investigation Area 4 and Adjacent Sampled Areas**

| Analyte | Total Number of Samples | Number of Detections | Detection Frequency (percent) | COI[a] | Maximum Detected Concentration | SLERA Southern Impoundment COPC[b] |
|---|---|---|---|---|---|---|
| *N* -Nitrosodiphenylamine | 65 | 1 | 1.5 | No | NA | |
| Pentachlorophenol | 135 | 0 | 0.0 | No | NA | |
| Phenol | 136 | 17 | 12.5 | Yes | 180 | |
| 2,4,5-Trichlorophenol | 136 | 0 | 0.0 | No | NA | |
| 2,4,6-Trichlorophenol | 136 | 0 | 0.0 | No | NA | |
| Total LPAH | 63 | 49 | 77.8 | Yes | 2,970 | |
| Total HPAH | 65 | 53 | 81.5 | Yes | 9,270 | |
| Volatile Organic Compounds (µg/kg dw) | | | | | | |
| Acetone | 72 | 38 | 52.8 | Yes | 1,600 | |
| Benzene | 72 | 69 | 95.8 | Yes | 73 | |
| Bromobenzene | 72 | 0 | 0.0 | No | NA | |
| Bromochloromethane | 72 | 0 | 0.0 | No | NA | |
| Bromodichloromethane | 72 | 0 | 0.0 | No | NA | |
| Bromoform | 72 | 0 | 0.0 | No | NA | |
| Bromomethane | 72 | 6 | 8.3 | Yes | 2.5 | |
| 2-Butanone | 72 | 54 | 75.0 | Yes | 320 | |
| *n* -Butylbenzene | 72 | 20 | 27.8 | Yes | 450 | |
| *sec* -Butylbenzene | 72 | 21 | 29.2 | Yes | 730 | |
| *tert* -Butylbenzene | 72 | 3 | 4.2 | No | NA | |
| Carbon disulfide | 72 | 65 | 90.3 | Yes | 83 | |
| Carbon tetrachloride | 72 | 2 | 2.8 | No | NA | |
| Chlorobenzene | 72 | 13 | 18.1 | Yes | 6.5 | |
| Chloroethane | 72 | 2 | 2.8 | No | NA | |
| Chloroform | 144 | 16 | 11.1 | Yes | 100 | |
| Chloromethane | 72 | 9 | 12.5 | Yes | 5.2 | |
| 2-Chlorotoluene | 72 | 0 | 0.0 | No | NA | |
| 4-Chlorotoluene | 72 | 0 | 0.0 | No | NA | |
| 1,2-Dibromo-3-chloropropane | 72 | 0 | 0.0 | No | NA | |
| Dibromochloromethane | 72 | 0 | 0.0 | No | NA | |
| 1,2-Dibromoethane | 72 | 0 | 0.0 | No | NA | |
| Dibromomethane | 72 | 0 | 0.0 | No | NA | |
| 1,2-Dichlorobenzene | 144 | 17 | 11.8 | Yes | 94 | |

**Table D-3**
**COI Detection Frequency in All Soil Samples from Soil Investigation Area 4 and Adjacent Sampled Areas**

| Analyte | Total Number of Samples | Number of Detections | Detection Frequency (percent) | COI[a] | Maximum Detected Concentration | SLERA Southern Impoundment COPC[b] |
|---|---|---|---|---|---|---|
| 1,3-Dichlorobenzene | 144 | 26 | 18.1 | Yes | 330 | |
| 1,4-Dichlorobenzene | 144 | 22 | 15.3 | Yes | 50 | |
| Dichlorodifluoromethane | 72 | 0 | 0.0 | No | NA | |
| 1,1-Dichloroethane | 72 | 0 | 0.0 | No | NA | |
| 1,2-Dichloroethane | 72 | 0 | 0.0 | No | NA | |
| 1,1-Dichloroethene | 72 | 0 | 0.0 | No | NA | |
| *cis* -1,2-Dichloroethene | 72 | 1 | 1.4 | No | NA | |
| *trans* -1,2-Dichloroethene | 72 | 5 | 6.9 | Yes | 1.2 | |
| 1,2-Dichloropropane | 72 | 0 | 0.0 | No | NA | |
| 1,3-Dichloropropane | 72 | 0 | 0.0 | No | NA | |
| 2,2-Dichloropropane | 72 | 2 | 2.8 | No | NA | |
| 1,1-Dichloropropene | 72 | 0 | 0.0 | No | NA | |
| *cis* -1,3-Dichloropropene | 72 | 0 | 0.0 | No | NA | |
| *trans* -1,3-Dichloropropene | 72 | 0 | 0.0 | No | NA | |
| Ethylbenzene | 72 | 46 | 63.9 | Yes | 120 | |
| Hexachlorobutadiene | 72 | 0 | 0.0 | No | NA | |
| 2-Hexanone | 72 | 1 | 1.4 | No | NA | |
| Isopropylbenzene | 72 | 36 | 50.0 | Yes | 17,000 | |
| 4-Isopropyltoluene | 72 | 40 | 55.6 | Yes | 630 | |
| 4-Methyl-2-pentanone | 72 | 3 | 4.2 | No | NA | |
| Methylene chloride | 72 | 0 | 0.0 | No | NA | |
| *n* -Propylbenzene | 72 | 30 | 41.7 | Yes | 280 | |
| Styrene | 72 | 8 | 11.1 | Yes | 1.4 | |
| 1,1,1,2-Tetrachloroethane | 72 | 0 | 0.0 | No | NA | |
| 1,1,2,2-Tetrachloroethane | 72 | 0 | 0.0 | No | NA | |
| Tetrachloroethene | 72 | 0 | 0.0 | No | NA | |
| Toluene | 72 | 67 | 93.1 | Yes | 110 | |
| 1,2,3-Trichlorobenzene | 144 | 0 | 0.0 | No | NA | |
| 1,2,4-Trichlorobenzene | 144 | 5 | 3.5 | No | NA | |
| 1,1,2-Trichloroethane | 72 | 0 | 0.0 | No | NA | |
| 1,1,1-Trichloroethane | 72 | 0 | 0.0 | No | NA | |
| Trichloroethene | 72 | 4 | 5.6 | Yes | 3.4 | |

**Table D-3**
**COI Detection Frequency in All Soil Samples from Soil Investigation Area 4 and Adjacent Sampled Areas**

| Analyte | Total Number of Samples | Number of Detections | Detection Frequency (percent) | COI[a] | Maximum Detected Concentration | SLERA Southern Impoundment COPC[b] |
|---|---|---|---|---|---|---|
| Trichlorofluoromethane | 72 | 1 | 1.4 | No | NA | |
| 1,2,3-Trichloropropane | 72 | 0 | 0.0 | No | NA | |
| 1,2,4-Trimethylbenzene | 72 | 47 | 65.3 | Yes | 16 | |
| 1,3,5-Trimethylbenzene | 72 | 31 | 43.1 | Yes | 6.8 | |
| Vinyl chloride | 72 | 2 | 2.8 | No | NA | |
| *o* -Xylene | 72 | 45 | 62.5 | Yes | 120 | |
| *m,p* -Xylenes | 72 | 59 | 81.9 | Yes | 270 | |

**Notes**

COI = chemical of interest
COPC = chemical of potential concern
dw = dry weight
HPAH = high molecular weight polycyclic aromatic hydrocarbon
LPAH = low molecular weight polycyclic aromatic hydrocarbon
NA = not applicable (analyte is not a COI)
PCB = polychlorinated biphenyl
SLERA = screening level ecological risk assessment
$TEQ_{DF,B}$ = Toxicity equivalent for dioxins and furans calculated using avian toxicity equivalency factors with nondetects set at one-half the detection limit.
$TEQ_{DF,M}$ (ND=1/2DL) = Toxicity equivalent for 2,3,7,8-tetrachlorinated dibenzo-p-dioxin (TCDD) calculated using dioxins and furans and mammalian toxicity equivalency factors (van den Berg et al. 2006) with nondetects set at one-half the detection limit.

a - COIs are those chemicals that are detected in greater than 5 percent of samples.
b - from Table 1-2 of the PSCR (Integral and Anchor QEA 2012)

**Table D-4**
**$COI_{SI}$ Detection Frequency in Soil Samples from Soil Investigation Area 4 and Adjacent Sampled Areas, 0- to 6-Inch Depth Interval**

| COI[a] | Total Number of Samples | Number of Detections | Detection Frequency (percent) | $COI_{SI}$[b] | Maximum Detected Concentration | SLERA Southern Impoundment COPC[c] |
|---|---|---|---|---|---|---|
| **Metals (mg/kg dw)** | | | | | | |
| Aluminum | 22 | 22 | 100 | Yes | 11,400 | |
| Arsenic | 22 | 22 | 100 | Yes | 390 | |
| Barium | 22 | 22 | 100 | Yes | 840 | |
| Cadmium | 22 | 22 | 100 | Yes | 6.96 | Yes |
| Chromium | 22 | 22 | 100 | Yes | 86.3 | Yes |
| Cobalt | 22 | 22 | 100 | Yes | 67.3 | |
| Copper | 22 | 22 | 100 | Yes | 1,990 | Yes |
| Lead | 22 | 22 | 100 | Yes | 896 | Yes |
| Magnesium | 22 | 22 | 100 | Yes | 14,900 | |
| Manganese | 22 | 22 | 100 | Yes | 10,500 | |
| Mercury | 22 | 22 | 100 | Yes | 0.628 | Yes |
| Nickel | 22 | 22 | 100 | Yes | 71.1 | |
| Thallium | 22 | 12 | 54.5 | Yes | 9.8 | |
| Vanadium | 22 | 22 | 100 | Yes | 110 | |
| Zinc | 22 | 22 | 100 | Yes | 8,050 | Yes |
| **Polychlorinated Biphenyl Congeners (µg/kg dw)** | | | | | | |
| Total PCBs | | | | | | Yes |
| Total PCB Aroclors | 10 | 8 | 80.0 | Yes | 119 | |
| Total PCB congeners (43) | 11 | 11 | 100 | Yes | 276 | |
| **Organics** | | | | | | |
| Dioxins/Furans (ng/kg dw) | | | | | | Yes |
| $TEQ_{DF, B}$ | 26 | 26 | 100 | Yes | 107 | |
| $TEQ_{DF, M}$ | 26 | 26 | 100 | Yes | 36.9 | |
| **Semivolatile Organic Compounds (µg/kg dw)** | | | | | | |
| Bis(2-ethylhexyl) phthalate | 21 | 20 | 95.2 | Yes | 3,500 | Yes |
| Butyl benzyl phthalate | 11 | 7 | 63.6 | Yes | 860 | |
| Carbazole | 21 | 13 | 61.9 | Yes | 48 | |
| Dibenzofuran | 11 | 1 | 9.1 | Yes | 22 | |

**Table D-4**
**$COI_{SI}$ Detection Frequency in Soil Samples from Soil Investigation Area 4 and Adjacent Sampled Areas, 0- to 6-Inch Depth Interval**

| COI[a] | Total Number of Samples | Number of Detections | Detection Frequency (percent) | $COI_{SI}$[b] | Maximum Detected Concentration | SLERA Southern Impoundment COPC[c] |
|---|---|---|---|---|---|---|
| Dimethyl phthalate | 11 | 5 | 45.5 | Yes | 200 | |
| Di-*n* -butyl phthalate | 11 | 4 | 36.4 | Yes | 130 | |
| Phenol | 21 | 3 | 14.3 | Yes | 6.4 | |
| Total LPAH | 10 | 10 | 100 | Yes | 435 | |
| Total HPAH | 11 | 11 | 100 | Yes | 4,840 | |
| Volatile Organic Compounds (µg/kg dw) | | | | | | |
| Acetone | 10 | 7 | 70.0 | Yes | 240 | |
| Benzene | 10 | 10 | 100 | Yes | 17 | |
| Bromomethane | 10 | 3 | 30.0 | Yes | 2.5 | |
| 2-Butanone | 10 | 8 | 80.0 | Yes | 39 | |
| *n* -Butylbenzene | 10 | 1 | 10.0 | Yes | 0.32 | |
| *sec* -Butylbenzene | 10 | 0 | 0.0 | No | NA | |
| Carbon disulfide | 10 | 9 | 90.0 | Yes | 20 | |
| Chlorobenzene | 10 | 1 | 10.0 | Yes | 0.17 | |
| Chloroform | 20 | 1 | 5.0 | No | NA | |
| Chloromethane | 10 | 1 | 10.0 | Yes | 4.1 | |
| 1,2-Dichlorobenzene | 20 | 0 | 0.0 | No | NA | |
| 1,3-Dichlorobenzene | 20 | 0 | 0.0 | No | NA | |
| 1,4-Dichlorobenzene | 20 | 0 | 0.0 | No | NA | |
| *trans* -1,2-Dichloroethene | 10 | 1 | 10.0 | Yes | 0.44 | |
| Ethylbenzene | 10 | 8 | 80.0 | Yes | 4 | |
| Isopropylbenzene | 10 | 3 | 30.0 | Yes | 0.32 | |
| 4-Isopropyltoluene | 10 | 2 | 20.0 | Yes | 0.19 | |
| *n* -Propylbenzene | 10 | 3 | 30.0 | Yes | 0.61 | |
| Styrene | 10 | 0 | 0.0 | No | NA | |
| Toluene | 10 | 8 | 80.0 | Yes | 17 | |

**Table D-4**
**$COI_{SI}$ Detection Frequency in Soil Samples from Soil Investigation Area 4 and Adjacent Sampled Areas, 0- to 6-Inch Depth Interval**

| COI[a] | Total Number of Samples | Number of Detections | Detection Frequency (percent) | $COI_{SI}$[b] | Maximum Detected Concentration | SLERA Southern Impoundment COPC[c] |
|---|---|---|---|---|---|---|
| Trichloroethene | 10 | 0 | 0.0 | No | NA | |
| 1,2,4-Trimethylbenzene | 10 | 6 | 60.0 | Yes | 1 | |
| 1,3,5-Trimethylbenzene | 10 | 3 | 30.0 | Yes | 0.46 | |
| *o* -Xylene | 10 | 5 | 50.0 | Yes | 1.9 | |
| *m,p* -Xylenes | 10 | 10 | 100 | Yes | 4.1 | |

**Notes**

COI = chemical of interest

COPC = chemical of potential concern

dw = dry weight

HPAH = high molecular weight polycyclic aromatic hydrocarbon

LPAH = low molecular weight polycyclic aromatic hydrocarbon

NA = not applicable (analyte is not a $COI_{SI}$)

PCB = polychlorinated biphenyl

SLERA = screening level ecological risk assessment

$TEQ_{DF,B}$ = Toxicity equivalent for dioxins and furans calculated using avian toxicity equivalency factors with nondetects set at one-half the detection limit.

$TEQ_{DF,M}$ (ND=1/2DL) = Toxicity equivalent for 2,3,7,8-tetrachlorinated dibenzo-p-dioxin (TCDD) calculated using dioxins and furans and mammalian toxicity equivalency factors (van den Berg et al. 2006) with nondetects set at one-half the detection limit.

a - COIs are those chemicals that are detected in greater than 5 percent of all soil samples from Soil Investigation Area 4.

b - $COI_{SI}$s are those COIs that are detected in greater than 5 percent of all Soil Investigation Area 4 soil samples for a specific depth interval of interest.

c - The southern impoundment screening level ecological risk assessment (SLERA) was included as Appendix E to the BERA for the impoundments north of I-10 and aquatic environment (Integral 2012b).

**Table D-5**
**$COI_{SI}$ Detection Frequency in Soil Samples from Soil Investigation Area 4 and Adjacent Sampled Areas, 0- to 24-Inch Depth Interval**

| COI[a] | Total Number of Samples | Number of Detections | Detection Frequency (percent) | $COI_{SI}$[b] | Maximum Detected Concentration | SLERA Southern Impoundment COPC[c] |
|---|---|---|---|---|---|---|
| **Metals (mg/kg dw)** | | | | | | |
| Aluminum | 61 | 61 | 100 | Yes | 17,900 | |
| Arsenic | 61 | 61 | 100 | Yes | 390 | |
| Barium | 61 | 61 | 100 | Yes | 1,430 | |
| Cadmium | 61 | 58 | 95.1 | Yes | 6.96 | Yes |
| Chromium | 61 | 61 | 100 | Yes | 215 | Yes |
| Cobalt | 61 | 61 | 100 | Yes | 67.3 | |
| Copper | 61 | 61 | 100 | Yes | 1,990 | Yes |
| Lead | 61 | 61 | 100 | Yes | 896 | Yes |
| Magnesium | 60 | 60 | 100 | Yes | 14,900 | |
| Manganese | 61 | 61 | 100 | Yes | 33,500 | |
| Mercury | 61 | 59 | 96.7 | Yes | 0.628 | Yes |
| Nickel | 61 | 61 | 100 | Yes | 596 | |
| Thallium | 61 | 28 | 45.9 | Yes | 9.8 | |
| Vanadium | 61 | 61 | 100 | Yes | 110 | |
| Zinc | 61 | 61 | 100 | Yes | 8,050 | Yes |
| **Polychlorinated Biphenyl Congeners (µg/kg dw)** | | | | | | |
| Total PCBs | | | | | | Yes |
| Total PCB Aroclors | 27 | 21 | 77.8 | Yes | 427 | |
| Total PCB congeners (43) | 33 | 33 | 100 | Yes | 535 | |
| **Organics** | | | | | | |
| Dioxins/Furans (ng/kg dw) | | | | | | Yes |
| $TEQ_{DF, B}$ | 78 | 78 | 100 | Yes | 897 | |
| $TEQ_{DF, M}$ | 78 | 78 | 100 | Yes | 303 | |
| **Semivolatile Organic Compounds (µg/kg dw)** | | | | | | |
| Bis(2-ethylhexyl) phthalate | 60 | 48 | 80.0 | Yes | 3,500 | Yes |
| Butyl benzyl phthalate | 33 | 18 | 54.5 | Yes | 910 | |
| Carbazole | 58 | 30 | 51.7 | Yes | 240 | |
| Dibenzofuran | 33 | 4 | 12.1 | Yes | 100 | |

**Table D-5**
**$COI_{SI}$ Detection Frequency in Soil Samples from Soil Investigation Area 4 and Adjacent Sampled Areas, 0- to 24-Inch Depth Interval**

| COI[a] | Total Number of Samples | Number of Detections | Detection Frequency (percent) | $COI_{SI}$[b] | Maximum Detected Concentration | SLERA Southern Impoundment COPC[c] |
|---|---|---|---|---|---|---|
| Dimethyl phthalate | 33 | 10 | 30.3 | Yes | 270 | |
| Di-*n* -butyl phthalate | 33 | 8 | 24.2 | Yes | 130 | |
| Phenol | 60 | 6 | 10.0 | Yes | 6.4 | |
| Total LPAH | 32 | 30 | 93.8 | Yes | 1,950 | |
| Total HPAH | 33 | 33 | 100 | Yes | 6,840 | |
| Volatile Organic Compounds (µg/kg dw) | | | | | | |
| Acetone | 32 | 18 | 56.3 | Yes | 330 | |
| Benzene | 32 | 32 | 100 | Yes | 73 | |
| Bromomethane | 32 | 5 | 15.6 | Yes | 2.5 | |
| 2-Butanone | 32 | 25 | 78.1 | Yes | 50 | |
| *n* -Butylbenzene | 32 | 10 | 31.3 | Yes | 0.96 | |
| *sec* -Butylbenzene | 32 | 6 | 18.8 | Yes | 0.58 | |
| Carbon disulfide | 32 | 30 | 93.8 | Yes | 83 | |
| Chlorobenzene | 32 | 2 | 6.3 | Yes | 0.21 | |
| Chloroform | 59 | 4 | 6.8 | Yes | 3.5 | |
| Chloromethane | 32 | 6 | 18.8 | Yes | 5.2 | |
| 1,2-Dichlorobenzene | 59 | 0 | 0.0 | No | NA | |
| 1,3-Dichlorobenzene | 59 | 0 | 0.0 | No | NA | |
| 1,4-Dichlorobenzene | 59 | 0 | 0.0 | No | NA | |
| *trans* -1,2-Dichloroethene | 32 | 2 | 6.3 | Yes | 0.44 | |
| Ethylbenzene | 32 | 28 | 87.5 | Yes | 25 | |
| Isopropylbenzene | 32 | 14 | 43.8 | Yes | 2.5 | |
| 4-Isopropyltoluene | 32 | 15 | 46.9 | Yes | 0.73 | |
| *n* -Propylbenzene | 32 | 15 | 46.9 | Yes | 2.5 | |
| Styrene | 32 | 5 | 15.6 | Yes | 1.4 | |
| Toluene | 32 | 30 | 93.8 | Yes | 110 | |

**Table D-5**
**$COI_{SI}$ Detection Frequency in Soil Samples from Soil Investigation Area 4 and Adjacent Sampled Areas, 0- to 24-Inch Depth Interval**

| COI[a] | Total Number of Samples | Number of Detections | Detection Frequency (percent) | $COI_{SI}$[b] | Maximum Detected Concentration | SLERA Southern Impoundment COPC[c] |
|---|---|---|---|---|---|---|
| Trichloroethene | 32 | 2 | 6.3 | Yes | 3.4 | |
| 1,2,4-Trimethylbenzene | 32 | 23 | 71.9 | Yes | 3.8 | |
| 1,3,5-Trimethylbenzene | 32 | 12 | 37.5 | Yes | 1.3 | |
| *o* -Xylene | 32 | 20 | 62.5 | Yes | 11 | |
| *m,p* -Xylenes | 32 | 31 | 96.9 | Yes | 25 | |

**Notes**

COI = chemical of interest
COPC = chemical of potential concern
dw = dry weight
HPAH = high molecular weight polycyclic aromatic hydrocarbon
LPAH = low molecular weight polycyclic aromatic hydrocarbon
NA = not applicable (analyte is not a $COI_{SI}$)
PCB = polychlorinated biphenyl
SLERA = screening level ecological risk assessment
$TEQ_{DF,B}$ = Toxicity equivalent for dioxins and furans calculated using avian toxicity equivalency factors with nondetects set at one-half the detection limit.
$TEQ_{DF,M}$ (ND=1/2DL) = Toxicity equivalent for 2,3,7,8-tetrachlorinated dibenzo-p-dioxin (TCDD) calculated using dioxins and furans and mammalian toxicity equivalency factors (van den Berg et al. 2006) with nondetects set at one-half the detection limit.

a - COIs are those chemicals that are detected in greater than 5 percent of all Soil Investigation Area 4 samples.
b - $COI_{SI}$s are those COIs that are detected in greater than 5 percent of all Soil Investigation Area 4 samples for a specific depth interval of interest.
c - The southern impoundment screening level ecological risk assessment (SLERA) was included as Appendix E to the BERA for the area north of I-10 and aquatic environment (Integral 2012b).

**Table D-6**
**Ecological Risk Screening Levels for Soils**

| Analyte | Soil Benchmark Values | | Background Values | | |
|---|---|---|---|---|---|
| | Mammalian Eco-SSL[a] | Avian Eco-SSL[a] | Site-Specific Median Surface[b] Soil Background | Site-Specific Median Subsurface[c] Soil Background | TCEQ Median[d] Background |
| **Metals (mg/kg dw)** | | | | | |
| Aluminum | NA | NA | 8,540 | 7,815 | 30,000 |
| Arsenic | 46 | 43 | 2.19 | 2.415 | 5.9 |
| Barium | 2,000 | NA | 88.5 | 55.85 | 300 |
| Cadmium | 0.36 | 0.77 | 0.096 | 0.0585 | NA |
| Chromium | NA | NA | 8.395 | 7.88 | 30 |
| Cobalt | 230 | 120 | 4.03 | 3.18 | 7 |
| Copper | 49 | 28 | 6.8 | 6.1 | 15 |
| Lead | 56 | 11 | 17 | 12.65 | 15 |
| Magnesium | NA | NA | 1,128 | 755.5 | NA |
| Manganese | 4,000 | 4,300 | 198 | 130 | 300 |
| Mercury | NA | NA | 0.029 | 0.0285 | 0.04 |
| Nickel | 130 | 210 | 6.075 | 4.1 | 10 |
| Thallium | NA | NA | 0.07 | 0.082 | 0.7 |
| Vanadium | 280 | 7.8 | 20.9 | 24.3 | 50 |
| Zinc | 79 | 46 | 31.9 | 19.25 | 30 |
| **Polychlorinated Biphenyl Congeners (µg/kg dw)** | | | | | |
| Total PCBs | | | | | |
| Total PCB Aroclors | NA | NA | 85.5 | 85.5 | 9.5[e] |
| Total PCB congeners (43) | NA | NA | NA | NA | NA |
| **Organics** | | | | | |
| Dioxins/Furans (ng/kg dw) | | | | | |
| $TEQ_{DF, B}$ | NA | NA | NA | NA | NA |
| $TEQ_{DF, M}$ | NA | NA | 1.04 | 0.507 | NA |
| **Semivolatile Organic Compounds (µg/kg dw)** | | | | | |
| Benzoic acid | NA | NA | NA | NA | NA |
| Benzyl alcohol | NA | NA | NA | NA | NA |
| Bis(2-chloroethoxy)methane | NA | NA | NA | NA | NA |
| Bis(2-chloroethyl) ether | NA | NA | NA | NA | NA |
| Bis(2-chloroisopropyl) ether | NA | NA | NA | NA | NA |
| Bis(2-ethylhexyl) phthalate | NA | NA | 8.1 | 3.5 | NA |
| 4-Bromophenyl phenyl ether | NA | NA | NA | NA | NA |
| Butyl benzyl phthalate | NA | NA | NA | NA | NA |
| Carbazole | NA | NA | 0.65 | 0.65 | NA |

**Table D-6**
**Ecological Risk Screening Levels for Soils**

| Analyte | Soil Benchmark Values | | Background Values | | |
|---|---|---|---|---|---|
| | Mammalian Eco-SSL[a] | Avian Eco-SSL[a] | Site-Specific Median Surface[b] Soil Background | Site-Specific Median Subsurface[c] Soil Background | TCEQ Median[d] Background |
| 4-Chloro-3-methylphenol | NA | NA | NA | NA | NA |
| 4-Chloroaniline | NA | NA | NA | NA | NA |
| 2-Chloronaphthalene | NA | NA | NA | NA | NA |
| 2-Chlorophenol | NA | NA | NA | NA | NA |
| 4-Chlorophenyl phenyl ether | NA | NA | NA | NA | NA |
| Dibenzofuran | NA | NA | NA | NA | NA |
| 3,3'-Dichlorobenzidine | NA | NA | NA | NA | NA |
| 2,4-Dichlorophenol | NA | NA | 0.5 | 0.5 | NA |
| Diethyl phthalate | NA | NA | NA | NA | NA |
| Dimethyl phthalate | NA | NA | NA | NA | NA |
| 2,4-Dimethylphenol | NA | NA | NA | NA | NA |
| Di-*n* -butyl phthalate | NA | NA | NA | NA | NA |
| 2,4-Dinitrophenol | NA | NA | NA | NA | NA |
| 2,4-Dinitrotoluene | NA | NA | NA | NA | NA |
| 2,6-Dinitrotoluene | NA | NA | NA | NA | NA |
| Di-*n* -octyl phthalate | NA | NA | NA | NA | NA |
| Hexachlorobenzene | NA | NA | 0.6 | 0.6 | NA |
| Hexachlorocyclopentadiene | NA | NA | NA | NA | NA |
| Hexachloroethane | NA | NA | NA | NA | NA |
| Isophorone | NA | NA | NA | NA | NA |
| 2-Methyl-4,6-dinitrophenol | NA | NA | NA | NA | NA |
| 2-Methylphenol | NA | NA | NA | NA | NA |
| 4-Methylphenol | NA | NA | NA | NA | NA |
| 2-Nitroaniline | NA | NA | NA | NA | NA |
| 3-Nitroaniline | NA | NA | NA | NA | NA |
| 4-Nitroaniline | NA | NA | NA | NA | NA |
| Nitrobenzene | NA | NA | NA | NA | NA |
| 2-Nitrophenol | NA | NA | NA | NA | NA |
| 4-Nitrophenol | NA | NA | NA | NA | NA |
| *N* -Nitrosodi-*n* -propylamine | NA | NA | NA | NA | NA |
| *N* -Nitrosodiphenylamine | NA | NA | NA | NA | NA |

**Table D-6**
**Ecological Risk Screening Levels for Soils**

| Analyte | Soil Benchmark Values | | Background Values | | |
|---|---|---|---|---|---|
| | Mammalian Eco-SSL[a] | Avian Eco-SSL[a] | Site-Specific Median Surface[b] Soil Background | Site-Specific Median Subsurface[c] Soil Background | TCEQ Median[d] Background |
| Pentachlorophenol | 2,800 | 2,100 | 10 | 10 | NA |
| Phenol | NA | NA | 1.45 | 1.2 | NA |
| 2,4,5-Trichlorophenol | NA | NA | 0.75 | 0.75 | NA |
| 2,4,6-Trichlorophenol | NA | NA | 0.7 | 0.7 | NA |
| Total LPAH | 100,000 | NA | NA | NA | NA |
| Total HPAH | 1,100 | NA | NA | NA | NA |
| **Volatile Organic Compounds (µg/kg dw)[f]** | | | | | |
| Acetone | NA | NA | NA | NA | NA |
| Benzene | NA | NA | NA | NA | NA |
| Bromobenzene | NA | NA | NA | NA | NA |
| Bromochloromethane | NA | NA | NA | NA | NA |
| Bromodichloromethane | NA | NA | NA | NA | NA |
| Bromoform | NA | NA | NA | NA | NA |
| Bromomethane | NA | NA | NA | NA | NA |
| 2-Butanone | NA | NA | NA | NA | NA |
| *n* -Butylbenzene | NA | NA | NA | NA | NA |
| *sec* -Butylbenzene | NA | NA | NA | NA | NA |
| *tert* -Butylbenzene | NA | NA | NA | NA | NA |
| Carbon disulfide | NA | NA | NA | NA | NA |
| Carbon tetrachloride | NA | NA | NA | NA | NA |
| Chlorobenzene | NA | NA | NA | NA | NA |
| Chloroethane | NA | NA | NA | NA | NA |
| Chloroform | NA | NA | 0.07 | 0.07 | NA |
| Chloromethane | NA | NA | NA | NA | NA |
| 2-Chlorotoluene | NA | NA | NA | NA | NA |
| 4-Chlorotoluene | NA | NA | NA | NA | NA |
| 1,2-Dibromo-3-chloropropane | NA | NA | NA | NA | NA |
| Dibromochloromethane | NA | NA | NA | NA | NA |
| 1,2-Dibromoethane | NA | NA | NA | NA | NA |
| Dibromomethane | NA | NA | NA | NA | NA |

**Table D-6**
**Ecological Risk Screening Levels for Soils**

| Analyte | Soil Benchmark Values | | Background Values | | |
|---|---|---|---|---|---|
| | Mammalian Eco-SSL[a] | Avian Eco-SSL[a] | Site-Specific Median Surface[b] Soil Background | Site-Specific Median Subsurface[c] Soil Background | TCEQ Median[d] Background |
| 1,2-Dichlorobenzene | NA | NA | 0.048[g] | 0.048[g] | NA |
| 1,3-Dichlorobenzene | NA | NA | 0.06[g] | 0.06[g] | NA |
| 1,4-Dichlorobenzene | NA | NA | 0.055[g] | 0.055[g] | NA |
| Dichlorodifluoromethane | NA | NA | NA | NA | NA |
| 1,1-Dichloroethane | NA | NA | NA | NA | NA |
| 1,2-Dichloroethane | NA | NA | NA | NA | NA |
| 1,1-Dichloroethene | NA | NA | NA | NA | NA |
| *cis* -1,2-Dichloroethene | NA | NA | NA | NA | NA |
| *trans* -1,2-Dichloroethene | NA | NA | NA | NA | NA |
| 1,2-Dichloropropane | NA | NA | NA | NA | NA |
| 1,3-Dichloropropane | NA | NA | NA | NA | NA |
| 2,2-Dichloropropane | NA | NA | NA | NA | NA |
| 1,1-Dichloropropene | NA | NA | NA | NA | NA |
| *cis* -1,3-Dichloropropene | NA | NA | NA | NA | NA |
| *trans* -1,3-Dichloropropene | NA | NA | NA | NA | NA |
| Ethylbenzene | NA | NA | NA | NA | NA |
| Hexachlorobutadiene | NA | NA | NA | NA | NA |
| 2-Hexanone | NA | NA | NA | NA | NA |
| Isopropylbenzene | NA | NA | NA | NA | NA |
| 4-Isopropyltoluene | NA | NA | NA | NA | NA |
| 4-Methyl-2-pentanone | NA | NA | NA | NA | NA |
| Methylene chloride | NA | NA | NA | NA | NA |
| *n* -Propylbenzene | NA | NA | NA | NA | NA |
| Styrene | NA | NA | NA | NA | NA |
| 1,1,1,2-Tetrachloroethane | NA | NA | NA | NA | NA |
| 1,1,2,2-Tetrachloroethane | NA | NA | NA | NA | NA |
| Tetrachloroethene | NA | NA | NA | NA | NA |
| Toluene | NA | NA | NA | NA | NA |
| 1,2,3-Trichlorobenzene | NA | NA | 0.12 | 0.12 | NA |
| 1,2,4-Trichlorobenzene | NA | NA | 0.085 | 0.085 | NA |
| 1,1,2-Trichloroethane | NA | NA | NA | NA | NA |
| 1,1,1-Trichloroethane | NA | NA | NA | NA | NA |
| Trichloroethene | NA | NA | NA | NA | NA |
| Trichlorofluoromethane | NA | NA | NA | NA | NA |

**Table D-6**
**Ecological Risk Screening Levels for Soils**

| Analyte | Soil Benchmark Values | | Background Values | | |
|---|---|---|---|---|---|
| | Mammalian Eco-SSL[a] | Avian Eco-SSL[a] | Site-Specific Median Surface[b] Soil Background | Site-Specific Median Subsurface[c] Soil Background | TCEQ Median[d] Background |
| 1,2,3-Trichloropropane | NA | NA | NA | NA | NA |
| 1,2,4-Trimethylbenzene | NA | NA | NA | NA | NA |
| 1,3,5-Trimethylbenzene | NA | NA | NA | NA | NA |
| Vinyl chloride | NA | NA | NA | NA | NA |
| *o* -Xylene | NA | NA | NA | NA | NA |
| *m,p* -Xylenes | NA | NA | NA | NA | NA |

**Notes**

dw = dry weight

HPAH = high molecular weight polycyclic aromatic hydrocarbon

LPAH = low molecular weight polycyclic aromatic hydrocarbon

NA - Not applicable

PCB = polychlorinated biphenyl

$TEQ_{DF,B}$ = Toxicity equivalent for dioxins and furans calculated using avian toxicity equivalency factors with nondetects set at one-half the detection limit.

$TEQ_{DF,M}$ = Toxicity equivalent for dioxins and furans calculated using mammalian toxicity equivalency factors with nondetects set at one-half the detection limit.

VOC = volatile organic compound

a - Eco-SSL values are presented here: http://www.epa.gov/ecotox/ecossl/.

b - Site-specific median values for surface includes all soil data with an upper sample depth of 0 inches.

c - Site-specific median values for subsurface includes soil data with an upper sample depth below 0 inches.

d - Texas Commission on Environmental Quality (TCEQ) median background values are given in Table 3-4 of *Update to Guidance for Conducting Ecological Risk Assessments at Remediation Sites in Texas RG-263 (Revised)* (TCEQ 2006).

e - This value is the detection limit for individual Aroclors.

f - The VOC screening performed to assess the inhalation expsoure pathway for burrowing mammals is presented in Attachment B.

g - Analyte was never detected in 0- to 12-inch background soils; the value shown is the median of the estimated values (i.e., one-half of detection limit) for the chemical in background samples from 0 to 6 inches.

**Table D-7**
**Comparison to Ecological Risk-Based Screening Levels, 0- to 6-Inch Depth Interval**

| $COI_{SI}$ | Maximum Detected Concentration | Mammalian Eco-SSL[a] | Max Detected Exceeds Screening Value | Avian Eco-SSL[a] | Max Detected Exceeds Screening Value | Site-Specific Median Surface Soil Background | TCEQ Median Background[b] | Max Detected Exceeds Background Value | Screening Summary[c] | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | Mammals | | | Birds[d] | | |
| | | | | | | | | | Exceeds Screening Value | Exceeds Background | Unknown | Exceeds Screening Value | Exceeds Background | Unknown |
| **Metals (mg/kg dw)** | | | | | | | | | | | | | | |
| Aluminum | 11,400 | NA | -- | NA | -- | 8,540 | 30,000 | No | NA | No | NA | NA | No | NA |
| Arsenic | 390 | 46 | Yes | 43 | Yes | NA | NA | NA | Yes | NA | NA | Yes | NA | NA |
| Barium | 840 | 2,000 | No | NA | -- | 88.5 | 300 | Yes | No | NA | NA | NA | Yes | NA |
| Cadmium | 6.96 | 0.36 | Yes | 0.77 | Yes | NA | NA | NA | Yes | NA | NA | Yes | NA | NA |
| Chromium | 86.3 | NA | -- | NA | -- | 8.395 | 30 | Yes | NA | Yes | NA | NA | Yes | NA |
| Cobalt | 67.3 | 230 | No | 120 | No | NA | NA | NA | No | NA | NA | No | NA | NA |
| Copper | 1,990 | 49 | Yes | 28 | Yes | NA | NA | NA | Yes | NA | NA | Yes | NA | NA |
| Lead | 896 | 56 | Yes | 11 | Yes | NA | NA | NA | Yes | NA | NA | Yes | NA | NA |
| Magnesium | 14,900 | NA | -- | NA | -- | 1,128 | NA | Yes | NA | Yes | NA | NA | Yes | NA |
| Manganese | 10,500 | 4,000 | Yes | 4,300 | Yes | NA | NA | NA | Yes | NA | NA | Yes | NA | NA |
| Mercury | 0.628 | NA | -- | NA | -- | 0.029 | 0.04 | Yes | NA | Yes | NA | NA | Yes | NA |
| Nickel | 71.1 | 130 | No | 210 | No | NA | NA | NA | No | NA | NA | No | NA | NA |
| Thallium | 9.8 | NA | -- | NA | -- | 0.07 | 0.7 | Yes | NA | Yes | NA | NA | Yes | NA |
| Vanadium | 110 | 280 | No | 7.8 | Yes | NA | NA | NA | No | NA | NA | Yes | NA | NA |
| Zinc | 8,050 | 79 | Yes | 46 | Yes | NA | NA | NA | Yes | NA | NA | Yes | NA | NA |
| **Polychlorinated Biphenyl Congeners (µg/kg dw)** | | | | | | | | | | | | | | |
| Total PCBs | | | | | | | | | | | | | | |
| Total PCB Aroclors | 119 | NA | -- | NA | -- | 85.5 | 9.5 | Yes | NA | Yes | NA | NA | Yes | NA |
| Total PCB congeners (43) | 276 | NA | -- | NA | -- | NA | NA | -- | NA | NA | Yes | NA | NA | Yes |
| **Organics** | | | | | | | | | | | | | | |
| Dioxins/Furans (ng/kg dw) | | | | | | | | | | | | | | |
| $TEQ_{DF, B}$ | 107 | NA | -- | NA | -- | NA | NA | -- | NA | NA | NA | NA | NA | Yes |
| $TEQ_{DF, M}$ | 36.9 | NA | -- | NA | -- | 1.04 | NA | Yes | NA | Yes | NA | NA | NA | NA |
| Semivolatile Organic Compounds (µg/kg dw) | | | | | | | | | | | | | | |
| Bis(2-ethylhexyl) phthalate | 3,500 | NA | -- | NA | -- | 8.1 | NA | Yes | NA | Yes | NA | NA | Yes | NA |
| Butyl benzyl phthalate | 860 | NA | -- | NA | -- | NA | NA | -- | NA | NA | Yes | NA | NA | Yes |
| Carbazole | 48 | NA | -- | NA | -- | 0.65 | NA | Yes | NA | Yes | NA | NA | Yes | NA |
| Dibenzofuran | 22 | NA | -- | NA | -- | NA | NA | -- | NA | NA | Yes | NA | NA | Yes |
| Dimethyl phthalate | 200 | NA | -- | NA | -- | NA | NA | -- | NA | NA | Yes | NA | NA | Yes |
| Di-*n* -butyl phthalate | 130 | NA | -- | NA | -- | NA | NA | -- | NA | NA | Yes | NA | NA | Yes |
| Phenol | 6.4 | NA | -- | NA | -- | 1.45 | NA | Yes | NA | Yes | NA | NA | Yes | NA |
| Total LPAH | 435 | 100,000 | No | NA | -- | NA | NA | -- | No | NA | NA | NA | NA | Yes |
| Total HPAH | 4,840 | 1,100 | Yes | NA | -- | NA | NA | -- | Yes | NA | NA | NA | NA | Yes |
| **Volatile Organic Compounds (µg/kg dw)** | | | | | | | | | | | | | | |
| Acetone | 240 | NA | -- | NA | -- | NA | NA | -- | NA | NA | Yes | NA | NA | Yes |
| Benzene | 17 | NA | -- | NA | -- | NA | NA | -- | NA | NA | Yes | NA | NA | Yes |
| Bromomethane | 2.5 | NA | -- | NA | -- | NA | NA | -- | NA | NA | Yes | NA | NA | Yes |
| 2-Butanone | 39 | NA | -- | NA | -- | NA | NA | -- | NA | NA | Yes | NA | NA | Yes |
| *n* -Butylbenzene | 0.32 | NA | -- | NA | -- | NA | NA | -- | NA | NA | Yes | NA | NA | Yes |
| Carbon disulfide | 20 | NA | -- | NA | -- | NA | NA | -- | NA | NA | Yes | NA | NA | Yes |
| Chlorobenzene | 0.17 | NA | -- | NA | -- | NA | NA | -- | NA | NA | Yes | NA | NA | Yes |
| Chloromethane | 4.1 | NA | -- | NA | -- | NA | NA | -- | NA | NA | Yes | NA | NA | Yes |
| *trans* -1,2-Dichloroethene | 0.44 | NA | -- | NA | -- | NA | NA | -- | NA | NA | Yes | NA | NA | Yes |
| Ethylbenzene | 4 | NA | -- | NA | -- | NA | NA | -- | NA | NA | Yes | NA | NA | Yes |
| Isopropylbenzene | 0.32 | NA | -- | NA | -- | NA | NA | -- | NA | NA | Yes | NA | NA | Yes |
| 4-Isopropyltoluene | 0.19 | NA | -- | NA | -- | NA | NA | -- | NA | NA | Yes | NA | NA | Yes |
| *n* -Propylbenzene | 0.61 | NA | -- | NA | -- | NA | NA | -- | NA | NA | Yes | NA | NA | Yes |
| Toluene | 17 | NA | -- | NA | -- | NA | NA | -- | NA | NA | Yes | NA | NA | Yes |
| 1,2,4-Trimethylbenzene | 1 | NA | -- | NA | -- | NA | NA | -- | NA | NA | Yes | NA | NA | Yes |

**Table D-7**
**Comparison to Ecological Risk-Based Screening Levels, 0- to 6-Inch Depth Interval**

| $COI_{SI}$ | Maximum Detected Concentration | Mammalian Eco-SSL[a] | Max Detected Exceeds Screening Value | Avian Eco-SSL[a] | Max Detected Exceeds Screening Value | Site-Specific Median Surface Soil Background | TCEQ Median Background[b] | Max Detected Exceeds Background Value | Screening Summary[c] | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | Mammals | | | Birds[d] | | |
| | | | | | | | | | Exceeds Screening Value | Exceeds Background | Unknown | Exceeds Screening Value | Exceeds Background | Unknown |
| 1,3,5-Trimethylbenzene | 0.46 | NA | -- | NA | -- | NA | NA | -- | NA | NA | Yes | NA | NA | Yes |
| *o* -Xylene | 1.9 | NA | -- | NA | -- | NA | NA | -- | NA | NA | Yes | NA | NA | Yes |
| *m,p* -Xylenes | 4.1 | NA | -- | NA | -- | NA | NA | -- | NA | NA | Yes | NA | NA | Yes |

**Notes**

-- = uncertain; no screening value available for this chemical
$COI_{SI}$ = southern impoundment-specific chemicals of interest that are comprised of chemicals detected in greater than 5% of Soil Investigation Area 4 soils for the specified depth interval
dw = dry weight
HPAH = high molecular weight polycyclic aromatic hydrocarbon
LPAH = low molecular weight polycyclic aromatic hydrocarbon
NA = not applicable
PCB = polychlorinated biphenyl
$TEQ_{DF,B}$ = Toxicity equivalent for dioxins and furans calculated using avian toxicity equivalency factors with nondetects set at one-half the detection limit.
$TEQ_{DF,M}$ = Toxicity equivalent for dioxins and furans calculated using mammalian toxicity equivalency factors with nondetects set at one-half the detection limit.

a - Eco-SSL values are presented here: http://www.epa.gov/ecotox/ecossl/.

b - The value listed for PCBs is the detection limit for individual aroclors. Texas Commission on Environmental Quality (TCEQ) median background values are given in Table 3-4 of *Update to Guidance for Conducting Ecological Risk Assessments at Remediation Sites in Texas RG-263 (Revised)* (TCEQ 2006).

c - Data from 0 to 6 inches were considered for birds, omnivorous mammals, and reptiles.

d - Avian screening is being considered representative of reptiles.

**Table D-8**
**Comparison to Ecological Risk-Based Screening Levels, 0- to 24-Inch Depth Interval**

| $COI_{SI}$ | Maximum Detected Concentration[a] | Mammalian Eco-SSL[b] | Max Detected Exceeds Screening Value | Site-Specific Median Subsurface Soil Background | TCEQ Median Background[c] | Max Detected Exceeds Background Value | Screening Summary[d] | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Mammals | | |
| | | | | | | | Exceeds Screening Value | Exceeds Background | Unknown |
| **Metals (mg/kg dw)** | | | | | | | | | |
| Aluminum | 17,900 | NA | -- | 7,815 | 30,000 | No | NA | No | NA |
| Arsenic | 390 | 46 | Yes | NA | NA | NA | Yes | NA | NA |
| Barium | 1,430 | 2,000 | No | NA | NA | NA | No | NA | NA |
| Cadmium | 6.96 | 0.36 | Yes | NA | NA | NA | Yes | NA | NA |
| Chromium | 215 | NA | -- | 7.88 | 30 | Yes | NA | Yes | NA |
| Cobalt | 67.3 | 230 | No | NA | NA | NA | No | NA | NA |
| Copper | 1,990 | 49 | Yes | NA | NA | NA | Yes | NA | NA |
| Lead | 896 | 56 | Yes | NA | NA | NA | Yes | NA | NA |
| Magnesium | 14,900 | NA | -- | 755.5 | NA | Yes | NA | Yes | NA |
| Manganese | 33,500 | 4,000 | Yes | NA | NA | NA | Yes | NA | NA |
| Mercury | 0.628 | NA | -- | 0.029 | 0.04 | Yes | NA | Yes | NA |
| Nickel | 596 | 130 | Yes | NA | NA | NA | Yes | NA | NA |
| Thallium | 9.8 | NA | -- | 0.082 | 0.7 | Yes | NA | Yes | NA |
| Vanadium | 110 | 280 | No | NA | NA | NA | No | NA | NA |
| Zinc | 8,050 | 79 | Yes | NA | NA | NA | Yes | NA | NA |
| **Polychlorinated Biphenyl Congeners (µg/kg dw)** | | | | | | | | | |
| Total PCBs | | | | | | | | | |
| Total PCB Aroclors | 427 | NA | -- | 85.5 | 9.5 | Yes | NA | Yes | NA |
| Total PCB congeners (43) | 535 | NA | -- | NA | NA | -- | NA | NA | Yes |
| **Organics** | | | | | | | | | |
| Dioxins/Furans (ng/kg dw) | | | | | | | | | |
| $TEQ_{DF, M}$ | 303 | NA | -- | 0.51 | NA | Yes | NA | Yes | NA |
| **Semivolatile Organic Compounds (µg/kg dw)** | | | | | | | | | |
| Bis(2-ethylhexyl) phthalate | 3,500 | NA | -- | 3.5 | NA | Yes | NA | Yes | NA |
| Butyl benzyl phthalate | 910 | NA | -- | NA | NA | -- | NA | NA | Yes |
| Carbazole | 240 | NA | -- | 0.65 | NA | Yes | NA | Yes | NA |
| Dibenzofuran | 100 | NA | -- | NA | NA | -- | NA | NA | Yes |
| Dimethyl phthalate | 270 | NA | -- | NA | NA | -- | NA | NA | Yes |
| Di-*n* -butyl phthalate | 130 | NA | -- | NA | NA | -- | NA | NA | Yes |
| Phenol | 6.4 | NA | -- | 1.2 | NA | Yes | NA | Yes | NA |
| Total LPAH | 1,950 | 100,000 | | NA | NA | NA | No | NA | NA |
| Total HPAH | 6,840 | 1,100 | Yes | NA | NA | NA | Yes | NA | NA |
| **Volatile Organic Compounds (µg/kg dw)** | | | | | | | | | |
| Acetone | 330 | NA | -- | NA | NA | -- | NA | NA | Yes |
| Benzene | 73 | NA | -- | NA | NA | -- | NA | NA | Yes |
| Bromomethane | 2.5 | NA | -- | NA | NA | -- | NA | NA | Yes |
| 2-Butanone | 50 | NA | -- | NA | NA | -- | NA | NA | Yes |
| *n* -Butylbenzene | 0.96 | NA | -- | NA | NA | -- | NA | NA | Yes |
| sec-Butylbenzene | 0.58 | NA | -- | NA | NA | -- | NA | NA | Yes |
| Carbon disulfide | 83 | NA | -- | NA | NA | -- | NA | NA | Yes |
| Chlorobenzene | 0.21 | NA | -- | NA | NA | -- | NA | NA | Yes |
| Chloroform | 3.5 | NA | -- | 0.07 | NA | Yes | NA | Yes | NA |
| Chloromethane | 5.2 | NA | -- | NA | NA | -- | NA | NA | Yes |
| *trans* -1,2-Dichloroethene | 0.44 | NA | -- | NA | NA | -- | NA | NA | Yes |

**Table D-8**
**Comparison to Ecological Risk-Based Screening Levels, 0- to 24-Inch Depth Interval**

| $COI_{SI}$ | Maximum Detected Concentration[a] | Mammalian Eco-SSL[b] | Max Detected Exceeds Screening Value | Site-Specific Median Subsurface Soil Background | TCEQ Median Background[c] | Max Detected Exceeds Background Value | Screening Summary[d] | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Mammals | | |
| | | | | | | | Exceeds Screening Value | Exceeds Background | Unknown |
| Ethylbenzene | 25 | NA | -- | NA | NA | -- | NA | NA | Yes |
| Isopropylbenzene | 2.5 | NA | -- | NA | NA | -- | NA | NA | Yes |
| 4-Isopropyltoluene | 0.73 | NA | -- | NA | NA | -- | NA | NA | Yes |
| *n* -Propylbenzene | 2.5 | NA | -- | NA | NA | -- | NA | NA | Yes |
| Styrene | 1.4 | NA | -- | NA | NA | -- | NA | NA | Yes |
| Toluene | 110 | NA | -- | NA | NA | -- | NA | NA | Yes |
| Trichloroethene | 3.4 | NA | -- | NA | NA | -- | NA | NA | Yes |
| 1,2,4-Trimethylbenzene | 3.8 | NA | -- | NA | NA | -- | NA | NA | Yes |
| 1,3,5-Trimethylbenzene | 1.3 | NA | -- | NA | NA | -- | NA | NA | Yes |
| *o* -Xylene | 11 | NA | -- | NA | NA | -- | NA | NA | Yes |
| *m,p* -Xylenes | 25 | NA | -- | NA | NA | -- | NA | NA | Yes |

**Notes**

-- = uncertain; no screening value available for this chemical
$COI_{SI}$ = southern impoundment-specific chemicals of interest that are comprised of chemicals detected in greater than 5% of Soil Investigation Area 4 soils for the specified depth interval
dw = dry weight
HPAH = high molecular weight polycyclic aromatic hydrocarbon
LPAH = low molecular weight polycyclic aromatic hydrocarbon
NA = not applicable
PCB = polychlorinated biphenyl
$TEQ_{DF,M}$ = Toxicity equivalent for dioxins and furans calculated using mammalian toxicity equivalency factors with nondetects set at one-half the detection limit.

a - Lists the maximum concentration among samples collected from the individual depth intervals falling within the 0- to 24-inch interval, not the depth-weighted average maximum concentration.
b - Eco-SSL values are presented here: http://www.epa.gov/ecotox/ecossl/.
c - The value listed for PCBs is the detection limit for individual aroclors. Texas Commission on Environmental Quality (TCEQ) median background values are given in Table 3-4 of *Update to Guidance for Conducting Ecological Risk Assessments at Remediation Sites in Texas RG-263 (Revised)* (TCEQ 2006).
d - Data from 0 to 24 inches were considered for burrowing herbivorous mammals.

**Table D-9**
**$COPC_E$ Determination, 0- to 6-Inch Depth Interval**

| $COI_{SI}$ | Screening Summary: Mammals Exceeds Screening Value or Background | Screening Summary: Birds[a] Exceeds Screening Value or Background | Bio-accumulative[b] | $COPC_E$[c]: Mammals Ingestion | $COPC_E$[c]: Birds[a] Ingestion | Reason for $COPC_E$ Decision |
|---|---|---|---|---|---|---|
| **Metals (mg/kg dw)** | | | | | | |
| Arsenic | Yes | Yes | No | No | No | Not bioaccumulative |
| Barium | No | Yes | No | No | No | Not bioaccumulative |
| Cadmium | Yes | Yes | Yes | Yes | Yes | Exceeds criteria; potentially bioaccumulative |
| Chromium | Yes | Yes | Yes | Yes | Yes | Exceeds criteria; potentially bioaccumulative |
| Copper | Yes | Yes | Yes | Yes | Yes | Exceeds criteria; potentially bioaccumulative |
| Lead | Yes | Yes | Yes | Yes | Yes | Exceeds criteria; potentially bioaccumulative |
| Magnesium | Yes | Yes | No | No | No | Not bioaccumulative |
| Manganese | Yes | Yes | No | No | No | Not bioaccumulative |
| Mercury | Yes | Yes | Yes | Yes | Yes | Exceeds criteria; potentially bioaccumulative |
| Thallium | Yes | Yes | No | No | No | Not bioaccumulative |
| Vanadium | No | Yes | No | No | No | Not bioaccumulative |
| Zinc | Yes | Yes | Yes | Yes | Yes | Exceeds criteria; potentially bioaccumulative |
| **Polychlorinated Biphenyl Congeners (µg/kg dw)** | | | | | | |
| Total PCBs | | | | | | |
| Total PCB Aroclors | Yes | Yes | Yes | Yes | Yes | Potentially bioaccumulative |
| Total PCB congeners (43) | NA | NA | Yes | Yes | Yes | Potentially bioaccumulative |
| **Organics** | | | | | | |
| Dioxins/Furans (ng/kg dw) | | | | | | |
| $TEQ_{DF, B}$ | NA | NA | Yes | NA | Yes | Potentially bioaccumulative; indicator chemical group |
| $TEQ_{DF, M}$ | Yes | NA | Yes | Yes | NA | Potentially bioaccumulative; indicator chemical group |
| **Semivolatile Organic Compounds (µg/kg dw)** | | | | | | |
| Bis(2-ethylhexyl) phthalate | Yes | Yes | Yes | Yes | Yes | Exceeds criteria; potentially bioaccumulative |
| Butyl benzyl phthalate | NA | NA | No | No | No | Not bioaccumulative |
| Carbazole | Yes | Yes | No | No | No | Not bioaccumulative |
| Dibenzofuran | NA | NA | No | No | No | Not bioaccumulative |
| Dimethyl phthalate | NA | NA | No | No | No | Not bioaccumulative |
| Di-*n* -butyl phthalate | NA | NA | No | No | No | Not bioaccumulative |
| Phenol | Yes | Yes | No | No | No | Not bioaccumulative |
| Total LPAH | No | NA | No | No | No | Not bioaccumulative |
| Total HPAH | Yes | NA | Yes | Yes | Yes | Potentially bioaccumulative |
| **Volatile Organic Compounds (µg/kg dw)** | | | | | | |
| Acetone | NA | NA | No | No | No | Not bioaccumulative |
| Benzene | NA | NA | No | No | No | Not bioaccumulative |
| Bromomethane | NA | NA | No | No | No | Not bioaccumulative |
| 2-Butanone | NA | NA | No | No | No | Not bioaccumulative |
| *n* -Butylbenzene | NA | NA | No | No | No | Not bioaccumulative |
| Carbon disulfide | NA | NA | No | No | No | Not bioaccumulative |
| Chlorobenzene | NA | NA | No | No | No | Not bioaccumulative |
| Chloromethane | NA | NA | No | No | No | Not bioaccumulative |
| *trans* -1,2-Dichloroethene | NA | NA | No | No | No | Not bioaccumulative |
| Ethylbenzene | NA | NA | No | No | No | Not bioaccumulative |
| Isopropylbenzene | NA | NA | No | No | No | Not bioaccumulative |
| 4-Isopropyltoluene | NA | NA | No | No | No | Not bioaccumulative |

**Table D-9**
**$COPC_E$ Determination, 0- to 6-Inch Depth Interval**

| $COI_{SI}$ | Screening Summary: Mammals Exceeds Screening Value or Background | Screening Summary: Birds[a] Exceeds Screening Value or Background | Bio-accumulative[b] | $COPC_E$[c]: Mammals Ingestion | $COPC_E$[c]: Birds[a] Ingestion | Reason for $COPC_E$ Decision |
|---|---|---|---|---|---|---|
| *n* -Propylbenzene | NA | NA | No | No | No | Not bioaccumulative |
| Toluene | NA | NA | No | No | No | Not bioaccumulative |
| 1,2,4-Trimethylbenzene | NA | NA | No | No | No | Not bioaccumulative |
| 1,3,5-Trimethylbenzene | NA | NA | No | No | No | Not bioaccumulative |
| *o* -Xylene | NA | NA | No | No | No | Not bioaccumulative |
| *m,p* -Xylenes | NA | NA | No | No | No | Not bioaccumulative |

**Notes**

$COI_{SI}$ = southern impoundment-specific chemcials of interest that are comprised of chemicals detected in greater than 5 percent of Soil Investigation Area 4 soils for the specified depth interval
$COPC_E$ = chemical of potential ecological concern
dw = dry weight
HPAH = high molecular weight polycyclic aromatic hydrocarbon
LPAH = low molecular weight polycyclic aromatic hydrocarbon
NA = not applicable; no screening criteria or background value available
PCB = polychlorinated biphenyl
$TEQ_{DF,B}$ = Toxicity equivalent for dioxins and furans calculated using avian toxicity equivalency factors with nondetects set at one-half the detection limit.
$TEQ_{DF,M}$ (ND=1/2DL) = Toxicity equivalent for 2,3,7,8-tetrachlorinated dibenzo-p-dioxin (TCDD) calculated using dioxins and furans and mammalian toxicity equivalency factors (van den Berg et al. 2006) with nondetects set at one-half the detection limit.

a - Avian screening is being considered representative of reptiles.
b - Bioaccumulation potential determination is as follows:
Octanol-water partitioning coefficients ($K_{OW}$) are from RAIS (http://rais.ornl.gov/). Values greater than or equal to 5 (highlighted) are considered bioaccumulative.
Total PCBs, dioxins/furans, and PAHs are bioaccumulative and are identified as such, despite not having $K_{ow}$ values.
TCEQ bioaccumulative metals are as given in Table 3-1 of the *Updated Guidance for Conducting Ecological Risk Assessments* (TCEQ 2006).
c - Data from 0 to 6 inches were considered for birds, omnivorous mammals, and reptiles.

**Table D-10**
**$COPC_E$ Determination, 0- to 24-Inch Depth Interval**

| $COI_{SI}$ | Screening Summary: Mammals: Exceeds Screening Value or Background | Bio-accumulative[a] | $COPC_E$[b]: Mammals: Ingestion | $COPC_E$[b]: Mammals: Inhalation[c] | Reason for $COPC_E$ Decision |
|---|---|---|---|---|---|
| **Metals (mg/kg dw)** | | | | | |
| Arsenic | Yes | No | No | No | Not bioaccumulative |
| Barium | No | No | No | No | Not bioaccumulative |
| Cadmium | Yes | Yes | Yes | No | Exceeds criteria; potentially bioaccumulative |
| Chromium | Yes | Yes | Yes | No | Exceeds criteria; potentially bioaccumulative |
| Copper | Yes | Yes | Yes | No | Exceeds criteria; potentially bioaccumulative |
| Lead | Yes | Yes | Yes | No | Exceeds criteria; potentially bioaccumulative |
| Magnesium | Yes | No | No | No | Not bioaccumulative |
| Manganese | Yes | No | No | No | Not bioaccumulative |
| Mercury | Yes | Yes | Yes | No | Exceeds criteria; potentially bioaccumulative |
| Nickel | Yes | Yes | Yes | No | Exceeds criteria; potentially bioaccumulative |
| Thallium | Yes | No | No | No | Not bioaccumulative |
| Vanadium | No | No | No | No | Not bioaccumulative |
| Zinc | Yes | Yes | Yes | No | Exceeds criteria; potentially bioaccumulative |
| **Polychlorinated Biphenyl Congeners (µg/kg dw)** | | | | | |
| Total PCBs | | | | | |
| Total PCB Aroclors | Yes | Yes | Yes | No | Potentially bioaccumulative |
| Total PCB congeners (43) | NA | Yes | Yes | No | Potentially bioaccumulative |
| **Dioxins/Furans (ng/kg dw)** | | | | | |
| $TEQ_{DF, M}$ | Yes | Yes | Yes | No | Potentially bioaccumulative; indicator chemical group |
| **Semivolatile Organic Compounds (µg/kg dw)** | | | | | |
| Bis(2-ethylhexyl) phthalate | Yes | Yes | Yes | No | Exceeds criteria; potentially bioaccumulative |
| Butyl benzyl phthalate | NA | No | No | No | Not bioaccumulative |
| Carbazole | Yes | No | No | No | Not bioaccumulative |
| Dibenzofuran | NA | No | No | No | Not bioaccumulative |
| Dimethyl phthalate | NA | No | No | No | Not bioaccumulative |
| Di-*n* -butyl phthalate | NA | No | No | No | Not bioaccumulative |
| Phenol | Yes | No | No | No | Not bioaccumulative |
| Total LPAH | No | No | No | No | Not bioaccumulative |
| Total HPAH | Yes | Yes | Yes | No | Potentially bioaccumulative; individual PAHs exceed criteria |
| **Volatile Organic Compounds (µg/kg dw)** | | | | | |
| Acetone | NA | No | No | Evaluate | Not bioaccumulative; further screening warranted |
| Benzene | NA | No | No | Evaluate | Not bioaccumulative; further screening warranted |
| Bromomethane | NA | No | No | Evaluate | Not bioaccumulative; further screening warranted |
| 2-Butanone | NA | No | No | Evaluate | Not bioaccumulative; further screening warranted |
| *n* -Butylbenzene | NA | No | No | Evaluate | Not bioaccumulative; further screening warranted |
| sec-Butylbenzene | NA | No | No | Evaluate | Not bioaccumulative; further screening warranted |
| Carbon disulfide | NA | No | No | Evaluate | Not bioaccumulative; further screening warranted |

**Table D-10**
**$COPC_E$ Determination, 0- to 24-Inch Depth Interval**

| $COI_{SI}$ | Screening Summary: Mammals: Exceeds Screening Value or Background | Bio-accumulative[a] | $COPC_E$[b]: Mammals: Ingestion | $COPC_E$[b]: Mammals: Inhalation[c] | Reason for $COPC_E$ Decision |
|---|---|---|---|---|---|
| Chlorobenzene | NA | No | No | Evaluate | Not bioaccumulative; further screening warranted |
| Chloroform | Yes | No | No | Evaluate | Not bioaccumulative; further screening warranted |
| Chloromethane | NA | No | No | Evaluate | Not bioaccumulative; further screening warranted |
| *trans* -1,2-Dichloroethene | NA | No | No | Evaluate | Not bioaccumulative; further screening warranted |
| Ethylbenzene | NA | No | No | Evaluate | Not bioaccumulative; further screening warranted |
| Isopropylbenzene | NA | No | No | Evaluate | Not bioaccumulative; further screening warranted |
| 4-Isopropyltoluene | NA | No | No | Evaluate | Not bioaccumulative; further screening warranted |
| *n* -Propylbenzene | NA | No | No | Evaluate | Not bioaccumulative; further screening warranted |
| Styrene | NA | No | No | Evaluate | Not bioaccumulative; further screening warranted |
| Toluene | NA | No | No | Evaluate | Not bioaccumulative; further screening warranted |
| Trichloroethene | NA | No | No | Evaluate | Not bioaccumulative; further screening warranted |
| 1,2,4-Trimethylbenzene | NA | No | No | Evaluate | Not bioaccumulative; further screening warranted |
| 1,3,5-Trimethylbenzene | NA | No | No | Evaluate | Not bioaccumulative; further screening warranted |
| *o* -Xylene | NA | No | No | Evaluate | Not bioaccumulative; further screening warranted |
| *m,p* -Xylenes | NA | No | No | Evaluate | Not bioaccumulative; further screening warranted |

**Notes**

$COI_{SI}$ = southern impoundment-specific chemcials of interest that are comprised of chemicals detected in greater than 5% of Soil Investigation Area 4 soils for the specified depth interval
$COPC_E$ = chemical of potential ecological concern
dw = dry weight
Evaluate = subject to additional screening (see Table D-11)
HPAH = high molecular weight polycyclic aromatic hydrocarbon
LPAH = low molecular weight polycyclic aromatic hydrocarbon
NA = not applicable; no screening criteria or background value available
PCB = polychlorinated biphenyl
$TEQ_{DF,M}$ (ND=1/2DL) = Toxicity equivalent for 2,3,7,8-tetrachlorinated dibenzo-p-dioxin (TCDD) calculated using dioxins and furans and mammalian toxicity equivalency factors (van den Berg et al. 2006) with nondetects set at one-half the detection limit.

a - Bioaccumulation potential determination is as follows:
Octanol-water partitioning coefficients ($K_{ow}$) are from RAIS (http://rais.ornl.gov/). Values greater than or equal to 5 (highlighted) are considered bioaccumulative.
Total PCBs, dioxins/furans, and PAHs are bioaccumulative and are identified as such, despite not having $K_{ow}$ values.
TCEQ bioaccumulative metals are as given in Table 3-1 of the *Updated Guidance for Conducting Ecological Risk Assessments* (TCEQ 2006).
b - Data from 0 to 24 inches were considered for burrowing herbivorous mammals.
c - Pertains to volatile organic compounds only for burrowing mammals only (0-24 inches).

**Table D-11**
**Comparison of Volatile Organic Compound Concentrations in Soils with Ecological Risk-Based Screening Concentrations**

| COI | CAS Number | Freq. Detected | Maximum Detected Concentration for Soil 0 to 24 Inches[a] (µg/kg dw) | Estimated Maximum Burrow VOC Concentrations ($mg/m^3$) | Ecological Screening Levels ($mg/m^3$) | Ratios of Burrow Concentration and ESL[b] | $COPC_E$ (Burrow Concentration > ESL) |
|---|---|---|---|---|---|---|---|
| Acetone | 67-64-1 | 18/32 | 330 | 0.00992 | 540 | $2x10^{-5}$ | No |
| Benzene | 71-43-2 | 32/32 | 73 | 0.00563 | 25.4 | 0.0002 | No |
| Bromomethane | 74-83-9 | 5/32 | 2.5 | 0.00282 | 57.0 | $5x10^{-5}$ | No |
| 2-Butanone | 78-93-3 | 25/32 | 50 | 0.00128 | 2,050 | $6x10^{-7}$ | No |
| n-Butylbenzene | 104-51-8 | 10/32 | 0.96 | $2.09x10^{-5}$ | 34.7 | $6x10^{-7}$ | No |
| sec-Butylbenzene | 135-98-8 | 6/32 | 0.58 | $1.56x10^{-5}$ | 127 | $1x10^{-7}$ | No |
| Carbon disulfide | 75-15-0 | 30/32 | 83 | 0.112 | 16.0 | 0.007 | No |
| Chlorobenzene | 108-90-7 | 2/32 | 0.21 | $5.66x10^{-6}$ | 22.0 | $3x10^{-7}$ | No |
| Chloroform | 67-66-3 | 4/59 | 3.5 | 0.000819 | 20.6 | $4x10^{-5}$ | No |
| Chloromethane | 74-87-3 | 6/32 | 5.2 | 0.00706 | 21.5 | 0.0003 | No |
| *trans* -1,2-Dichloroethene | 156-60-5 | 2/32 | 0.44 | $9.21x10^{-5}$ | 75.1 | $1x10^{-6}$ | No |
| Ethylbenzene | 100-41-4 | 28/32 | 25 | 0.000896 | 112 | $8x10^{-6}$ | No |
| Isopropylbenzene | 98-82-8 | 14/32 | 2.5 | $8.35x10^{-5}$ | 127 | $7x10^{-7}$ | No |
| 4-Isopropyltoluene | 99-87-6 | 15/32 | 0.73 | $1.46x10^{-5}$ | 889 | $2x10^{-8}$ | No |
| n-Propylbenzene | 103-65-1 | 15/32 | 2.5 | $6.55x10^{-5}$ | 0.289 | 0.0002 | No |
| Styrene | 100-42-5 | 5/32 | 1.4 | $1.74x10^{-5}$ | 23.1 | $8x10^{-7}$ | No |
| Toluene | 108-88-3 | 30/32 | 110 | 0.00632 | 60.8 | 0.0001 | No |
| Trichloroethene | 79-01-6 | 2/32 | 3.4 | 0.00112 | 19.0 | $6x10^{-5}$ | No |
| 1,2,4-Trimethylbenzene | 95-63-6 | 23/32 | 3.8 | $7.74x10^{-5}$ | 370 | $2x10^{-7}$ | No |
| 1,3,5-Trimethylbenzene | 108-67-8 | 12/32 | 1.3 | $3.85x10^{-5}$ | 123 | $3x10^{-7}$ | No |
| *o* -Xylene | 95-47-6 | 20/32 | 11 | 0.000302 | 87.6 | $3x10^{-6}$ | No |
| *m,p* -Xylenes | 179601-23-1 | 31/32 | 25 | 0.000953 | 87.6 | $1x10^{-5}$ | No |
| Xylenes (total)[c] | | 31/32 | 36 | 0.000989 | 87.6 | $1x10^{-5}$ | No |

**Notes**

CAS = Chemical Abstracts Service
COI = chemical of interest
$COPC_E$ = chemical of potential ecological concern
dw = dry weight
ESL = ecological screening levels
VOC = volatile organic compound

a - Depth intervals included in the 0 to 2 feet range were 0-15.24 cm, 15.24-30.48 cm, 30.48-60.96 cm and 0-60.96 cm.
b - See Attachment B for approach to developing ESLs and calculated burrow concentrations.
c - Xylenes (total) calculated as sum of *o* - and *m,p* -xylene concentrations in individual samples.

The corresponding samples include SBSB001 through SJSB010, SJSB012 through SJSB027,and SJSB032 through SJSB034.

**Table D-12**
**Summary of Ecological Receptor Surrogates**

| Receptor Group | Receptor Surrogate | Feeding Guild | Potentially Present | Representative of One or More Feeding Guilds | High Site Fidelity/Residential | Sensitive or Potentially Highly Exposed | Life History Information Is Readily Available | Additional Considerations |
|---|---|---|---|---|---|---|---|---|
| **Reptiles** | | | | | | | | |
| | Common garter snake | Carnivore | X | X | X | X | X | |
| **Birds** | | | | | | | | |
| | Killdeer | Invertivore (terrestrial) | X | X | X | | X | Feeds on invertebrate fauna closely associated with soils |
| **Mammals** | | | | | | | | |
| | Pocket gopher | Herbivore | X | X | X | X | X | Burrowing mammal, used to evaluate both ingestion and inhalation pathways |
| | Virginia oppossum | Omnivore | X | X | X | | X | |

**Table D-13**
**Summary of Assessment Endpoints and Risk Questions for the BERA**

| Receptor Class | Assessment Endpoint | Risk Questions |
|---|---|---|
| Reptiles | Stable or increasing populations of reptiles | Is the total daily ingested dose (mg/kg bw-day) of $COPC_E$s greater than doses known to cause effects on the survival, growth and reproduction of reptiles? |
| Birds | Stable or increasing populations of invertivorous birds | Is the total daily ingested dose (mg/kg bw-day) of $COPC_E$s greater than doses known to cause effects on the survival, growth, and reproduction of birds? |
| Mammals | Stable or increasing populations of omnivorous mammals | Is the total daily ingested dose (mg/kg bw-day) of $COPC_E$s greater than doses known to cause effects on the survival, growth and reproduction of mammals? |
| | Stable or increasing populations of burrowing mammals | Is the total daily ingested dose (mg/kg bw-day) of $COPC_E$s greater than doses known to cause effects on the survival, growth and reproduction of mammals? |

**Note**

bw = body weight

$COPC_E$s = chemicals of potential ecological concern

Evaluation of exposure to burrowing mammals via the inhalation pathway is evaluated during the screening step.

**Table D-14**
**Life History Parameters for Wildlife Receptors Used for the Ingestion-Based Exposure Model**

| Species | Parameter | Units | Value | Source | Notes |
|---|---|---|---|---|---|
| **Birds** | | | | | |
| Killdeer | bw | kg | 0.088 | UMMZ (2011) | |
| | FIR | kg diet/kg bw-day | 0.19 | Nagy (2001) | Allometric equation[a] for Charadriiformes, dry-weight basis: DMI g/day = 0.522* (g bw) 0.769, divided by kg bw and converted to kg diet basis by * kg/1000g |
| | Fs | kg sediment/kg diet | 0.10 | Beyer et al. (1994) | Value for American woodcock is used as most ecologically similar species available (terrestrial invertivore) in Beyer et al. (1994) |
| | HR | $km^2$ | 0.06 | Jackson and Jackson (2000) | Average of home ranges for N=10 in northeastern California population; defended breeding territories are considerably smaller and feeding may also take place at much greater distances. |
| | F(i) | kg food/kg diet | 0.98 | Jackson and Jackson (2000) | Missouri population 98% insects, predominantly terrestrial; Puerto Rico N=20 stomachs 98% animal material, primarily terrestrial invertebrates |
| | F(p) | kg food/kg diet | 0.02 | Jackson and Jackson (2000) | 2% plant material in gut contents of Puerto Rico study; 1.3% in Missouri study |
| **Mammals** | | | | | |
| Bairds pocket gopher | bw | kg | 0.1 | MNH (2011) | Average adult weight |
| | FIR | kg diet/kg bw-day | 0.16 | Nagy (2001) | Allometric equation for mesic rodents, dry-weight basis: DMI g/day = 0.614* (g bw) 0.705, divided by kg bw and converted to kg diet basis by * kg/1,000 g |
| | Fs | kg sediment/kg diet | 0.052 | Beyer et al. (1994) | Average of values available for two prairie dog populations |
| | HR | $km^2$ | 0.003 | Davis and Schmidly (1994) | Based on a congeneric, Plains Pocket gopher data (*Geomys bursarius* ) average density in eastern Texas of 3.2 gophers per hectare (per .01 $km^2$) |
| | F(i) | kg food/kg diet | 0 | Davis and Schmidly (1994) | This species is entirely herbivourous. |
| | F(p) | kg food/kg diet | 1 | | |
| Virginia oppossum | bw | kg | 2.2 | Georgia DNR (2012) | Average of adult male and female weights |
| | FIR | kg diet/kg bw-day | 0.04 | Nagy (2001) | Allometric equation for marsupials, dry-weight basis: DMI g/d = 0.483* (g bw) 0.666, divided by kg bw and converted to kg diet basis by * kg/1000g |
| | Fs | kg sediment/kg diet | 0.094 | Beyer et al. (1994) | Estimated fraction soil in diet of opossums from two US populations. |
| | HR | $km^2$ | 0.05 | Penn State (2002) | |
| | F(i) | kg food/kg diet | 0.7 | Hamilton 1951; Hopkins & Forbes 1980 | Estimated from animal matter comprising 72 percent by volume of 129 opossum stomachs and 71 perecent by volume of 64 opossum stomachs, respectively. |
| | F(p) | kg food/kg diet | 0.3 | Hamilton 1951; Hopkins & Forbes 1980 | Estimated from plant matter comprising 28 percent by volume of 129 opossum stomachs and 29 percent by volume of 64 opossum stomachs, respectively. |

**Table D-14**
**Life History Parameters for Wildlife Receptors Used for the Ingestion-Based Exposure Model**

| Species | Parameter | Units | Value | Source | Notes |
|---|---|---|---|---|---|
| **Reptiles** | | | | | |
| Common garter snake | bw | kg | 0.15 | Zimmerman (2002) | Average adult weight |
| | FIR | kg diet/kg bw-day | 0.01 | Nagy (2001) | Allometric equation for carnivorous reptiles, dry-weight basis: DMI g/day = 0.00865* (g bw) 0.963, divided by kg bw and converted to kg diet basis by * kg/1,000 g |
| | Fs | kg sediment/kg diet | 0.045 | Beyer et al. (1994) | Value for sediment in the diet of box turtle (no data found for snakes) |
| | HR | NA | ND | | No data are available. An AUF = 1 is assumed. |
| | F(i) | kg food/kg diet | 1 | Zimmerman (2002) | While garter snakes are known to eat fish and other animal prey, as a terrestrial reptile surrogate the diet will be modeled as primarily invertebrates. |
| | F(p) | kg food/kg diet | 0 | | |

**Notes**

AUF = area use factor
bw = body weight (kg)
DMI = dry matter intake
Fs = fraction of the diet that is sediment
F(i) = fraction of the diet consisting of terrestrial invertebrates (kg invertebrates/kg food)
F(p) = fraction of the diet consisting of plants (kg plants/kg food)
FIR = food ingestion rate (kg food dw/day)
HR = home range
NA = not applicable
ND = nondetect
WIR = water ingestion rate

a - allometric equation for birds, WIR (L/day) = (0.059*BW(kg)0.67)/kg bw

References provided in Appendix A of BERA for area north of I-10 and aquatic environment (Integral 2012b).

**Table D-15**
**Summary of Lines of Evidence for Each Receptor and Assessment Endpoint**

| Receptor | Assessment Endpoint | Lines of Evidence | Measure of Exposure | Measure of Effect | Comments/Rationale |
|---|---|---|---|---|---|
| Reptiles | Stable or increasing populations of reptiles | Comparison of estimated ingested $COPC_E$ dose to literature-based effects levels expressed on a dose basis | $COPC_E$ doses that account for all ingested media (mg/kg bw-day) | Toxicity reference values for concentrations of $COPC_E$s as ingested doses (mg/kg bw-day) | Evaluated in the uncertainty assessment because dosimetric data for reptiles is lacking. Bird receptor is used as surrogate. |
| Birds | Stable or increasing populations of invertivorous birds | Comparison of estimated ingested $COPC_E$ dose to literature-based effects levels expressed on a dose basis | $COPC_E$ doses that account for all ingested media (mg/kg bw-day) | Toxicity reference values for concentrations of $COPC_E$s as ingested doses (mg/kg bw-day) | |
| Mammals | Stable or increasing populations of omnivorous mammals | Comparison of estimated ingested $COPC_E$ dose to literature-based effects levels expressed on a dose basis | $COPC_E$ doses that account for all ingested media (mg/kg bw-day) | Toxicity reference values for concentrations of $COPC_E$s as ingested doses (mg/kg bw-day) | |
| | Stable or increasing populations of herbivorous mammals | Comparison of estimated ingested $COPC_E$ dose to literature-based effects levels expressed on a dose basis | $COPC_E$ doses that account for all ingested media (mg/kg bw-day) | Toxicity reference values for concentrations of $COPC_E$s as ingested doses (mg/kg bw-day) | |

**Notes**
bw = body weight
$COPC_E$ = chemical of potential ecological concern

**Table D-16**
**Assumptions for Parameterizing the Wildlife Exposure Model**

| Taxon | Feeding Guild | Receptor | Soils | Terrestrial Invertebrates | Plants |
|---|---|---|---|---|---|
| Birds | Invertivore (terrestrial) | Killdeer | Southern impoundment soils 0 to 6 inches in depth | BAFs from southern impoundment soils for non-dioxin $COPC_E$s; regression approach for dioxins and furans[a] | BAFs from southern impoundment soils |
| Mammals | Herbivore | Bairds pocket gopher | Southern impoundment soils 0 to 2 feet in depth | NA | BAFs from southern impoundment soils |
| | Omnivore | Virginia opossum | Southern impoundment soils 0 to 6 inches in depth | BAFs from southern impoundment soils for non-dioxin $COPC_E$s; regression approach for dioxins and furans[a] | BAFs from southern impoundment soils |
| Reptiles | Carnivore | Common garter snake | Southern impoundment soils 0 to 6 inches in depth | BAFs from southern impoundment soils for non-dioxin $COPC_E$s; regression approach for dioxins and furans[a] | NA |

**Notes**

BAF = bioaccumulation factor

$COPC_E$ = ecological chemical of potential concern

NA = not applicable (no exposure to this medium is expected)

a - as described in Appendix D of Integral 2012b

**Table D-17**
**Relative Bioavailability Adjustment Factors for TCDD in Soil and Food Ingested by Birds**

| Medium | Relative Bioavailability Adjustment Factor |
|---|---|
| Invertebrates[a] | 0.44 |
| Soils | 0.33 |

**Source**

Nosek et al. (1992)

**Notes**

TCDD = tetrachlorodibenzo-*p* -dioxin

a - average of percent absorption from homogenate of earthworms and homogenate of crickets

**Table D-18**
**Bioaccumulation Relationships for Soil-to-Invertebrate and Soil-to-Plant Tissue**

| Chemical | Concentration in Invertebrate Tissue [a,b] (mg/kg dw) | Concentration in Plant Tissue [a,b] (mg/kg dw) |
|---|---|---|
| **Dioxins and Furans** | | |
| Dioxins and Furans | See Table D-20 and Appendix D of Integral (2012) | 0 [c] |
| **Polychlorinated Biphenyls** | | |
| Polychlorinated Biphenyls | $Cs^{1.361} * e^{1.41}$ [d] | 0 [c] |
| **Semivolatile Organic Compounds** | | |
| Bis(2-ethylhexyl) phthalate | 0 [e] | 0 [c] |
| HPAH | 2.6*Cs | $Cs^{0.947}/e^{1.703}$ |
| **Metals** | | |
| Cadmium | $Cs^{0.795} * e^{2.114}$ | $Cs^{0.546}/e^{0.475}$ |
| Chromium | Cs*0.306 | Cs*0.041 |
| Copper | Cs * 0.515 | $Cs^{0.394}*e^{0.668}$ |
| Lead | $Cs^{0.807}/e^{0.218}$ | $Cs^{0.561}/e^{1.328}$ |
| Mercury | Cs*3.1 [f] | Cs*0.0375 [g] |
| Nickel | NA [h] | $Cs^{0.748}/e^{2.223}$ |
| Zinc | $Cs^{0.328}*e^{4.449}$ | $Cs^{0.554}*e^{1.575}$ |

**Notes**

BAF = bioaccumulation factor

BEHP = bis(2-ethylhexyl) phthalate

$COPC_E$ = chemical of potential ecological concern

Cs = concentration in soil (mg/kg)

dw = dry weight

HPAH = high molecular weight polycyclic aromatic hydrocarbon

NA = not applicable

PCB = polychlorinated biphenyl

a - Unless otherwise indicated, the source for values in this column is USEPA (2007c) *Attachment 4-1: Exposure Factors and Bioaccumulation Models for Derivation of Wildlife EcoSSLs* (Tables 4a and 4b).

b - Natural log equations were transformed as follows:

$\ln(y) = a*\ln(x)-b$, transformed to $y = x^a/e^b$; or

$\ln(y) = a*\ln(x)+b$, transformed to $y = x^a*e^b$

c - Dioxins, PCBs, and BEHP are low-solubility, high molecular weight compounds which have a negligible potential for uptake into plant tissues (Staples et al. 1997; Bacci et al. 1992; McCrady et al. 1990, 1993); therefore, a BAF of zero is used for these $COPC_E$s.

d - Sample et al. (1998); regression equation from Table 12 for total PCBs

e - BEHP does not bioaccumulate in invertebrate tissue at environmentally realistic concentrations in soil (Staples et al. 1997).

f - Tissue concentrations are based on differential uptake by earthworms depending on soil concentrations: a higher BAF for soils with lower mercury concentrations, and a lower BAF for soils with higher mercury concentrations (Burton et al. 2006). Southern impoundment surface soils are all less than the cutoff for the lower BAF, so the higher BAF is used here; see text for details.

g - recommended soil to plant bioconcentration factor from Table C-2 for mercuric chloride in USEPA (1999a)

h - Nickel is not a $COPC_E$ for surface soils (0 to 6 inches), so no exposure models are needed that include invertebrate tissue estimates.

**Table D-19**
**Regression Equations Used to Estimate Dioxin and Furan Congener Concentrations in Terrestrial Invertebrate Tissue from Soils**

| Congener | Equation |
|---|---|
| 2,3,7,8-TCDD | $\exp(-2.49 + 0.819 * (\ln(C_{s2,3,7,8\text{-TCDD}}))$ |
| 1,2,3,7,8-PCDD | $\exp(-5.92 + 0.516 * (\ln(C_{s1,2,3,7,8\text{-PCDD}}))$ |
| 1,2,3,4,7,8-HxCDD | $0.430 * C_{e1,2,3,7,8,9\text{-HxCDD}}$ |
| 1,2,3,6,7,8-HxCDD | $\exp(-3.42 + 0.664 * (\ln(C_{s1,2,3,6,7,8\text{-HxCDD}}))$ |
| 1,2,3,7,8,9-HxCDD | $\exp(-5.04 + 0.55 * (\ln(C_{s1,2,3,7,8,9\text{-HxCDD}}))$ |
| 1,2,3,4,6,7,8-HpCDD | $\exp(-3.91 + 0.479 * (\ln(C_{s1,2,3,4,6,7,8\text{-HpCDD}}))$ |
| OCDD | $8.02 * C_{e1,2,3,4,6,7,8\text{-HpCDD}}$ |
| 2,3,7,8-TCDF | $0.120 * C_{e1,2,3,6,7,8\text{-HxCDD}}$ |
| 1,2,3,7,8-PCDF | $\exp(-4.86 + 0.593 * (\ln(C_{s1,2,3,7,8\text{-PCDF}}))$ |
| 2,3,4,7,8-PCDF | $0.108 * C_{e1,2,3,6,7,8\text{-HxCDD}}$ |
| 1,2,3,4,7,8-HxCDF | $\exp(-4.29 + 0.616 * (\ln(C_{s1,2,3,4,7,8\text{-HxCDF}}))$ |
| 1,2,3,6,7,8-HxCDF | $\exp(-4.50 + 0.609 * (\ln(C_{s1,2,3,6,7,8\text{-HxCDF}}))$ |
| 1,2,3,7,8,9-HxCDF | $\exp(-5.74 + 0.671 * (\ln(C_{s1,2,3,7,8,9\text{-HxCDF}}))$ |
| 2,3,4,6,7,8-HxCDF | $\exp(-5.22 + 0.576 * (\ln(C_{s2,3,4,6,7,8\text{-HxCDF}}))$ |
| 1,2,3,4,6,7,8-HpCDF | $\exp(-3.69 + 0.593 * (\ln(C_{s1,2,3,4,6,7,8\text{-HpCDF}}))$ |
| 1,2,3,4,7,8,9-HpCDF | $0.723 * C_{e1,2,3,4,7,8\text{-HxCDF}}$ |
| OCDF | $0.603 * C_{e1,2,3,4,6,7,8\text{-HpCDD}}$ |

**Notes**

$C_{scongener}$= concentration of the given congener in soil

$C_{econgener}$ = concentration of the given congener in earthworms

Regression equations are from Cass Lake Study and are consistent with those used for the BERA for the area north of I-10 and aquatic environment (see Table 4-11 in Integral 2012b). Equations shown with the $C_e$ variable are based on the best relationship among earthworm tissue congener concentrations from the Cass Lake Study, as described in Appendix D of Integral 2012b.

**Table D-20**
**Area Use Factors Used to Evaluate Exposure of Wildlife Receptors**

| | Common Garter Snake | Virginia Opossum | Pocket Gopher | Killdeer |
|---|---|---|---|---|
| Exposure Unit [a] | Western half of the southern peninsula, inclusive of the southern impoundment boundary | | | |
| Estimated Size of Exposure Unit | 0.1 $km^2$ | 0.1 $km^2$ | 0.1 $km^2$ | 0.1 $km^2$ |
| Home Range [b] | ND | 0.05 $km^2$ | 0.003 $km^2$ | 0.06 $km^2$ |
| AUF [c] | 1 | 1 | 1 | 1 |

**Notes**

AUF = area use factor

ND = no data available

a - The exposure unit is calculated in units that match the units of the home range so that an AUF may be calculated. See Figure D-6 for illustration of the exposure unit.

b - Receptor home ranges are further described in Table D-15.

c - Receptors whose home range is less than the exposure unit are assigned an AUF of 1; for receptors lacking home range data, an AUF of 1 is assumed.

**Table D-21**
**Estimated Daily Ingestion Rates of $COPC_E$s for Upland Wildlife Receptors**

| | Ingestion Rate (mg/kg bw-day) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Killdeer | | Bairds Pocket Gopher | | Common Garter Snake | | Virginia Opossum | |
| Analyte | CT | RM | CT | RM | CT | RM | CT | RM |
| Cadmium | 0.83 | 2.6 | 0.062 | 0.12 | 0.033 | 0.10 | 0.12 | 0.38 |
| Chromium | 1.6 | 4.2 | 0.32 | 0.89 | 0.054 | 0.14 | 0.25 | 0.67 |
| Copper | 6.6 | 47 | 1.9 | 5.8 | 0.24 | 1.7 | 1.1 | 7.2 |
| Lead | 4.7 | 15 | 0.77 | 2.4 | 0.16 | 0.51 | 0.74 | 2.4 |
| Mercury | 0.026 | 0.076 | 0.00056 | 0.0013 | 0.0010 | 0.0029 | 0.0038 | 0.011 |
| Nickel | NA | NA | 0.28 | 0.95 | NA | NA | NA | NA |
| Zinc | 118 | 234 | 21 | 64 | 4.5 | 8.0 | 18 | 39 |
| Bis(2-ethylhexyl) phthalate | 0.0028 | 0.022 | 0.00094 | 0.0078 | $4.7x10^{-5}$ | 0.00037 | 0.00051 | 0.0040 |
| HPAH | 0.69 | 1.9 | 0.031 | 0.11 | 0.027 | 0.071 | 0.10 | 0.27 |
| $TEQ_{DF,B}$ | $1.7x10^{-6}$ | $2.7x10^{-6}$ | NA | NA | $6.0x10^{-8}$ | $8.3x10^{-8}$ | NA | NA |
| $TEQ_{P,B}$ | $2.1x10^{-7}$ | $2.1x10^{-6}$ | NA | NA | $3.5x10^{-9}$ | $3.5x10^{-8}$ | NA | NA |
| $TEQ_{DFP,B}$ | $1.9x10^{-6}$ | $4.8x10^{-6}$ | NA | NA | $6.4x10^{-8}$ | $1.2x10^{-7}$ | NA | NA |
| $TEQ_{DF,M}$ | NA | NA | $7.4x10^{-8}$ | $2.0x10^{-7}$ | NA | NA | $3.5x10^{-7}$ | $4.5x10^{-7}$ |
| $TEQ_{P,M}$ | NA | NA | $1.1x10^{-8}$ | $8.1x10^{-8}$ | NA | NA | $6.4x10^{-9}$ | $4.2x10^{-8}$ |
| $TEQ_{DFP,M}$ | NA | NA | $1.2x10^{-7}$ | $4.9x10^{-7}$ | NA | NA | $3.7x10^{-7}$ | $5.0x10^{-7}$ |
| Total PCBs | 0.012 | 0.13 | 0.00027 | 0.0033 | 0.00047 | 0.0052 | 0.0018 | 0.019 |

**Notes**

bw = body weight
$COPC_E$s = chemicals of potential ecological concern
CT = central tendency
HPAH = high molecular weight polycyclic aromatic hydrocarbons
NA = not applicable
PCB = polychlorinated biphenyl
RM = reasonable maximum

$TEQ_{DF,B}$ = Toxicity equivalent for dioxins and furans calculated using avian toxicity equivalency factors with nondetects set at one-half the detection limit.
$TEQ_{P,B}$ = Toxicity equivalent for dioxin-like PCBs calculated using avian toxicity equivalency factors with nondetects set at one-half the detection limit.
$TEQ_{DFP,B}$ = Toxicity equivalent for dioxins and furans, and dioxin-like PCBs calculated using avian toxicity equivalency factors with nondetects set at one-half the detection limit.
$TEQ_{DF,M}$ (ND=1/2DL) = Toxicity equivalent for 2,3,7,8-tetrachlorinated dibenzo-p-dioxin (TCDD) calculated using dioxins and furans and mammalian toxicity equivalency factors (van den Berg et al. 2006) with nondetects set at one-half the detection limit.
$TEQ_{P,M}$ (ND=1/2DL) = TCDD toxicity equivalent calculated using dioxin-like PCBs and mammalian toxicity equivalency factors (van den Berg et al. 2006) with nondetects set at one-half the detection limit.
$TEQ_{DFP,M}$ (ND=1/2DL) = TCDD toxicity equivalent calculated using dioxins, furans, and dioxin-like PCBs and mammalian toxicity equivalency factors (van den Berg et al. 2006) with nondetects set at one-half the detection limit.

**Table D-22**

**Parameter Distributions Used for Probabilistic Exposure and Risk Assessment for Wildlife Receptors[a]**

| Receptor | Distribution Type | Central Tendency | SD | Range | Reference |
|---|---|---|---|---|---|
| **Killdeer** | | | | | |
| Body weight (kg) | Normal | 0.101 | 0.0037 | 0.0922-0.107 | Jackson and Jackson (2000) for CT of adult female; range and SD based on scaling sandpiper data to killdeer CT |
| Soil ingestion rate (fraction of diet) | Triangular | 0.10 | NA | 0.02-0.2 | Beyer et al. (1994) for CT; BPJ for range |
| Diet – Terrestrial invertebrates (fraction of diet) | Triangular | 0.98 | NA | 0.5-0.99 | Jackson and Jackson (2000) for CT; BPJ for range |
| Diet – Plants (fraction of diet) | Triangular | 0.02 | NA | 0.01-0.5 | Jackson and Jackson (2000) for CT; BPJ for range; fraction in diet for plants calculated in each iteration after random selection of fraction in diet for terrestrial invertebrates |

**Notes**

BPJ = best professional judgment
CT = central tendency
NA = not applicable
SD = standard deviation

a - Feeding rate and water ingestion rate were calculated from body weight value using allometric equations in each iteration of the Monte Carlo analysis. Home range was not used in the exposure model for these receptors because Area Use Factor was assumed equal to 1.0.

**Table D-23**
**Toxicity Reference Values for Birds**

| Chemical | | TRV (mg/kg bw-day) | Ref | Endpoint | Comments |
|---|---|---|---|---|---|
| **Organic Compounds** | | | | | |
| PCBs | NOAEL | 2 | a | Reproduction | Geometric mean of NOAELs for 5 bird species (Table B-11, Integral 2012b) |
| | LOAEL | 3 | | | Geometric mean of LOAELs for 4 bird species (Table B-11, Integral 2012b) |
| TCDD | NOAEL | $1.4x10^{-5}$ | b | Hen mortality and egg mortality | Ingested dose was estimated from weekly injected dose. |
| | LOAEL | 0.00014 | | | |
| HPAHs | NOAEL | 0.2 | c | Growth | Administered as 7,12- Dimethylbenz(a)anthracene. Study duration 5 days; UF of 10 applied to adjust for subchronic exposure |
| | LOAEL | 2 | c | Growth | |
| Bis(2-ethylhexyl) phthalate | NOAEL | 74.9 | d | Growth | Unbounded NOAEL for body weight |
| | LOAEL | -- | | | |
| **Metals** | | | | | |
| Cadmium | NOAEL | 1.47 | e | Reproduction, growth | Geometric mean of NOAELs for reproduction and growth |
| | LOAEL | 2.37 | | Reproduction | Minimum bounded LOAEL for a mortality/growth/repro endpoint |
| Chromium | NOAEL | 2.66 | f | Reproduction, growth | Geometric mean of NOAELs for reproduction and growth |
| | LOAEL | 2.78 | | | Minimum bounded LOAEL for a mortality/growth/repro endpoint |
| Copper | NOAEL | 4.05 | g | Reproduction, growth | Highest bounded NOAEL below the lowest bounded LOAEL for survival, growth, or reproduction |
| | LOAEL | 12.1 | | | |
| Lead | NOAEL | 1.63 | h | Reproduction | Highest bounded NOAEL below lowest bounded LOAEL |
| | LOAEL | 1.94 | | | Lowest bounded LOAEL |
| Mercury | NOAEL | 0.078 | i | Reproduction | One dose only tested; unbounded NOAEL for first generation |
| | LOAEL | 0.9 | j | Reproduction | Administered as methylmercury |

**Table D-23**
**Toxicity Reference Values for Birds**

| Chemical | | TRV (mg/kg bw-day) | Ref | Endpoint | Comments |
|---|---|---|---|---|---|
| Zinc | NOAEL | 66.1 | k | Reproduction | Geometric mean of NOAELs for reproduction and growth |
| | LOAEL | 86.6 | | | Lowest bounded LOAEL for survival, growth, or reproduction |

**Notes**

-- = not applicable
bw = body weight
EcoSSL = interim EcoSSL documents by chemical available at: http://www.epa.gov/ecotox/ecossl/
HPAH = high molecular weight polycyclic aromatic hydrocarbons
LOAEL = lowest-observed-adverse-effect level
NA = not available
NOAEL = no-observed-adverse-effect level
PCB = polychlorinated biphenyl
TCDD = 2,3,7,8-tetrachlorodibenzo-*p* -dioxin
TRV = toxicity reference value
UF = uncertainty factor
USEPA = U.S. Environmental Protection Agency

a - Risebrough and Anderson (1975)
b - Nosek et al. (1992)
c - EcoSSL (USEPA 2007f)
d - O'Shea and Stafford (1980)
e - EcoSSL (USEPA 2005b)
f - EcoSSL for Cr(III) (USEPA 2008c)
g - EcoSSL (USEPA 2007d)
h - EcoSSL (USEPA 2005c)
i - Heinz (1979)
j - Hill and Schaffner (1976)
k - EcoSSL USEPA (2007a)

**Table D-24**
**Toxicity Reference Values for Mammals**

| Chemical | | TRV (mg/kg bw-day) | Ref | Endpoint | Comments |
|---|---|---|---|---|---|
| **Organic Compounds** | | | | | |
| PCBs | NOAEL | 0.98 | a | Reproduction | Geometric means of NOAELs and LOAELs from toxicity studies with mice |
| | LOAEL | 2 | | | |
| TCDD | NOAEL | $1.00x10^{-6}$ | b | Reproduction | Converted from dietary concentration to dose using assumed body weight and consumption rate |
| | LOAEL | $1.00x10^{-5}$ | | | |
| HPAHs | NOAEL | 0.615 | c | Reproduction, growth, survival | Highest bounded NOAEL beneath the lowest bounded LOAEL |
| | LOAEL | 3.07 | c | Geometric mean of bounded NOAELs for growth, mortality, reproduction | |
| Bis(2-ethylhexyl) phthalate | NOAEL | 5.8 | d | Reproduction | Effects seen at 29 and 147 mg/kg-day doses might be age-related, in which case NOAEL and LOAEL would be under-estimated. |
| | LOAEL | 29 | | | |
| **Metals** | | | | | |
| Cadmium | NOAEL | 2 | e | Geometric mean of bounded NOAELs for growth, mortality, reproduction | 38 bounded NOAELs/LOAELs included in calculation |
| | LOAEL | 10 | | Geometric mean of associated LOAELs | |
| Chromium | NOAEL | 2.40 | f | Reproduction, growth | Geometric mean of NOAELs for reproduction and growth |
| | LOAEL | 2.82 | | Mortality | No unbounded LOAELs; minimum unbounded LOAEL for a mortality/growth/reproduction endpoint |
| Copper | NOAEL | 5.6 | g | Reproduction, growth, survival | Highest bounded NOAEL beneath the lowest bounded LOAEL |
| | LOAEL | 9.34 | | | |
| Lead | NOAEL | 4.7 | h | Survival | Highest bounded NOAEL below lowest bounded LOAEL |
| | LOAEL | 5.0 | | Growth | Lowest bounded LOAEL |
| Mercury | NOAEL | 0.015 | i | Survival and growth | Converted from dietary concentration to dose using assumed body weight and consumption rate; converted to chronic from subchronic exposure period; administered as methylmercury chloride |
| | LOAEL | 0.025 | | | |

**Table D-24**
**Toxicity Reference Values for Mammals**

| Chemical | | TRV (mg/kg bw-day) | Ref | Endpoint | Comments |
|---|---|---|---|---|---|
| Nickel | NOAEL | 1.7 | j | Reproduction | Highest bounded NOAEL below the lowest bounded LOAEL for a mortality/growth/reproduction endpoint |
| | LOAEL | 2.71 | | | Minimum bounded LOAEL for a mortality/growth/reproduction |
| Zinc | NOAEL | 75.4 | k | Reproduction | Geometric mean of NOAELs for reproduction and growth; lowest bounded LOAEL for survival, reproduction and growth |
| | LOAEL | 75.9 | | | |

**Notes**

bw = body weight
EcoSSL = interim EcoSSL documents by chemical available at: http://www.epa.gov/ecotox/ecossl/
HPAH = high molecular weight polycyclic aromatic hydrocarbons
LOAEL = lowest observed adverse effect level
NOAEL = no observed adverse effect level
PCB = polychlorinated biphenyl
TCDD = 2,3,7,8-tetrachlorodibenzo-*p* -dioxin
TRV = toxicity reference value
USEPA = U.S. Environmental Protection Agency

a - Aulerich and Ringer (1977)
b - Murray et al. (1979)
c - EcoSSL (USEPA 2007f)
d - Davis et al. (2000)
e - EcoSSL (USEPA 2005b)
f - EcoSSL (USEPA 2008c)
g - EcoSSL (USEPA 2007d)
h - EcoSSL (USEPA 2005c)
i - Sample et al. (1996)
j - EcoSSL (USEPA 2007g)
k - Eco SSL (USEPA 2007a)

**Table D-25**
**Hazard Quotients for Bird and Mammal Receptors**

| | Killdeer | | | | Pocket Gopher | | | | Oppossum | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | NOAEL-based | | LOAEL-based | | NOAEL-based | | LOAEL-based | | NOAEL-based | | LOAEL-based | |
| $COPC_E$ | CT | RM | CT | RM | CT | RM | CT | RM | CT | RM | CT | RM |
| Cadmium | 0.6 | **2** | 0.4 | **1** | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | 0.2 | <0.1 | <0.1 |
| Chromium | 0.6 | **2** | 0.6 | **2** | 0.1 | 0.4 | 0.1 | 0.3 | 0.1 | 0.3 | <0.1 | 0.2 |
| Copper | **2** | **12** | 0.5 | **4** | 0.3 | **1** | 0.2 | 0.6 | 0.2 | **1** | 0.1 | 0.8 |
| Lead | **3** | **10** | **2** | **8** | 0.2 | 0.5 | 0.2 | 0.5 | 0.2 | 0.5 | 0.1 | 0.5 |
| Mercury[a] | 0.3 | 1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | 0.3 | 0.7 | 0.2 | 0.4 |
| Nickel | NA | NA | NA | NA | 0.2 | 0.6 | 0.1 | 0.4 | NA | NA | NA | NA |
| Zinc | **2** | **4** | **1** | **3** | 0.3 | 0.8 | 0.3 | 0.8 | 0.2 | 0.5 | 0.2 | 0.5 |
| Bis(2-ethylhexyl) phthalate | <0.1 | <0.1 | NA | NA | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| HPAH | **3** | **9** | 0.3 | 0.9 | <0.1 | 0.2 | <0.1 | <0.1 | 0.2 | 0.4 | <0.1 | <0.1 |
| $TEQ_{DF,B}$ | 0.1 | 0.2 | <0.1 | <0.1 | NA | NA | NA | NA | NA | NA | NA | NA |
| $TEQ_{P,B}$ | <0.1 | 0.1 | <0.1 | <0.1 | NA | NA | NA | NA | NA | NA | NA | NA |
| $TEQ_{DFP,B}$ | 0.1 | 0.3 | <0.1 | <0.1 | NA | NA | NA | NA | NA | NA | NA | NA |
| $TEQ_{DF,M}$ | NA | NA | NA | NA | <0.1 | 0.2 | <0.1 | <0.1 | 0.3 | 0.5 | <0.1 | <0.1 |
| $TEQ_{P,M}$ | NA | NA | NA | NA | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| $TEQ_{DFP,M}$ | NA | NA | NA | NA | 0.1 | 0.5 | <0.1 | <0.1 | 0.4 | 0.5 | <0.1 | <0.1 |
| Total PCBs | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |

**Notes**

$COPC_E$ = chemical of potential ecological concern
CT = central tendency
HPAH = high molecular weight polycyclic aromatic hydrocarbons
LOAEL = lowest-observed-adverse-effect level
NA = not applicable
NOAEL = no-observed-adverse-effect level
PCB = polychlorinated biphenyl
RM = reasonable maximum

$TEQ_{DF,B}$ = Toxicity equivalent for dioxins and furans calculated using avian toxicity equivalency factors with nondetects set at one-half the detection limit.
$TEQ_{P,B}$ = Toxicity equivalent for dioxin-like PCBs calculated using avian toxicity equivalency factors with nondetects set at one-half the detection limit.
$TEQ_{DFP,B}$ = Toxicity equivalent for dioxins and furans, and dioxin-like PCBs calculated using avian toxicity equivalency factors with nondetects set at one-half the detection limit.
$TEQ_{DF,M}$ (ND=1/2DL) = Toxicity equivalent for 2,3,7,8-tetrachlorinated dibenzo-p-dioxin (TCDD) calculated using dioxins and furans and mammalian toxicity equivalency factors (van den Berg et al. 2006) with nondetects set at one-half the detection limit.
$TEQ_{P,M}$ (ND=1/2DL) = TCDD toxicity equivalent calculated using dioxin-like PCBs and mammalian toxicity equivalency factors (van den Berg et al. 2006) with nondetects set at one-half the detection limit.
$TEQ_{DFP,M}$ (ND=1/2DL) = TCDD toxicity equivalent calculated using dioxins, furans, and dioxin-like PCBs and mammalian toxicity equivalency factors (van den Berg et al. 2006) with nondetects set at one-half the detection limit.
**Bold** values are HQs ≥ 1.

a - Actual HQ NOAEL RM value for mercury is 0.97, so it does not exceed 1.

**Table D-26**

**Hazard Quotients for Killdeer in the Area of Investigation South of I-10 and in Background Areas**

| Receptor | $COPC_E$ | Site Exposures | | | | Background Exposures | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | NOAEL-based | | LOAEL-based | | NOAEL-based | | LOAEL-based | |
| | | CT | RM | CT | RM | CT | RM | CT | RM |
| Killdeer | Cadmium | 0.6 | **2** | 0.4 | **1** | 0.2 | 0.4 | < 0.1 | 0.3 |
| | Chromium | 0.6 | **2** | 0.6 | **2** | 0.2 | 0.4 | 0.2 | 0.4 |
| | Copper | **2** | **12** | 0.5 | **4** | 0.2 | 0.3 | < 0.1 | < 0.1 |
| | Lead | **3** | **10** | **2** | **8** | **1** | **2** | 0.9 | **2** |
| | Zinc | **2** | **4** | **1** | **3** | 0.7 | **1** | 0.6 | 0.8 |

**Notes**

$COPC_E$ = chemical of potential ecological concern

CT = central tendency

HQ = hazard quotient

$HQ_L$ = LOAEL-based HQ

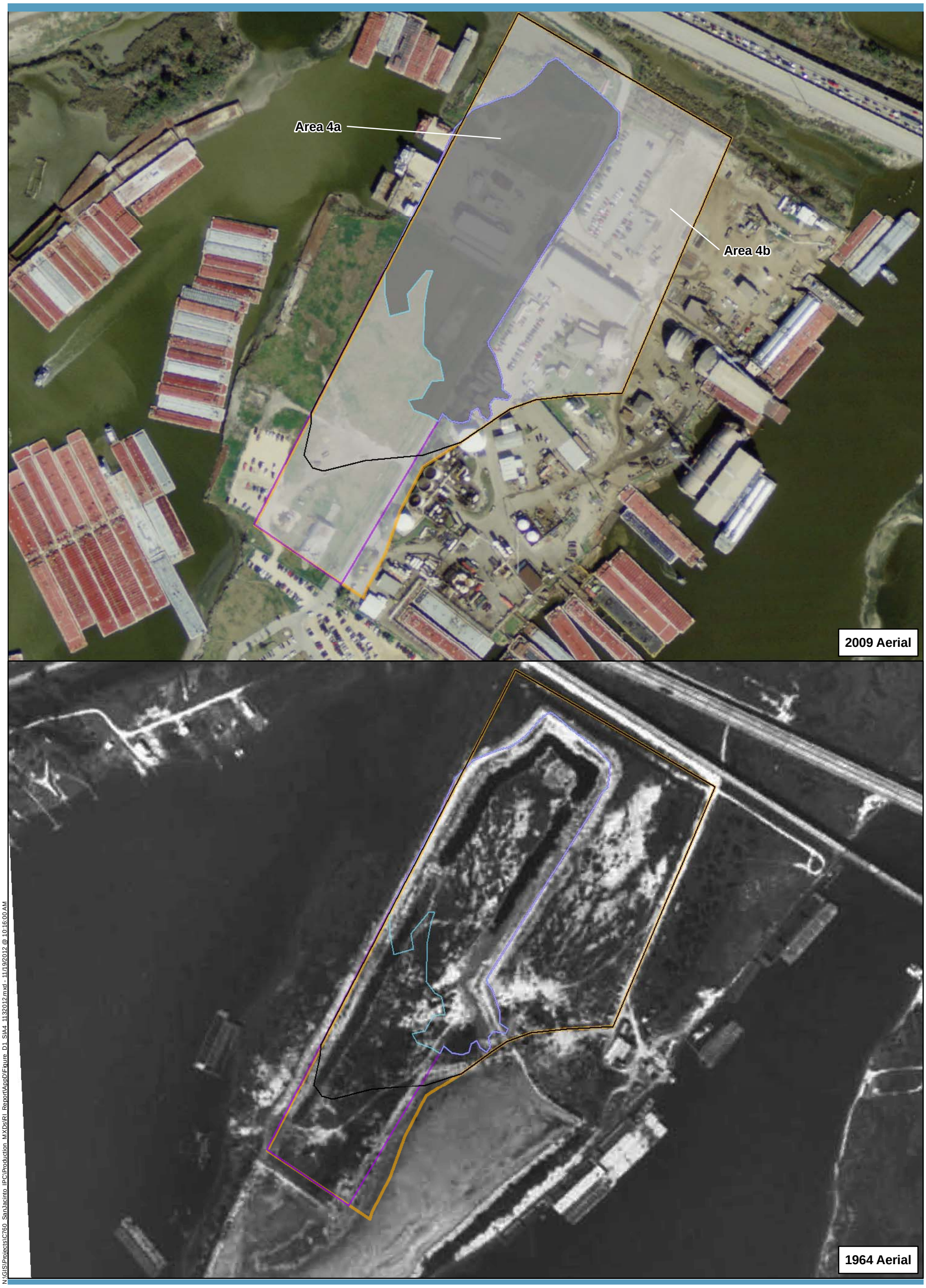
LOAEL = lowest-observed-adverse-effect level

NOAEL = no-observed-adverse-effect level

RM = reasonable maximum

**Bold** values are HQs ≥ 1.

# FIGURES




N:\GIS\Projects\C760_SanJacinto_IPC\Production_MXDs\RI_Report\AppD\Figure_D1_SIA4_1132012.mxd - 11/19/2012 @ 10:16:00 AM

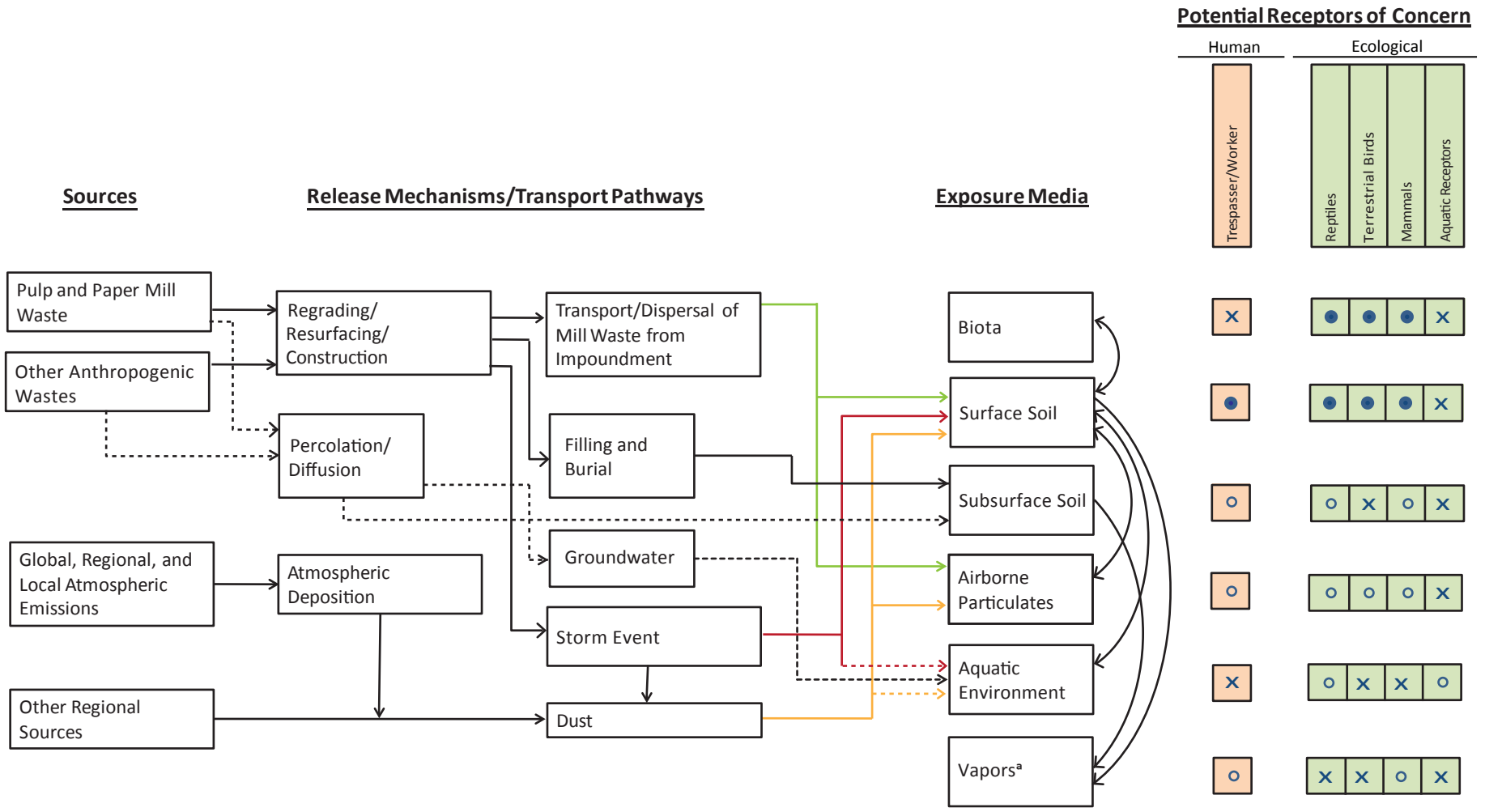
ANCHOR QEA integral consulting inc.

0 400
Feet

- Approximate impoundment boundary derived from historical TDH drawing
- Boundary of a wetted area that is visible in a 1966 aerial photograph
- The smaller of two approximate impoundment boundaries proposed by USEPA on the basis of historical drawings by the TDH *
- The larger of two approximate impoundment boundaries proposed by USEPA on the basis of historical drawings by the TDH and boundary of Soil Investigation Area 4 *
- Soil Sampling Area 4a
- Soil Sampling Area 4b

* USEPA's Interpretation

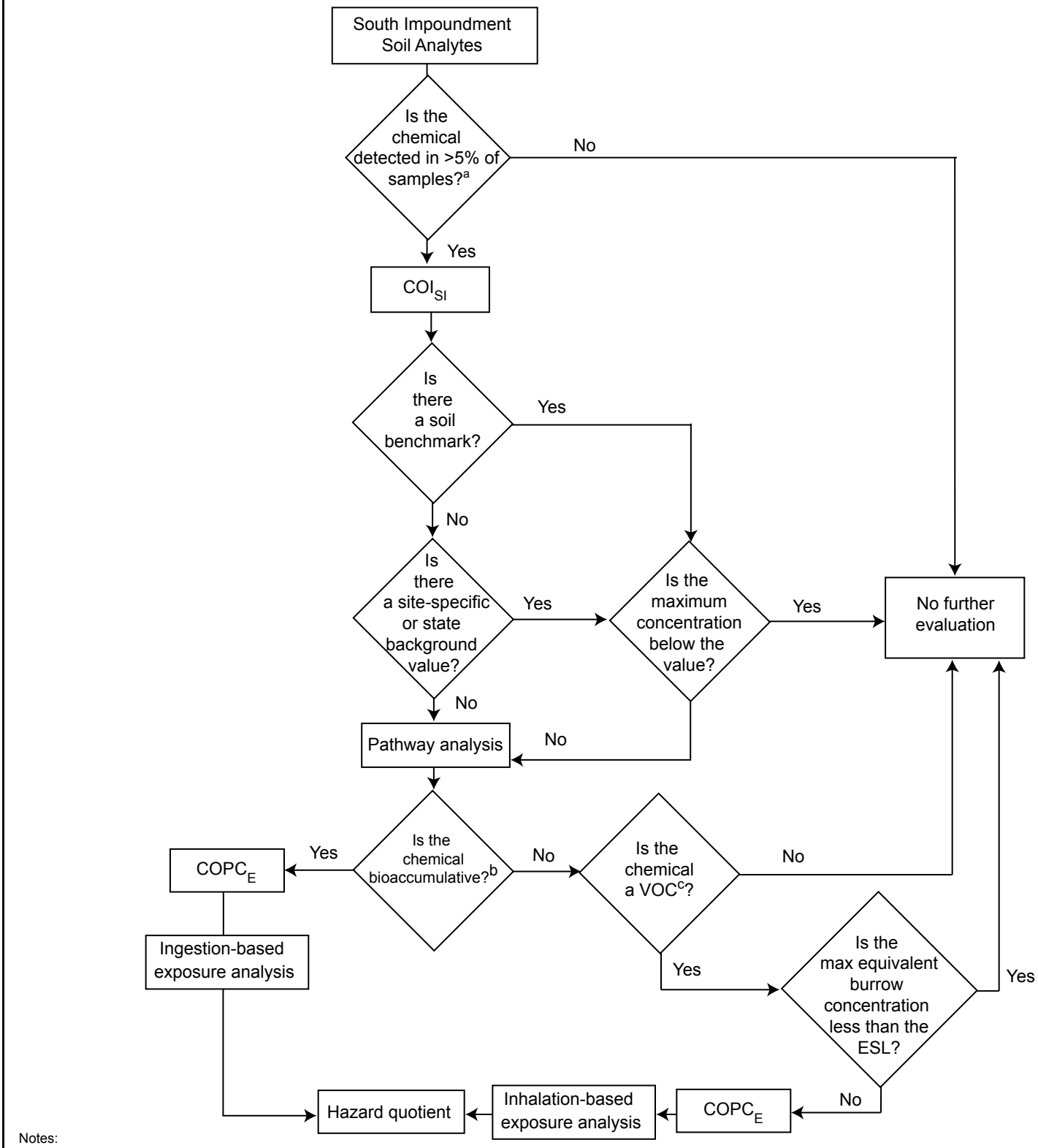
**Figure D-1**
Overview of Soil Investigation Area 4
Draft Baseline Ecological Risk Assessment
for Peninsula South of I-10
San Jacinto River Waste Pits Superfund Site




Notes:
Local sources may include industrial air emissions, vehicle or machinery fluid leaks, or other releases resulting from ongoing commercial activities.
Curved lines indicate potential transport pathways for chemicals of potential concern among exposure media.
[a] Evaluated for human receptors and burrowing mammals.

ANCHOR QEA integral consulting inc.

**Figure D-2**
Conceptual Site Model for the Southern Impoundment
Draft Baseline Ecological Risk Assessment for Peninsula South of I-10
San Jacinto River Waste Pits Superfund Site




Notes:
$COI_{SI}$ = chemical of interest for Soil Investigation Area 4
$COPC_E$ = chemical of potential ecological concern
ESL = ecological screening level (upper concentration)
VOC = volatile organic compound

[a]Soil data from 0 to 6 inches were considered for birds, omnivorous mammals, and reptiles. Data from 0 to 24 inches were considered for burrowing herbivorous mammals.

[b]Organic compounds with log $K_{OW}$ values ≥5 are considered bioaccumulative. Bioaccumulative inorganics are identified in TCEQ (2006).

[c]Pertains to VOCs for burrowing mammals only (0 to 24 inches).

**Figure D-3**
Screening Process for Soil Investigation Area 4 Soils
Draft Baseline Ecological Risk Assessment for Peninsula South of I-10
San Jacinto River Waste Pits Superfund Site

| Exposure Media | Exposure Routes | Reptiles | Terrestrial Birds | Mammals |
|---|---|---|---|---|
| | | | Invertivore | |
| Biota | Ingestion | ● | ● | ● |
| Soils | Ingestion | ● | ● | ● |
| | Direct Contact | ○ | ○ | ○ |
| | Inhalation (Vapors) | ○ | ○ | ○ |

Notes:

● Potentially complete and significant exposure pathway

○ Potentially complete but minor exposure pathway

ANCHOR QEA

integral consulting inc.

**Figure D-4**

Conceptual Site Model for Ecological Exposures:
Exposure Details for Receptor Feeding Guilds and Habitat Associations
Draft Baseline Ecological Risk Assessment for Peninsula South of I-10
San Jacinto River Waste Pits Superfund Site

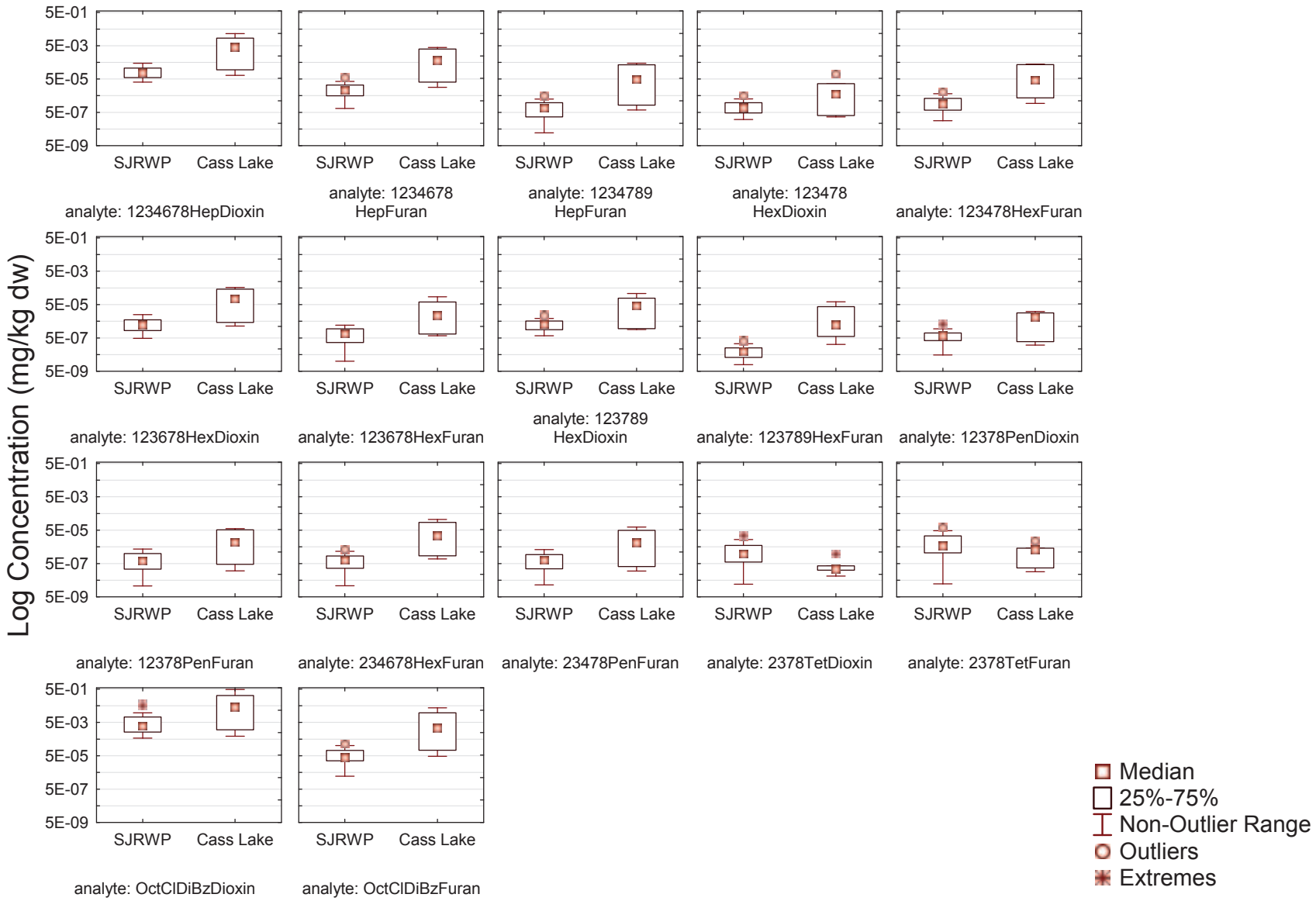



**Figure D-5**
Box Plots of Dioxin and Furan Congener Concentrations in
Cass Lake and Soil Investigation Area 4 and Adjacent Surface Soils
Draft Baseline Ecological Risk Assessment for Peninsula South of I-10
San Jacinto River Waste Pits Superfund Site

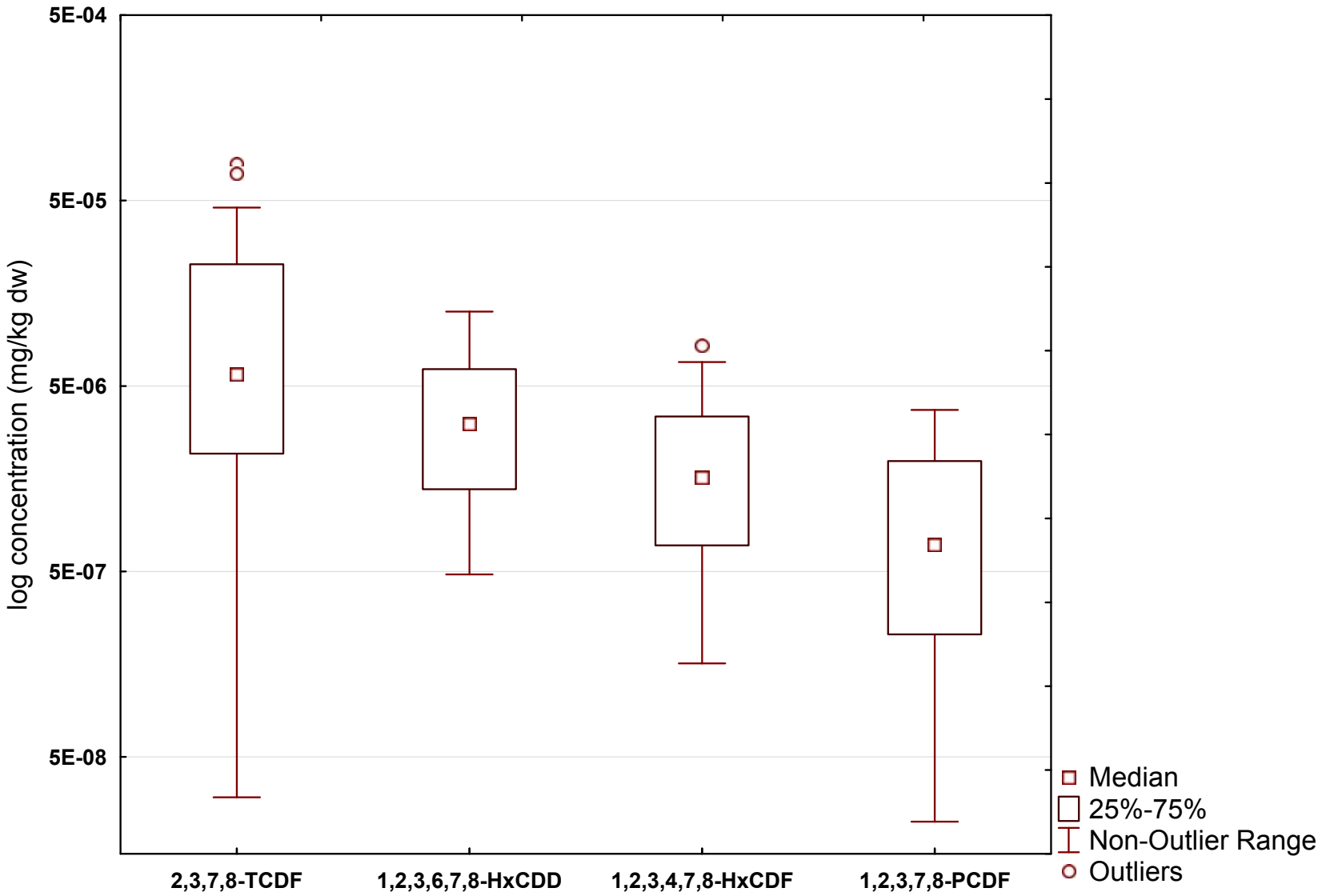
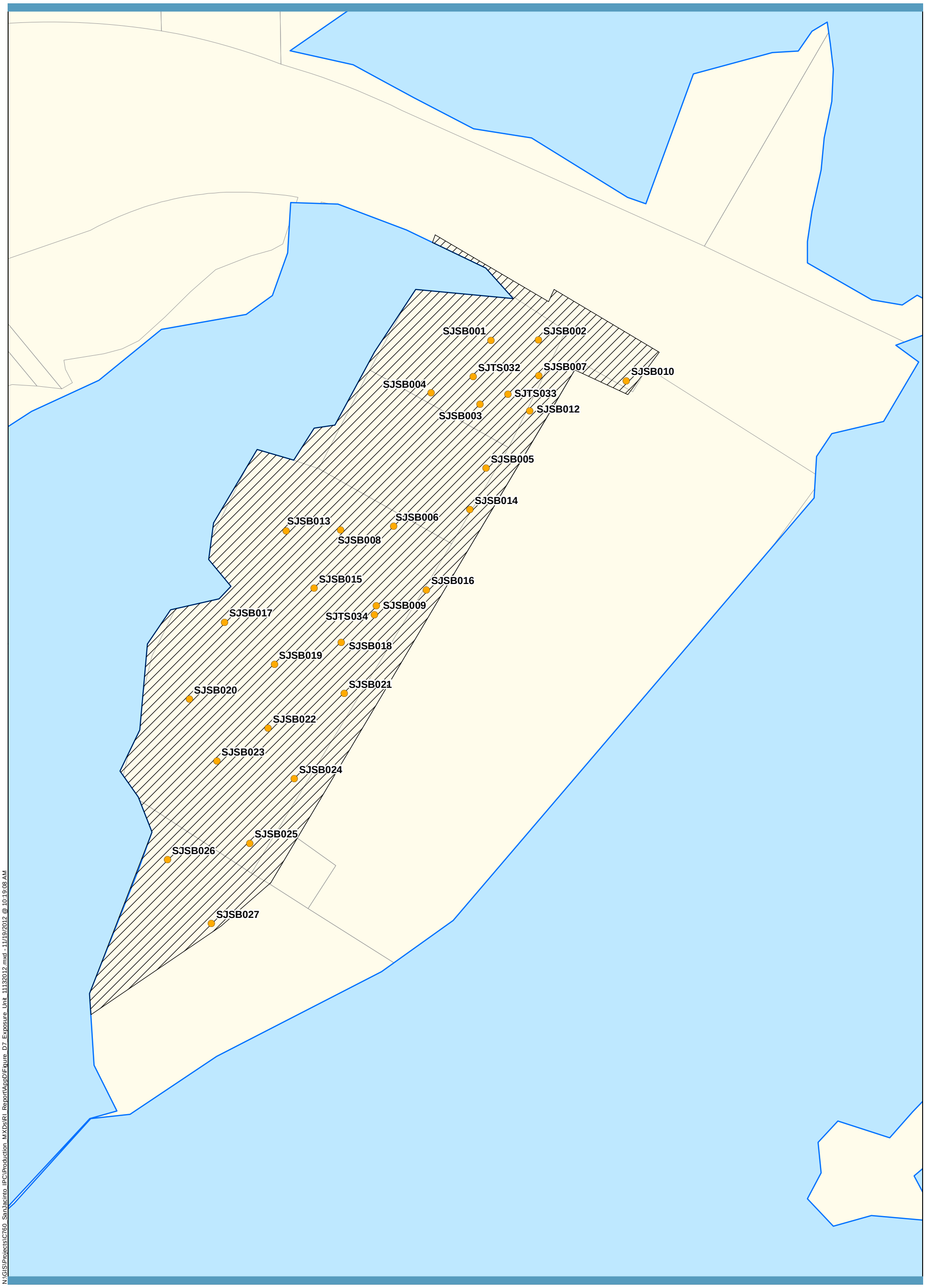



**Figure D-6**
Concentrations of 2,3,7,8-TCDF and Three Other Congeners
Evaluated as Correlates for EstimatingTissue Concentrations
from Soil Investigation Area 4 Soil Data
Draft Baseline Ecological Risk Assessment for Peninsula South of I-10
San Jacinto River Waste Pits Superfund Site




Soil Sample Locations

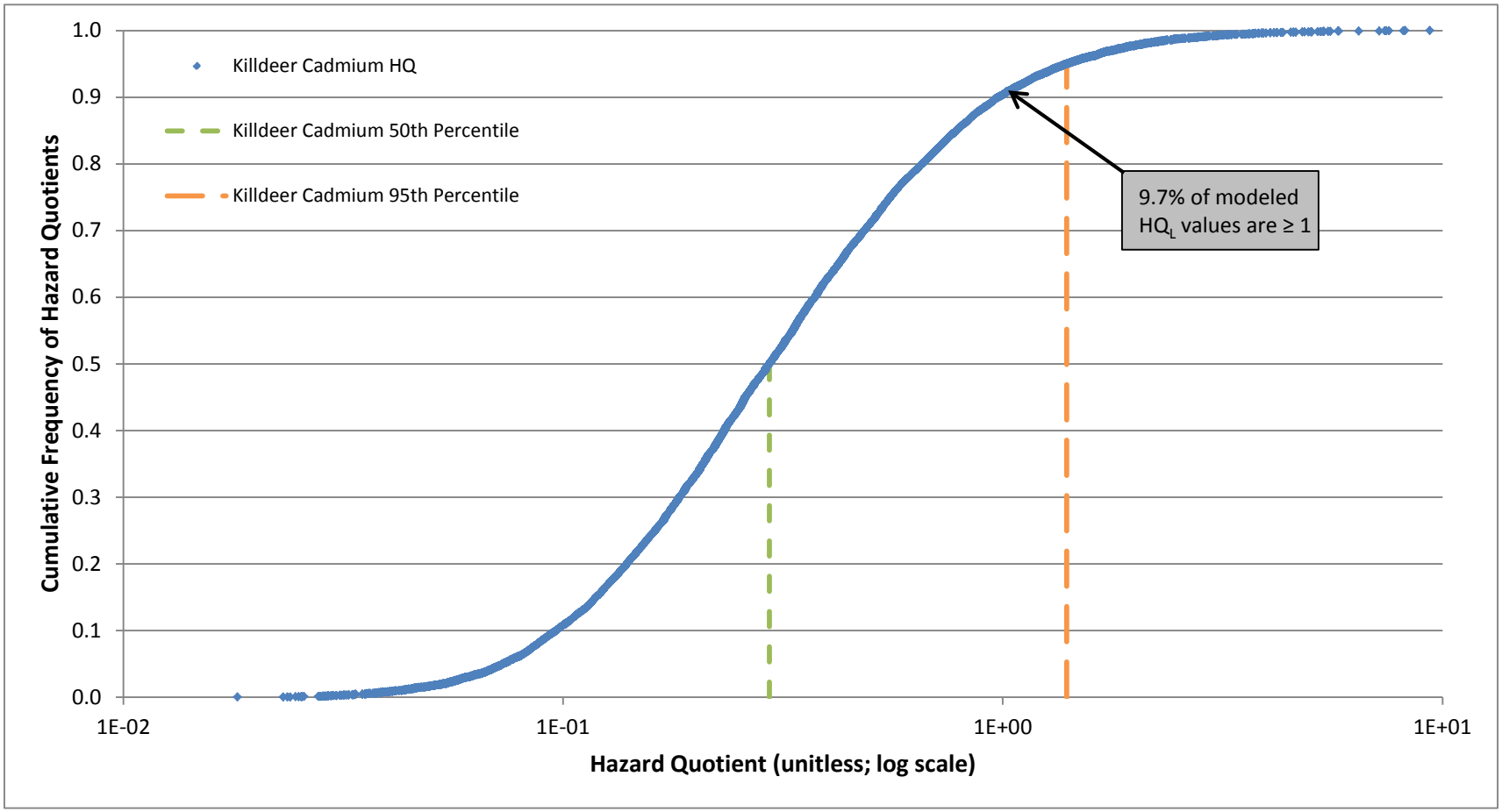
Estimated Exposure Area

0 500

Feet

**Figure D-7**
Exposure Areas and Soil Samples Used for Estimating Exposures to Killdeer, Virginia Opossum, Pocket Gopher, and Common Garter Snake
Draft Baseline Ecological Risk Assessment for Peninsula South of I-10
San Jacinto River Waste Pits Superfund Site

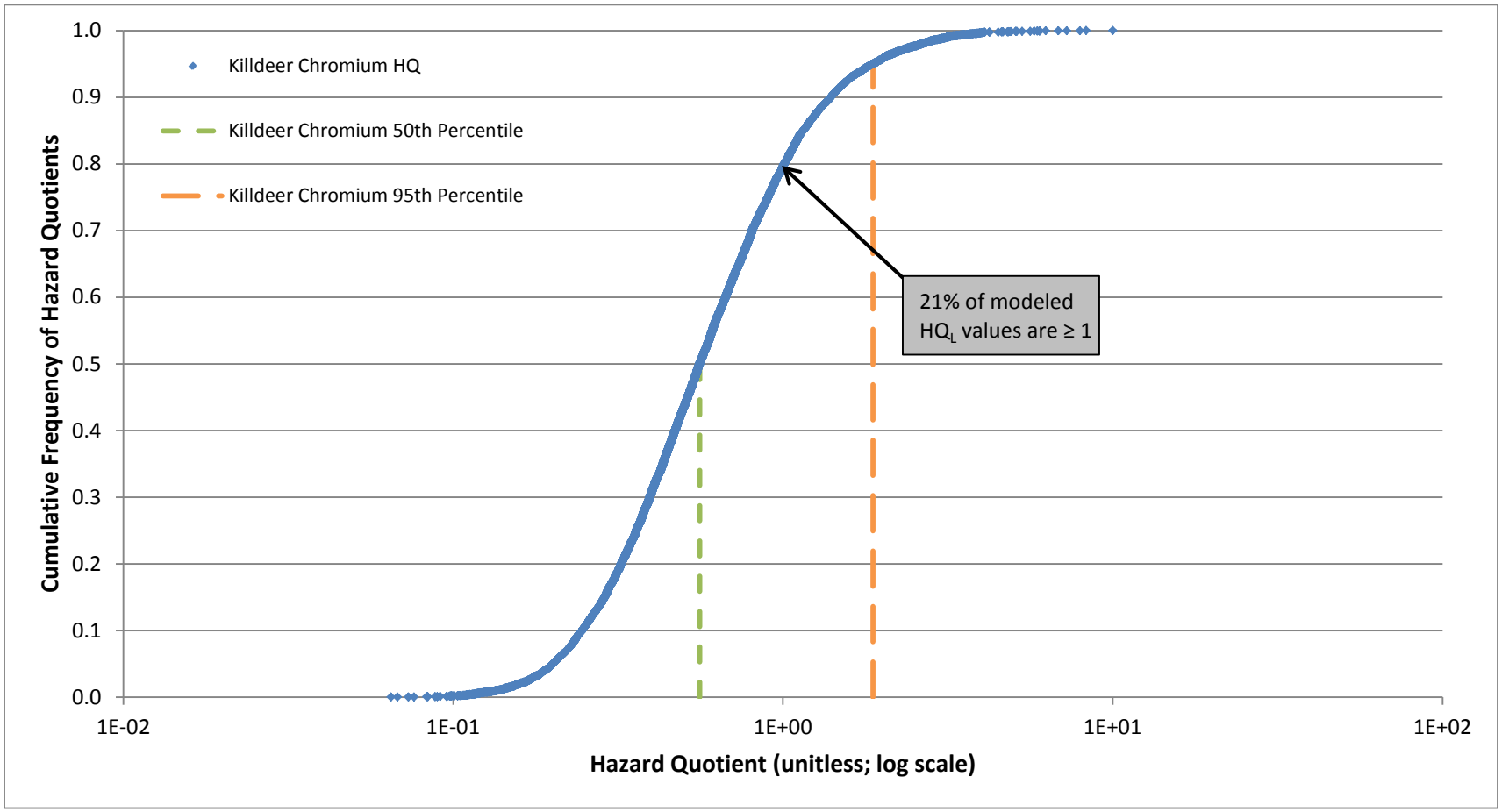
NOTES:
Relevant exposure depth for killdeer, Virginia opossum, and garter snake = 0 to 6 inches
Relevant exposure depth for pocket gopher = 0 to 2 feet




HQ = hazard quotient
$HQ_L$ = HQ calculated using a lowest-observed-adverse-effects level

ANCHOR QEA integral consulting inc

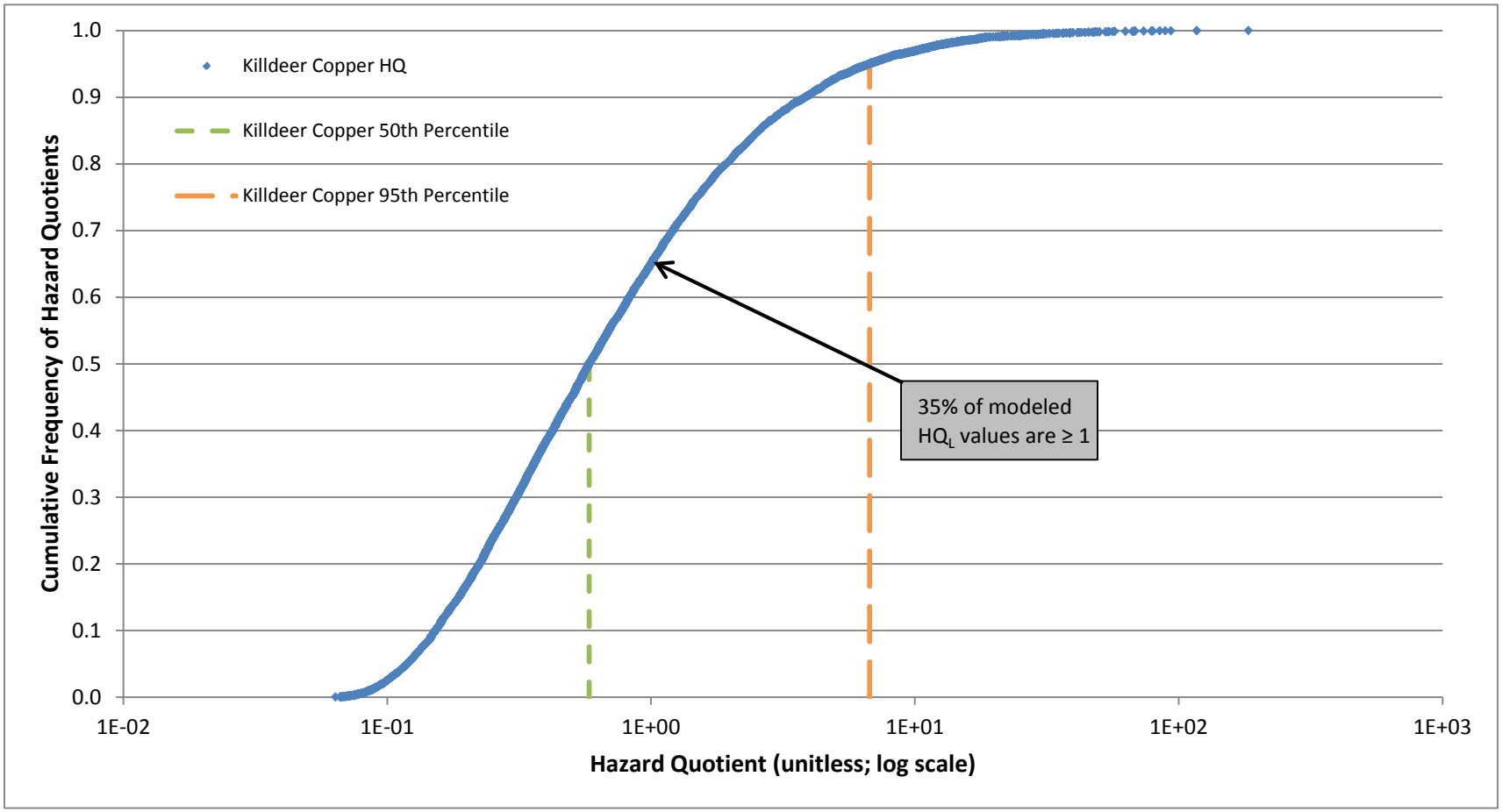
**Figure D-8**
Probability Distribution of Cadmium Hazard Quotients for Killdeer
Draft Baseline Ecological Risk Assessment for Peninsula South of I-10
San Jacinto River Waste Pits Superfund Site




HQ = hazard quotient
$HQ_L$ = HQ calculated using a lowest-observed-adverse-effects level

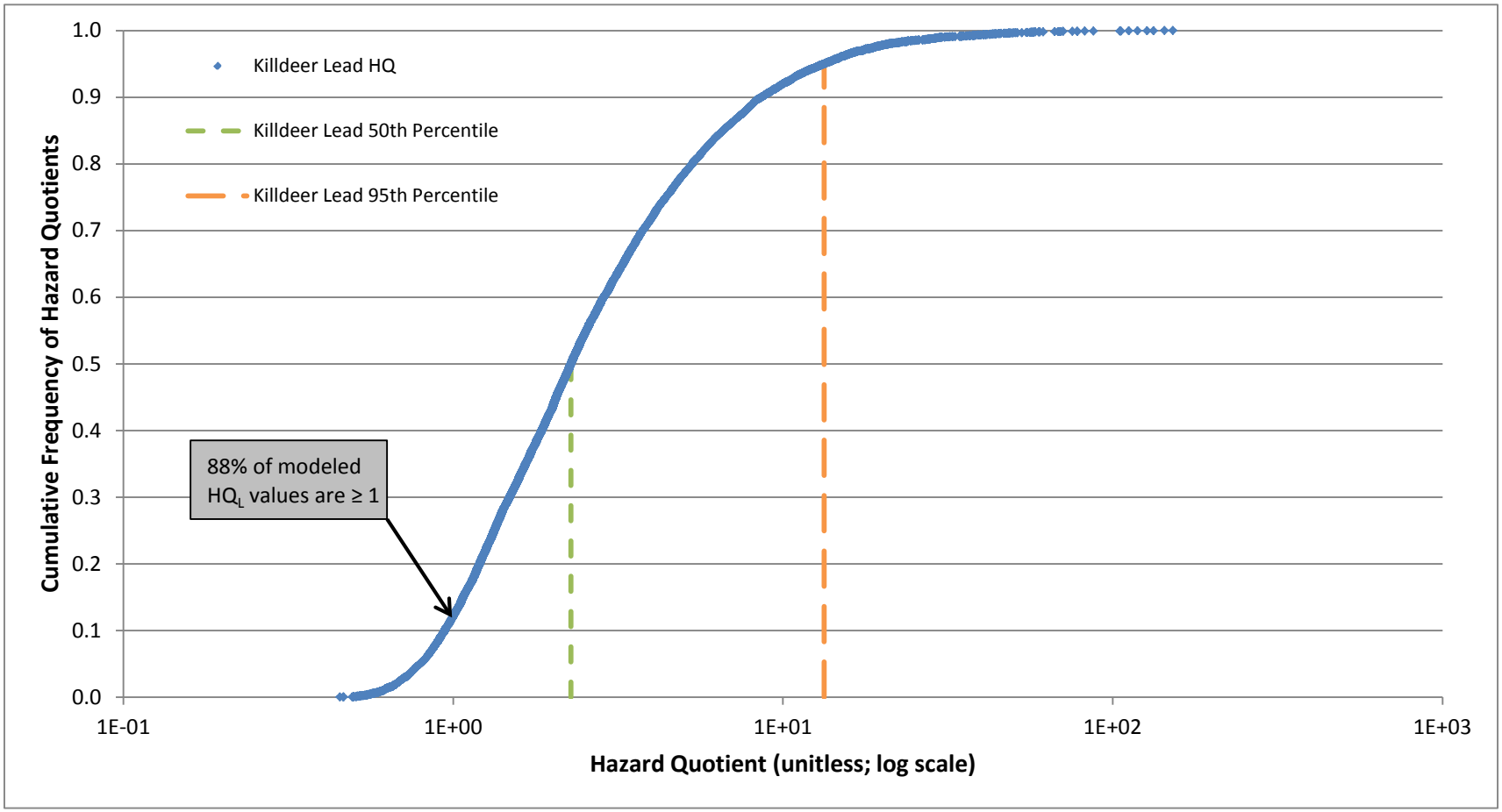
ANCHOR QEA integral consulting inc

**Figure D-9**
Probability Distribution of Chromium Hazard Quotients for Killdeer
Draft Baseline Ecological Risk Assessment for Peninsula South of I-10
San Jacinto River Waste Pits Superfund Site




HQ = hazard quotient
$HQ_L$ = HQ calculated using a lowest-observed-adverse-effects level

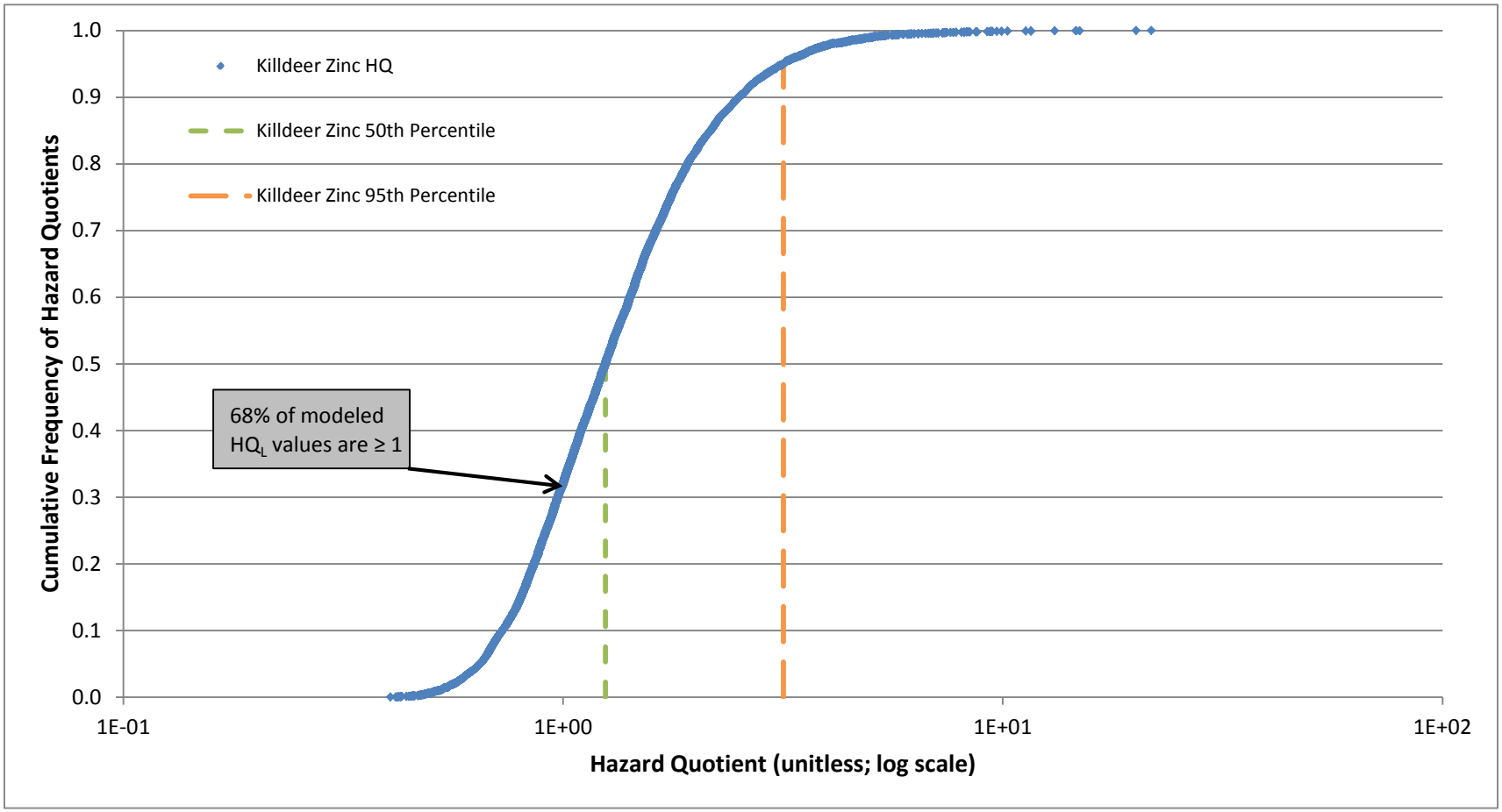
**Figure D-10**
Probability Distribution of Copper Hazard Quotients for Killdeer
Draft Baseline Ecological Risk Assessment for Peninsula South of I-10
San Jacinto River Waste Pits Superfund Site




HQ = hazard quotient
$HQ_L$ = HQ calculated using a lowest-observed-adverse-effects level

ANCHOR QEA integral consulting inc

**Figure D-11**
Probability Distribution of Lead Hazard Quotients for Killdeer
Draft Baseline Ecological Risk Assessment for Peninsula South of I-10
San Jacinto River Waste Pits Superfund Site




HQ = hazard quotient
$HQ_L$ = HQ calculated using a lowest-observed-adverse-effects level

ANCHOR QEA integral consulting inc

**Figure D-12**
Probability Distribution of Zinc Hazard Quotients for Killdeer
Draft Baseline Ecological Risk Assessment for Peninsula South of I-10
San Jacinto River Waste Pits Superfund Site

# ATTACHMENT A
# EXPOSURE POINT CONCENTRATIONS USED FOR EXPOSURE ASSESSMENT – AREA OF INVESTIGATION SOUTH OF I-10

## SAN JACINTO RIVER WASTE PITS SUPERFUND SITE

**Table A-1**
**Exposure Point Concentrations Used for Exposure Assessment in the BERA**

| Analyte | Distribution Type | Method | Units [a] | Number of Samples | Detection Frequency (percent) | Mean/CT[b] | UCL/RM[c] | Maximum Concentration |
|---|---|---|---|---|---|---|---|---|
| **Soil** | | | | | | | | |
| Surface Soil (0 to 6 inches) | | | | | | | | |
| Cadmium | lognormal | ucl.cheb.log | mg/kg | 22 | 100 | 0.47 | 2.2 | 7 |
| Chromium | lognormal | ucl.cheb.log | mg/kg | 22 | 100 | 21.3 | 56.5 | 86.3 |
| Copper | lognormal | ucl.cheb.log | mg/kg | 22 | 100 | 58.4 | 415 | 1,990 |
| Lead | lognormal | ucl.cheb.log | mg/kg | 22 | 100 | 54.2 | 232 | 896 |
| Mercury | lognormal | ucl.cheb.log | mg/kg | 22 | 100 | 0.0449 | 0.13 | 0.628 |
| Zinc | lognormal | ucl.cheb.log | mg/kg | 22 | 100 | 386 | 2,770 | 8,050 |
| HPAH | lognormal | ucl.cheb.log | µg/kg | 11 | 100 | 1,400 | 3,760 | 4,840 |
| Total PCB congeners[d] | lognormal | ucl.cheb.log | µg/kg | 11 | 100 | 46.4 | 348 | 276 |
| Total PCB Aroclors[e] | lognormal | ucl.cheb.log | µg/kg | 10 | 80 | 11.5 | 101 | 112 |
| Bis(2-ethylhexyl) phthalate | lognormal | ucl.cheb.log | µg/kg | 21 | 95.2 | 147 | 1,160 | 3,500 |
| $TEQ_{DF,B}$[f] | lognormal | ucl.cheb.log | ng/kg | 26 | 100 | 12.4 | 56.4 | 93.3 |
| $TEQ_{DF,M}$ | lognormal | ucl.cheb.log | ng/kg | 26 | 100 | 10.3 | 27.9 | 36.9 |
| $TEQ_{DFP,M}$ | lognormal | ucl.cheb.log | ng/kg | 11 | 100 | 18 | 41 | 44.5 |
| $TEQ_{P,B}$ | lognormal | ucl.cheb.log | ng/kg | 11 | 100 | 10.9 | 109 | 207 |
| $TEQ_{P,M}$[g] | lognormal | ucl.cheb.log | ng/kg | 11 | 100 | 1.85 | 13.9 | 12 |
| Subsurface Soil (0 to 24 inches) | | | | | | | | |
| Cadmium | lognormal | ucl.cheb.log | mg/kg | 22 | 100 | 0.39 | 1.5 | 4.4 |
| Chromium | lognormal | ucl.cheb.log | mg/kg | 22 | 100 | 21.9 | 60.5 | 110 |
| Copper | lognormal | ucl.cheb.log | mg/kg | 22 | 100 | 53.5 | 381 | 1,410 |
| Lead | lognormal | ucl.cheb.log | mg/kg | 22 | 100 | 49 | 200 | 690 |
| Mercury | lognormal | ucl.cheb.log | mg/kg | 22 | 100 | 0.04 | 0.095 | 0.18 |
| Nickel | lognormal | ucl.cheb.log | mg/kg | 22 | 100 | 17 | 69.8 | 337 |
| Zinc | lognormal | ucl.cheb.log | mg/kg | 22 | 100 | 326 | 2,200 | 6,110 |
| HPAH | lognormal | ucl.cheb.log | µg/kg | 11 | 100 | 841 | 3,090 | 4,220 |
| Total PCB congeners[d] | lognormal | ucl.cheb.log | µg/kg | 11 | 100 | 33 | 413 | 401 |
| Total PCB Aroclors[e] | lognormal | ucl.cheb.log | µg/kg | 10 | 100 | 20 | 99.2 | 154 |
| Bis(2-ethylhexyl) phthalate | lognormal | ucl.cheb.log | µg/kg | 21 | 95.2 | 110 | 950 | 1,800 |
| $TEQ_{DF,M}$ | unk | ucl.proucl.np | ng/kg | 29 | 100 | 9 | 24.6 | 170 |
| $TEQ_{DFP,M}$ | lognormal | ucl.cheb.log | ng/kg | 11 | 100 | 14.4 | 59.6 | 173 |
| $TEQ_{P,M}$ | lognormal | ucl.cheb.log | ng/kg | 11 | 100 | 1.33 | 9.92 | 13.6 |
| Background Surface Soil (0 to 6 inches) | | | | | | | | |
| Cadmium | lognormal | ucl.cheb.log | mg/kg | 20 | 85 | 0.0914 | 0.355 | 0.842 |
| Chromium | normal | ucl.t | mg/kg | 20 | 100 | 9.4 | 11.4 | 17.6 |
| Copper[h] | normal | ucl.t | mg/kg | 19 | 100 | 8.03 | 9.83 | 16 |
| Lead | lognormal | ucl.cheb.log | mg/kg | 20 | 100 | 17.2 | 37.1 | 66.6 |
| Zinc | lognormal | ucl.cheb.log | mg/kg | 19 | 100 | 30.6 | 95.6 | 276 |
| **Terrestrial Invertebrates**[i] | | | | | | | | |
| Surface Soil (0 to 6 inches) | | | | | | | | |
| Cadmium | lognormal | ucl.cheb.log | mg/kg | 22 | 100 | 4.52 | 14 | 38.7 |
| Chromium | lognormal | ucl.cheb.log | mg/kg | 22 | 100 | 6.53 | 17.3 | 26.4 |
| Copper | lognormal | ucl.cheb.log | mg/kg | 22 | 100 | 30.1 | 214 | 1,020 |
| Lead | lognormal | ucl.cheb.log | mg/kg | 22 | 100 | 20.2 | 60.5 | 194 |
| Mercury | lognormal | ucl.cheb.log | mg/kg | 22 | 100 | 0.139 | 0.403 | 1.95 |
| Zinc | lognormal | ucl.cheb.log | mg/kg | 22 | 100 | 603 | 987 | 1,630 |
| $TEQ_{DF,B}$[f,j] | normal | ucl.t | ng/kg | 26 | 100 | 7.85 | 8.98 | 14.8 |
| $TEQ_{DF,M}$[j] | normal | ucl.t | ng/kg | 26 | 100 | 12.0 | 13.8 | 24.3 |
| Total PCB congeners[d] | lognormal | ucl.cheb.log | mg/kg | 11 | 100 | 0.0628 | 1.15 | 0.71 |
| HPAH | lognormal | ucl.cheb.log | mg/kg | 11 | 100 | 3.63 | 9.76 | 12.6 |
| Background Surface Soil (0 to 6 inches) | | | | | | | | |
| Cadmium | lognormal | ucl.cheb.log | mg/kg | 20 | 85 | 1.24 | 3.42 | 7.22 |
| Chromium | lognormal | ucl.cheb.log | mg/kg | 20 | 100 | 2.43 | 4.79 | 5.39 |
| Copper[h] | normal | ucl.t | mg/kg | 19 | 100 | 4.14 | 5.06 | 8.24 |
| Lead | lognormal | ucl.cheb.log | mg/kg | 20 | 100 | 7.97 | 14.6 | 23.8 |
| Zinc | lognormal | ucl.cheb.log | mg/kg | 19 | 100 | 263 | 363 | 540 |

**Table A-1**
**Exposure Point Concentrations Used for Exposure Assessment in the BERA**

| Analyte | Distribution Type | Method | Units [a] | Number of Samples | Detection Frequency (percent) | Mean/CT[b] | UCL/RM[c] | Maximum Concentration |
|---|---|---|---|---|---|---|---|---|
| **Terrestrial Plants[k]** | | | | | | | | |
| Surface Soil (0 to 6 inches) | | | | | | | | |
| Cadmium | lognormal | ucl.cheb.log | mg/kg | 22 | 100 | 0.411 | 0.837 | 1.79 |
| Chromium | lognormal | ucl.cheb.log | mg/kg | 22 | 100 | 0.875 | 2.31 | 3.54 |
| Copper | lognormal | ucl.cheb.log | mg/kg | 22 | 100 | 9.69 | 17.7 | 38.9 |
| Lead | lognormal | ucl.cheb.log | mg/kg | 22 | 100 | 2.49 | 5.03 | 12 |
| Mercury | lognormal | ucl.cheb.log | mg/kg | 22 | 100 | 0.00168 | 0.00488 | 0.0236 |
| Zinc | lognormal | No | mg/kg | 22 | 100 | 131 | 325 | 704 |
| HPAH | lognormal | ucl.cheb.log | mg/kg | 11 | 100 | 0.25 | 0.636 | 0.811 |
| Subsurface Soil (0 to 24 inches) | | | | | | | | |
| Cadmium | lognormal | ucl.cheb.log | mg/kg | 22 | 100 | 0.373 | 0.71 | 1.4 |
| Chromium | lognormal | ucl.cheb.log | mg/kg | 22 | 100 | 0.898 | 2.48 | 4.51 |
| Copper | lognormal | ucl.cheb.log | mg/kg | 22 | 100 | 9.35 | 17.1 | 34 |
| Lead | lognormal | ucl.cheb.log | mg/kg | 22 | 100 | 2.34 | 4.63 | 10.4 |
| Mercury | lognormal | ucl.cheb.log | mg/kg | 22 | 100 | 0.00149 | 0.00356 | 0.00678 |
| Nickel | lognormal | ucl.cheb.log | mg/kg | 22 | 100 | 0.901 | 2.39 | 8.42 |
| Zinc | lognormal | ucl.cheb.log | mg/kg | 22 | 100 | 119 | 289 | 605 |
| HPAH | lognormal | ucl.cheb.log | mg/kg | 11 | 100 | 0.155 | 0.527 | 0.712 |
| Background Surface Soil (0 to 6 inches) | | | | | | | | |
| Cadmium | lognormal | ucl.cheb.log | mg/kg | 20 | 85 | 0.168 | 0.323 | 0.566 |
| Chromium | lognormal | ucl.cheb.log | mg/kg | 20 | 100 | 0.325 | 0.642 | 0.722 |
| Copper[h] | normal | ucl.t | mg/kg | 19 | 100 | 4.26 | 4.67 | 5.81 |
| Lead | lognormal | ucl.cheb.log | mg/kg | 20 | 100 | 1.31 | 1.95 | 2.79 |
| Zinc | lognormal | ucl.cheb.log | mg/kg | 19 | 100 | 32.2 | 56.8 | 109 |

**Notes**

BAF = bioaccumulation factor
CT = central tendency
EPC = exposure point concentration
HPAH = high molecular weight polycyclic aromatic hydrocarbon
PCB = polychlorinated biphenyl
RM = reasonable maximum
ROS = regression on order statistics, a method for substituting for non-detects
$TEQ_{DF,B}$ = Toxicity equivalent for dioxins and furans calculated using avian toxicity equivalency factors with nondetects set at one-half the detection limit.
$TEQ_{P,B}$ = Toxicity equivalent for dioxin-like PCBs calculated using avian toxicity equivalency factors with nondetects set at one-half the detection limit.
$TEQ_{DF,M}$ = Toxicity equivalent for dioxins and furans calculated using mammalian toxicity equivalency factors with nondetects set at one-half the detection limit.
$TEQ_{P,M}$ = Toxicity equivalent for dioxin-like PCBs calculated using mammalian toxicity equivalency factors with nondetects set at one-half the detection limit.
$TEQ_{DFP,M}$ = Toxicity equivalent for dioxins and furans, and dioxin-like PCBs calculated using mammalian toxicity equivalency factors with nondetects set at one-half the detection limit.
UCL = upper confidence limit on the mean
ucl.t = UCL for normally distributed data; calculated based on the T statistic
ucl.cheb.log = UCL for lognormally distributed data, using a Chebyshev correction factor
ucl.proucl.np = nonparametric UCL for an unknown data distribution, method is based on that used in ProUCL (USEPA 2010a)
unk = unknown distribution

a - All concentrations are on a dry-weight basis.
b - The mean value is the central tendency EPC.
c - The UCL was used as the RM EPC, except where UCL > maximum concentration, in which case the maximum concentration was selected as the RM EPC. Because the detection frequency was between 20 and 50 percent and N > 10, ROS was used for calculating the UCL.
d - Sum of 43 PCB congeners with non-detects set at one-half the detection limit.
e - Sum of detected Aroclors; highest detection limit used if none detected.
f - Calculated using a relative bioavailability adjustment factor for avian receptors for 2,3,7,8-tetrachlorodibenzo-*p* -dioxin.
g - High biasing nondetects were removed from the dataset prior to calculation of exposure point concentrations.
h - Outliers identified in statistical outlier analysis were removed from the dataset prior to calculation of exposure point concentrations.
i - Unless otherwise footnoted, estimated using Soil Investigation Area 4 soils data and soil-to-invertebrate BAFs.
j - Estimated using Soil Investigation Area 4 soils data and regression relationships (see BERA text).
k - Estimated using Soil Investigation Area 4 soils data and soil-to-plant BAFs.

# TABLES

**Table B-1**
**Toxicity Reference Values for Volatile Organic Compounds Detected in Soil Investigation Area 4 Soils**

| COI | CAS Number | Test Species | Study Duration | Endpoints | Exposure Route | Dosage | Study Toxicity Metric(s) | Study Toxicity Value(s) | NOAEL TRV (mg/kg-day) | Source | Comment |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Acetone | 67-64-1 | Mouse, rat | NR | NR | Inhalation | NR | NOAEL | 47 to 4,000 mg/kg bw-day | 462 | LANL (2011) | Reported as geometric mean of multiple studies; additional details not provided in the LANL database |
| Benzene | 71-43-2 | Mouse, guinea pig, rat, dog, monkey, and rabbit | NR | NR | Inhalation | NR | NOAEL | 0.18 to 210 mg/kg bw-day | 21.7 | LANL (2011) | Reported as geometric mean of multiple studies; additional details not provided in the LANL database |
| Bromomethane | 74-83-9 | Rat | 3 weeks prior to mating (7h/d, 5d/wk) | Reproduction (fetal effects) | Inhalation | 20 and 70 ppm | NOAEL | 70 ppm | NC | IRIS | NOAEL of 70 ppm converts to 272 mg/m$^3$ (as reported in IRIS); equivalent to 57 mg/m$^3$ on a continuous exposure basis |
| 2-Butanone | 78-93-3 | Rat | 2 generations | Reproduction (fetal effects) | Oral | 538, 1,644, and 5,089 mg/kg-day (males); 594, 1,771, and 4,571 mg/kg-day (females) | NOAEL | 1,771 mg/kg bw-day | 1,770 | USDOE (1999) | Same as Sample et al. (1996) |
| n-Butylbenzene | 104-51-8 | Rat | 2 generations | Reproduction (fetal effects) | Oral | 0, 30, 100 and 300 mg/kg-day | NOAEL | 30 mg/kg bw-day | 30.0 | Izumi et al. (2005) | |
| sec-Butylbenzene | 135-98-8 | Rat | 194 days (139 doses) | Tissue pathologies (organ weight) | Oral | 154, 462, or 769 mg/kg bw-day | NOAEL | 154 mg/kg bw-day | 110 | CalOEHHA (2000) | CalOEHHA (2000) recommended using isopropylbenzene as surrogate. These are the same as the IRIS entry for isopropylbenzene. |
| Carbon disulfide | 75-15-0 | Rabbit | 14 days, 6 h/day | Reproduction (fetal effects) | Inhalation | 20 and 40 ppm | NOAEL | 20 ppm | NC | IRIS | NOAEL of 20 ppm converts to 62.3 mg/m$^3$ (as reported in IRIS); equivalent to 16 mg/m$^3$ for continuous exposures. |
| Chlorobenzene | 108-90-7 | Beagle Dog | 13 weeks (5 d/wk) | Growth, survival, and hematological | Oral | 27.25, 54.5, or 272.5 mg/kg bw-day | NOAEL | 27.25 mg/kg bw-day | 19.0 | USDOE (1999); IRIS | NOAEL was adjusted to reflect dosing schedule; USDOE (1999) did not apply this adjustment. |
| Chloroform | 67-66-3 | Rat, guinea pig, rabbit and dog | NR | NR | Inhalation | NR | NOAEL | 0.3 to 92 mg/kg bw-day | 17.6 | LANL (2011) | Reported as geometric mean of multiple studies; additional details not provided in the LANL database |
| Chloromethane | 74-87-3 | Mouse, rat | NR | NR | Inhalation | NR | NOAEL | 1.9 to 290 mg/kg bw-day | 18.4 | LANL (2011) | Reported as geometric mean of multiple studies; additional details not provided in the LANL database |
| *trans* -1,2-Dichloroethene | 156-60-5 | Mouse | 90 days | Immunological | Oral | 0.1, 1.0, and 2.0 mg/mL in drinking water | NOAEL (as $BMDL_{1SD}$) | 65 mg/kg bw-day | 65.0 | IRIS | |
| Ethylbenzene | 100-41-4 | Rat | 182 days (5 doses/week) | Growth, survival, hematological, behavioral | Oral | 13.6, 136, 408, and 680 mg/kg bw-day | NOAEL | 136 mg/kg bw-day | 97.1 | IRIS | NOAEL adjusted to reflect dosing schedule |
| Isopropylbenzene | 98-82-8 | Rat | 194 days (139 doses) | Tissue pathologies (organ weight) | Oral | 154, 462, or 769 mg/kg bw-day | NOAEL | 154 mg/kg bw-day | 110 | IRIS | NOAEL adjusted to reflect dosing schedule |
| 4-Isopropyltoluene | 99-87-6 | Rat | 6 months | NR | Oral | Up to 769 mg/kg-day | NOAEL | 769 mg/kg-day | 769 | USEPA (2012) | USEPA (2012) used toxicity data for structurally similar chemical (cumene) as a surrogate for 4-isopropyltoluene. |
| n-Propylbenzene | 103-65-1 | Rabbit | 6 months | Tissue pathologies | Oral | 0, 0.25 and 2.5 mg/kg-day | NOAEL | 0.25 mg/kg-day | 0.250 | HSDB[a] | Effects seen at maxmimum dose only |
| Styrene | 100-42-5 | Beagle Dog | 560 days | Tissue pathologies | Oral | 0, 200, 400, and 600 mg/kg bw-day | NOAEL (Subchronic) | 200 mg/kg-day | 20.0 | USDOE (1999); IRIS | USDOE (1999) applied a UF of 10 to adjust to the chronic NOAEL. |

**Table B-1**
**Toxicity Reference Values for Volatile Organic Compounds Detected in Soil Investigation Area 4 Soils**

| COI | CAS Number | Test Species | Study Duration | Endpoints | Exposure Route | Dosage | Study Toxicity Metric(s) | Study Toxicity Value(s) | NOAEL TRV (mg/kg-day) | Source | Comment |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Toluene | 108-88-3 | Mouse, guinea pig, rat, dog, monkey, and rabbit | NR | NR | Inhalation | NR | NOAEL | 2.1 to 3,000 mg/kg bw-day | 52.0 | LANL (2011) | Reported as geometric mean of multiple studies; additional details not provided in the LANL database |
| Trichloroethene | 79-01-6 | Mouse, guinea pig, rat, dog, monkey, and rabbit | NR | NR | Inhalation | NR | NOAEL | 0.84 to 200 mg/kg bw-day | 16.3 | LANL (2011) | Reported as geometric mean of multiple studies; additional details not provided in the LANL database |
| 1,2,4-Trimethylbenzene | 95-63-6 | Rat | 14 days, 6 h/day | Growth and reproduction (fetal body weight) | Inhalation | 0, 100, 300, 600 and 900 ppm | NOAEL | 300 ppm | NC | HSDB[a] | NOAEL of 300 ppm converts to 1,474 mg/m$^3$; equivalent to 370 mg/m$^3$ on a continuous exposure basis |
| 1,3,5-Trimethylbenzene | 108-67-8 | Rat | 14 days, 6 h/day | Growth and reproduction (fetal body weight) | Inhalation | 0, 100, 300, 600 and 1,200 ppm | NOAEL | 100 ppm | NC | HSDB[a] | NOAEL of 100 ppm converts to 492 mg/m$^3$; equivalent to 123 mg/m$^3$ on a continuos exposure basis |
| *o* -Xylene | 95-47-6 | -- | -- | -- | -- | -- | -- | -- | 75.0 | -- | Assumed to be the same as total xylenes |
| *m,p* -Xylenes | 179601-23-1 | -- | -- | -- | -- | -- | -- | -- | 75.0 | -- | Assumed to be the same as total xylenes |
| Xylenes (total)[b] | -- | Mouse, rabbit and rat | NR | NR | Inhalation | NR | NOAEL | 8.3 to 1,800 mg/kg bw-day | 75.0 | LANL (2011) | Reported as geometric mean of multiple studiesl; additional details not provided in the LANL database |

**Notes**
-- = not applicable
$BMDL_{1SD}$ = 95% lower confidence limit on the benchmark dose
bw = body weight
CAS = Chemical Abstracts Service
COI = chemical of interest
HSDB = EPA's Hazardous Substance Database
IRIS = Integrated Risk Information System
LANL = Los Alamos National Laboratory
NC = not calculated; results used directly as ecological screening levels
NOAEL = no-observed-adverse-effects level
NR = not reported
ppm = parts per million
TRV = toxicity reference value
UF = uncertainty factor

a - This is a summary of available toxicity data and does not represent a primary reference.
b - Xylenes (total) was calculated as sum of *o* - and *m,p* -xylene concentrations in individual samples.

**Table B-2a**

**Burrowing Mammal Inhalation Ecological Screening Values for Volatile Organic Compounds Detected in Soil Investigation Area 4 Soils**

| COI | CAS Number | ESL ($mg/m^3$) | Source | Comment |
|---|---|---|---|---|
| Acetone | 67-64-1 | 540 | LANL (2011)[a] | |
| Benzene | 71-43-2 | 25 | LANL (2011)[a] | |
| Bromomethane | 74-83-9 | 57 | IRIS | IRIS value reported as air concentration |
| 2-Butanone | 78-93-3 | 2,000 | Calc | |
| n-Butylbenzene | 104-51-8 | 35 | Calc | |
| sec-Butylbenzene | 135-98-8 | 130 | Calc | |
| Carbon disulfide | 75-15-0 | 16 | IRIS | IRIS value reported as air concentration |
| Chlorobenzene | 108-90-7 | 22 | Calc | |
| Chloroform | 67-66-3 | 21 | LANL (2011)[a] | |
| Chloromethane | 74-87-3 | 22 | LANL (2011)[a] | |
| *trans* -1,2-Dichloroethene | 156-60-5 | 75 | Calc | |
| Ethylbenzene | 100-41-4 | 110 | Calc | |
| Isopropylbenzene | 98-82-8 | 130 | Calc | |
| 4-Isopropyltoluene | 99-87-6 | 890 | Calc | |
| n-Propylbenzene | 103-65-1 | 0.29 | Calc | |
| Styrene | 100-42-5 | 23 | Calc | |
| Toluene | 108-88-3 | 61 | LANL (2011)[a] | |
| Trichloroethene | 79-01-6 | 19 | LANL (2011)[a] | |
| 1,2,4-Trimethylbenzene | 95-63-6 | 370 | HSDB | HSDB value reported as air concentration |
| 1,3,5-Trimethylbenzene | 108-67-8 | 120 | HSDB | HSDB value reported as air concentration |
| *o* -Xylene | 95-47-6 | 88 | -- | Assumed comparable to total xylenes |
| *m,p* -Xylenes | 179601-23-1 | 88 | -- | Assumed comparable to total xylenes |
| Xylenes (total)[b] | | 88 | LANL (2011)[a] | |

**Notes**

-- = not applicable

Calc = calculated from toxicity reference values (see Table B-2b for supporting calculations)

CAS = Chemical Abstracts Service

COI = chemical of interest

ESL = ecological screening level

HSDB = EPA's Hazardous Substance Database

IRIS = Integrated Risk Information System

a - ESLs from LANL (2011) were used as reported because of the similarity in body weights of the ESL organism (Botta's pocket gopher) and the representative burrowing mammal for the peninsula south of I-10 (Baird's pocket gopher).

b - Xylenes (total) was calculated as sum of *o* - and *m,p* -xylene concentrations in individual samples.

**Table B-2b**
**Supporting Information Used to Calculate Inhalation Ecological Screening Values**

| COI[a] | CAS Number | NOAEL TRV (mg/kg-day) | ESL[b] ($mg/m^3$) |
|---|---|---|---|
| 2-Butanone | 78-93-3 | 1,800 | 2,050 |
| n-Butylbenzene | 104-51-8 | 30 | 34.7 |
| sec-Butylbenzene | 135-98-8 | 110 | 127 |
| Chlorobenzene | 108-90-7 | 19 | 22.0 |
| *trans* -1,2-Dichloroethene | 156-60-5 | 65 | 75.1 |
| Ethylbenzene | 100-41-4 | 97 | 112 |
| Isopropylbenzene | 98-82-8 | 110 | 127 |
| 4-Isopropyltoluene | 99-87-6 | 770 | 889 |
| n-Propylbenzene | 103-65-1 | 0.25 | 0.289 |
| Styrene | 100-42-5 | 20 | 23.1 |

**Notes**

CAS = Chemical Abstracts Service
COI = chemical of interest
ESL = ecological screening level
NOAEL = no-observed-adverse-effects level
TRV = toxicity reference value

a - Only those chemicals where ESLs were calculated from TRVs are shown on this table.
b - ESLs were calculated following the method of Carlsen (1996) and Gallegos et al (2007). See text for discussion.

| | | |
|---|---|---|
| Body weight of receptor: | 0.1 | kg |
| Inhalation rate of receptor: | 0.0865 | $m^3/d$ |
| Occupancy Factor: | 1 | assumed (i.e., 100%) |

**Table B-3**
**Original Calculated ESLs and Reported ESLs from the LANL ECORISK Database, and Recalculated ESLs**

| Analyte Name | ESL Raw Value ($mg/m^3$) | NOAEL ESL ($mg/m^3$) | Recalculated ESL ($mg/m^3$) |
|---|---|---|---|
| Acetone | 539.87 | 530 | 540 |
| Benzene | 25.367 | 25 | 25 |
| Chloroform | 20.57 | 20 | 21 |
| Chloromethane | 21.5 | 21 | 22 |
| Toluene | 60.76 | 60 | 61 |
| Trichloroethene | 19.05 | 19 | 19 |
| Xylene (Total) | 87.64 | 87 | 88 |

**Notes**

ESL = ecological screening level

LANL = Los Alamos National Laboratory

NOAEL = no-observed-adverse-effects level

**Table B-4**
**Volatile Organic Compound Concentrations in Soils, 0- to 24-Inch Depth Interval, and Estimated Burrow Concentrations**

| COI | CAS Number | Freq. Detected | Maximum Detected Concentration for Soil 0 to 24 Inches[a] (µg/kg dw) | H[b] (Pa-$m^3$/mol) | $K_{oc}$[b] | Estimated Maximum Burrow Conc. (mg/$m^3$) |
|---|---|---|---|---|---|---|
| Acetone | 67-64-1 | 18/32 | 330 | 3.48 | 2.36 | 0.00992 |
| Benzene | 71-43-2 | 32/32 | 73 | 552 | 146 | 0.00563 |
| Bromomethane | 74-83-9 | 5/32 | 2.5 | 730 | 13.2 | 0.00282 |
| 2-Butanone | 78-93-3 | 25/32 | 50 | 5.67 | 4.51 | 0.00128 |
| n-Butylbenzene | 104-51-8 | 10/32 | 0.96 | 1,580 | 1,480 | $2.09x10^{-5}$ |
| sec-Butylbenzene | 135-98-8 | 6/32 | 0.58 | 1,750 | 1,330 | $1.56x10^{-5}$ |
| Carbon disulfide | 75-15-0 | 30/32 | 83 | 1,430 | 21.7 | 0.112 |
| Chlorobenzene | 108-90-7 | 2/32 | 0.21 | 309 | 234 | $5.66x10^{-6}$ |
| Chloroform | 67-66-3 | 4/59 | 3.5 | 365 | 31.8 | 0.000819 |
| Chloromethane | 74-87-3 | 6/32 | 5.2 | 878 | 13.2 | 0.00706 |
| *trans* -1,2-Dichloroethene | 156-60-5 | 2/32 | 0.44 | 406 | 39.6 | $9.21x10^{-5}$ |
| Ethylbenzene | 100-41-4 | 28/32 | 25 | 783 | 446 | 0.000896 |
| Isopropylbenzene | 98-82-8 | 14/32 | 2.5 | 1,140 | 698 | $8.35x10^{-5}$ |
| 4-Isopropyltoluene | 99-87-6 | 15/32 | 0.73 | 1,090 | 1,120 | $1.46x10^{-5}$ |
| n-Propylbenzene | 103-65-1 | 15/32 | 2.5 | 1,040 | 813 | $6.55x10^{-5}$ |
| Styrene | 100-42-5 | 5/32 | 1.4 | 272 | 446 | $1.74x10^{-5}$ |
| Toluene | 108-88-3 | 30/32 | 110 | 659 | 234 | 0.00632 |
| Trichloroethene | 79-01-6 | 2/32 | 3.4 | 980 | 60.7 | 0.00112 |
| 1,2,4-Trimethylbenzene | 95-63-6 | 23/32 | 3.8 | 613 | 614 | $7.74x10^{-5}$ |
| 1,3,5-Trimethylbenzene | 108-67-8 | 12/32 | 1.3 | 873 | 602 | $3.85x10^{-5}$ |
| *o* -Xylene | 95-47-6 | 20/32 | 11 | 516 | 383 | 0.000302 |
| *m,p* -Xylenes[c] | 179601-23-1 | 31/32 | 25 | 700 | 375 | 0.000953 |
| Xylenes (total)[d] | | 31/32 | 36 | 516 | 383 | 0.000989 |

**Notes**

CAS = Chemical Abstracts Service
COI = chemical of interest
dw = dry weight
H = Henry's Law Constant
$K_{oc}$ = organic carbon partition coefficient

a - Depth intervals included in the 0- to 2-foot range were 0-15.24 cm, 15.24-30.48 cm, 30.48-60.96 cm and 0-60.96 cm.
b - The H and $K_{oc}$ values were obtained from the Oak Ridge National Laboratory (ORNL) Risk Assessment Information System website (http://rais.ornl.gov/).
c - The H and $K_{oc}$ values for *m,p* -xylenes were the average of the reported values from ORNL for *m* - and *p* -xylenes.
d - Xylenes (total) was calculated as sum of *o* - and *m,p* -xylene concentrations in individual samples.

The corresponding samples include SBSB001 through SJSB010, SJSB012 through SJSB027,and SJSB032 through SJSB034.

# ATTACHMENT B
# METHODOLOGY FOR ASSESSING INHALATION OF VOLATILE ORGANIC COMPOUNDS BY BURROWING MAMMALS – SOIL INVESTIGATION AREA 4

## Table of Contents

1 INTRODUCTION ..... 1-1

2 METHODS TO DEVELOP INHALATION ECOLOGICAL SCREENING LEVELS ..... 2-1

2.1 Development of TRVs for VOCs ..... 2-1

2.1.1 Toxicological Endpoints Considered ..... 2-2

2.1.2 Use of Uncertainty Factors in Estimates of TRVs ..... 2-3

2.1.3 Summary of VOC Toxicity Reference Values ..... 2-4

2.2 Development of Ecological Screening Levels for VOCs ..... 2-7

2.2.1 ESL Values Derived from the Literature ..... 2-7

2.2.2 Derivation of ESLs from TRVs Reported as Vapor Concentrations ..... 2-8

2.2.3 Derivation of ESLs from TRVs Reported as a Dose ..... 2-9

3 CALCULATION OF BURROW AIR CONCENTRATIONS FROM SOIL CONCENTRATIONS ..... 3-1

4 REFERENCES ..... 4-1

## List of Tables

Table B-1 Toxicity Reference Values for Volatile Organic Compounds Detected in Soil Investigation Area 4 Soils
Table B-2a Burrowing Mammal Inhalation Ecological Screening Values for Volatile Organic Compounds Detected in Soil Investigation Area 4 Soils
Table B-2b Supporting Information Used to Calculate Inhalation Ecological Screening Values
Table B-3 Original Calculated ESLs and Reported ESLs from the LANL ECORISK Database, and Recalculated ESLs
Table B-4 Volatile Organic Compound Concentrations in Soils, 0- to 24-inch Depth Interval, and Estimated Burrow Concentrations

# LIST OF ACRONYMS AND ABBREVIATIONS

| Abbreviation | Definition |
|---|---|
| BERA | baseline ecological risk assessment |
| CalOEHHA | California Office of Environmental Health Hazard Assessment |
| ESL | ecological screening level |
| HSDB | Hazardous Substances Data Bank |
| InhR | inhalation rate |
| IRIS | Integrated Risk Information System |
| $LC_{50}$ | median lethal concentration |
| LANL | Los Alamos National Laboratory |
| LOAEL | lowest-observed-adverse-effects level |
| NOAEL | no-observed-adverse-effects level |
| SJRWP | San Jacinto River Waste Pits |
| TRV | toxicity reference value |
| USDOE | U.S. Department of Energy |
| USEPA | U.S. Environmental Protection Agency |
| VOC | volatile organic compound |

# 1 INTRODUCTION

The U.S. Environmental Protection Agency (USEPA) required analysis of soil samples from Soil Investigation Area 4 (Figure D-1 in the report to which this is attached) in the area south of Interstate Highway 10 (I-10) of the San Jacinto River Waste Pits (SJRWP) Superfund site for concentrations of volatile organic compounds (VOCs). To provide a complete baseline ecological risk assessment (BERA) for the area of investigation on the peninsula south of I-10, it is necessary to evaluate risks to ecological receptors resulting from potentially complete exposure pathways. Exposure pathways for VOCs are incomplete for the terrestrial ecological receptors addressed by the BERA for the area of investigation on the peninsula south of I-10, with the following exception: volatilization of VOCs present in soils within which mammal burrows may be present could result in inhalation by mammals while in their burrows. Therefore, it is necessary to address inhalation of VOCs in burrow air to provide a complete evaluation of baseline risks to terrestrial ecological receptors that may use the area of investigation on the peninsula south of I 10.

This attachment summarizes the screening approach used to address the inhalation pathway for burrowing mammals and supporting methods. To perform the screening evaluation, the following analyses were required:

- Identification and selection of toxicity reference values (TRVs) for the VOCs considered to be chemicals of interest for Soil Investigation Area 4
- Derivation of ecological screening levels (ESLs)
- Estimation of concentrations of each VOC in burrow air from the concentration measured in soil samples.

Following these analytical steps, estimated VOC concentrations in burrow air were compared to the ESLs. The approaches and methods for each of these analytical steps are described below.

# 2 METHODS TO DEVELOP INHALATION ECOLOGICAL SCREENING LEVELS

For some of the VOCs detected in soils of Soil Investigation Area 4, ESLs were available in the published literature (Gallegos et al. 2007). For those VOCs lacking ESLs, inhalation ESLs were developed in a two-step process:

1. Identification of TRVs – TRV (mg/kg-day) values for the VOCs that were detected in the soils samples were identified from the published literature, or were derived from relevant published data.
2. Derivation of an ESL as a VOC concentration in air – The inhalation ESLs ($mg/m^3$) were calculated from the TRVs using standard exposure models and assumptions for the relevant ecological receptor, which is the Baird's pocket gopher (*Geomys breviceps*) for this BERA.

These steps could only be performed if suitable toxicological studies that reported results as an air exposure (i.e., as $mg/m^3$) were available.

## 2.1 Development of TRVs for VOCs

Appendix B of the BERA for the area north of I-10 and aquatic environment (Integral 2012) provides detailed information on the methods used to identify TRVs for the risk assessment. The approach for identifying the screening-level TRVs for this analysis was somewhat different than that described in Appendix B of Integral (2012). A modified approach was appropriate and necessary because 1) published mammalian toxicity data for VOCs related to ecologically-relevant endpoints are very limited; and 2) a screening assessment should be conservative. The primary published or gray literature sources used for this evaluation represented several well-established sources of TRVs and other toxicity information commonly used at Superfund sites, and included the following:

- Los Alamos National Laboratory (LANL) ECORISK Database Release 3.0 (LANL 2012)
- USEPA's Integrated Risk Information System (IRIS) database (http://www.epa.gov/IRIS/)
- California Office of Environmental Health Hazard Assessment (CalOEHHA)
- Hazardous Substances Data Bank (HSDB) (http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?HSDB)
- U.S. Department of Energy (USDOE 1999)

- Sample et al. (1996)
- USEPA (2012)
- Other published toxicological studies.

The following data sources were also evaluated but were not used since they lacked TRVs for the VOCs evaluated, or TRVs were already addressed by the data sources listed above:

- Cal/Ecotox Database (http://www.oehha.ca.gov/scripts/cal_ecotox/CHEMLIST.ASP)
- Eco-SSL (http://www.epa.gov/ecotox/ecossl/)
- USEPA ECOTOX Database (http://cfpub.epa.gov/ecotox/)
- Combustion Guidance TRV Appendix (USEPA 1999)
- Environmental Health Criteria Monographs (http://www.inchem.org/pages/ehc.html).

Because evaluation of the VOC inhalation pathway is a screening-level assessment, the primary objective was to compile no-observed-adverse-effects levels (NOAELs) as TRVs.

This assessment focuses on the Baird's pocket gopher (*G. breviceps*), so only mammalian toxicity data were considered relevant. Consistent with the approach taken in the BERA for the area north of I-10 and aquatic environment( Integral 2012), extrapolation of TRVs between species on the basis of the difference in body weights between the two species (i.e., allometric scaling) was not used to estimate or derive measures of effects when species-specific TRVs are not available. The selected value is as reported by the information source, regardless of the test species.

The TRVs and key data sources for the selected VOCs included in this evaluation are presented in Table B-1. From the key data sources for each VOC evaluated, this summary presents the test species, study duration, measured endpoints, exposure routes, the dose or exposure regimen, the reported study metric (e.g., NOAEL), the reported study toxicity values, and the NOAEL TRV.

### *2.1.1 Toxicological Endpoints Considered*

Toxicity literature available for use in BERAs is often limited to studies reporting effects at the individual level. TRVs associated with individual effects that are clearly related to

population-level responses (i.e., survival, growth, and reproduction of tested individuals) are preferred. Studies documenting an effect of a toxicant on an endpoint that is related by the authors of the study to survival, growth, or reproduction (e.g., a developmental endpoint that is clearly related to the reduced survival of young) may also be used. Studies addressing endpoints unrelated to population effects (e.g., cellular or biochemical alterations or gene expression) are generally not used to establish TRVs for a BERA, because these effects cannot be related to population-level assessment endpoints.

However, for some of the VOCs, the evaluated endpoints were not related to population effects, but rather effects such as tissue pathologies (organ weights) or immunological effects. When TRVs for endpoints considered more relevant to population-level assessment were not available, these types of studies were used instead to develop the needed TRVs. This substitution is a source of uncertainty in the screening evaluation, but is considered likely to cause a conservative bias in results.

### *2.1.2 Use of Uncertainty Factors in Estimates of TRVs*

The preferred approach for selecting TRVs is to find values that meet acceptability criteria (see Appendix B of Integral 2012), are taxonomically relevant, and are appropriate to the receptors of concern, but data may not be available for a given taxon or effect level of interest (e.g., a median lethal concentration [$LC_{50}$] may be available, but not a NOAEL or lowest-observed-adverse-effects level [LOAEL]). In these cases, the application of an uncertainty factor to conservatively estimate the benchmark or TRV may be needed. In a review of the types and uses of uncertainty factors, Chapman et al. (1999) conclude that an uncertainty factor should account for the uncertainty in the extrapolation, but should not be so large that it renders the resultant value meaningless for assessing risk.

Chapman et al.'s (1999) review emphasizes the importance of evaluating the substance and context of the uncertainty. They caution against the extrapolation of LOAELs to NOAELs because there can be substantial uncertainty in moving from effects to no-effects concentrations. They provide several examples that support the use of uncertainty factors of 10 or below for individual extrapolations, and suggest that the combination of all uncertainty factors not exceed 10. Their review points out that uncertainty factors are essentially

screening tools for which the imprecision cannot be quantified, and should not be regarded as mathematical absolutes. These recommendations were used as a basis for the application of uncertainty factors in deriving TRVs where relevant effects-level values were missing but related values were available.

### *2.1.3 Summary of VOC Toxicity Reference Values*

TRVs to support derivation of ESLs were obtained or calculated from several different data sources, which are discussed below. Each source presented the TRVs as either a dose (mg/kg-day) or as a concentration in air ($mg/m^3$). The manner in which TRVs are presented by each source is indicated next to the name of the information source:

- LANL ECORISK database – This database included TRVs for eight of the VOCs (acetone, benzene, chloroform, chloromethane, toluene, trichloroethene, *o*-xylenes, and *m/p*-xylenes[1]) detected in soils of Soil Investigation Area 4. These values represent geometric means of TRVs from multiple studies across several mammalian species.
- IRIS (vapor concentration values) – USEPA's online IRIS database included NOAEL values for vapor concentrations for two of the VOCs (bromomethane and carbon disulfide) detected in soils of Soil Investigation Area 4. TRVs were not used to derive ESLs because these NOAEL values are already presented as vapor-based ESLs. However, for both of these chemicals the exposure durations were less than 24 hours per day and less than 7 days a week, so an adjustment to the reported concentrations was made to reflect a continuous exposure (the method for making the adjustment is described in Section 2.2.2).
- IRIS (dose values) – USEPA's online IRIS database included NOAEL values (as doses, not air concentrations) for three of the VOCs (*trans*-1,2-dichloroethene, ethylbenzene, and isopropylbenzene) detected in the soils of Soil Investigation Area 4. These were all based on oral exposures and included endpoints that are not considered to be directly relevant to evaluation of population level effects. For example, the isopropyl benzene value was based on tissue pathology. USEPA (2010)

[1] The LANL ECORISK database summarized xylenes as total xylenes. It is assumed that this value would apply to the *o*-xylene and *m/p*-xylenes reported in the soils of Soil Investigation Area 4.

developed a NOAEL for *trans*-1,2-dichloroethene using their benchmark dose software,[2] which was used as reported. The ethyl benzene and isopropylbenzene exposure durations reflect a chronic exposure (182 and 194 days, respectively) and were used as reported.

- CalOEHHA 2000 (dose values) – CalOEHHA reviewed the toxicology data for *sec*-butylbenzene to support the development of action levels for this chemical in water. Chronic toxicity data were not available for this VOC. CalOEHHA recommended using cumene (isopropylbenzene) as a surrogate, which is similar to the approach used by USEPA (1997) to develop a provisional reference dose for *sec*-butylbenzene. The NOAEL endpoint was tissue pathology (increased kidney weight) in rats exposed orally over a 194-day period. This is the same study referenced in IRIS for this chemical.
- HSDB (dose value) – The online HSDB database included a dose-based NOAEL value for *n*-propylbenzene. The test organisms (rabbits) were exposed orally for 6 months, consistent with a chronic exposure. The toxicological endpoint for *n*-propylbenzene was tissue pathology because no other suitable toxicological benchmarks were available. The NOAEL (0.25 mg/kg-day) was used as reported for the TRV.
- HSDB (vapor concentration values) – The online HSDB database reported inhalation NOAELs for two of the VOCs (1,2,4-trimethylbenzene and 1,3,5-trimethylbenzene) detected in Soil Investigation Area 4. The measurement endpoints for both of these VOCs were growth and reproduction. TRVs were not calculated because these reported values already represented vapor-based ESLs. The 14-day study duration was not long, but test subjects were exposed during a sensitive life stage (pregnancy and gestation) so application of an uncertainty factor related to study duration was not required. However, the exposure durations for both of these chemicals were less than a day, so an adjustment to the reported concentrations was made to reflect a continuous exposure (as described in Section 2.2.2).
- USDOE 1999 (dose values) – USDOE (1999) compiled ecological TRVs to support evaluations at USDOE facilities. This compilation included dose-based NOAEL values for three of the VOCs (2-butanone, chlorobenzene, and styrene) detected in Soil

[2] The latest version of the benchmark dose software is available at: http://www.epa.gov/ncea/bmds/.

Investigation Area 4. The test organisms were exposed chronically to 2-butanone or chlorobenzene. The styrene exposure duration was subchronic. The toxicological endpoints were reproduction for 2-butanone and growth and survival for chlorobenzene. These endpoints are appropriate surrogates for population effects. The measurement endpoint for styrene was tissue pathology, which is not preferred for TRV development, but no other suitable toxicological benchmarks were available. The TRV reported for 2-butanone is the same as that reported by Sample et al. (1996). The NOAEL values reported for chlorobenzene and styrene were also reported in the IRIS database. For styrene, an uncertainty factor of 10 was used to convert from subchronic to chronic NOAEL. For chlorobenzene, an adjustment to the NOAEL was made to reflect the less than continuous exposure (as described in Section 2.2.2). This was not required for the other two VOCs from this data source.

- USEPA 2012 (dose value) – EPA's Office of Pollution Prevention and Toxics summarized the toxicology for high production volume chemicals, including VOCs, provided by producers and importers. Although there was no chronic toxicological data for 4-isopropyltoluene (also known as *p*-cymene), USEPA used the relevant NOAEL reported for the closely related VOC cumene.[3] A NOAEL of 769 mg/kg-day (highest tested dose) was reported based on a 6-month oral ingestion study in rats.
- Published studies (dose value) – A limited review of the toxicological data was performed for some of the VOCs that lacked suitable NOAELs or TRVs from sources listed above. The TRV for *n*-butylbenzene was from a two generation rat study by Izumi et al. (2005). Rats were exposed to three different dose levels in their diets and reproductive effects were monitored across two generations. The NOAEL was based upon the absence of developmental or growth effects on offspring.

Calculation of ESLs from the vapor concentration-based TRV values and the dose-based TRV values are discussed in Sections 2.2.2 and 2.2.3, respectively.

[3] *p*-Cymene and cumene differ only in that the latter lacks a methyl group in the *para*-position of the benzene ring.

## 2.2 Development of Ecological Screening Levels for VOCs

For use in the VOC screening evaluation for burrowing mammals, it was necessary that the final ESLs be expressed as vapor concentrations (i.e., as $mg/m^3$). Given the variety of information available to support this screening evaluation, several approaches were used to either identify an appropriate ESL or to derive one using TRVs reported by the sources described in the previous section. That is, final ESL values were one of the following:

- An ESL reported as a vapor concentration in the literature
- A TRV reported as a vapor concentration
- An ESL calculated by Integral Consulting Inc. based on TRVs reported in the literature as a dose (mg/kg-day).

Each of these types of ESLs, and the methods and approaches supporting them, are discussed below. The resulting ESLs are summarized in Table B-2a. Supporting calculations are provided in Table B-2b.

### *2.2.1 ESL Values Derived from the Literature*

Gallegos et al. (2007) developed burrowing mammal ESLs for VOCs, several of which were measured in the soils of Soil Investigation Area 4. These ESLs were compiled in an earlier version (v2.2) of the LANL ECOTOX database. The receptor evaluated by Gallegos et al. (2007) was Botta's pocket gopher (*Thomomys bottae*), which has a similar body weight (0.104 kg) to the receptor (Baird's pocket gopher) addressed by the current evaluation (0.1 kg body weight; MNH 2011). Based on the comparability of the body weights, the ESLs reported in the more current version of the LANL ECORISK database were used for this screening evaluation. These included seven of the soil VOCs found in Soil Investigation Area 4: acetone, benzene, chloroform, chloromethane, toluene, trichloroethene, and xylenes (total). It was assumed that the ESL for *o*-xylene and *m,p*-xylenes would be comparable to xylenes (total) for this screening assessment.

It was observed during compilation of these seven TRVs from the ECORISK database that LANL rounded the ESLs down from the values originally calculated from the TRVs that were developed. A simple truncation to two significant digits was used, as shown in Table B-3.

Although rounding up the ESL raw values to two significant digits does not significantly change the results, it is preferable to the simple truncation approach used in the LANL database. The "Corrected ESL" values are shown in Tables B-2a and B-3.

### *2.2.2 Derivation of ESLs from TRVs Reported as Vapor Concentrations*

The toxicological studies for four of the VOCs (bromomethane, carbon disulfide, 1,2,4-trimethylbenzene, and 1,3,5-trimethylbenzene) addressed by this screening evaluation were reported as vapor concentrations. The values for bromomethane and carbon disulfide were both NOAEL values reported in IRIS. The values for 1,2,4-trimethylbenzene and 1,3,5-trimethylbenzene were both NOAEL values reported in the HSDB database.

Vapor concentrations for all four of these VOCs were time-adjusted to reflect a continuous exposure that may occur with a burrowing mammal. This approach, as discussed by Gallegos et al. (2007), adjusts for the portion of the day that the test animal was exposed in the toxicity test (e.g., 5 to 7 hours/day) and number of days per week test animals were exposed (e.g., 5 days per week), so that the ESL reflects a continuous exposure condition, as summarized in the equation below:

$$ESL = C_{vap,adj} = C_{vap} \times \frac{t_{study}}{24} \times \frac{d_{study}}{7}$$

where:

| | | |
|---|---|---|
| $C_{vap,adj}$ | = | time-weighted NOAEL vapor phase concentration (mg/m$^3$) |
| $Cv_{ap}$ | = | NOAEL vapor phase concentration (mg/m$^3$) |
| $t_{study}$ | = | number of hours per day the test organism was exposed (hours) |
| 24 | = | number of hours per day (hours) |
| $d_{study}$ | = | number of days per week the test organism was exposed (days) |
| 7 | = | number of days per week (days) |

As an example, the NOAEL value for bromomethane was 70 parts per million (equivalent to 272 mg/m$^3$). The exposure was designed to mimic an industrial exposure, and was 7 hours per day, 5 days per week. Using the equation above, this yields an ESL (that is equivalent to

a continuous exposure) of 57 mg/m$^3$ (272 x 7/24 x 5/7). These adjusted values are reflected in Tables B-1 and Table B-2a.

### 2.2.3 Derivation of ESLs from TRVs Reported as a Dose

For the ESLs that are calculated from TRVs, the following equation from Carlsen (1996) was used:

$$ESL = \frac{(BW \times TRV)}{InhR} \times OF$$

where:

BW = body weight of receptor (kg)
InhR = inhalation rate of receptor (m$^3$/day)
OF = occupancy factor (unitless)

The body weight for the pocket gopher was assumed to be 0.1 kg (MNH 2012), which is the same as the value used in the food-chain model in the BERA.

The inhalation rate (InhR) for the pocket gopher was calculated using the following equation from Stahl (1967) and USEPA (1993):

$$InhR = 0.5458 \times BW^{0.8}$$

This calculation resulted in an assumed inhalation rate of $8.65 \times 10^{-2}$ m$^3$/day for the Baird's pocket gopher. The occupancy factor (OF) represents the time spent by the receptor in the burrow. For these calculations, the OF was conservatively assumed to be 1—i.e., that the burrow is occupied 100% of the receptor's lifetime.

The 10 VOC ESLs that were calculated from their corresponding TRVs were 2-butanone, *n*-butylbenzene, *sec*-butylbenzene, chlorobenzene, *trans*-1,2-dichloroethene, ethylbenzene, isopropylbenzene, 4-isopropyltoluene, *n*-propylbenzene, and styrene.

# 3 CALCULATION OF BURROW AIR CONCENTRATIONS FROM SOIL CONCENTRATIONS

Sample et al. (1997) recommends using the methodology from Hope (1995) to estimate burrow air concentrations ($C_{burrow}$) in the absence of field measurements of burrow air or a surrogate (e.g., soil vapor measurements). This approach is described in the equation below.

$$C_{burrow} = \left\{ \frac{(H/(R \times T))}{(\rho_s \times f_{oc} \times K_{oc})} \right\} \times C_{soil} \times \rho_a$$

where:

| | | |
|---|---|---|
| $C_{burrow}$ | = | burrow air concentration (mg/m$^3$) |
| $C_{soil}$ | = | soil concentration (mg/kg) |
| H | = | Henry's Law Constant (Pa-m$^3$/mole) |
| R | = | Universal Gas Constant = 8.31 Pa-m$^3$/mol-K |
| T | = | temperature (K) |
| $\rho_s$ | = | soil bulk density (kg/L) |
| $f_{oc}$ | = | fraction organic carbon in soils |
| $K_{oc}$ | = | organic carbon-water partition coefficient (L/kg) |
| $\rho_a$ | = | air bulk density (kg/m$^3$) |

This is a fugacity-based approach that estimates the equilibrium concentration. It does not account for burrow geometry or exchange with the exterior air. The values for these variables and the estimated burrow air concentrations are presented in Table B-4, and are discussed below:

- Soil concentration ($C_{soil}$) – The maximum VOC soil concentration for the multiple intervals that fell within the 0- to 2-foot depth interval across the 29 Soil Investigation Area 4soil samples was used for this parameter. The use of the maximum from individual depth intervals is a more conservative approach than using the maximum depth-weighted concentration. For example, the maximum concentration for benzene from the 32 individual subsurface samples was 73 µg/kg (sample SJSB012, 15.24-30.48 cm depth) while the maximum depth-weighted concentration was 36.7 µg/kg (sample SJSSB02). Although the maximum depth-

weighted concentration would be more representative of the potential exposures to the 0- to 2-foot depth interval soils, the more conservative approach was used because this is a screening process.

- Soil bulk density ($\rho_s$) – Review of the grain size data shows that the soils of Soil Investigation Area 4 would be classified as sandy soils. Therefore, a soil bulk density of 1.6 kg/L was assumed (Burden and Sims 1999).
- Fraction organic carbon in soils ($f_{oc}$) – Total organic carbon for the equation above was assumed to be 1.5 percent, which represents the average of the depth-weighted total organic carbon content across Soil Investigation Area 4. The overall depth-weighted average total organic carbon ranged from 0.2 to 15.7 percent in the soil samples within the 0- to 2-foot depth interval.

The unitless Henry's Law Constant (H) and organic carbon-water partition coefficient ($K_{oc}$) were chemical specific and were obtained from the Oak Ridge National Laboratory Risk Assessment Information website (http://rais.ornl.gov/cgi-bin/tools/TOX_search?select=chem_spef). The unitless H values were first multiplied by 0.024 to convert to units of atm-$m^3$/mol, and then by 101,325 (1 atm = 101,325 Pascals) to convert to units of Pa-$m^3$/mol for these calculations.

A soil temperature (T) of 20°C (i.e., 293K), and an air bulk density of 1.205 kg/$m^3$ (sea level at 20°C; Weast 1975) were also assumed. The soil temperature is likely higher than is typical for subsurface soils in the evaluated area, but was used for conservatism, because the amount of volatilization increases with increasing temperatures.

As shown in Table B-4, the estimated maximum burrow VOC concentrations averaged $6.5 \times 10^{-3}$ mg/$m^3$, with a range of $5.6 \times 10^{-6}$ mg/$m^3$ (for chlorobenzene) to $1.1 \times 10^{-1}$ mg/$m^3$ (for carbon disulfide). These values are compared to the ESLs in Section 3.1.3 of the BERA.

# 4 REFERENCES


Burden, D.S., and J.L Sims, 1999. Fundamentals of Soil Science as Applicable to Management of Hazardous Wastes. EPA/540/S-98/500. April. U.S Environmental Protection Agency, Office of Research and Development, Office of Solid Waste and Emergency Response, Washington, DC.

Carlsen, T.M., 1996. Ecological Risks to Fossorial Vertebrates from Volatile Organic Compounds in Soil. *Risk Analysis* 16:211–219.

Chapman, P.M., A. Fairbrother, and D. Brown, 1999. A critical evaluation of safety (uncertainty) factors for ecological risk assessment. *Environ. Toxicol. Chem.* 17(1):99-108.

Gallegos, P., J. Lutz, J. Markwiese, R. Ryti, and R. Mirenda, 2007. Wildlife Ecological Screening Levels for Inhalation of Volatile Organic Chemicals. *Environ. Toxicol. Chem.* 26(6):1299–1303.

Hope, B.K., 1995. A Review of Models for Estimating Terrestrial Ecological Receptor Exposure to Chemical Contaminants. *Chemosphere* 30(12):2267-2287.

Integral, 2012. Baseline Ecological Risk Assessment, San Jacinto River Waste Pits Superfund Site. Prepared for McGinnes Industrial Maintenance Corporation, International Paper Company, and U.S. Environmental Protection Agency, Region 6. Integral Consulting Inc., Seattle, WA. August.

Izumi, H., E. Kimura, T. Ota, and S. Shimazu, 2005. A Two-Generation Reproductive Study of n-Butylbenzene in Rats. *J. Toxicol. Sci.* 30(Special Issue):21-38.

LANL, 2012. ECORISK Database (Release 3.0). LA-UR-11-5460, Los Alamos National Laboratory, Los Alamos, New Mexico. October. Available at: http://empress.lanl.gov/reportData/LAUR1105460/LA-UR-11-05460.zip. Accessed on September 6, 2012.

MNH, 2011. North American Mammals, Online publication, Costello, R. and A. Rosenberger, Eds., Smithsonian National Museum of Natural History. Accessed at: http://www.mnh.si.edu/mna/image_info.cfm?species_id=97 on October 19, 2011. Museum of Natural History.

Sample, B.E., D.M. Opresko, and G.W.I. Suter, 1996. Toxicological Benchmarks for Wildlife: 1996 Revision. ES/ER/TM-86/R3 Contract DE-AC05-84OR21400. Lockheed Martin Energy Systems, Inc., Oak Ridge National Laboratory, Risk Assessment Program, Health Sciences Research Division, Oak Ridge, TN. Appendix A.

Sample, B.E., M.S. Alpin, R.A. Eforymson, G.W. Suter II, and C.J.E. Welsh, 1997. Methods and Tools for Estimation of the Exposure of Terrestrial Wildlife to Contaminants. ORNL/TM-13391. Available at: http://www.esd.ornl.gov/programs/ecorisk/documents/tm13391.pdf. Oak Ridge National Laboratory. October 1997.

Stahl, W.R., 1967. Scaling of Respiratory Variables in Mammals. *J. Am. Physiol.* 22:453–460.

USDOE, 1999. Terrestrial Toxicity Reference Values (TRVs). Environmental Restoration Division. Manual ERD-AG-003, P.7.3. April 6, 1999. Available at: http://professionals.pr.doe.gov/srs/soilfiles/rdh/p73.PDF. U.S. Department of Energy.

USEPA, 1993. Wildlife Exposure Factors Handbook -Volume 1. General Factors. Office of Research and Development. EPA/600/R-93/187. December. Available at: http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=2799. U.S. Environmental Protection Agency, Washington, DC.

USEPA, 1997. Risk Assessment Issue Paper for: Derivation of Provisional Chronic RIDs for n-Butylbenzene (CASRN 104-51-8), sec-Butylbenzene (CASRN 135-98-8), tert-Butylbenzene (CASRN 98-06-6), and n-Propylbenzene (CASRN 103-65-1). Report No. 97-009/6-5-97. Available at: http://hero.epa.gov/index.cfm?action=reference.details&reference_id=597097 U.S. Environmental Protection Agency, National Center for Environmental Assessment.

USEPA, 1999. Screening Level Ecological Risk Assessment Protocol for Hazardous Waste Combustion Facilities. Appendix E: Toxicity Reference Values. EPA530-D-99-001A. August. Available at: http://www.epa.gov/osw//hazard/tsd/td/combust/eco-risk/volume3/appx-e.pdf. U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, Washington, DC.

USEPA, 2010. Toxicological Review of cis-1,2-Dichloroethylene and trans-1,2-Dichloroethylene. EPA/635/R-09/006F. September. Available at: http://www.epa.gov/iris/toxreviews/0418tr.pdf. U.S. Environmental Protection Agency, Washington, DC.

USEPA, 2012. Screening-Level Hazard Characterization, Sponsored Chemical: p-Cymene (CASRN 99-87-6). June. Available at: http://www.epa.gov/oppt/chemrtk/hpvis/hazchar/120711_%20p-Cymene_June%202012.pdf. U.S. Environmental Protection Agency, Washington, DC.

Weast, R.C., 1975. *Handbook of Chemistry and Physics*. 56th Edition. CRC Press, Cleveland, Ohio.

# APPENDIX E
# RESIDENTIAL SOILS
# SAN JACINTO RIVER WASTE PITS
# SUPERFUND SITE

# 1 INTRODUCTION

Soil sampling was conducted in residential areas on August 11, 2011, in response to a letter from the U.S. Environmental Protection Agency (USEPA) (Miller 2011, pers. comm.), wherein USEPA directed International Paper Company and McGinnes Industrial Maintenance Corporation (Respondents) to conduct soil sampling in residential areas near USEPA's Preliminary Site Perimeter.[1] This appendix describes soil sampling and testing results at residential locations identified by USEPA and the Respondents. The information in this appendix was presented to USEPA in a memorandum from David Keith of Anchor QEA to Gary Miller of USEPA, finalized on September 20, 2011.

The residential soil sampling and analyses described in this appendix were conducted consistent with the Soil Sampling and Analysis Plan (SAP) (Integral 2010) and related appendices (including the Field Sampling Plan, which is Appendix A to the Soil SAP). Soil samples from residential areas that are near USEPA's Preliminary Site Perimeter and that are within the 100-year floodplain (Figure E-1) were analyzed for polychlorinated dibenzo-*p*-dioxins (dioxins) and polychlorinated dibenzofurans (furans). The purpose of the sampling was to address uncertainty as to whether flooding events may have caused dioxins and furans in sediments to be carried onto residential properties.

For this evaluation, TEQ concentration in each soil sample was calculated using dioxins and furans and mammalian toxicity equivalency factors ($TEQ_{DF,M}$). At the time of sampling in 2011, USEPA's (2009b) proposed draft interim preliminary remediation goal (PRG) for dioxins and furans in residential soil was 72 ng/kg dry weight toxicity equivalent (TEQ) concentration, specifically the 2,3,7,8-tetrachlorinated dibenzo-*p*-dioxin (TCDD) equivalent. When USEPA published the final noncancer reference dose (RfD) for TCDD (and TEQ) on February 17, 2012, they noted that, although the agency "no longer has a need" for the draft interim soil PRGs, the equivalent to the USEPA (2009b) residential soil PRG, calculated using the final RfD, would be 50 ng/kg TEQ.[2] This residential soil PRG was used to interpret the $TEQ_{DF,M}$ in residential soils.

[1] For the purposes of this document, the term "USEPA's Preliminary Site Perimeter" refers to the area shown within the "preliminary perimeter" in Appendix B of the UAO.

[2] http://epa.gov/superfund/health/contaminants/dioxin/dioxinsoil.html

## 2 SOIL SAMPLING AND ANALYSIS METHODS

Soil samples were collected from two residential areas as defined in Figure E-1: an area to the west of the USEPA's Preliminary Site Perimeter (between Meadowbrook and River Road), and a second area along the eastern shoreline of the San Jacinto River to the northeast of the impoundments north of I-10.

A total of 10 surface soil samples were collected from residential locations where access was granted by property owner (Figure E-1). Of the 10 samples, 5 samples were collected from residential properties along the eastern shoreline of the San Jacinto River and 5 samples from the western shoreline. All sampled residential property was within the 100-year floodplain free of debris and obstructions to soil sampling, and free of obvious soil impacts due to physical disturbance or sources of household chemicals (e.g., oil, paint). Four subsample aliquots from each sampled residence were composited into a single sample from the residence.

Locations of soil aliquots were randomly selected during the field sampling under the direction of a USEPA representative (Gary Miller) and were evenly spaced. Samples were not collected from disturbed or otherwise affected soil (e.g., driveways, walking concourses, and high activity areas). The USEPA representative served as a liaison with residents during the sampling event. An off-duty police officer was also present during the sampling to ensure safety and security for personnel and resources of the sampling effort.

Soil samples were collected on August 11, 2011, between 0900 and 1600 CST. A unique sample number was assigned to each composited sample. Surface soil samples were collected to depth of 6 inches below the ground surface using a stainless steel shovel. A small section of intact sod was cut away and reserved by the sampling team. After the soil sample was collected, any excess soil was backfilled and the sod replaced and tamped down. When necessary, supplemental soil was added to the backfill of original soil to augment the volume removed.

Rocks and other debris and gross vegetation were removed from the sample prior to homogenization. Any such removals were documented in the field log, as described in Section 2.1.3 of Appendix A to the Soil SAP (Integral 2010). Referenced in the project documentation are photographs of each composite sample, and of the subsampling locations

within the sampled residential areas. The geographic coordinates of each sample location were collected using a differential geographic positioning system (GPS) at the time of sampling. USEPA does not allow disclosure of the specific locations of the residential sample. For confidentiality, the actually GPS coordinates have been submitted to USEPA electronically.

Field quality control samples included one field split, three equipment filter wipes, one filter blank, and one standard reference material. All other field and laboratory quality assurance and quality control procedures were implemented as described in the Soil SAP (Integral 2010). Sample containers, preservation, and holding time requirements were consistent with those described in the Soil SAP (Integral 2010).

Soil samples were analyzed for dioxins and furans, soil texture, and total organic carbon. Samples were received by Columbia Analytical (Houston, Texas) on August 12, 2011. The analytical methods were as described in the Soil SAP (Integral 2010). Soil samples at all 10 stations were analyzed for the 17 toxic dioxin and furan congeners, as required by USEPA. The 2,3,7,8-TCDD $TEQ_{DF,M}$ concentrations for each sample were calculated using toxicity equivalence factors developed for mammals (nondetect = one-half detection limit) (Van den Berg et al. 2006).

## 3 RESULTS

Calculated using the final dioxin non cancer RfD, the TEQ concentration equivalent to USEPA's (2009b) interim residential soil PRG is 50 ng/kg $TEQ_{DF,M}$.

Soils averaged 4.11 ± 3.60 ng/kg $TEQ_{DF,M}$ and ranged from 1.71 to 11.90 ng/kg $TEQ_{DF,M}$ (Table E-1). None of the surface soils (0 to 6 inches in depth) from any of the 10 residential properties exceeded a $TEQ_{DF,M}$ concentration of 50 ng/kg. Therefore, soils at depths greater than 6 inches below the surface (6 to 12 inches, and 12 to 24 inches) were not analyzed because 50 ng/kg was not exceeded in the surface soil.

**Table E-1**
**$TEQ_{DF,M}$ Concentrations in Residential Soil Samples**

| Sample ID | $TEQ_{DF,M}$ (ng/kg) |
|---|---|
| SJRS001 | 2.15 |
| SJRS002 | 2.02 |
| SJRS003 | 2.41 |
| SJRS004 | 11.9 |
| SJRS005 | 1.71 |
| SJRS006 | 2.11 |
| SJRS007 | 3.43 |
| SJRS008 | 2.87 |
| SJRS009 | 2.78 |
| SJRS010 | 9.71 |

# 4 REFERENCES


Integral, 2010. Sampling and Analysis Plan: Soil Study San Jacinto River Waste Pits Superfund Site. Prepared for McGinnes Industrial Maintenance Corporation, International Paper Company, and U.S. Environmental Protection Agency, Region 6. Anchor QEA, Ocean Springs, MS, and Integral Consulting Inc., Seattle, WA.

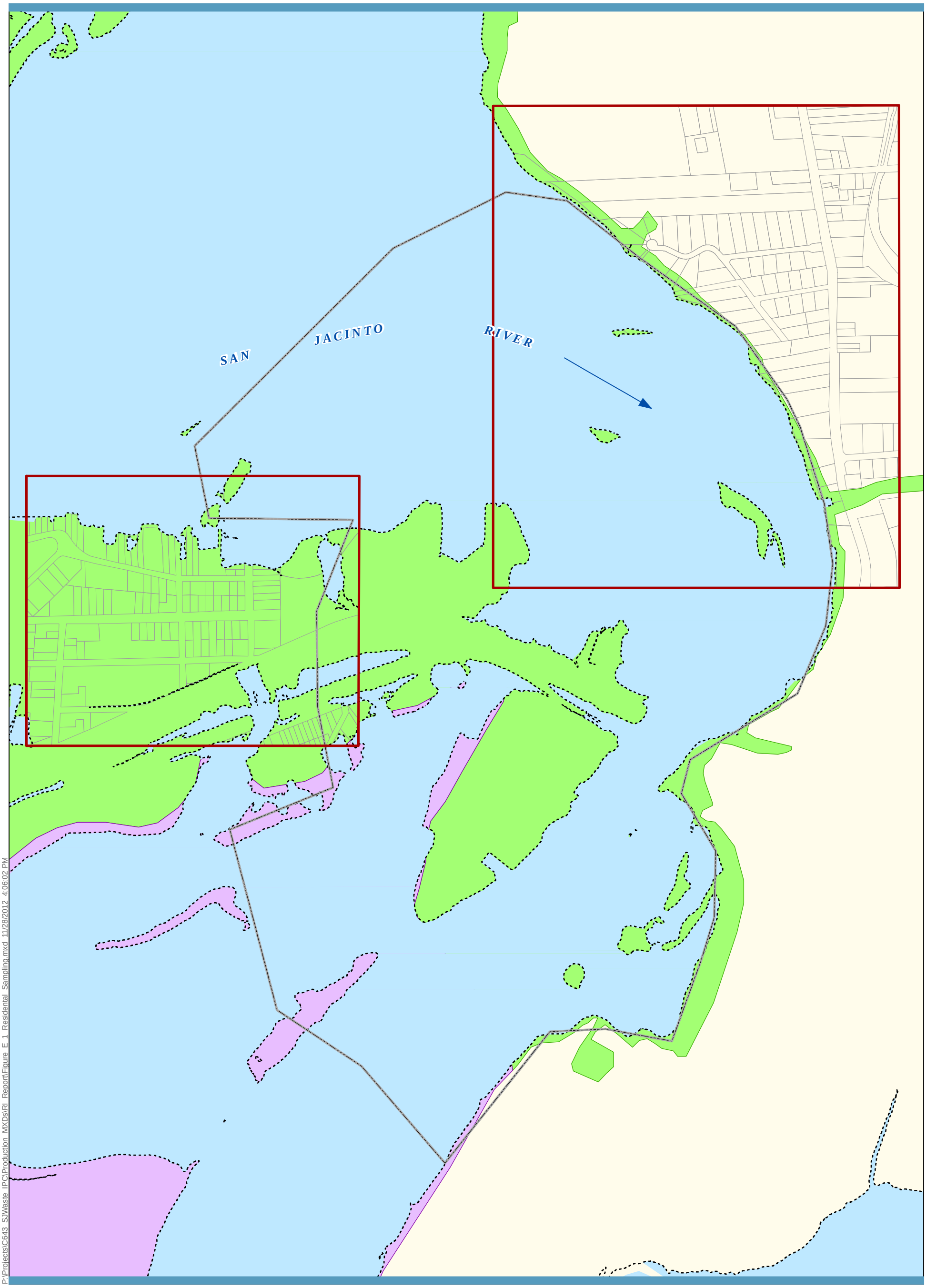
Miller, M.G., 2011. Personal communication (letter to D. Keith, Anchor QEA, Ocean Springs, MS, dated May 20, 2011, regarding residential soil sampling). U.S. Environmental Protection Agency, Dallas, TX.

USEPA, 2009a. Unilateral Administrative Order for Remedial Investigation/Feasibility Study. U.S. EPA Region 6 CERCLA Docket No. 06-03-10. In the matter of: San Jacinto River Waste Pits Superfund Site Pasadena, Texas. International Paper Company, Inc. & McGinnes Industrial Management Corporation, respondents.

USEPA, 2009b. Draft Recommended Interim Preliminary Remediation Goals for Dioxin in Soil at CERCLA and RCRA Sites. OSWER 9200.3-56. U.S. Environmental Protection Agency, Office of Superfund Remediation and Technology Innovation, Washington, DC.

Van den Berg, M., L.S. Birnbaum, M. Denison, et al., 2006. The 2005 World Health Organization Reevaluation of Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-Like Compounds. *Toxicol. Sci.* 93(2):223-241.

# FIGURES




P:\Projects\C643 SJWaste IPC\Production MXDs\RI Report\Figure E_1 Residental Sampling.mxd 11/28/2012 4:06:02 PM

ANCHOR QEA
integral consulting inc.

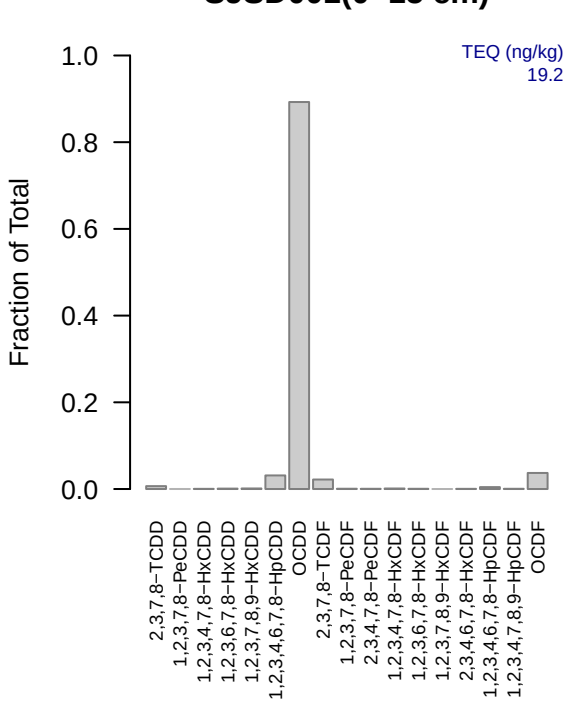
0 1,000
Feet

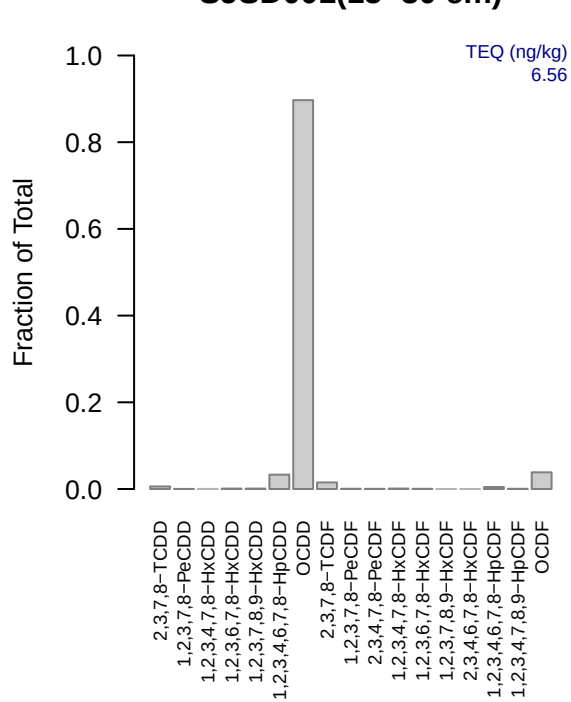
Sampling Area
USEPA's Preliminary Site Perimeter
0 contour (NAVD 88)
Parcel Boundary
100 YR Coastal Floodplain
100 YR Floodplain

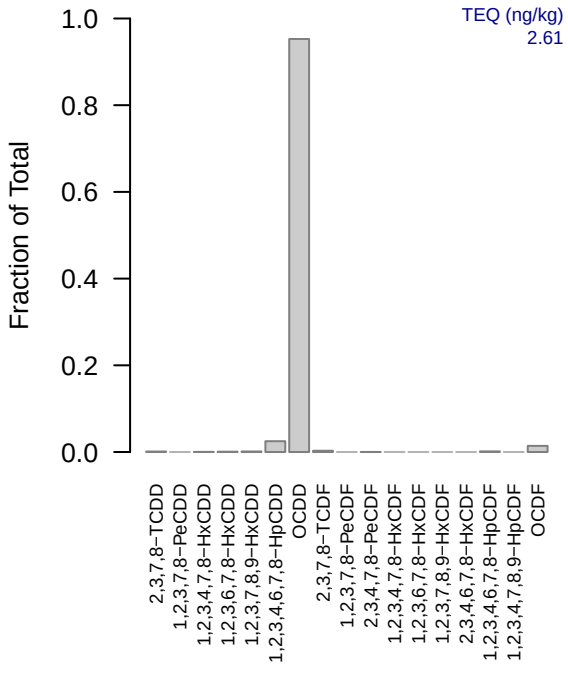
FEATURE SOURCES:
Parcel Boundaries: Harris County Appraisal District

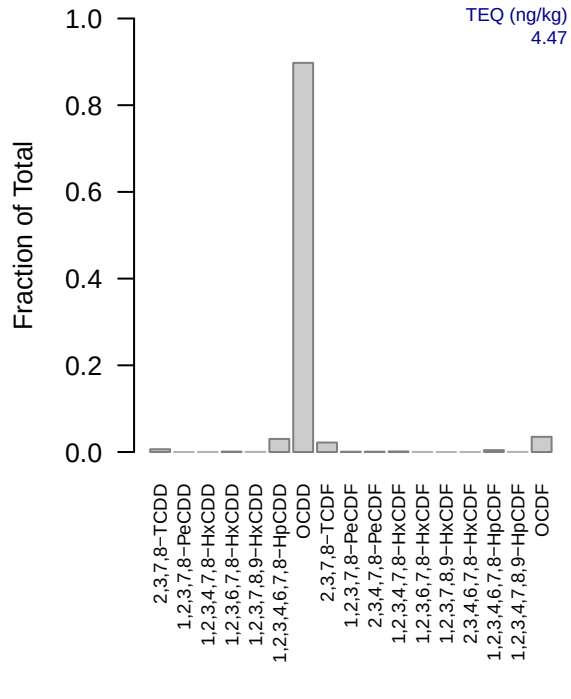
**Figure E-1**
100-Year Floodplain
Draft Remedial Investigation Report
San Jacinto River Waste Pits Superfund Site

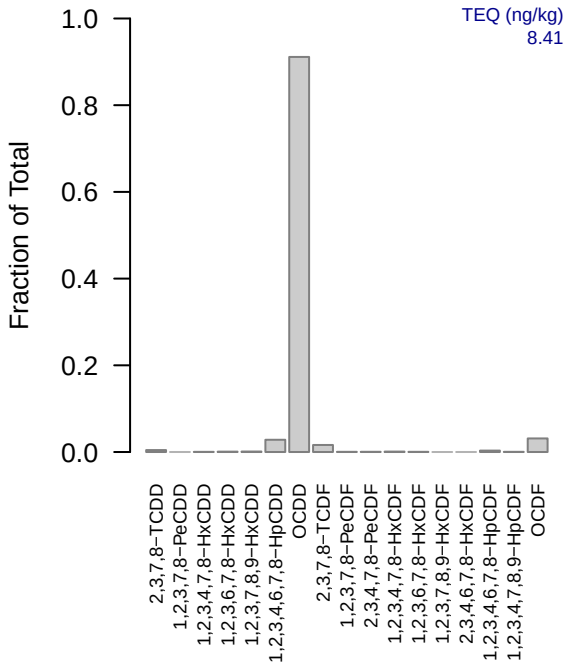
# APPENDIX F
# SEDIMENT AND SOIL FINGERPRINTS SAN JACINTO RIVER WASTE PITS SUPERFUND SITE

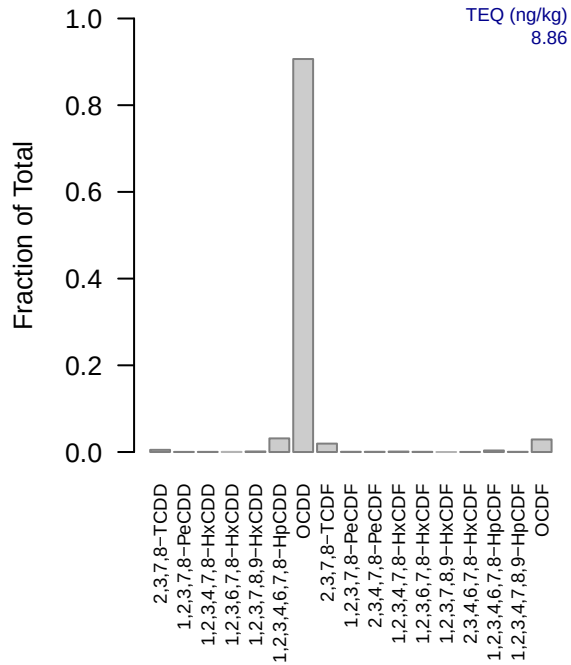

SJSD001(0−15 cm)
TEQ (ng/kg)
19.2
Fraction of Total
1.0
0.8
0.6
0.4
0.2
0.0
2,3,7,8−TCDD
1,2,3,7,8−PeCDD
1,2,3,4,7,8−HxCDD
1,2,3,6,7,8−HxCDD
1,2,3,7,8,9−HxCDD
1,2,3,4,6,7,8−HpCDD
OCDD
2,3,7,8−TCDF
1,2,3,7,8−PeCDF
2,3,4,7,8−PeCDF
1,2,3,4,7,8−HxCDF
1,2,3,6,7,8−HxCDF
1,2,3,7,8,9−HxCDF
2,3,4,6,7,8−HxCDF
1,2,3,4,6,7,8−HpCDF
1,2,3,4,7,8,9−HpCDF
OCDF

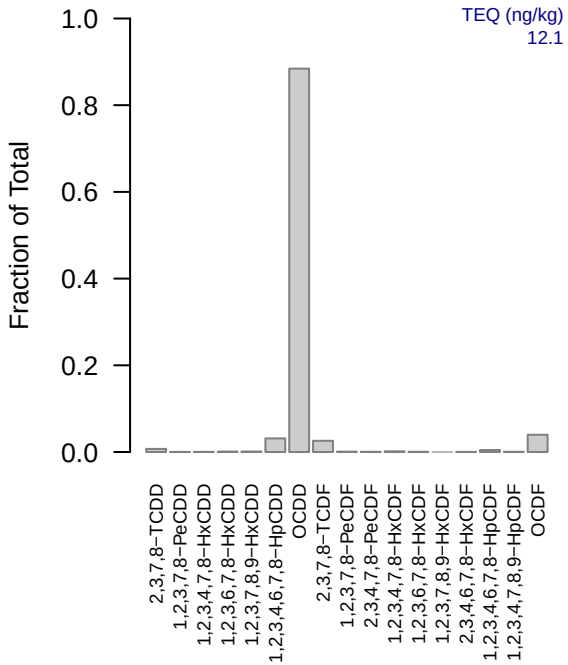

SJSD001(15−30 cm)
TEQ (ng/kg)
6.56
Fraction of Total
1.0
0.8
0.6
0.4
0.2
0.0
2,3,7,8−TCDD
1,2,3,7,8−PeCDD
1,2,3,4,7,8−HxCDD
1,2,3,6,7,8−HxCDD
1,2,3,7,8,9−HxCDD
1,2,3,4,6,7,8−HpCDD
OCDD
2,3,7,8−TCDF
1,2,3,7,8−PeCDF
2,3,4,7,8−PeCDF
1,2,3,4,7,8−HxCDF
1,2,3,6,7,8−HxCDF
1,2,3,7,8,9−HxCDF
2,3,4,6,7,8−HxCDF
1,2,3,4,6,7,8−HpCDF
1,2,3,4,7,8,9−HpCDF
OCDF

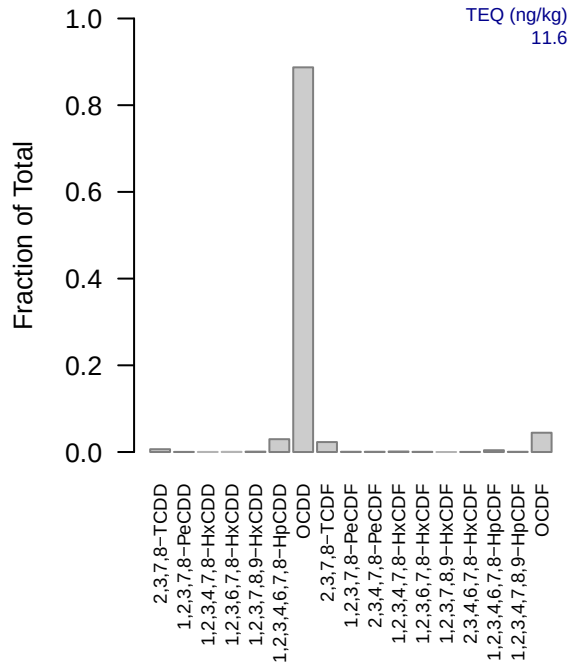

SJSD001(30−60 cm)
TEQ (ng/kg)
2.61
Fraction of Total
1.0
0.8
0.6
0.4
0.2
0.0
2,3,7,8−TCDD
1,2,3,7,8−PeCDD
1,2,3,4,7,8−HxCDD
1,2,3,6,7,8−HxCDD
1,2,3,7,8,9−HxCDD
1,2,3,4,6,7,8−HpCDD
OCDD
2,3,7,8−TCDF
1,2,3,7,8−PeCDF
2,3,4,7,8−PeCDF
1,2,3,4,7,8−HxCDF
1,2,3,6,7,8−HxCDF
1,2,3,7,8,9−HxCDF
2,3,4,6,7,8−HxCDF
1,2,3,4,6,7,8−HpCDF
1,2,3,4,7,8,9−HpCDF
OCDF

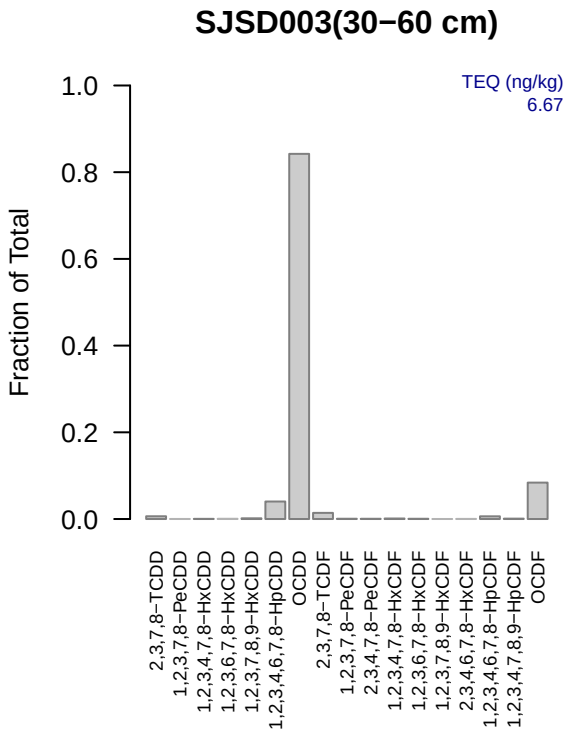

SJSD002(0−15 cm)
TEQ (ng/kg)
4.47
Fraction of Total
1.0
0.8
0.6
0.4
0.2
0.0
2,3,7,8−TCDD
1,2,3,7,8−PeCDD
1,2,3,4,7,8−HxCDD
1,2,3,6,7,8−HxCDD
1,2,3,7,8,9−HxCDD
1,2,3,4,6,7,8−HpCDD
OCDD
2,3,7,8−TCDF
1,2,3,7,8−PeCDF
2,3,4,7,8−PeCDF
1,2,3,4,7,8−HxCDF
1,2,3,6,7,8−HxCDF
1,2,3,7,8,9−HxCDF
2,3,4,6,7,8−HxCDF
1,2,3,4,6,7,8−HpCDF
1,2,3,4,7,8,9−HpCDF
OCDF

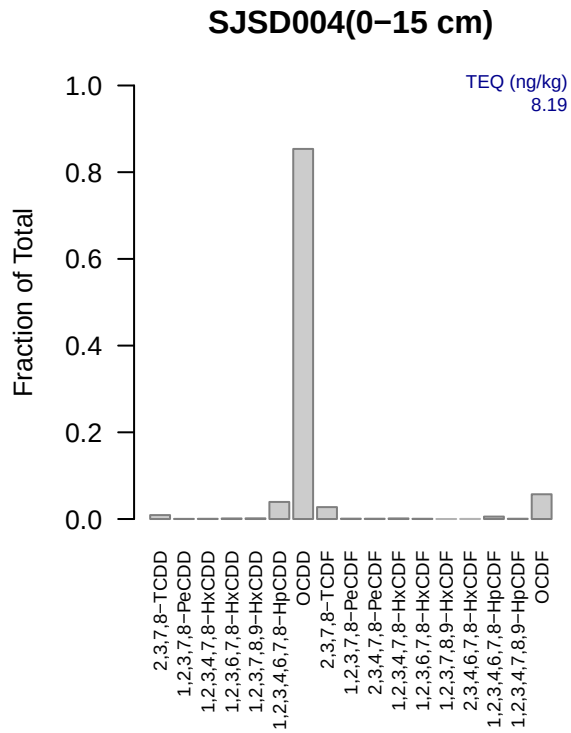

SJSD002(15−30 cm)
TEQ (ng/kg)
8.41
Fraction of Total
1.0
0.8
0.6
0.4
0.2
0.0
2,3,7,8−TCDD
1,2,3,7,8−PeCDD
1,2,3,4,7,8−HxCDD
1,2,3,6,7,8−HxCDD
1,2,3,7,8,9−HxCDD
1,2,3,4,6,7,8−HpCDD
OCDD
2,3,7,8−TCDF
1,2,3,7,8−PeCDF
2,3,4,7,8−PeCDF
1,2,3,4,7,8−HxCDF
1,2,3,6,7,8−HxCDF
1,2,3,7,8,9−HxCDF
2,3,4,6,7,8−HxCDF
1,2,3,4,6,7,8−HpCDF
1,2,3,4,7,8,9−HpCDF
OCDF

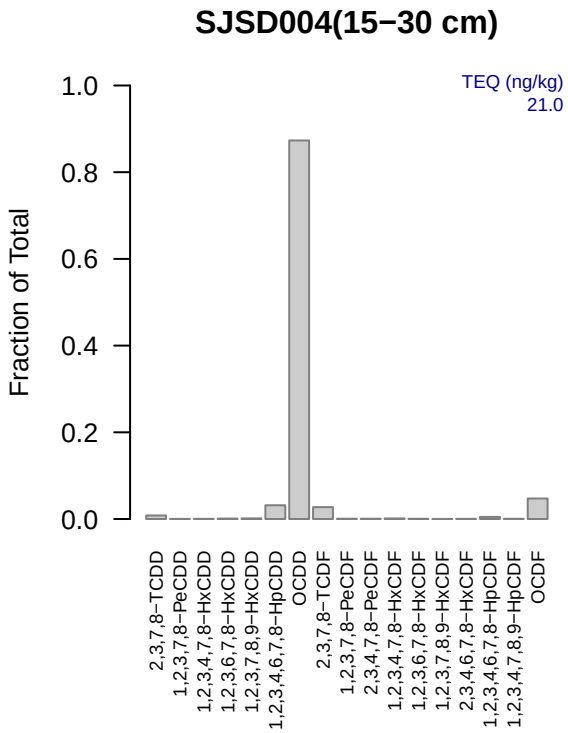

SJSD002(30−60 cm)
TEQ (ng/kg)
8.86
Fraction of Total
1.0
0.8
0.6
0.4
0.2
0.0
2,3,7,8−TCDD
1,2,3,7,8−PeCDD
1,2,3,4,7,8−HxCDD
1,2,3,6,7,8−HxCDD
1,2,3,7,8,9−HxCDD
1,2,3,4,6,7,8−HpCDD
OCDD
2,3,7,8−TCDF
1,2,3,7,8−PeCDF
2,3,4,7,8−PeCDF
1,2,3,4,7,8−HxCDF
1,2,3,6,7,8−HxCDF
1,2,3,7,8,9−HxCDF
2,3,4,6,7,8−HxCDF
1,2,3,4,6,7,8−HpCDF
1,2,3,4,7,8,9−HpCDF
OCDF

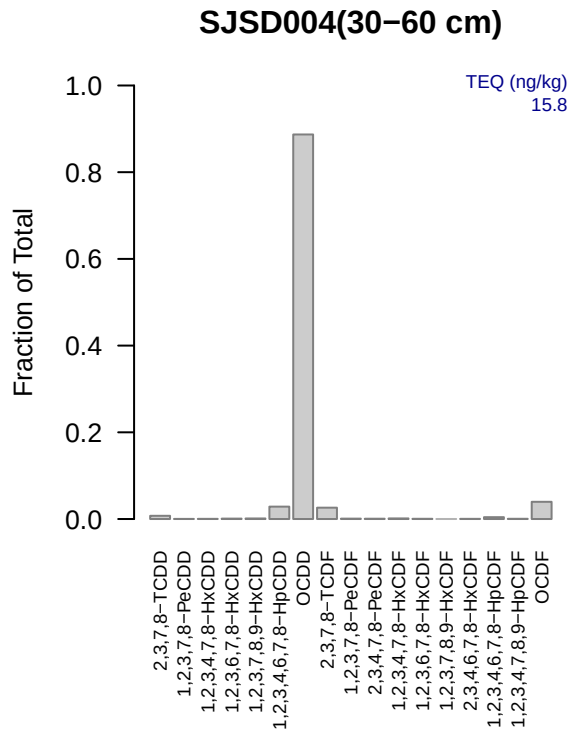

SJSD003(0−15 cm)
TEQ (ng/kg)
12.1
Fraction of Total
1.0
0.8
0.6
0.4
0.2
0.0
2,3,7,8−TCDD
1,2,3,7,8−PeCDD
1,2,3,4,7,8−HxCDD
1,2,3,6,7,8−HxCDD
1,2,3,7,8,9−HxCDD
1,2,3,4,6,7,8−HpCDD
OCDD
2,3,7,8−TCDF
1,2,3,7,8−PeCDF
2,3,4,7,8−PeCDF
1,2,3,4,7,8−HxCDF
1,2,3,6,7,8−HxCDF
1,2,3,7,8,9−HxCDF
2,3,4,6,7,8−HxCDF
1,2,3,4,6,7,8−HpCDF
1,2,3,4,7,8,9−HpCDF
OCDF


SJSD003(15−30 cm)
TEQ (ng/kg)
11.6
Fraction of Total
1.0
0.8
0.6
0.4
0.2
0.0
2,3,7,8−TCDD
1,2,3,7,8−PeCDD
1,2,3,4,7,8−HxCDD
1,2,3,6,7,8−HxCDD
1,2,3,7,8,9−HxCDD
1,2,3,4,6,7,8−HpCDD
OCDD
2,3,7,8−TCDF
1,2,3,7,8−PeCDF
2,3,4,7,8−PeCDF
1,2,3,4,7,8−HxCDF
1,2,3,6,7,8−HxCDF
1,2,3,7,8,9−HxCDF
2,3,4,6,7,8−HxCDF
1,2,3,4,6,7,8−HpCDF
1,2,3,4,7,8,9−HpCDF
OCDF

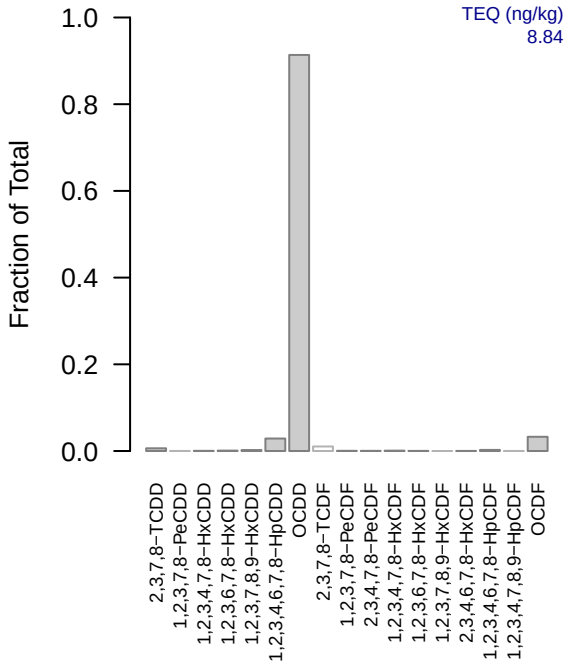

SJSD003(30−60 cm)
TEQ (ng/kg)
6.67
Fraction of Total
1.0
0.8
0.6
0.4
0.2
0.0
2,3,7,8−TCDD
1,2,3,7,8−PeCDD
1,2,3,4,7,8−HxCDD
1,2,3,6,7,8−HxCDD
1,2,3,7,8,9−HxCDD
1,2,3,4,6,7,8−HpCDD
OCDD
2,3,7,8−TCDF
1,2,3,7,8−PeCDF
2,3,4,7,8−PeCDF
1,2,3,4,7,8−HxCDF
1,2,3,6,7,8−HxCDF
1,2,3,7,8,9−HxCDF
2,3,4,6,7,8−HxCDF
1,2,3,4,6,7,8−HpCDF
1,2,3,4,7,8,9−HpCDF
OCDF


SJSD004(0−15 cm)
TEQ (ng/kg)
8.19
Fraction of Total
1.0
0.8
0.6
0.4
0.2
0.0
2,3,7,8−TCDD
1,2,3,7,8−PeCDD
1,2,3,4,7,8−HxCDD
1,2,3,6,7,8−HxCDD
1,2,3,7,8,9−HxCDD
1,2,3,4,6,7,8−HpCDD
OCDD
2,3,7,8−TCDF
1,2,3,7,8−PeCDF
2,3,4,7,8−PeCDF
1,2,3,4,7,8−HxCDF
1,2,3,6,7,8−HxCDF
1,2,3,7,8,9−HxCDF
2,3,4,6,7,8−HxCDF
1,2,3,4,6,7,8−HpCDF
1,2,3,4,7,8,9−HpCDF
OCDF

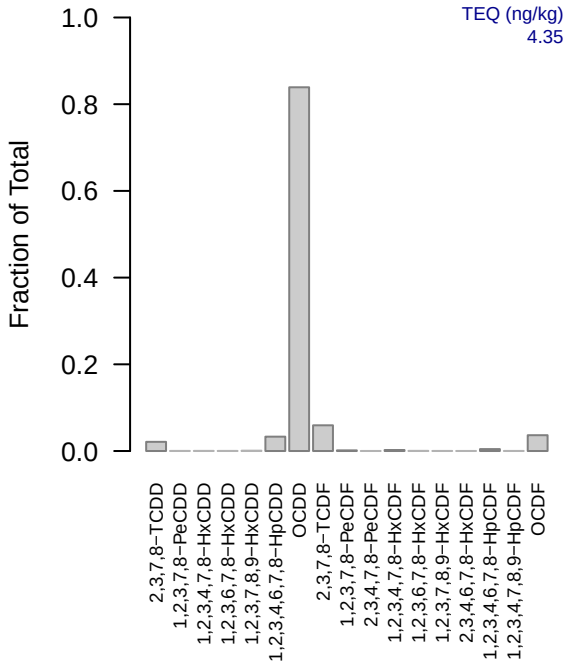

SJSD004(15−30 cm)
TEQ (ng/kg)
21.0
Fraction of Total
1.0
0.8
0.6
0.4
0.2
0.0
2,3,7,8−TCDD
1,2,3,7,8−PeCDD
1,2,3,4,7,8−HxCDD
1,2,3,6,7,8−HxCDD
1,2,3,7,8,9−HxCDD
1,2,3,4,6,7,8−HpCDD
OCDD
2,3,7,8−TCDF
1,2,3,7,8−PeCDF
2,3,4,7,8−PeCDF
1,2,3,4,7,8−HxCDF
1,2,3,6,7,8−HxCDF
1,2,3,7,8,9−HxCDF
2,3,4,6,7,8−HxCDF
1,2,3,4,6,7,8−HpCDF
1,2,3,4,7,8,9−HpCDF
OCDF


SJSD004(30−60 cm)
TEQ (ng/kg)
15.8
Fraction of Total
1.0
0.8
0.6
0.4
0.2
0.0
2,3,7,8−TCDD
1,2,3,7,8−PeCDD
1,2,3,4,7,8−HxCDD
1,2,3,6,7,8−HxCDD
1,2,3,7,8,9−HxCDD
1,2,3,4,6,7,8−HpCDD
OCDD
2,3,7,8−TCDF
1,2,3,7,8−PeCDF
2,3,4,7,8−PeCDF
1,2,3,4,7,8−HxCDF
1,2,3,6,7,8−HxCDF
1,2,3,7,8,9−HxCDF
2,3,4,6,7,8−HxCDF
1,2,3,4,6,7,8−HpCDF
1,2,3,4,7,8,9−HpCDF
OCDF

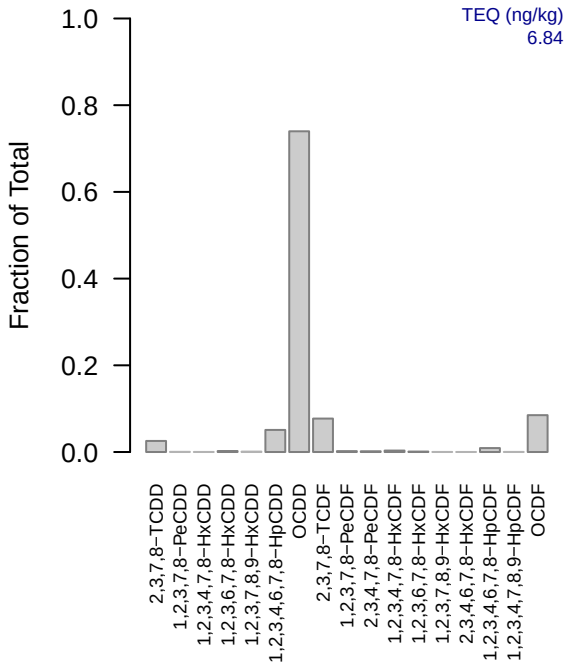
## SJSB012(304.8−365.76 cm)



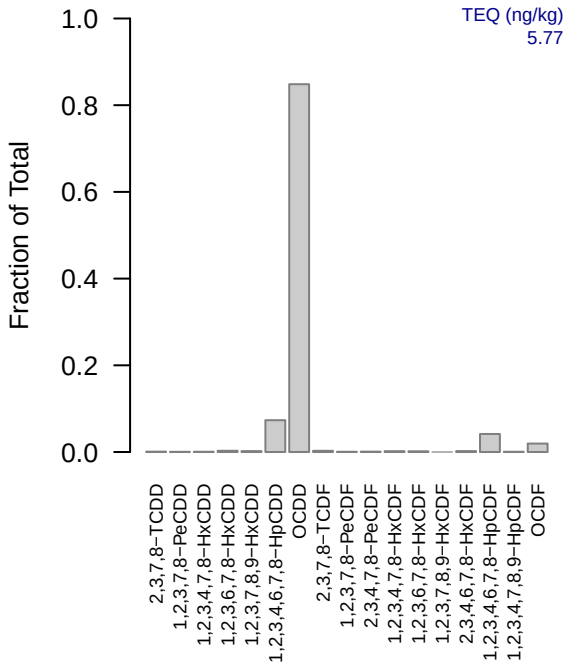

## SJSB012(365.76−426.72 cm)



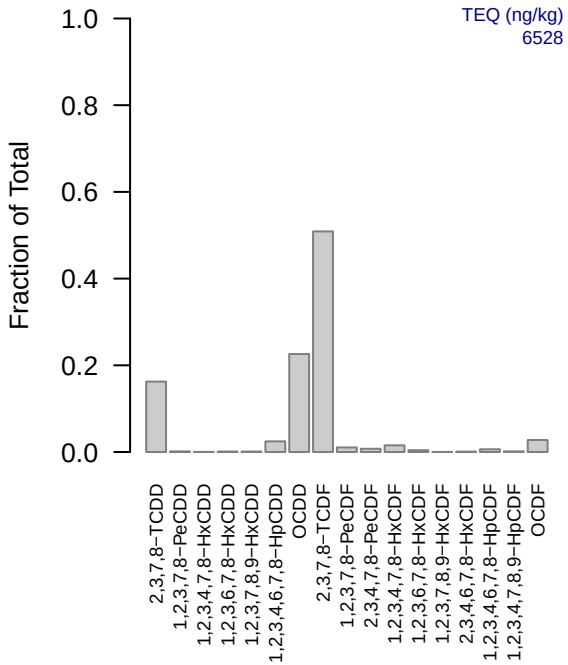

## SJSB012(426.72−487.68 cm)



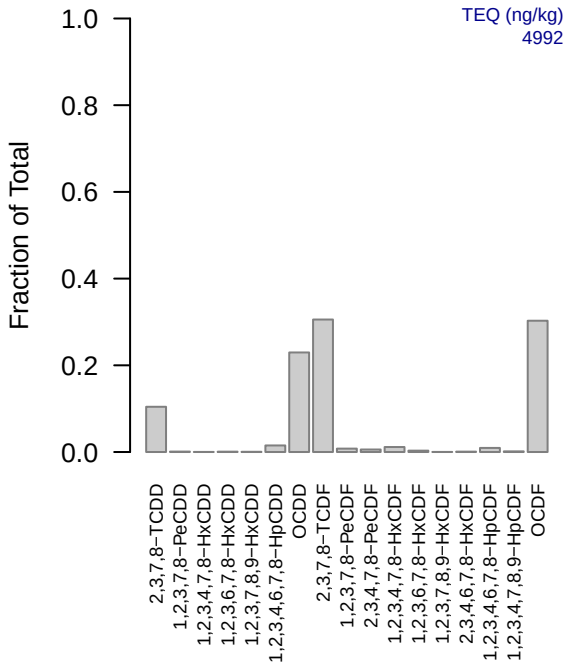

## SJSB012(60.96−121.92 cm)



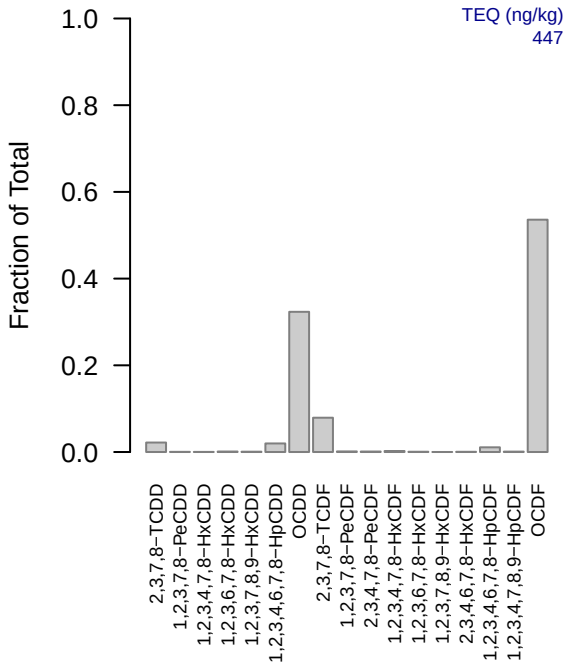
## SJSB012(121.92−182.88 cm)



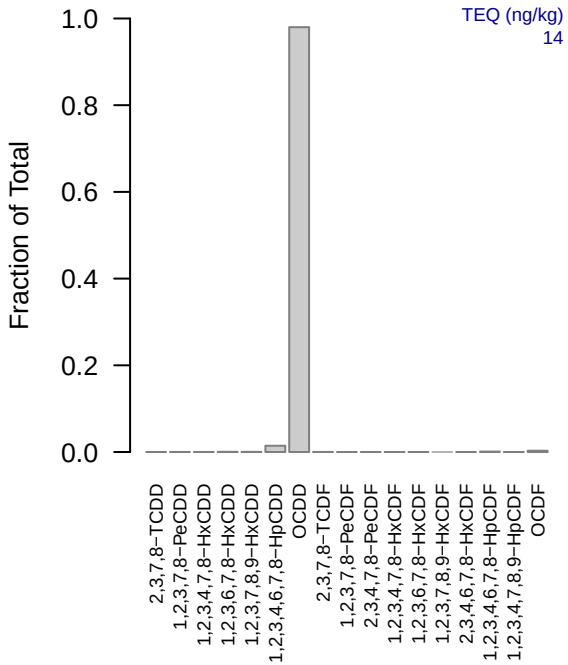

## SJSB012(182.88−243.84 cm)

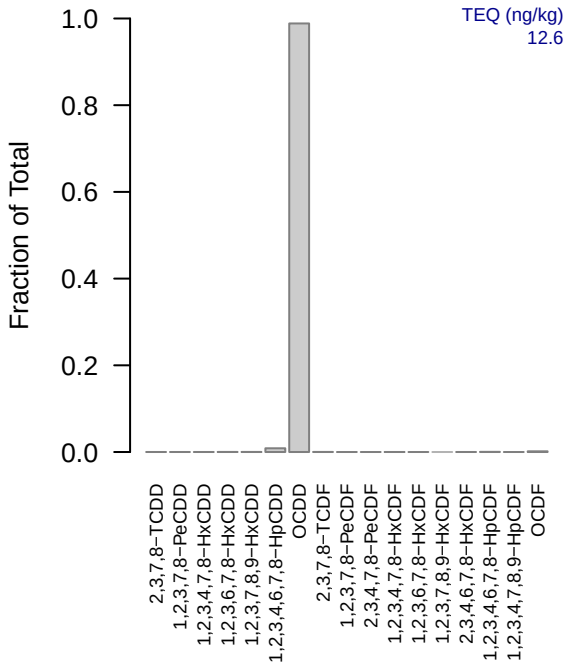


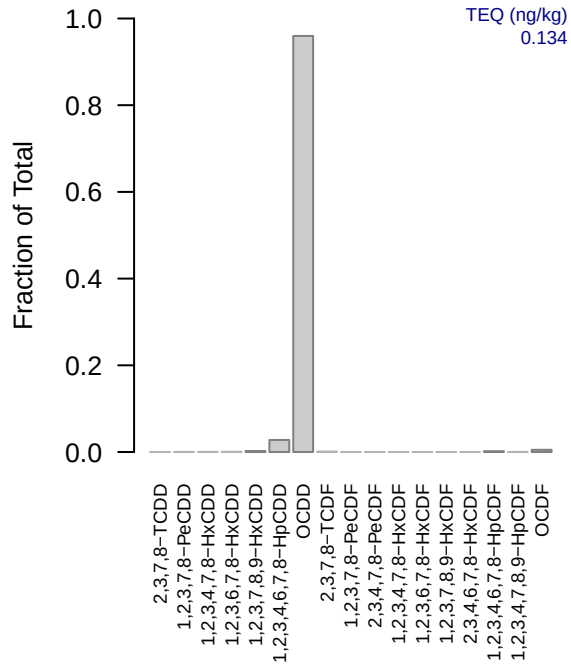

## SJSB012(243.84−304.8 cm)

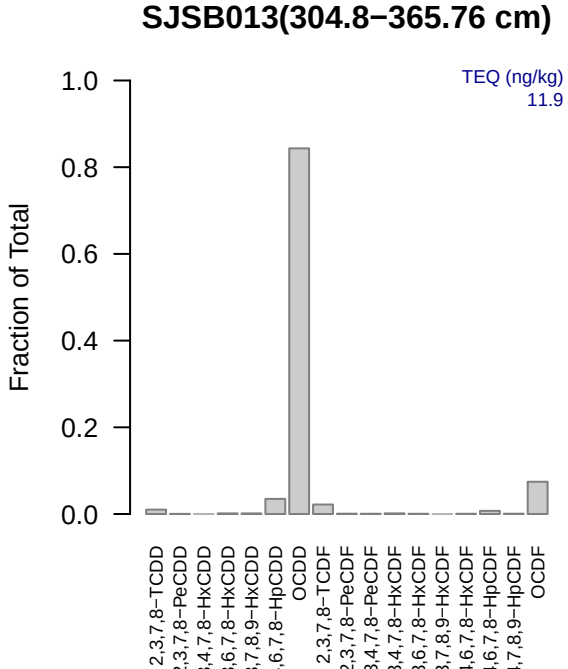


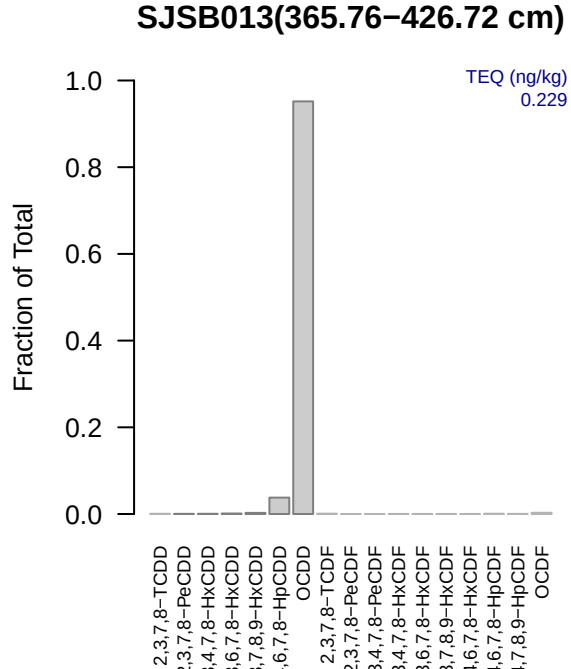

## SJSB012(0−15.24 cm)



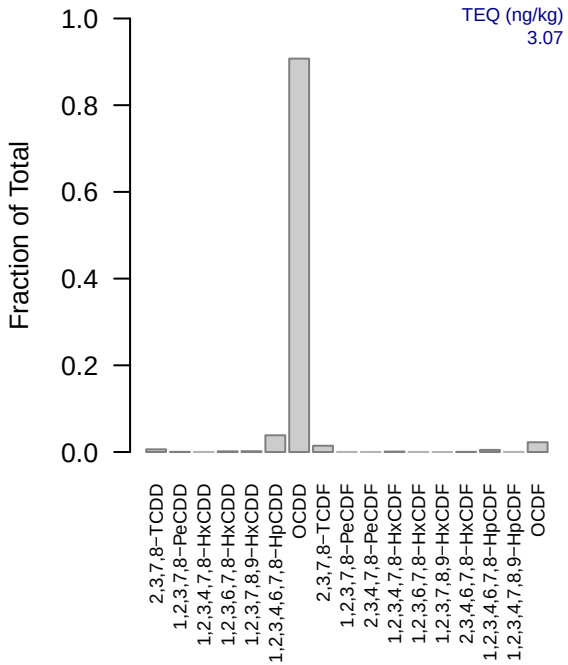

SJSB012(15.24−30.48 cm)
TEQ (ng/kg)
12.6
Fraction of Total
1.0
0.8
0.6
0.4
0.2
0.0
2,3,7,8−TCDD
1,2,3,7,8−PeCDD
1,2,3,4,7,8−HxCDD
1,2,3,6,7,8−HxCDD
1,2,3,7,8,9−HxCDD
1,2,3,4,6,7,8−HpCDD
OCDD
2,3,7,8−TCDF
1,2,3,7,8−PeCDF
2,3,4,7,8−PeCDF
1,2,3,4,7,8−HxCDF
1,2,3,6,7,8−HxCDF
1,2,3,7,8,9−HxCDF
2,3,4,6,7,8−HxCDF
1,2,3,4,6,7,8−HpCDF
1,2,3,4,7,8,9−HpCDF
OCDF


SJSB012(30.48−60.96 cm)
TEQ (ng/kg)
0.134
Fraction of Total
1.0
0.8
0.6
0.4
0.2
0.0
2,3,7,8−TCDD
1,2,3,7,8−PeCDD
1,2,3,4,7,8−HxCDD
1,2,3,6,7,8−HxCDD
1,2,3,7,8,9−HxCDD
1,2,3,4,6,7,8−HpCDD
OCDD
2,3,7,8−TCDF
1,2,3,7,8−PeCDF
2,3,4,7,8−PeCDF
1,2,3,4,7,8−HxCDF
1,2,3,6,7,8−HxCDF
1,2,3,7,8,9−HxCDF
2,3,4,6,7,8−HxCDF
1,2,3,4,6,7,8−HpCDF
1,2,3,4,7,8,9−HpCDF
OCDF

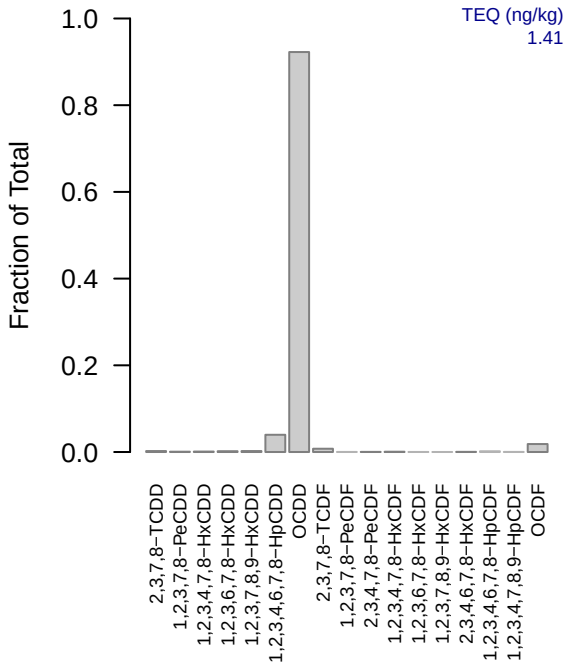

SJSB013(304.8−365.76 cm)
TEQ (ng/kg)
11.9
Fraction of Total
1.0
0.8
0.6
0.4
0.2
0.0
2,3,7,8−TCDD
1,2,3,7,8−PeCDD
1,2,3,4,7,8−HxCDD
1,2,3,6,7,8−HxCDD
1,2,3,7,8,9−HxCDD
1,2,3,4,6,7,8−HpCDD
OCDD
2,3,7,8−TCDF
1,2,3,7,8−PeCDF
2,3,4,7,8−PeCDF
1,2,3,4,7,8−HxCDF
1,2,3,6,7,8−HxCDF
1,2,3,7,8,9−HxCDF
2,3,4,6,7,8−HxCDF
1,2,3,4,6,7,8−HpCDF
1,2,3,4,7,8,9−HpCDF
OCDF


SJSB013(365.76−426.72 cm)
TEQ (ng/kg)
0.229
Fraction of Total
1.0
0.8
0.6
0.4
0.2
0.0
2,3,7,8−TCDD
1,2,3,7,8−PeCDD
1,2,3,4,7,8−HxCDD
1,2,3,6,7,8−HxCDD
1,2,3,7,8,9−HxCDD
1,2,3,4,6,7,8−HpCDD
OCDD
2,3,7,8−TCDF
1,2,3,7,8−PeCDF
2,3,4,7,8−PeCDF
1,2,3,4,7,8−HxCDF
1,2,3,6,7,8−HxCDF
1,2,3,7,8,9−HxCDF
2,3,4,6,7,8−HxCDF
1,2,3,4,6,7,8−HpCDF
1,2,3,4,7,8,9−HpCDF
OCDF

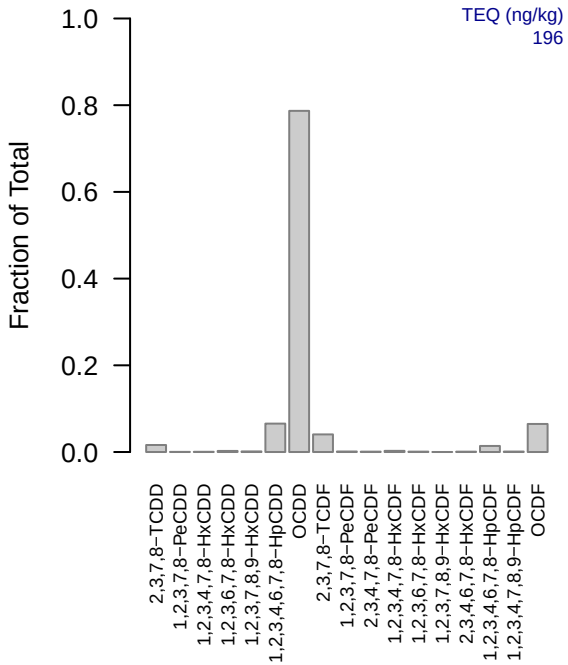
## SJSB013(426.72−487.68 cm)



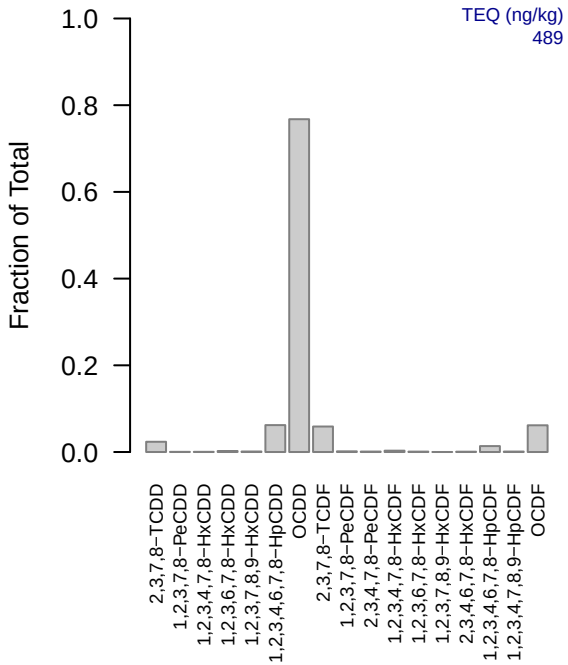

## SJSB013(60.96−121.92 cm)

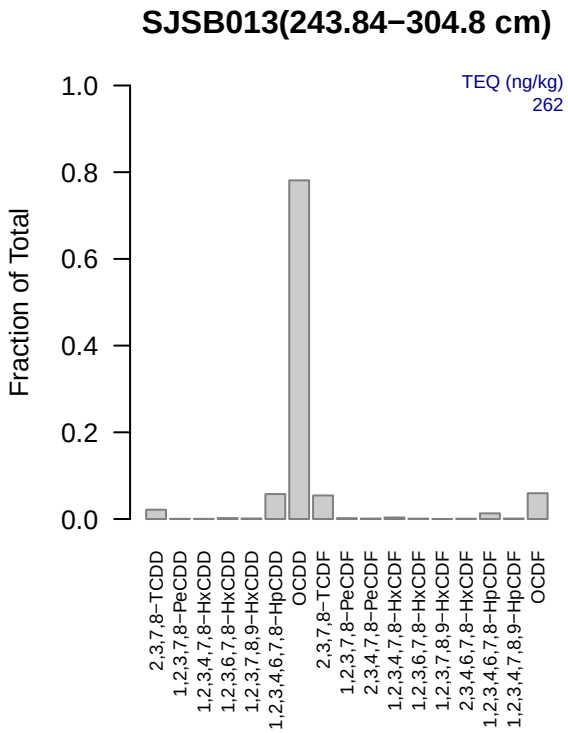


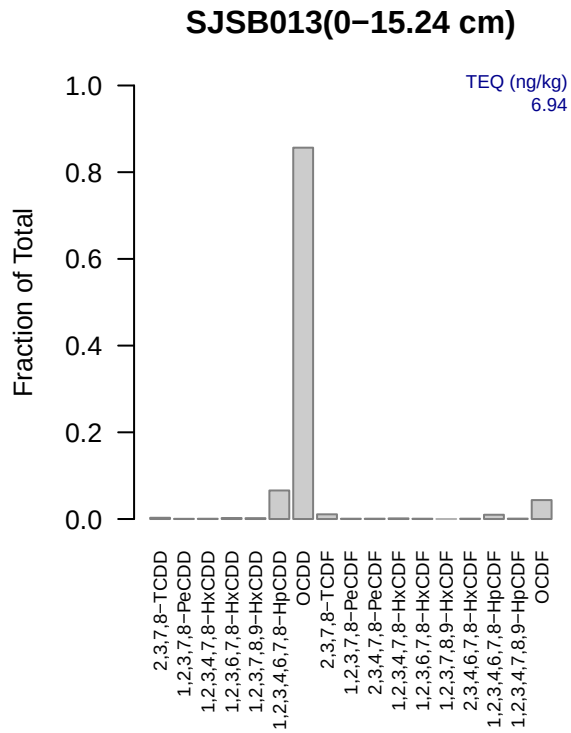

## SJSB013(121.92−182.88 cm)

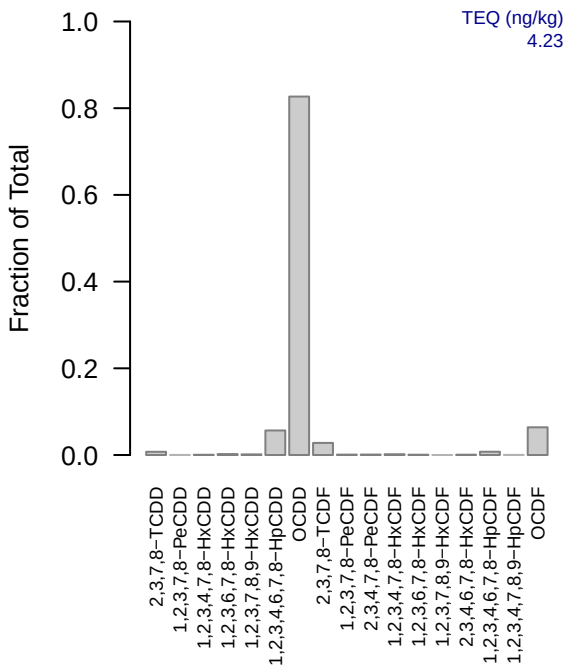


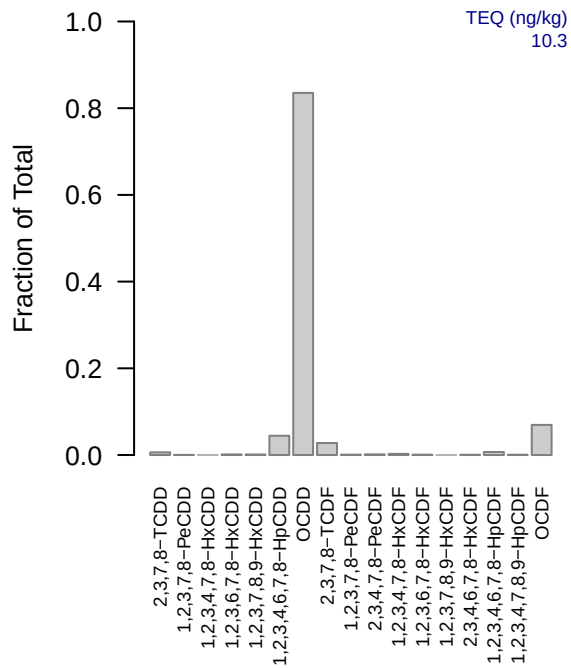

## SJSB013(182.88−243.84 cm)



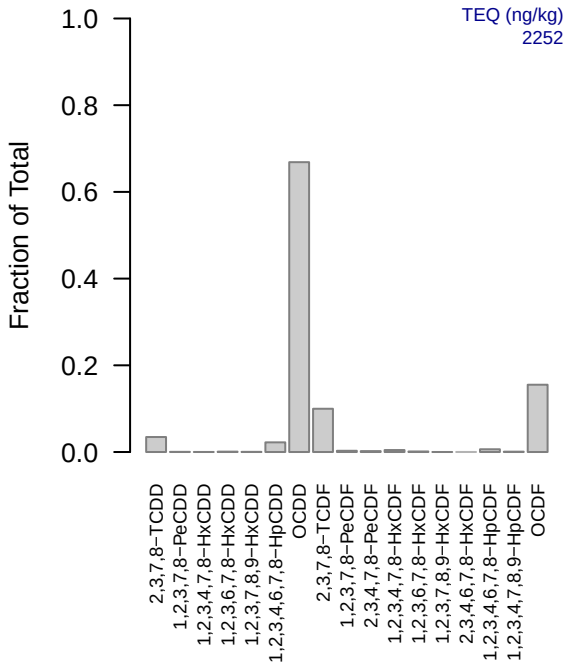

SJSB013(243.84−304.8 cm)
TEQ (ng/kg)
262
Fraction of Total
1.0
0.8
0.6
0.4
0.2
0.0
2,3,7,8−TCDD
1,2,3,7,8−PeCDD
1,2,3,4,7,8−HxCDD
1,2,3,6,7,8−HxCDD
1,2,3,7,8,9−HxCDD
1,2,3,4,6,7,8−HpCDD
OCDD
2,3,7,8−TCDF
1,2,3,7,8−PeCDF
2,3,4,7,8−PeCDF
1,2,3,4,7,8−HxCDF
1,2,3,6,7,8−HxCDF
1,2,3,7,8,9−HxCDF
2,3,4,6,7,8−HxCDF
1,2,3,4,6,7,8−HpCDF
1,2,3,4,7,8,9−HpCDF
OCDF


SJSB013(0−15.24 cm)
TEQ (ng/kg)
6.94
Fraction of Total
1.0
0.8
0.6
0.4
0.2
0.0
2,3,7,8−TCDD
1,2,3,7,8−PeCDD
1,2,3,4,7,8−HxCDD
1,2,3,6,7,8−HxCDD
1,2,3,7,8,9−HxCDD
1,2,3,4,6,7,8−HpCDD
OCDD
2,3,7,8−TCDF
1,2,3,7,8−PeCDF
2,3,4,7,8−PeCDF
1,2,3,4,7,8−HxCDF
1,2,3,6,7,8−HxCDF
1,2,3,7,8,9−HxCDF
2,3,4,6,7,8−HxCDF
1,2,3,4,6,7,8−HpCDF
1,2,3,4,7,8,9−HpCDF
OCDF

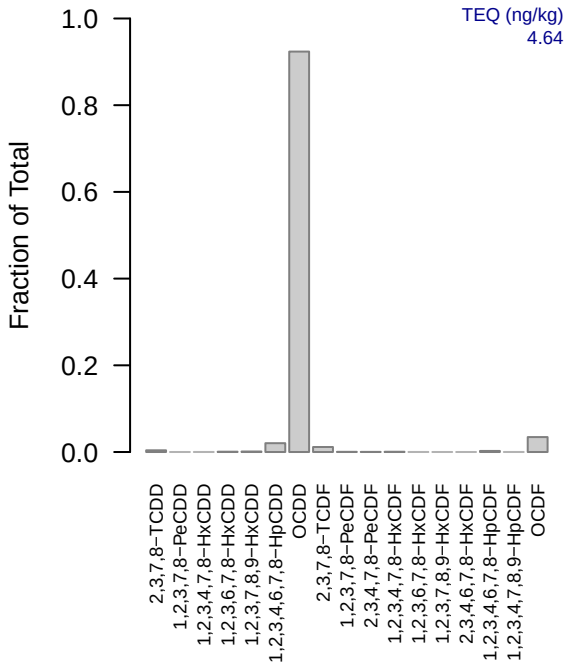

SJSB013(15.24−30.48 cm)
TEQ (ng/kg)
4.23
Fraction of Total
1.0
0.8
0.6
0.4
0.2
0.0
2,3,7,8−TCDD
1,2,3,7,8−PeCDD
1,2,3,4,7,8−HxCDD
1,2,3,6,7,8−HxCDD
1,2,3,7,8,9−HxCDD
1,2,3,4,6,7,8−HpCDD
OCDD
2,3,7,8−TCDF
1,2,3,7,8−PeCDF
2,3,4,7,8−PeCDF
1,2,3,4,7,8−HxCDF
1,2,3,6,7,8−HxCDF
1,2,3,7,8,9−HxCDF
2,3,4,6,7,8−HxCDF
1,2,3,4,6,7,8−HpCDF
1,2,3,4,7,8,9−HpCDF
OCDF


SJSB013(30.48−60.96 cm)
TEQ (ng/kg)
10.3
Fraction of Total
1.0
0.8
0.6
0.4
0.2
0.0
2,3,7,8−TCDD
1,2,3,7,8−PeCDD
1,2,3,4,7,8−HxCDD
1,2,3,6,7,8−HxCDD
1,2,3,7,8,9−HxCDD
1,2,3,4,6,7,8−HpCDD
OCDD
2,3,7,8−TCDF
1,2,3,7,8−PeCDF
2,3,4,7,8−PeCDF
1,2,3,4,7,8−HxCDF
1,2,3,6,7,8−HxCDF
1,2,3,7,8,9−HxCDF
2,3,4,6,7,8−HxCDF
1,2,3,4,6,7,8−HpCDF
1,2,3,4,7,8,9−HpCDF
OCDF

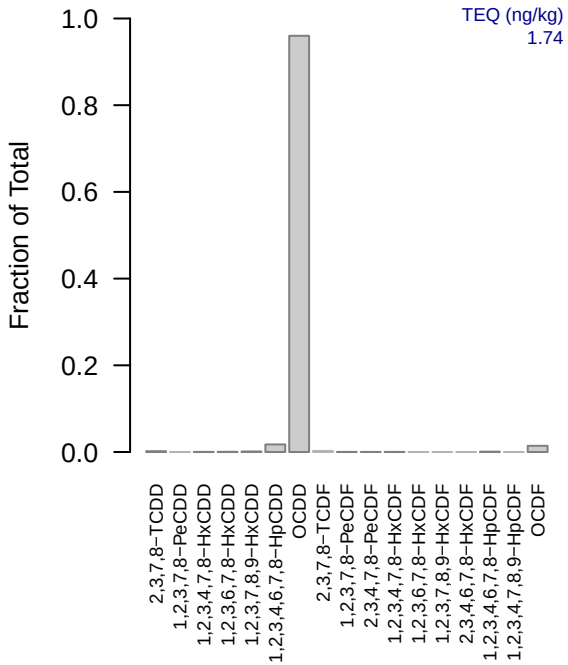
## SJSB014(304.8−365.76 cm)



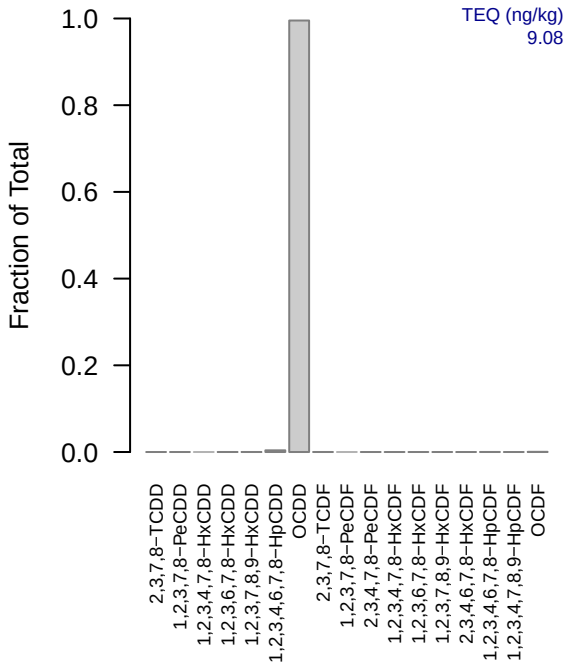

## SJSB014(365.76−426.72 cm)



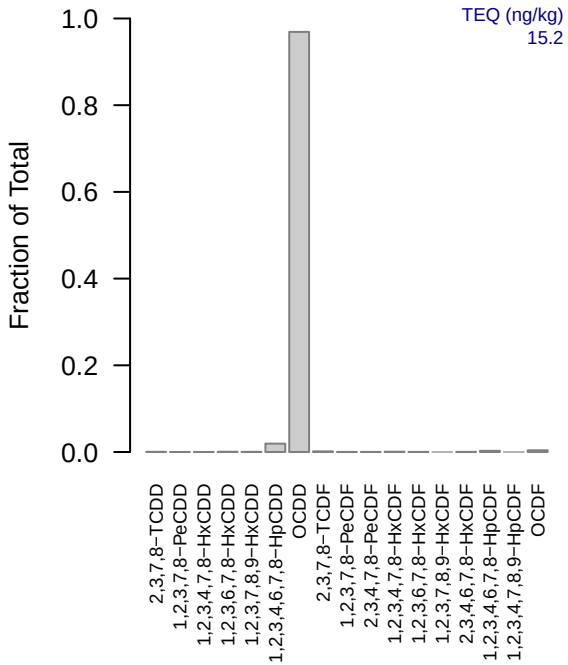

## SJSB014(426.72−487.68 cm)



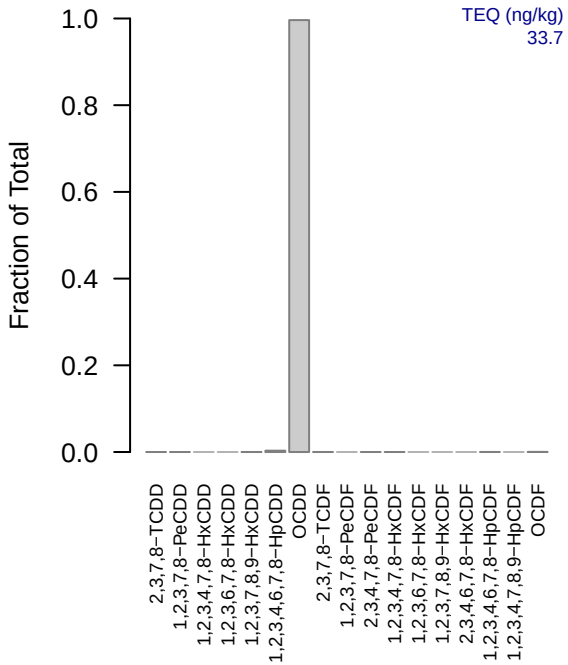

## SJSB014(60.96−121.92 cm)



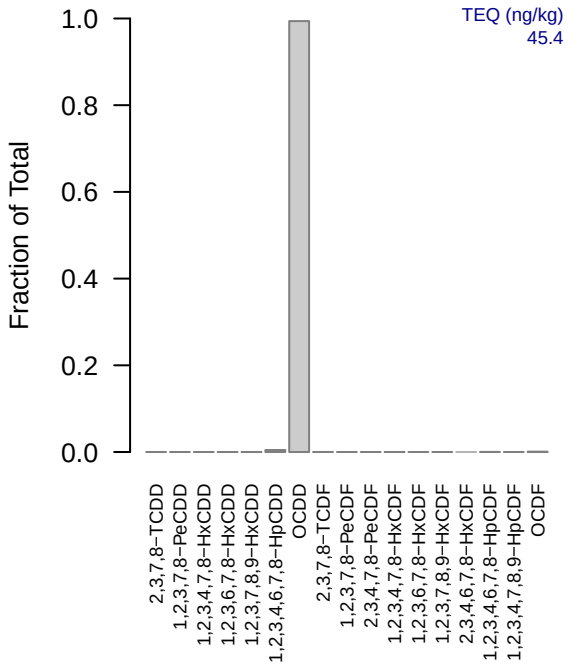
## SJSB014(121.92−182.88 cm)



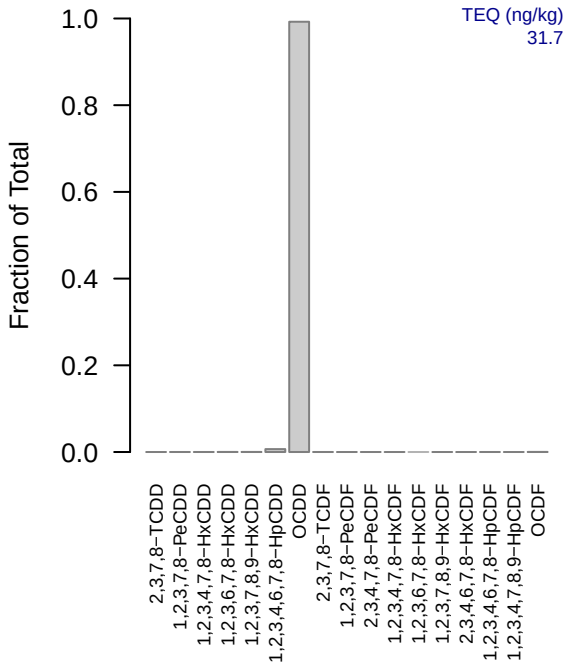

## SJSB014(182.88−243.84 cm)



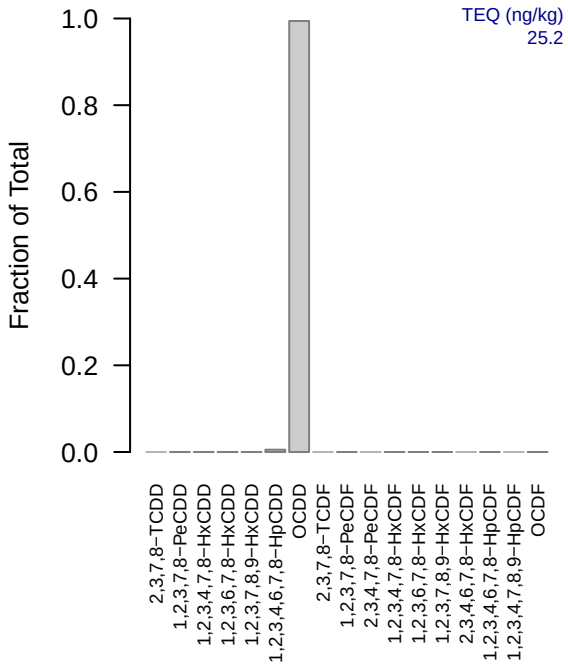

## SJSB014(243.84−304.8 cm)



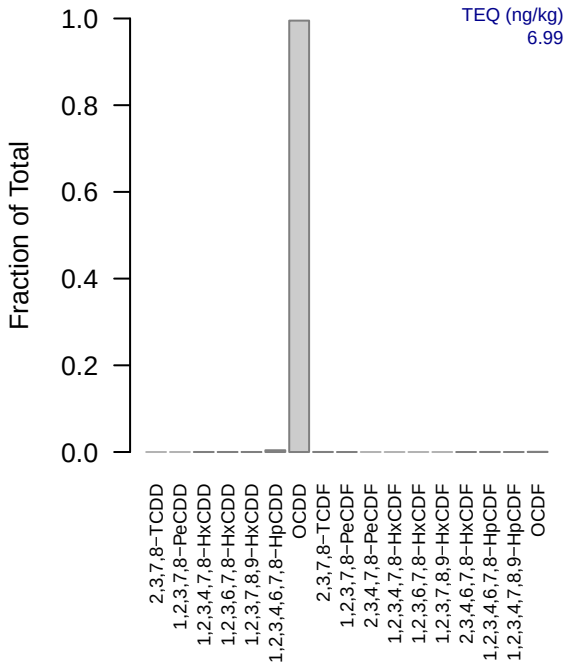

## SJSB014(0−15.24 cm)



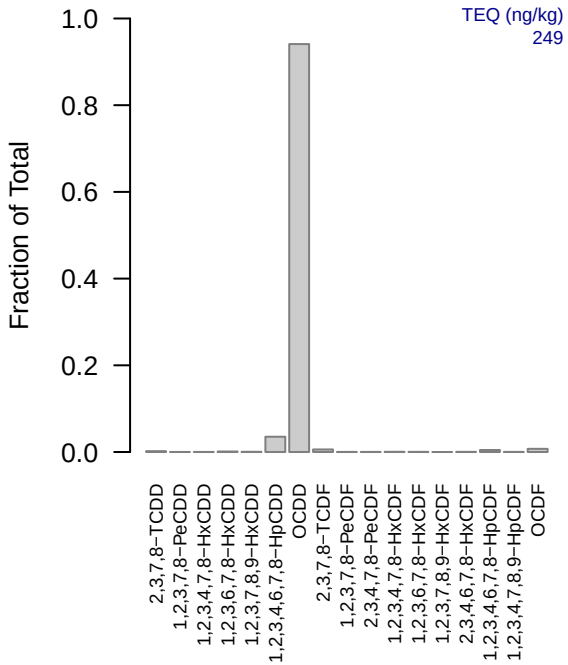
## SJSB014(15.24−30.48 cm)



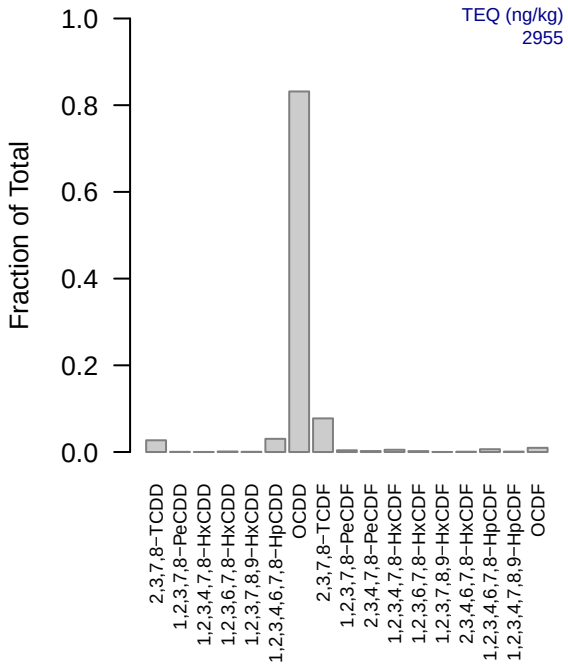

## SJSB014(30.48−60.96 cm)



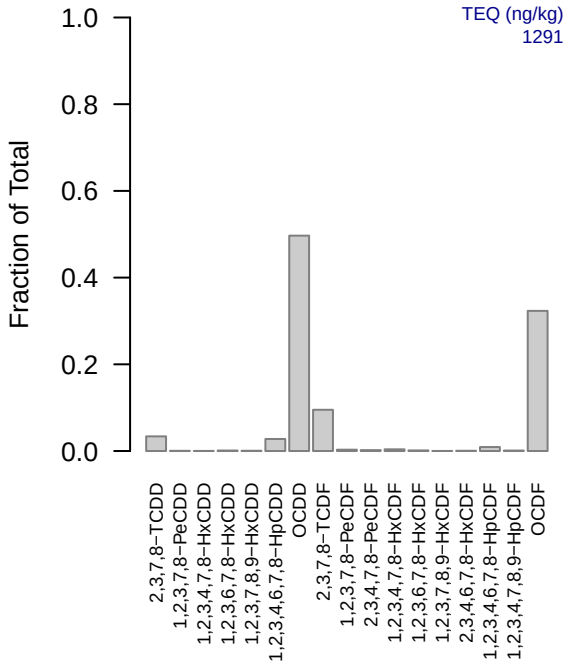

## SJSB015(304.8−365.76 cm)



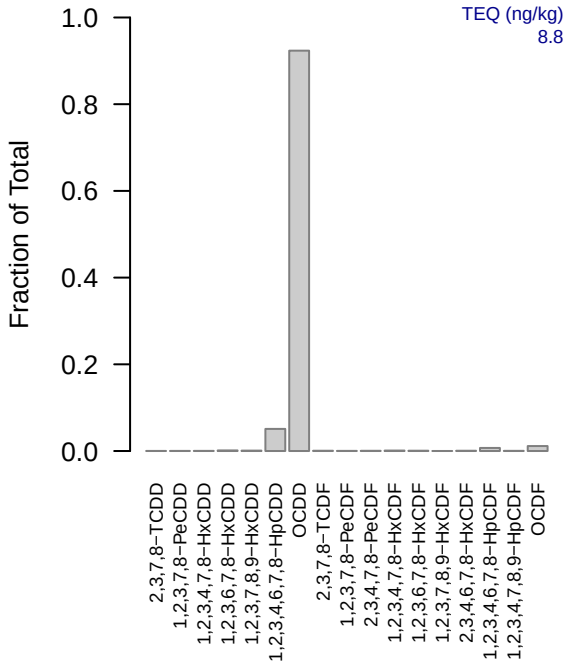

## SJSB015(365.76−426.72 cm)



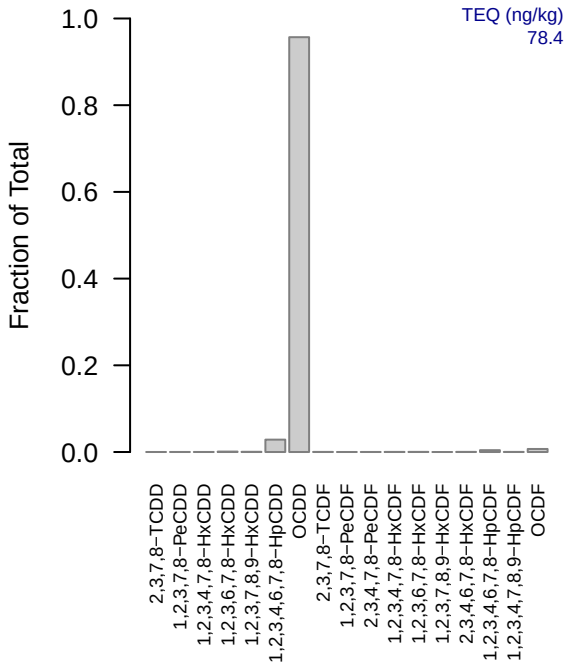
## SJSB015(426.72−487.68 cm)



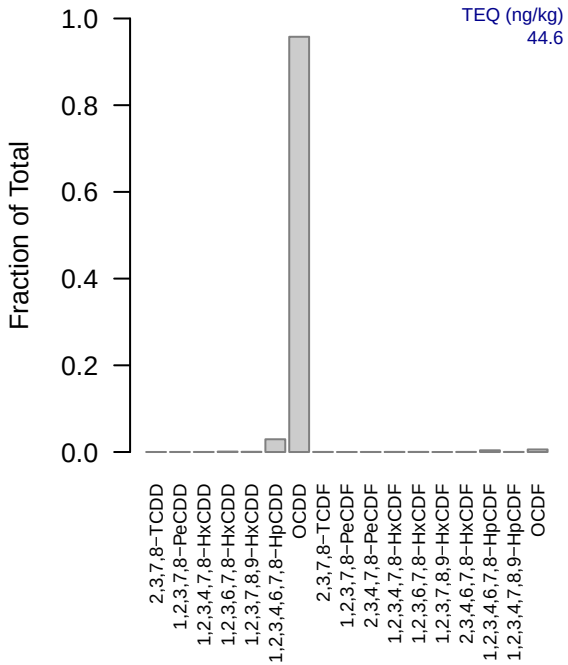

## SJSB015(60.96−121.92 cm)



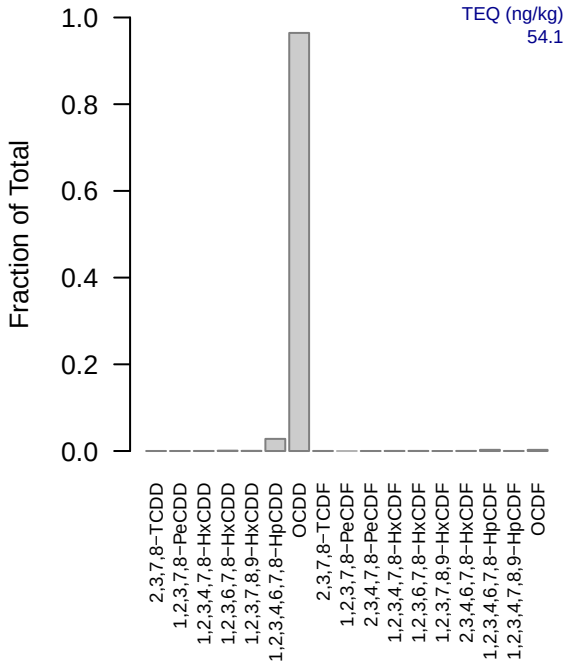

## SJSB015(121.92−182.88 cm)



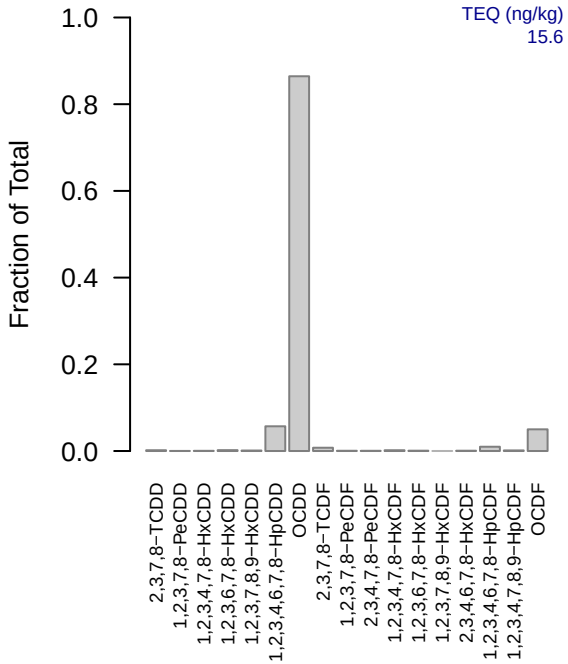

## SJSB015(182.88−243.84 cm)



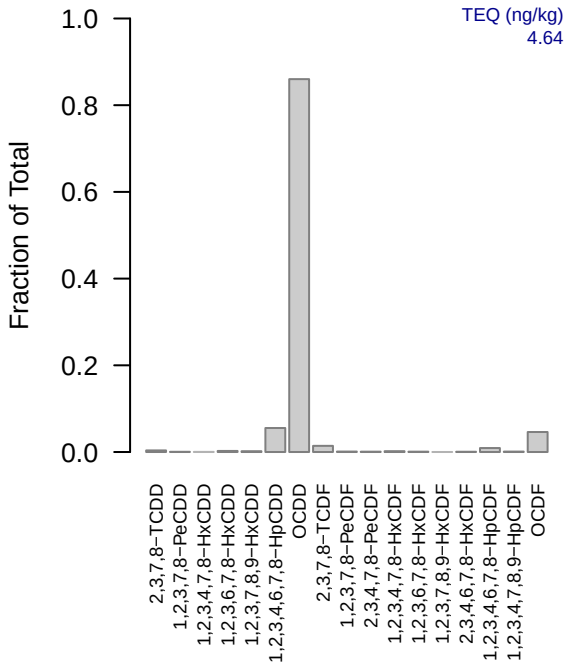
## SJSB015(243.84−304.8 cm)



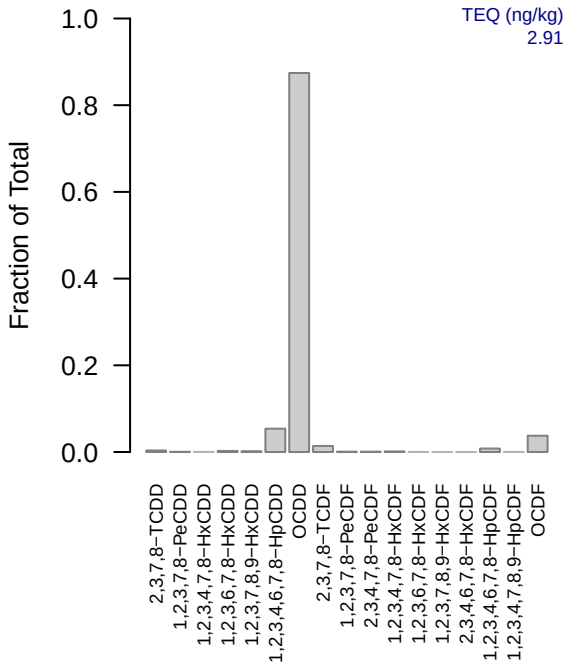

## SJSB015(0−15.24 cm)



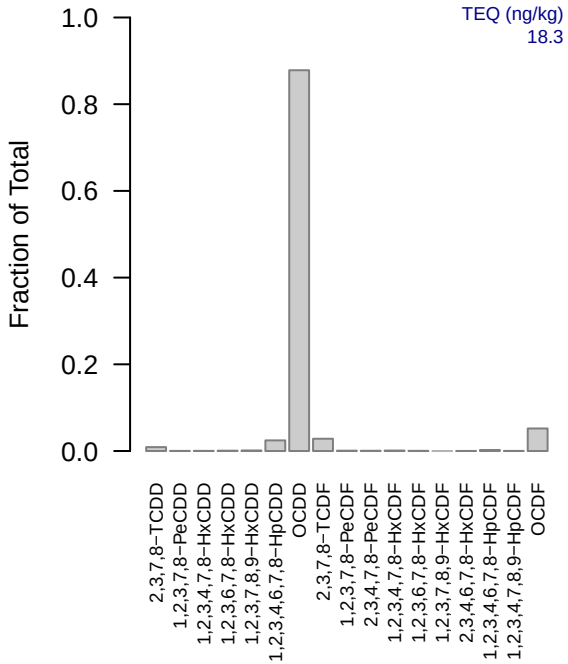

## SJSB015(15.24−30.48 cm)



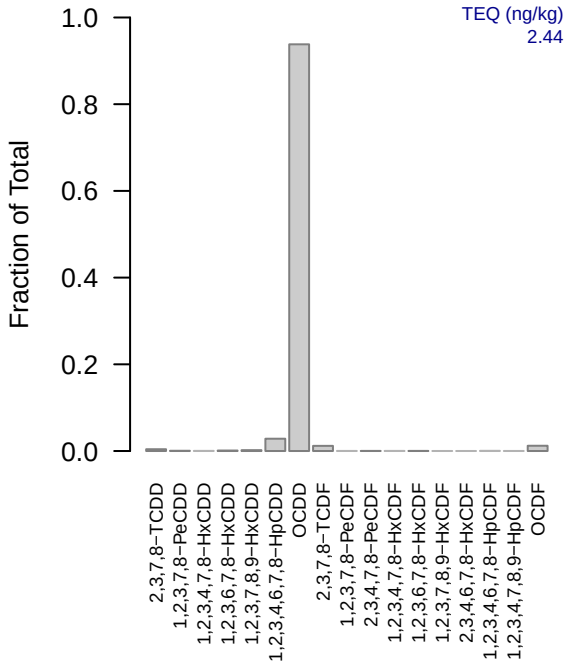

## SJSB015(30.48−60.96 cm)



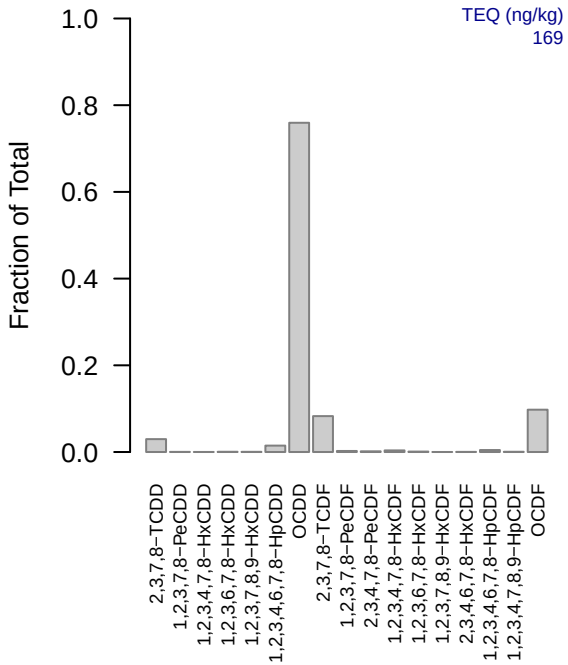
## SJSB016(304.8−365.76 cm)



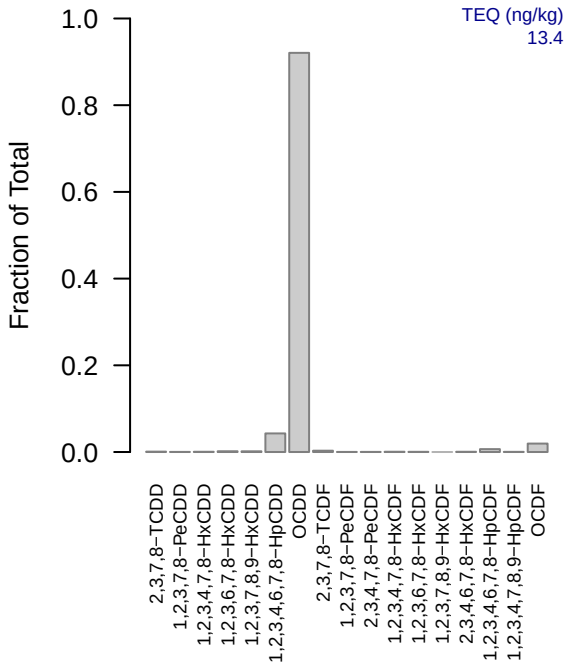

## SJSB016(365.76−426.72 cm)



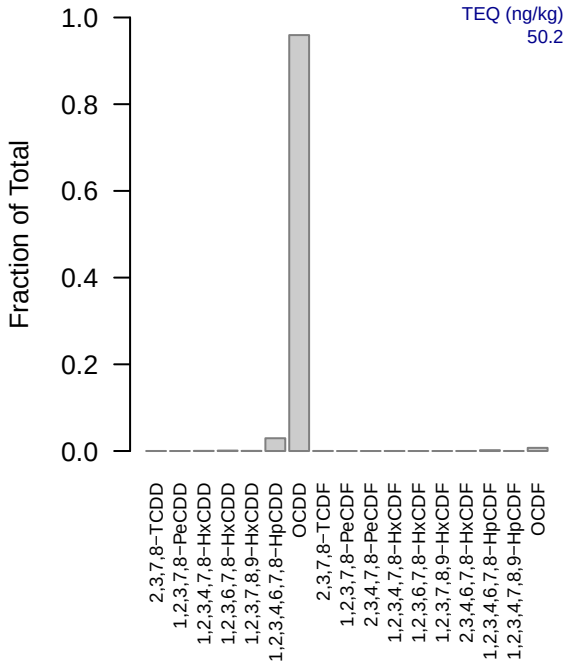

## SJSB016(426.72−487.68 cm)



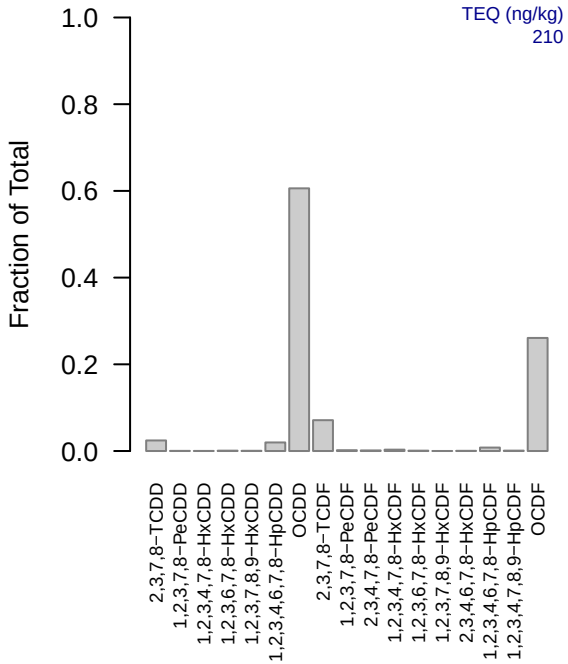

## SJSB016(60.96−121.92 cm)



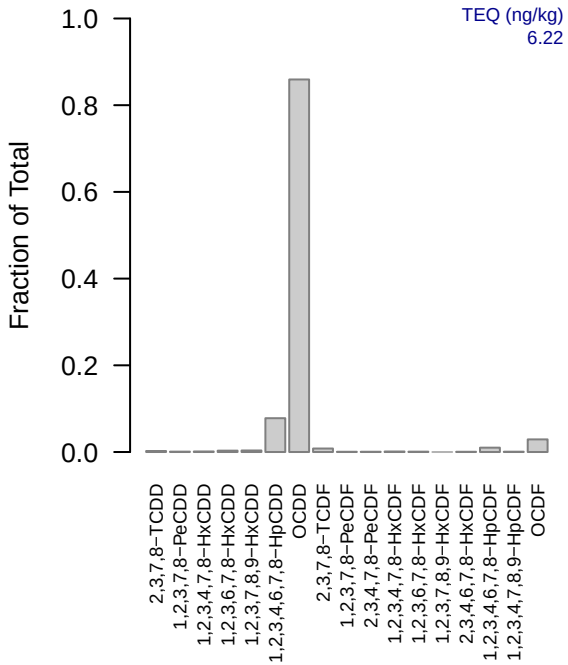
## SJSB016(182.88−243.84 cm)



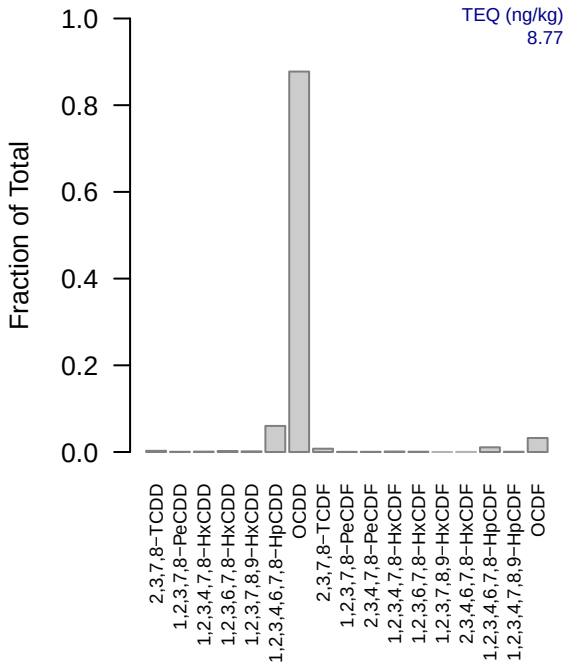

## SJSB016(243.84−304.8 cm)



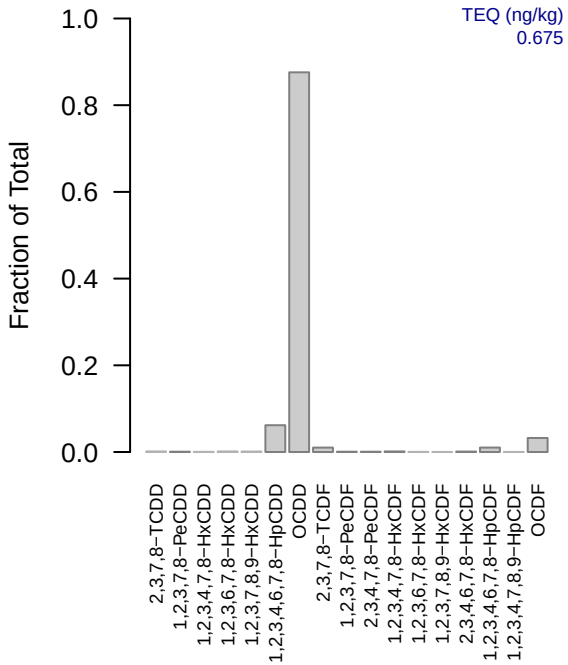

## SJSB016(0−15.24 cm)



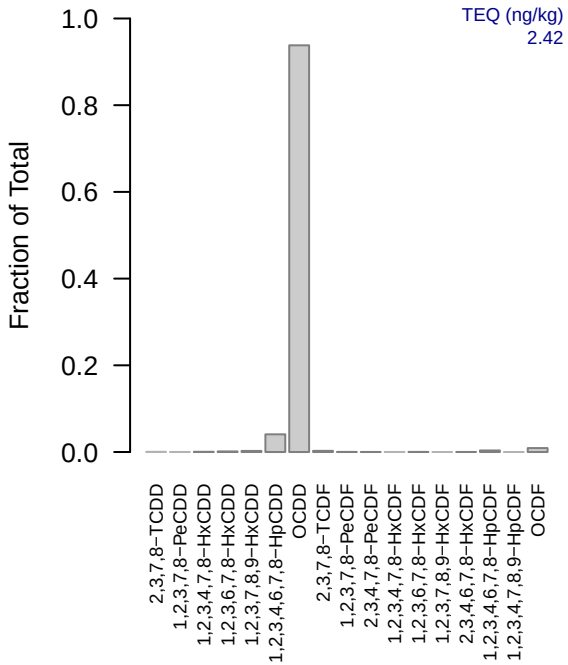

## SJSB016(15.24−30.48 cm)



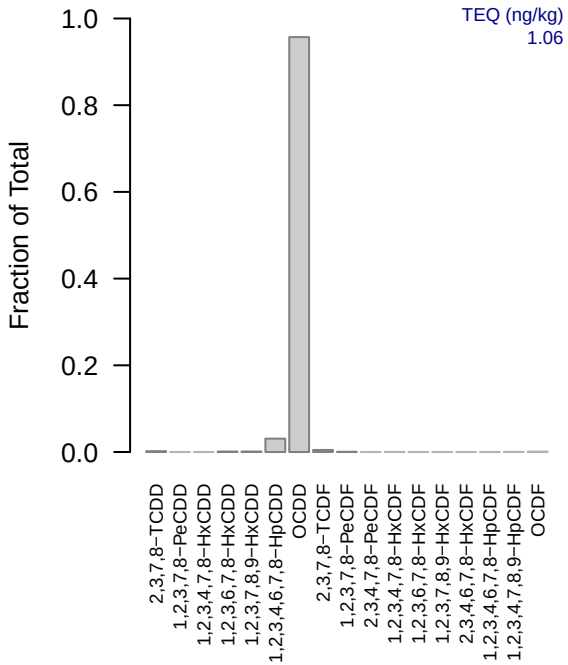
## SJSB016(30.48−60.96 cm)



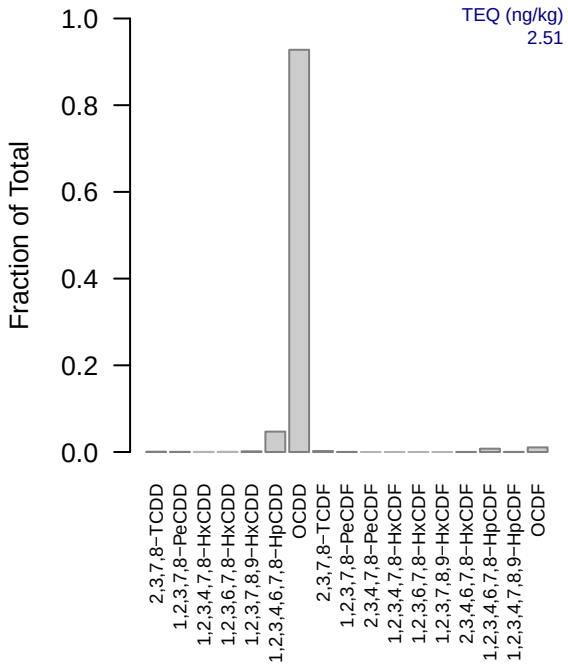

## SJSB017(304.8−365.76 cm)



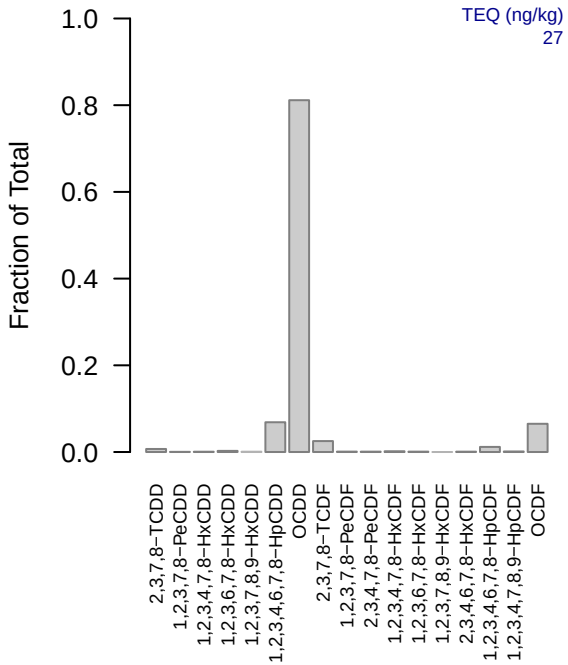

## SJSB017(365.76−426.72 cm)



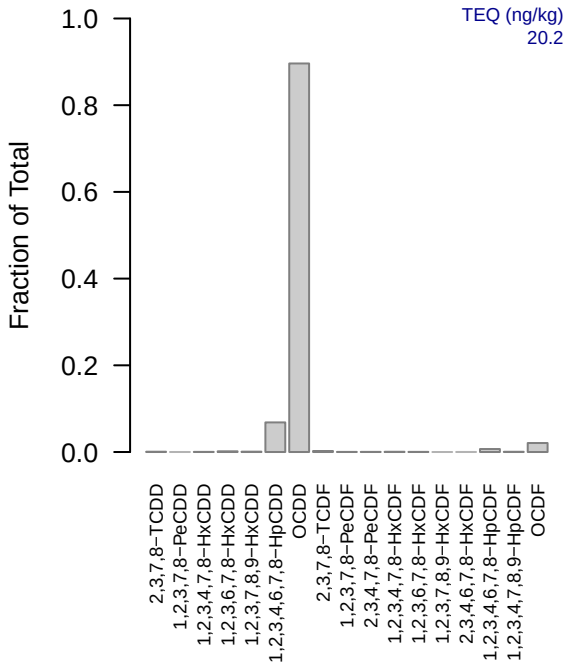

## SJSB017(426.72−487.68 cm)



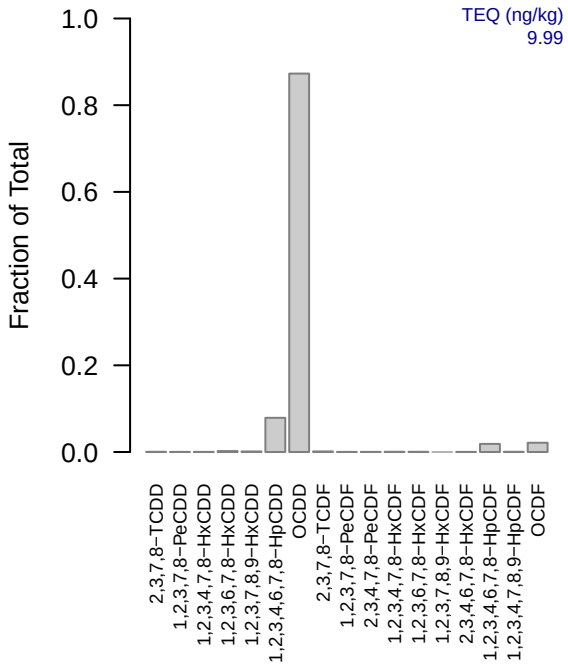
## SJSB017(60.96−121.92 cm)



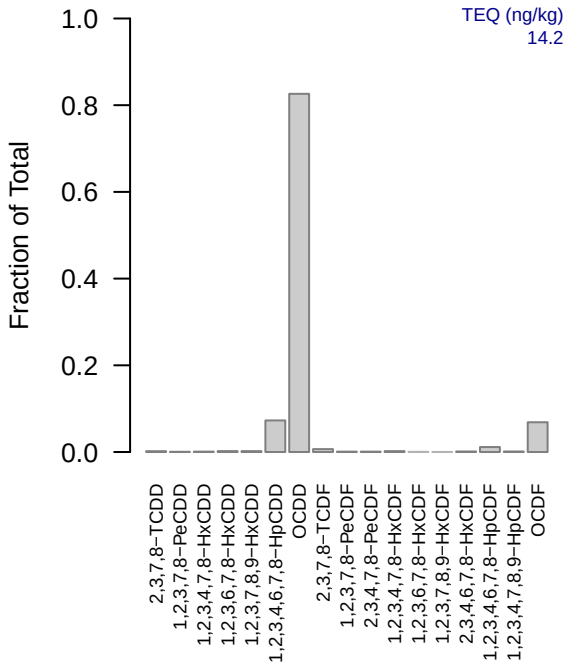

## SJSB017(121.92−182.88 cm)

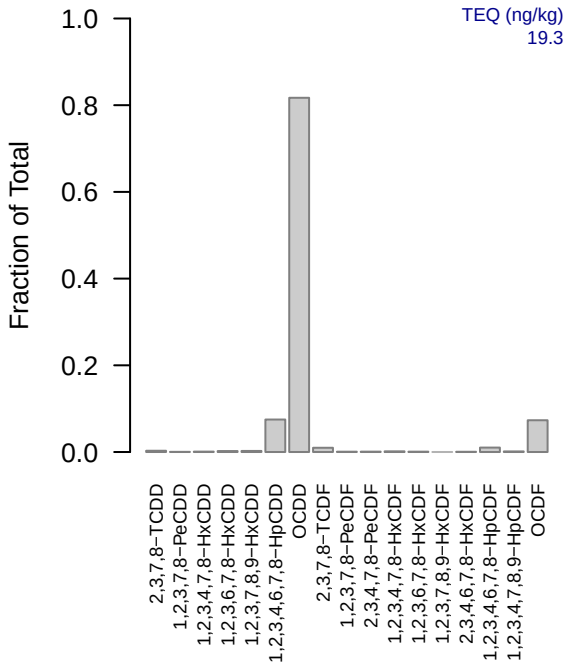


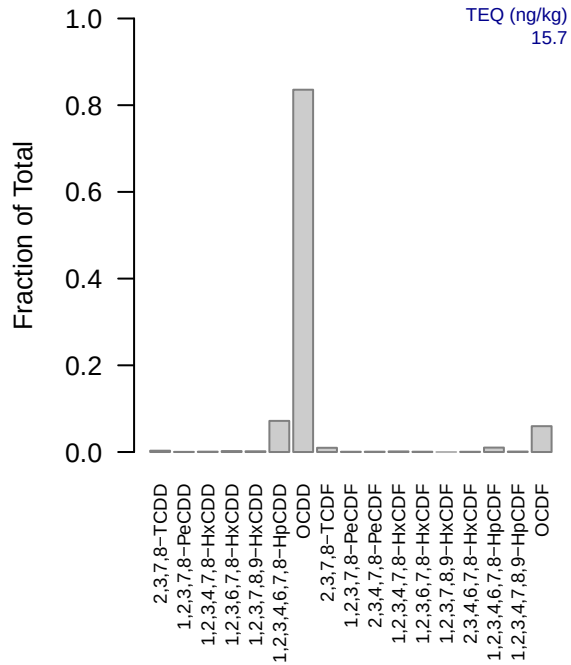

## SJSB017(182.88−243.84 cm)

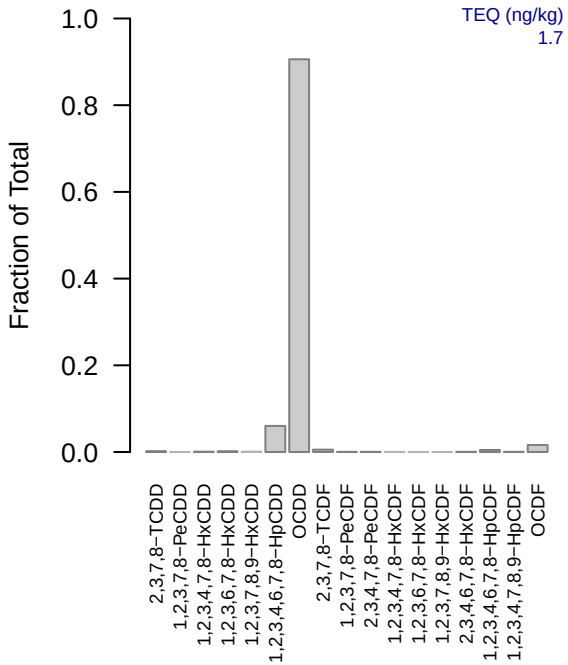


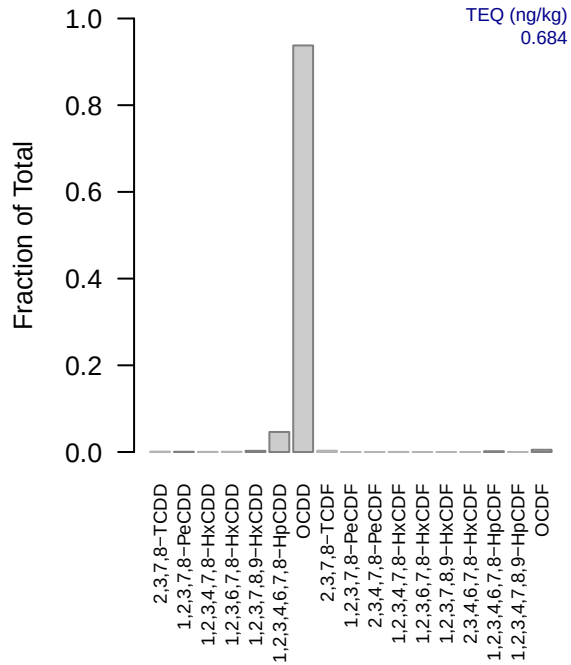

## SJSB017(0−15.24 cm)



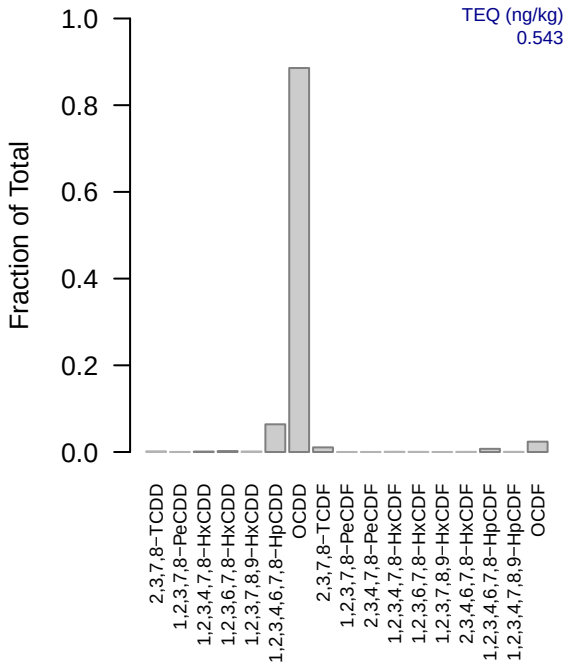

SJSB017(15.24−30.48 cm)
TEQ (ng/kg)
19.3
Fraction of Total
1.0
0.8
0.6
0.4
0.2
0.0
2,3,7,8−TCDD
1,2,3,7,8−PeCDD
1,2,3,4,7,8−HxCDD
1,2,3,6,7,8−HxCDD
1,2,3,7,8,9−HxCDD
1,2,3,4,6,7,8−HpCDD
OCDD
2,3,7,8−TCDF
1,2,3,7,8−PeCDF
2,3,4,7,8−PeCDF
1,2,3,4,7,8−HxCDF
1,2,3,6,7,8−HxCDF
1,2,3,7,8,9−HxCDF
2,3,4,6,7,8−HxCDF
1,2,3,4,6,7,8−HpCDF
1,2,3,4,7,8,9−HpCDF
OCDF


SJSB017(30.48−60.96 cm)
TEQ (ng/kg)
15.7
Fraction of Total
1.0
0.8
0.6
0.4
0.2
0.0
2,3,7,8−TCDD
1,2,3,7,8−PeCDD
1,2,3,4,7,8−HxCDD
1,2,3,6,7,8−HxCDD
1,2,3,7,8,9−HxCDD
1,2,3,4,6,7,8−HpCDD
OCDD
2,3,7,8−TCDF
1,2,3,7,8−PeCDF
2,3,4,7,8−PeCDF
1,2,3,4,7,8−HxCDF
1,2,3,6,7,8−HxCDF
1,2,3,7,8,9−HxCDF
2,3,4,6,7,8−HxCDF
1,2,3,4,6,7,8−HpCDF
1,2,3,4,7,8,9−HpCDF
OCDF

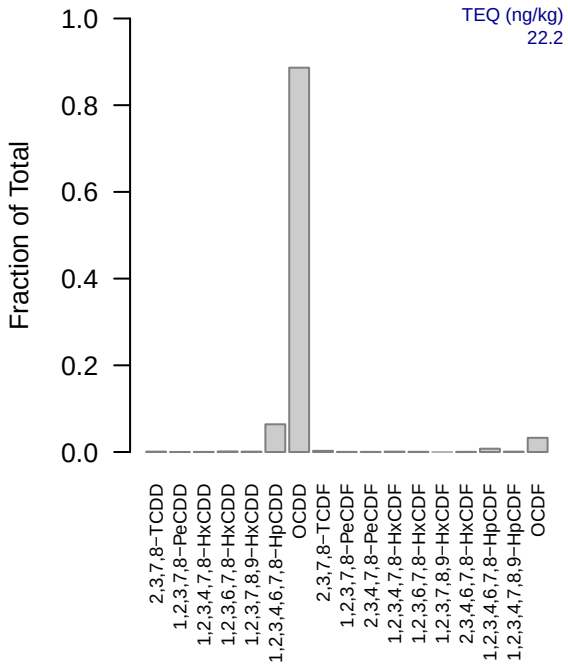

SJSB018(304.8−365.76 cm)
TEQ (ng/kg)
1.7
Fraction of Total
1.0
0.8
0.6
0.4
0.2
0.0
2,3,7,8−TCDD
1,2,3,7,8−PeCDD
1,2,3,4,7,8−HxCDD
1,2,3,6,7,8−HxCDD
1,2,3,7,8,9−HxCDD
1,2,3,4,6,7,8−HpCDD
OCDD
2,3,7,8−TCDF
1,2,3,7,8−PeCDF
2,3,4,7,8−PeCDF
1,2,3,4,7,8−HxCDF
1,2,3,6,7,8−HxCDF
1,2,3,7,8,9−HxCDF
2,3,4,6,7,8−HxCDF
1,2,3,4,6,7,8−HpCDF
1,2,3,4,7,8,9−HpCDF
OCDF


SJSB018(365.76−426.72 cm)
TEQ (ng/kg)
0.684
Fraction of Total
1.0
0.8
0.6
0.4
0.2
0.0
2,3,7,8−TCDD
1,2,3,7,8−PeCDD
1,2,3,4,7,8−HxCDD
1,2,3,6,7,8−HxCDD
1,2,3,7,8,9−HxCDD
1,2,3,4,6,7,8−HpCDD
OCDD
2,3,7,8−TCDF
1,2,3,7,8−PeCDF
2,3,4,7,8−PeCDF
1,2,3,4,7,8−HxCDF
1,2,3,6,7,8−HxCDF
1,2,3,7,8,9−HxCDF
2,3,4,6,7,8−HxCDF
1,2,3,4,6,7,8−HpCDF
1,2,3,4,7,8,9−HpCDF
OCDF

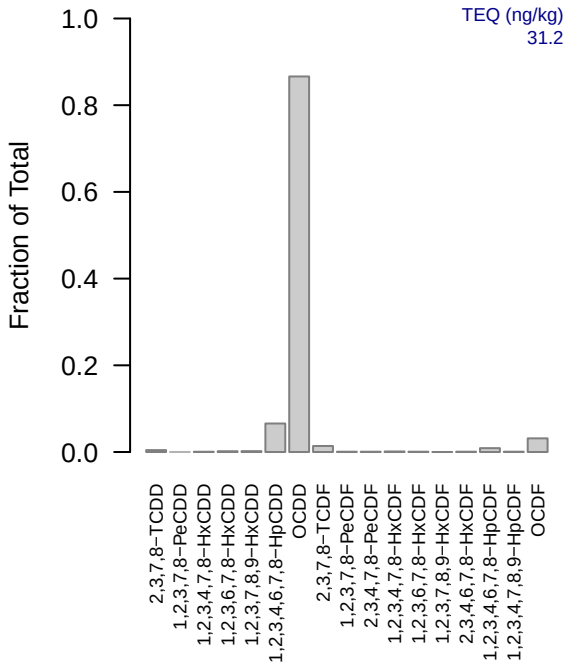
## SJSB018(426.72−487.68 cm)



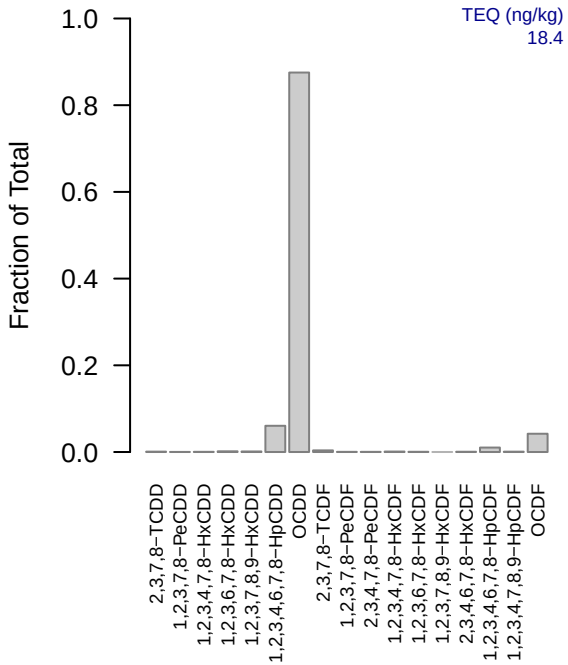

## SJSB018(60.96−121.92 cm)

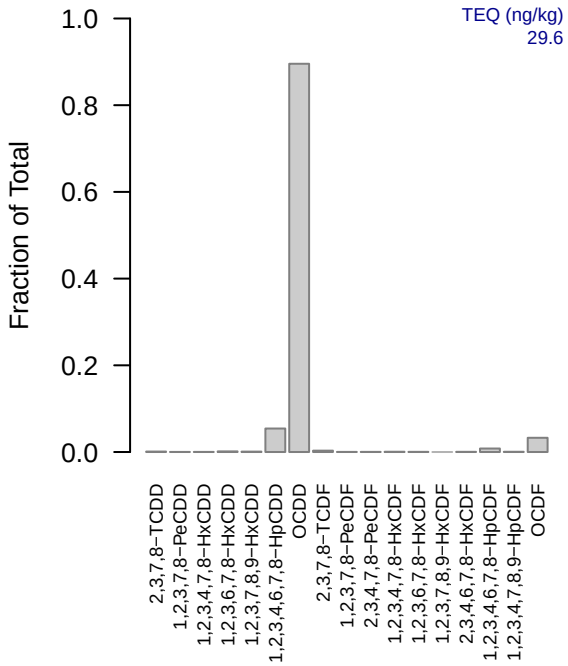


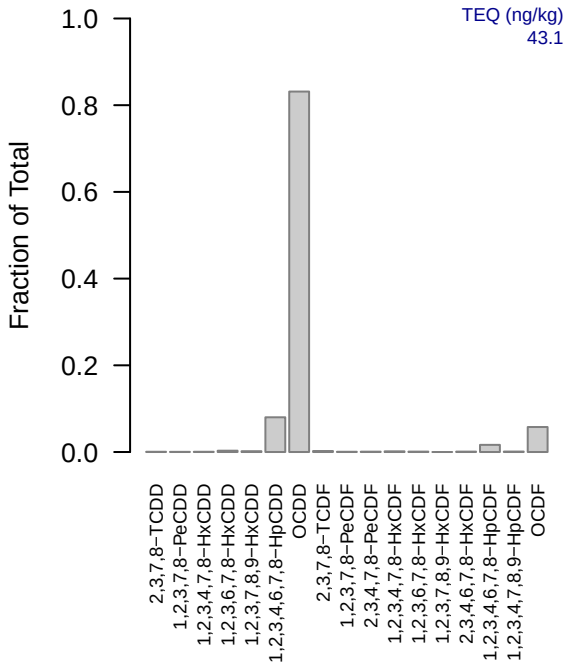

## SJSB018(182.88−243.84 cm)

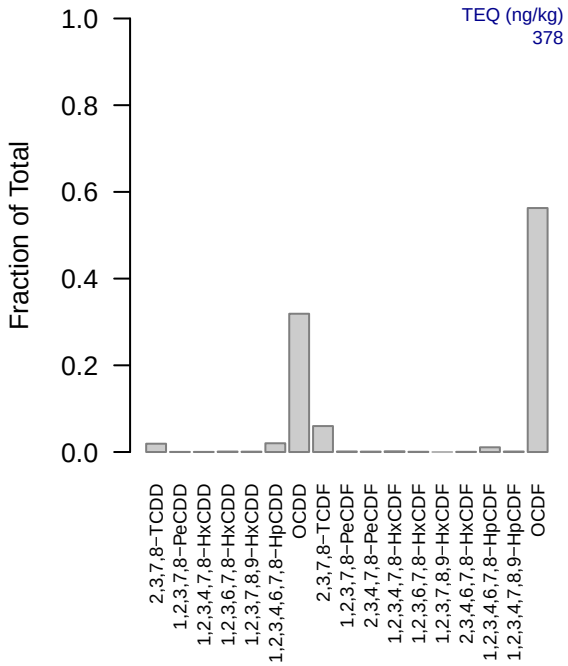


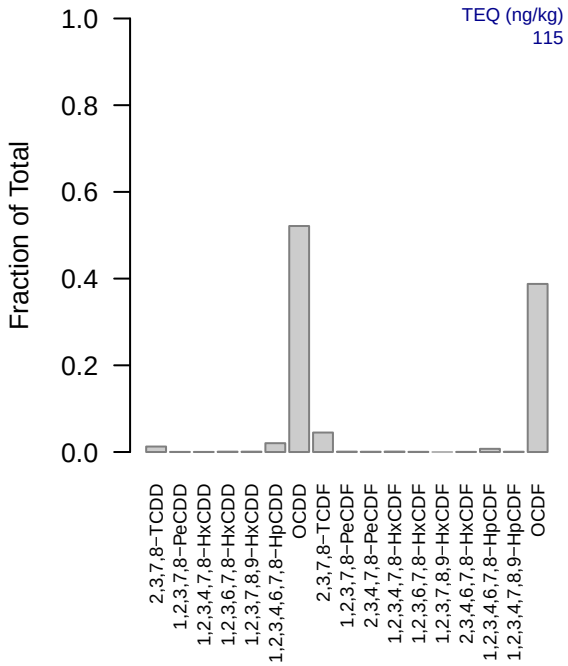

## SJSB018(0−15.24 cm)



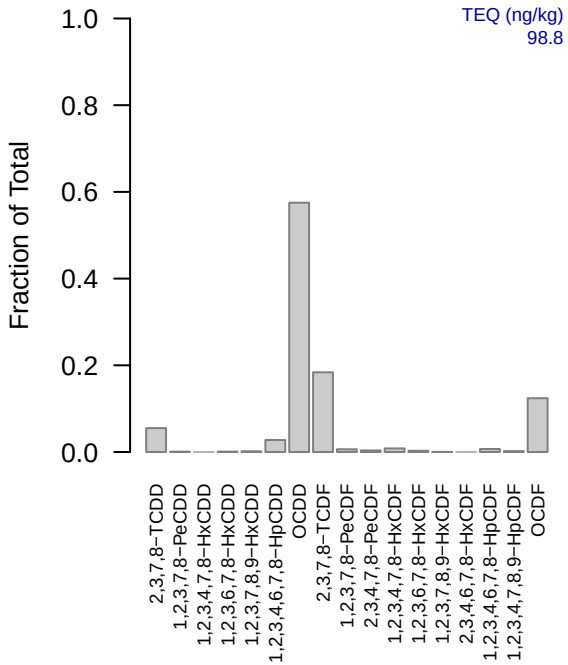

SJSB018(15.24−30.48 cm)
TEQ (ng/kg)
29.6
Fraction of Total
1.0
0.8
0.6
0.4
0.2
0.0
2,3,7,8−TCDD
1,2,3,7,8−PeCDD
1,2,3,4,7,8−HxCDD
1,2,3,6,7,8−HxCDD
1,2,3,7,8,9−HxCDD
1,2,3,4,6,7,8−HpCDD
OCDD
2,3,7,8−TCDF
1,2,3,7,8−PeCDF
2,3,4,7,8−PeCDF
1,2,3,4,7,8−HxCDF
1,2,3,6,7,8−HxCDF
1,2,3,7,8,9−HxCDF
2,3,4,6,7,8−HxCDF
1,2,3,4,6,7,8−HpCDF
1,2,3,4,7,8,9−HpCDF
OCDF


SJSB018(30.48−60.96 cm)
TEQ (ng/kg)
43.1
Fraction of Total
1.0
0.8
0.6
0.4
0.2
0.0
2,3,7,8−TCDD
1,2,3,7,8−PeCDD
1,2,3,4,7,8−HxCDD
1,2,3,6,7,8−HxCDD
1,2,3,7,8,9−HxCDD
1,2,3,4,6,7,8−HpCDD
OCDD
2,3,7,8−TCDF
1,2,3,7,8−PeCDF
2,3,4,7,8−PeCDF
1,2,3,4,7,8−HxCDF
1,2,3,6,7,8−HxCDF
1,2,3,7,8,9−HxCDF
2,3,4,6,7,8−HxCDF
1,2,3,4,6,7,8−HpCDF
1,2,3,4,7,8,9−HpCDF
OCDF

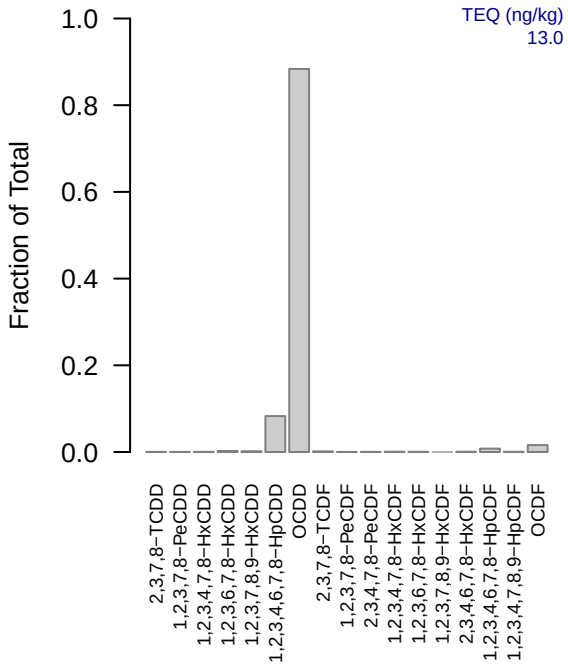

SJSB019(304.8−365.76 cm)
TEQ (ng/kg)
378
Fraction of Total
1.0
0.8
0.6
0.4
0.2
0.0
2,3,7,8−TCDD
1,2,3,7,8−PeCDD
1,2,3,4,7,8−HxCDD
1,2,3,6,7,8−HxCDD
1,2,3,7,8,9−HxCDD
1,2,3,4,6,7,8−HpCDD
OCDD
2,3,7,8−TCDF
1,2,3,7,8−PeCDF
2,3,4,7,8−PeCDF
1,2,3,4,7,8−HxCDF
1,2,3,6,7,8−HxCDF
1,2,3,7,8,9−HxCDF
2,3,4,6,7,8−HxCDF
1,2,3,4,6,7,8−HpCDF
1,2,3,4,7,8,9−HpCDF
OCDF


SJSB019(365.76−426.72 cm)
TEQ (ng/kg)
115
Fraction of Total
1.0
0.8
0.6
0.4
0.2
0.0
2,3,7,8−TCDD
1,2,3,7,8−PeCDD
1,2,3,4,7,8−HxCDD
1,2,3,6,7,8−HxCDD
1,2,3,7,8,9−HxCDD
1,2,3,4,6,7,8−HpCDD
OCDD
2,3,7,8−TCDF
1,2,3,7,8−PeCDF
2,3,4,7,8−PeCDF
1,2,3,4,7,8−HxCDF
1,2,3,6,7,8−HxCDF
1,2,3,7,8,9−HxCDF
2,3,4,6,7,8−HxCDF
1,2,3,4,6,7,8−HpCDF
1,2,3,4,7,8,9−HpCDF
OCDF

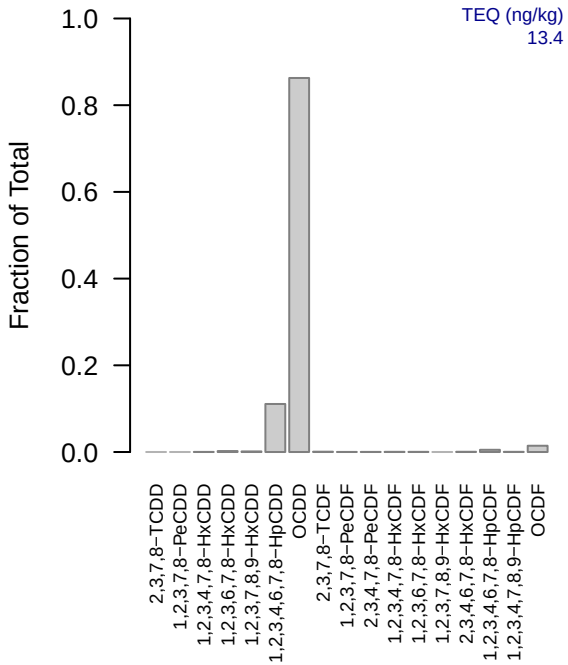
## SJSB019(426.72−487.68 cm)



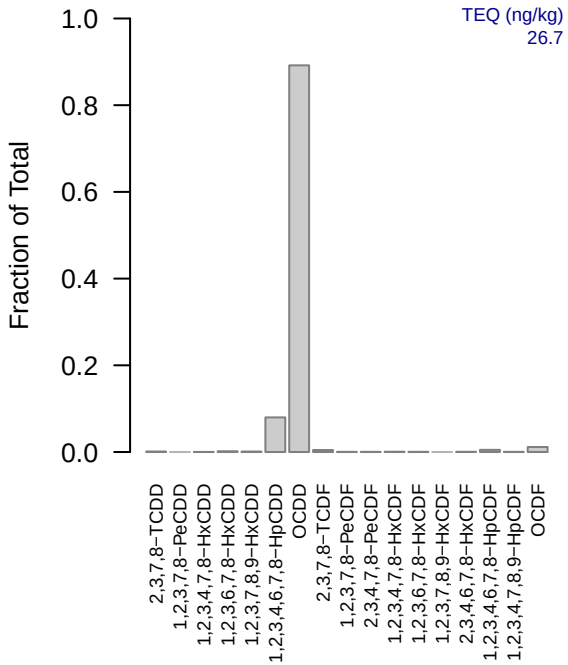

## SJSB019(60.96−121.92 cm)



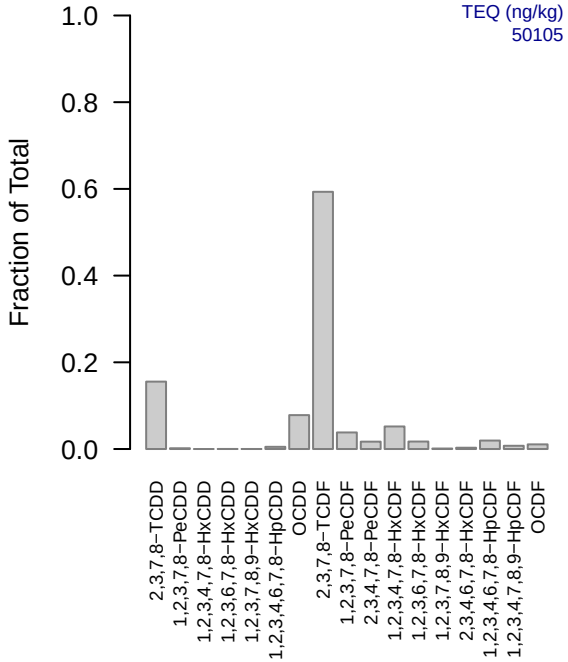

## SJSB019(121.92−182.88 cm)



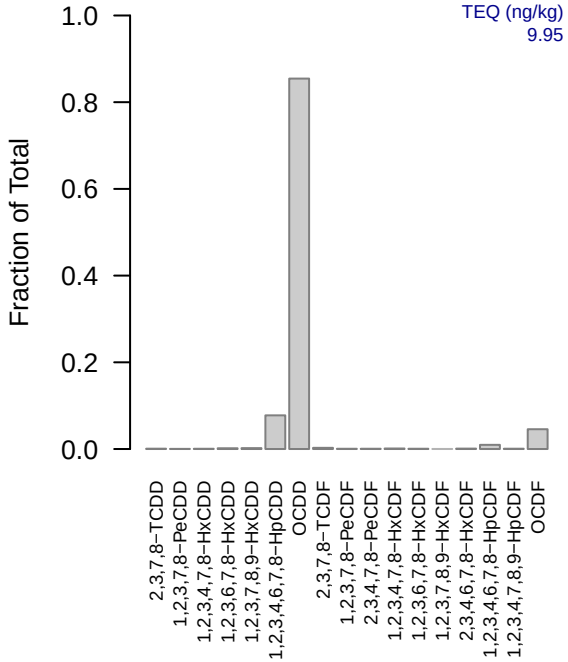

## SJSB019(182.88−243.84 cm)



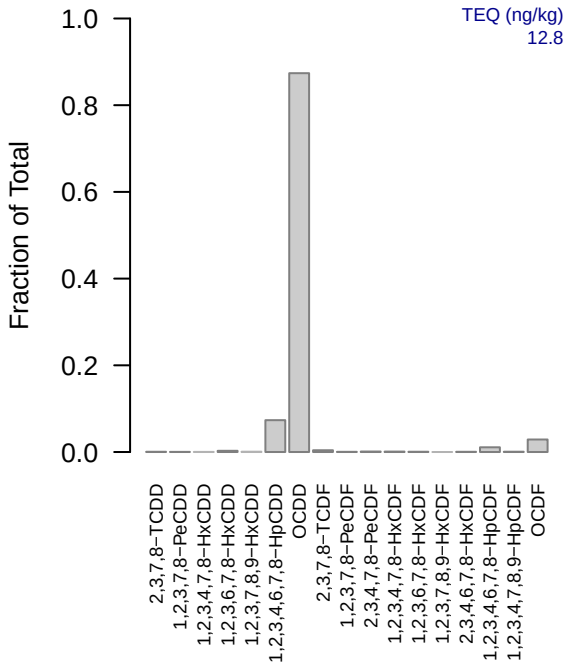
## SJSB019(243.84−304.8 cm)



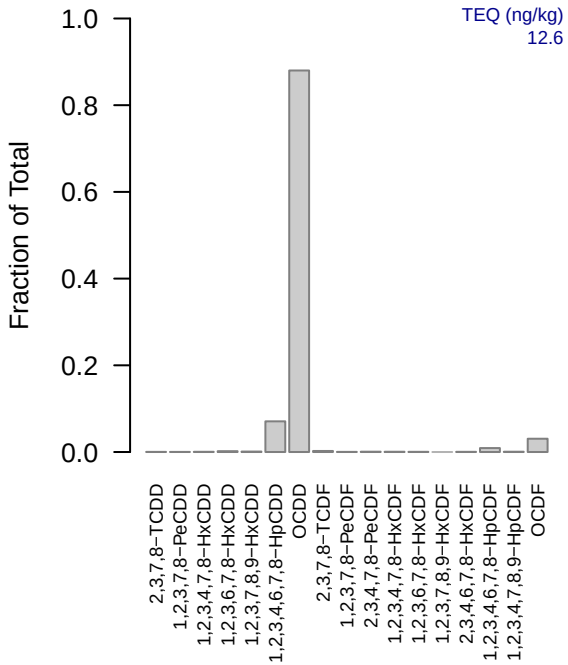

## SJSB019(0−15.24 cm)



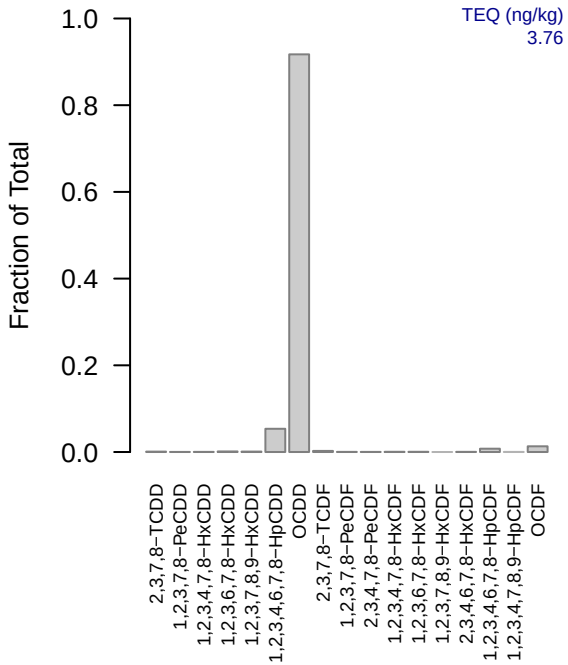

## SJSB019(15.24−30.48 cm)



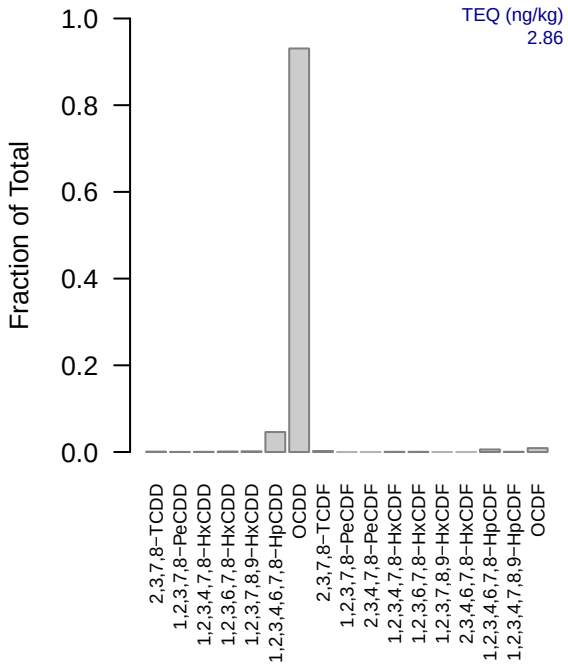

## SJSB019(30.48−60.96 cm)



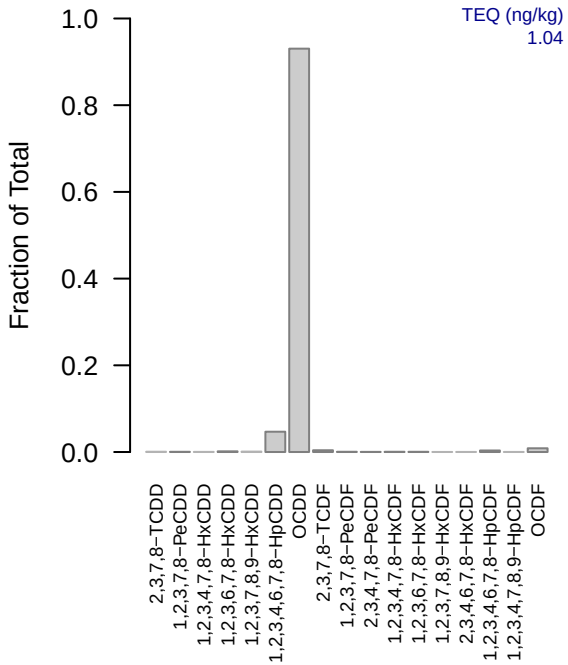
## SJSB020(304.8−365.76 cm)



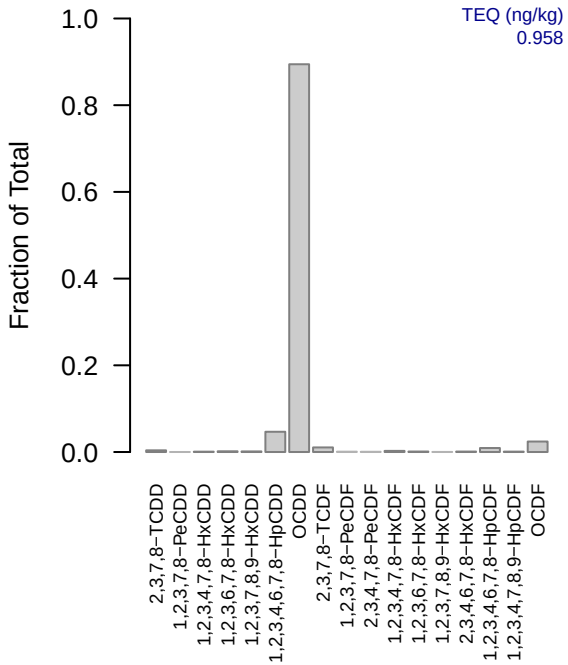

## SJSB020(365.76−426.72 cm)



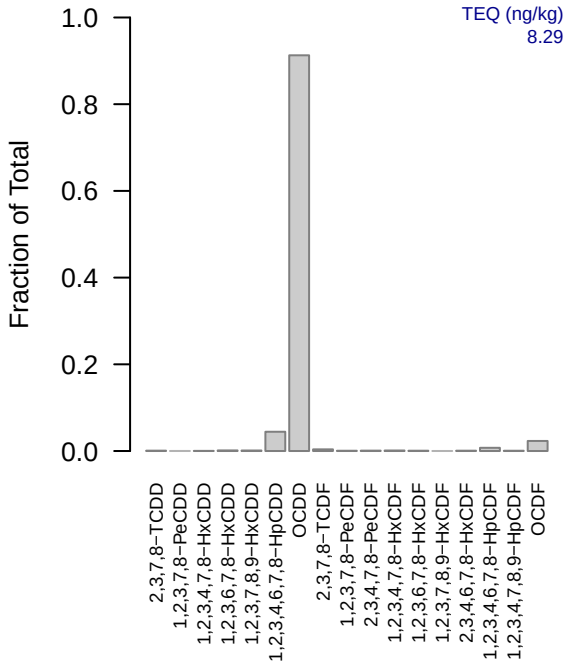

## SJSB020(426.72−487.68 cm)



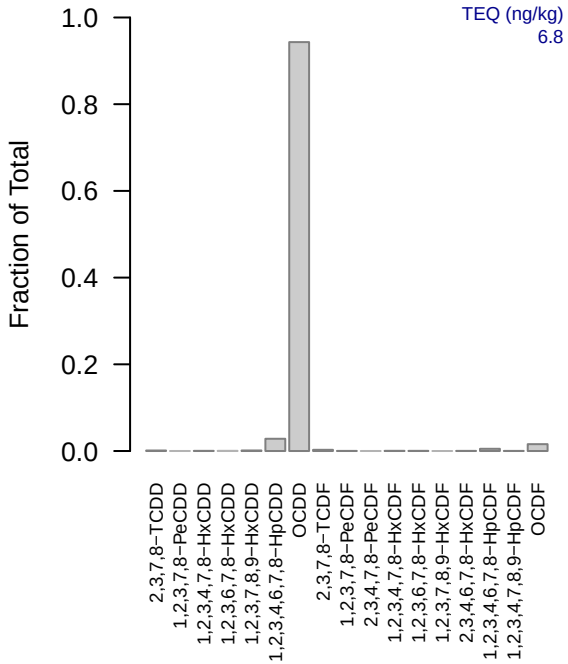

## SJSB020(60.96−121.92 cm)



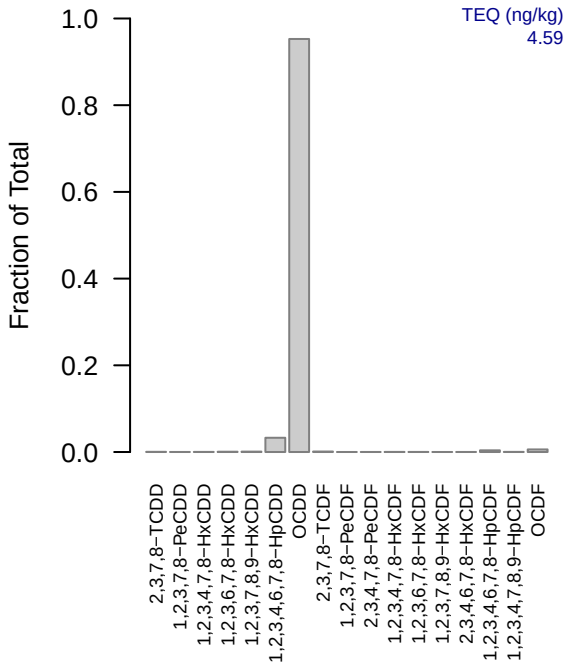
## SJSB020(121.92−182.88 cm)



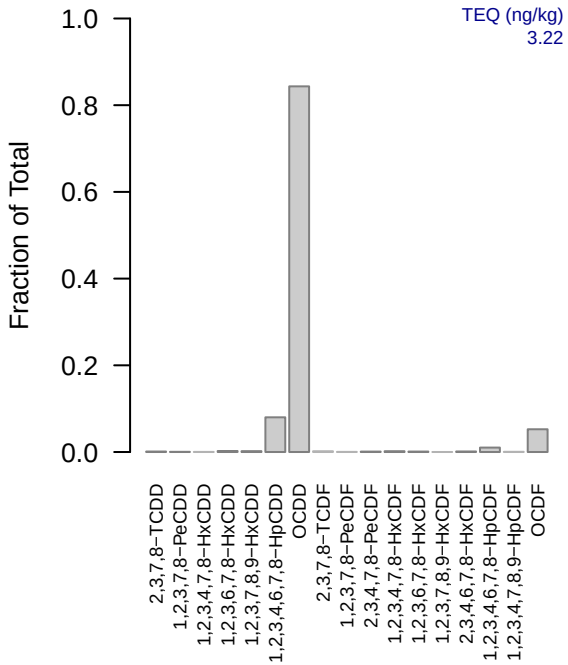

## SJSB020(182.88−243.84 cm)

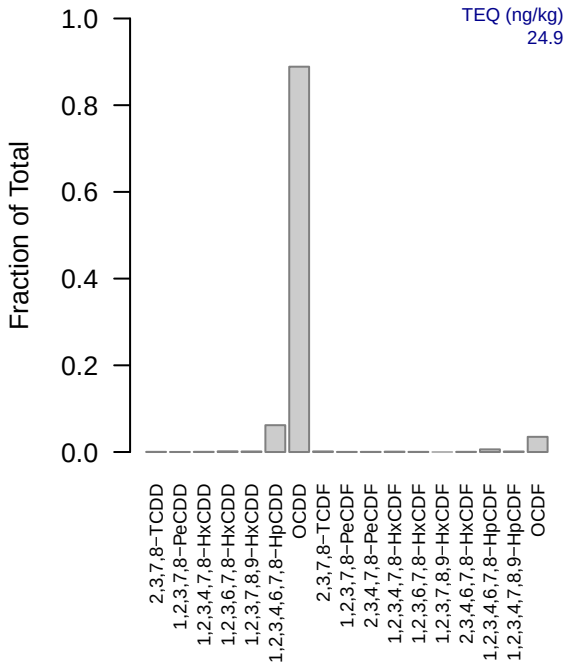


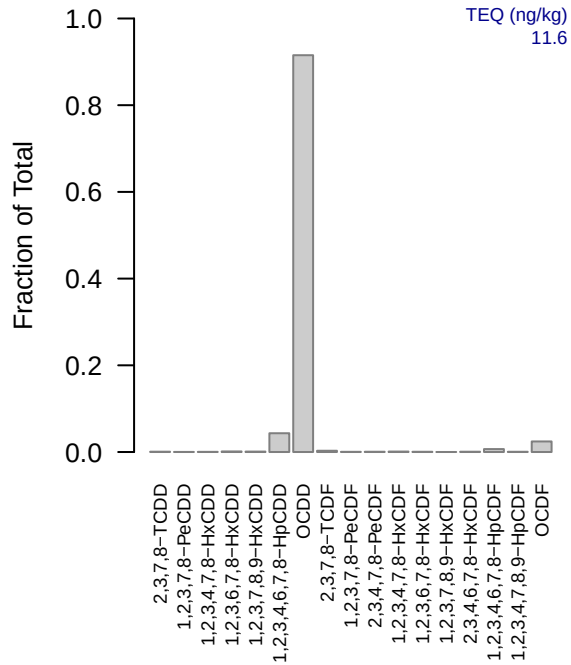

## SJSB020(243.84−304.8 cm)

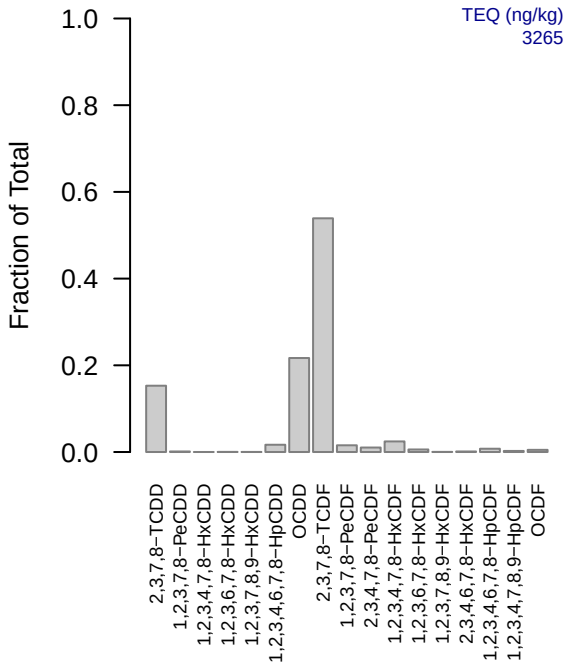


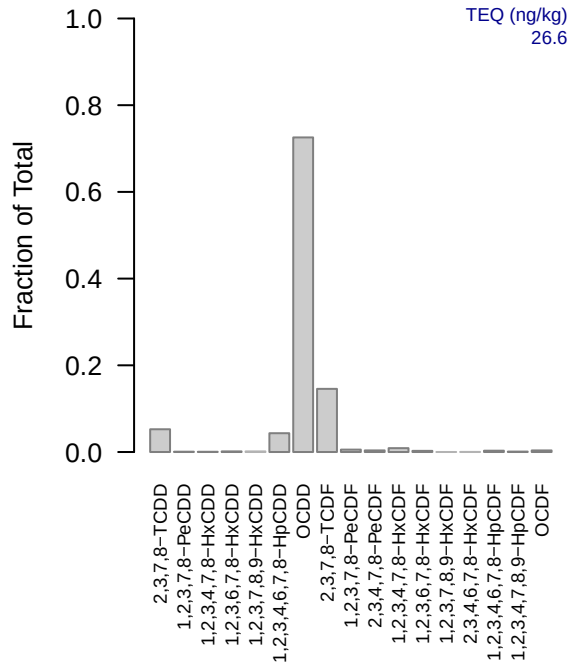

## SJSB020(0−15.24 cm)



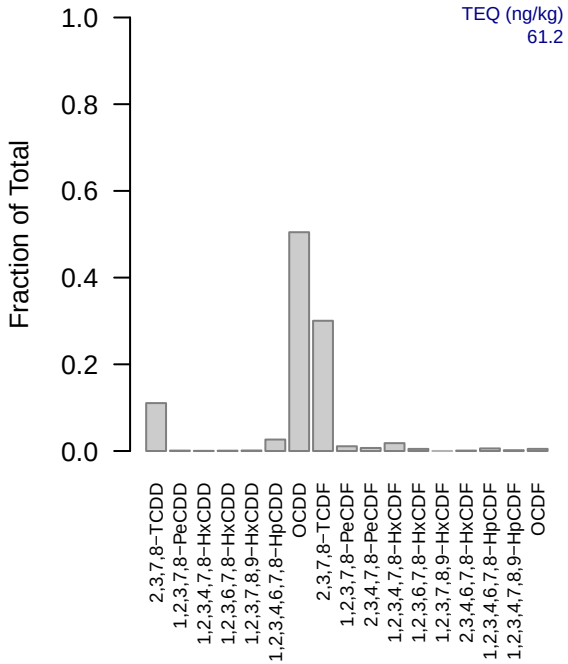

SJSB020(15.24−30.48 cm)
TEQ (ng/kg)
24.9
Fraction of Total
1.0
0.8
0.6
0.4
0.2
0.0
2,3,7,8−TCDD
1,2,3,7,8−PeCDD
1,2,3,4,7,8−HxCDD
1,2,3,6,7,8−HxCDD
1,2,3,7,8,9−HxCDD
1,2,3,4,6,7,8−HpCDD
OCDD
2,3,7,8−TCDF
1,2,3,7,8−PeCDF
2,3,4,7,8−PeCDF
1,2,3,4,7,8−HxCDF
1,2,3,6,7,8−HxCDF
1,2,3,7,8,9−HxCDF
2,3,4,6,7,8−HxCDF
1,2,3,4,6,7,8−HpCDF
1,2,3,4,7,8,9−HpCDF
OCDF


SJSB020(30.48−60.96 cm)
TEQ (ng/kg)
11.6
Fraction of Total
1.0
0.8
0.6
0.4
0.2
0.0
2,3,7,8−TCDD
1,2,3,7,8−PeCDD
1,2,3,4,7,8−HxCDD
1,2,3,6,7,8−HxCDD
1,2,3,7,8,9−HxCDD
1,2,3,4,6,7,8−HpCDD
OCDD
2,3,7,8−TCDF
1,2,3,7,8−PeCDF
2,3,4,7,8−PeCDF
1,2,3,4,7,8−HxCDF
1,2,3,6,7,8−HxCDF
1,2,3,7,8,9−HxCDF
2,3,4,6,7,8−HxCDF
1,2,3,4,6,7,8−HpCDF
1,2,3,4,7,8,9−HpCDF
OCDF

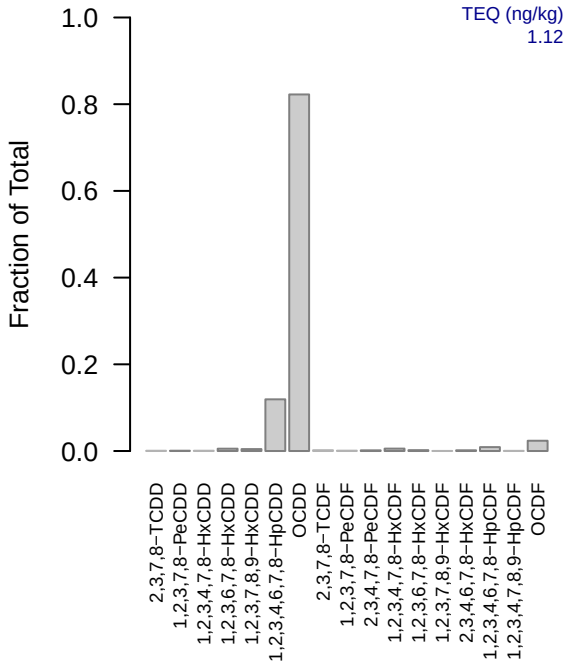

SJSB021(304.8−365.76 cm)
TEQ (ng/kg)
3265
Fraction of Total
1.0
0.8
0.6
0.4
0.2
0.0
2,3,7,8−TCDD
1,2,3,7,8−PeCDD
1,2,3,4,7,8−HxCDD
1,2,3,6,7,8−HxCDD
1,2,3,7,8,9−HxCDD
1,2,3,4,6,7,8−HpCDD
OCDD
2,3,7,8−TCDF
1,2,3,7,8−PeCDF
2,3,4,7,8−PeCDF
1,2,3,4,7,8−HxCDF
1,2,3,6,7,8−HxCDF
1,2,3,7,8,9−HxCDF
2,3,4,6,7,8−HxCDF
1,2,3,4,6,7,8−HpCDF
1,2,3,4,7,8,9−HpCDF
OCDF


SJSB021(365.76−426.72 cm)
TEQ (ng/kg)
26.6
Fraction of Total
1.0
0.8
0.6
0.4
0.2
0.0
2,3,7,8−TCDD
1,2,3,7,8−PeCDD
1,2,3,4,7,8−HxCDD
1,2,3,6,7,8−HxCDD
1,2,3,7,8,9−HxCDD
1,2,3,4,6,7,8−HpCDD
OCDD
2,3,7,8−TCDF
1,2,3,7,8−PeCDF
2,3,4,7,8−PeCDF
1,2,3,4,7,8−HxCDF
1,2,3,6,7,8−HxCDF
1,2,3,7,8,9−HxCDF
2,3,4,6,7,8−HxCDF
1,2,3,4,6,7,8−HpCDF
1,2,3,4,7,8,9−HpCDF
OCDF

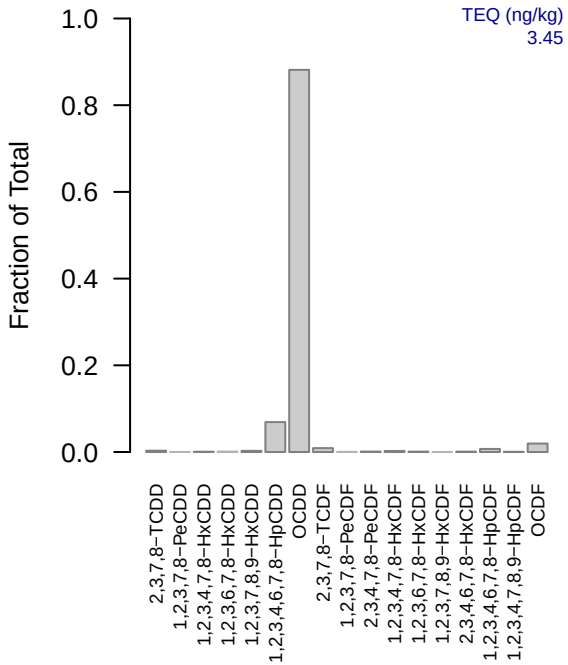
## SJSB021(426.72−487.68 cm)



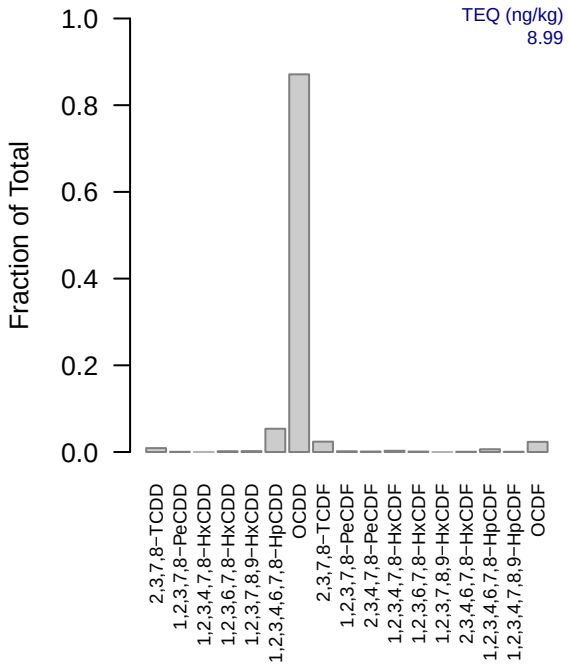

## SJSB021(60.96−121.92 cm)



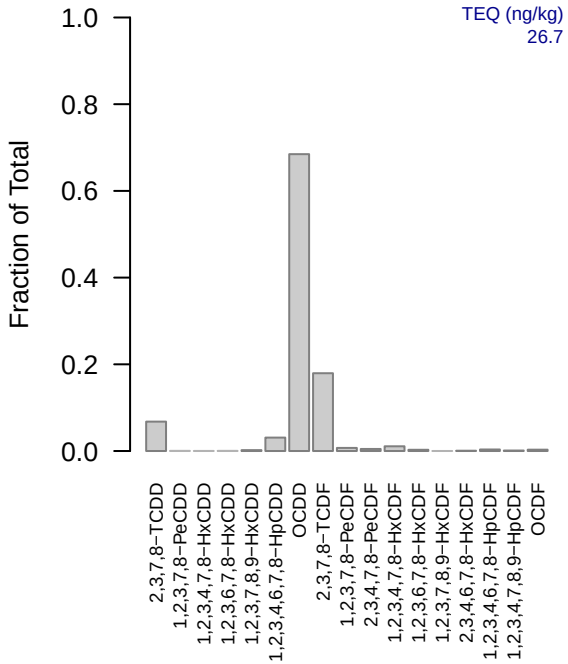

## SJSB021(121.92−182.88 cm)



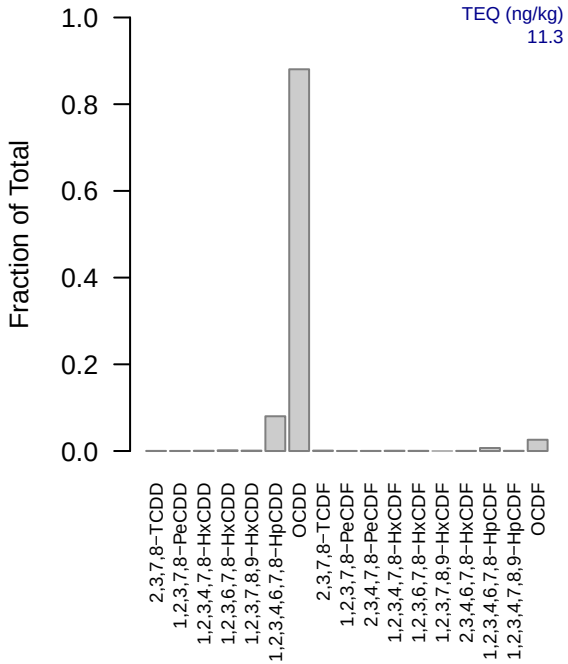

## SJSB021(182.88−243.84 cm)



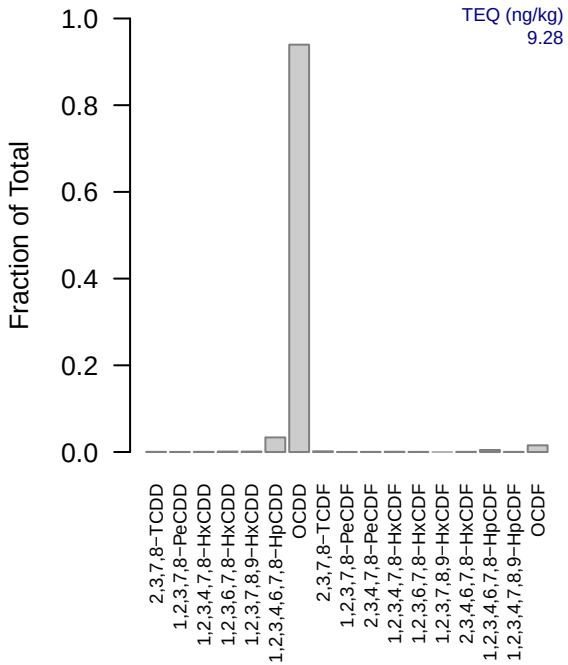
## SJSB021(243.84−304.8 cm)



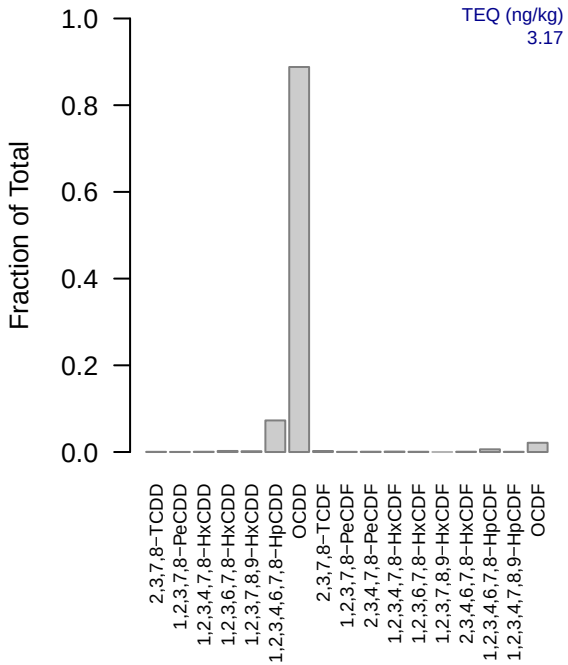

## SJSB021(0−15.24 cm)



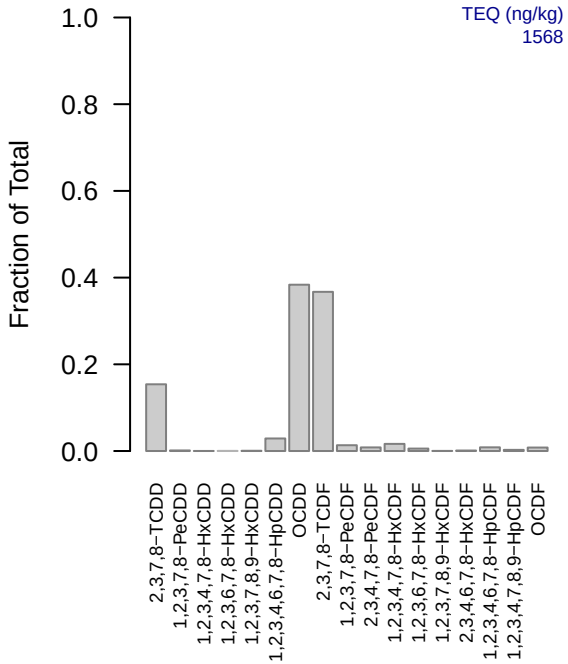

## SJSB021(15.24−30.48 cm)



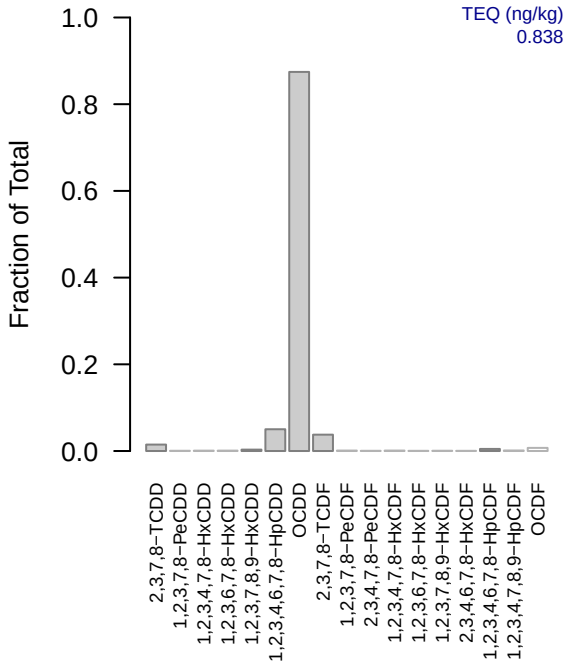

## SJSB021(30.48−60.96 cm)



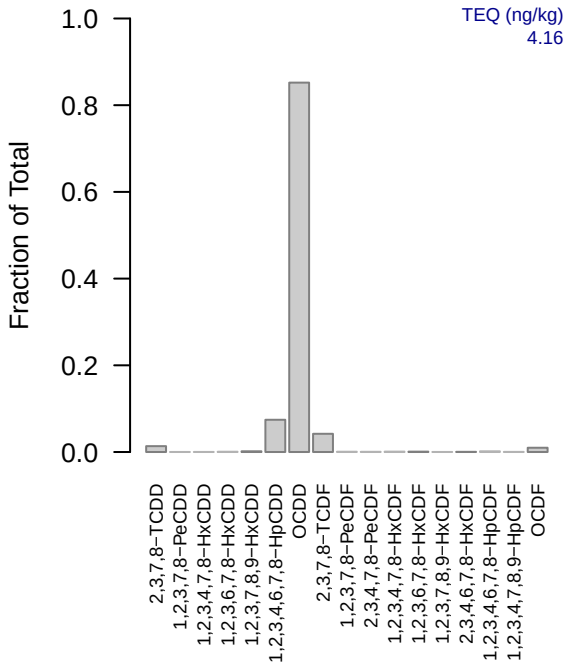
## SJSB022(304.8−365.76 cm)



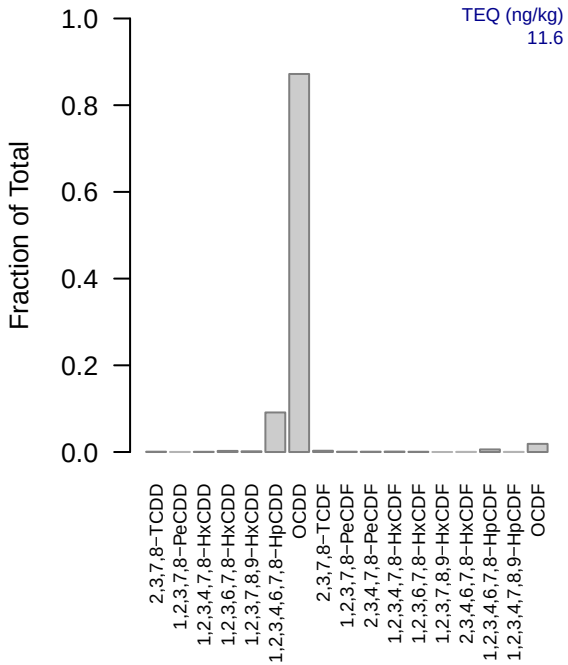

## SJSB022(365.76−426.72 cm)



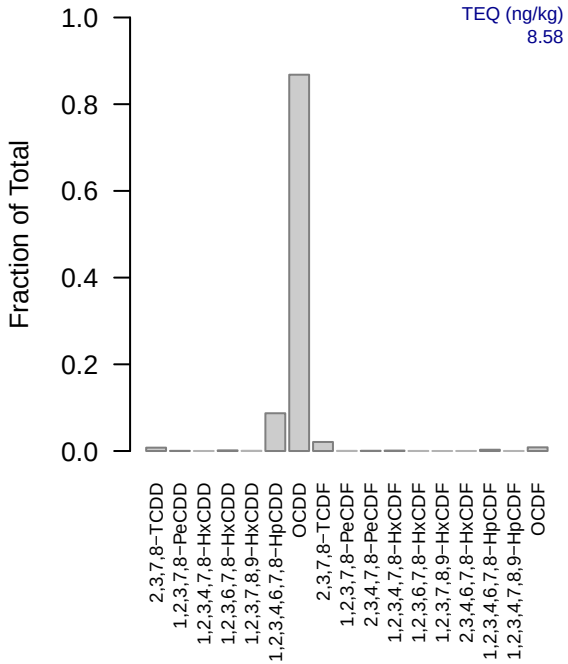

## SJSB022(426.72−487.68 cm)



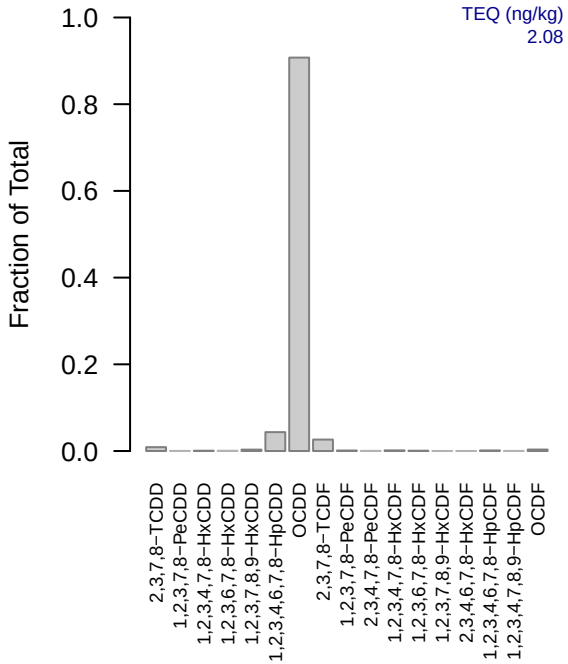

## SJSB022(60.96−121.92 cm)



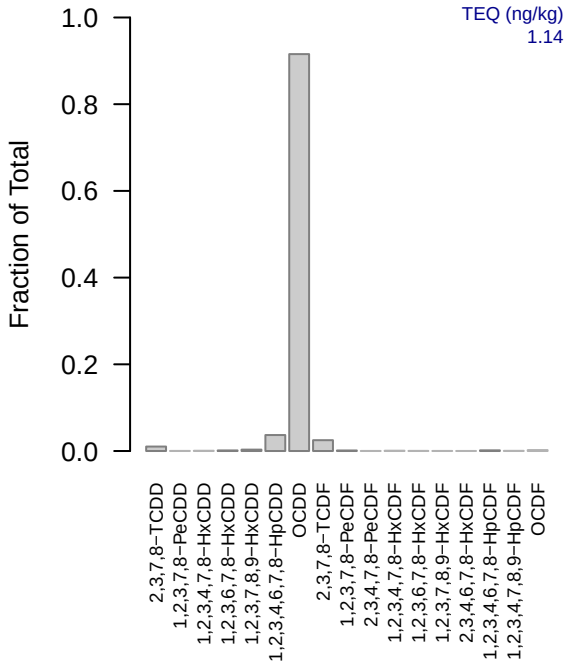
## SJSB022(121.92−182.88 cm)



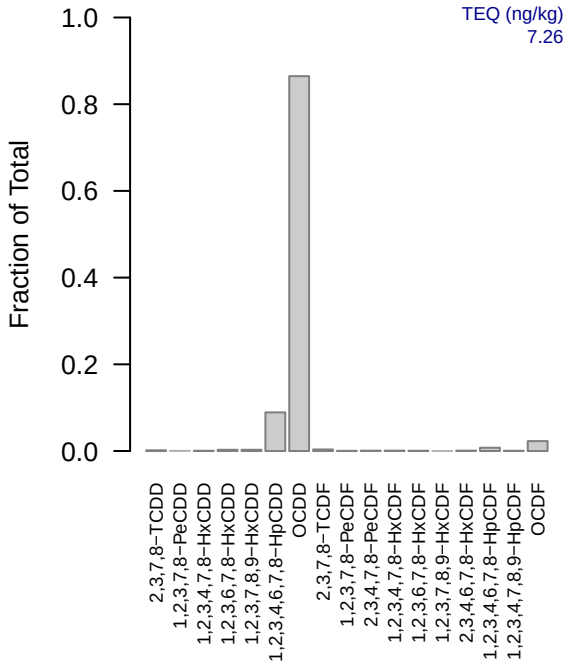

## SJSB022(182.88−243.84 cm)



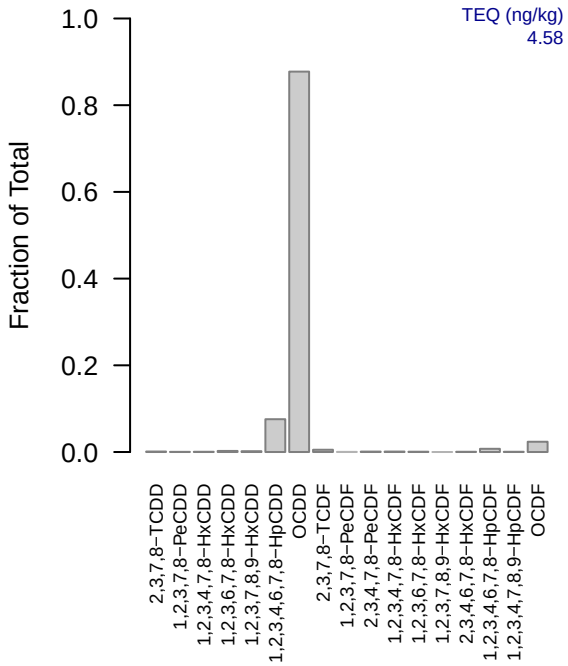

## SJSB022(243.84−304.8 cm)



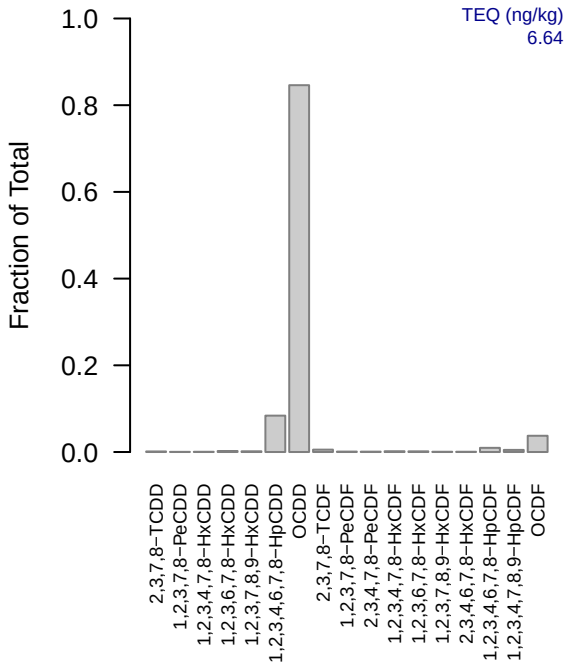

## SJSB022(0−15.24 cm)



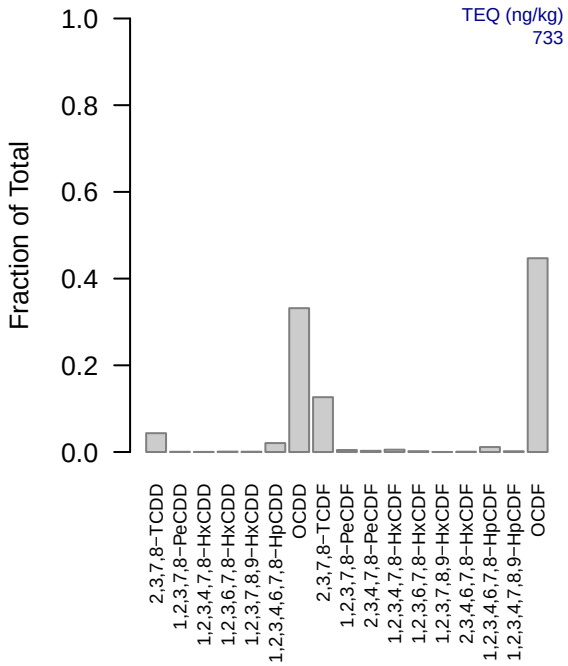
## SJSB022(15.24−30.48 cm)



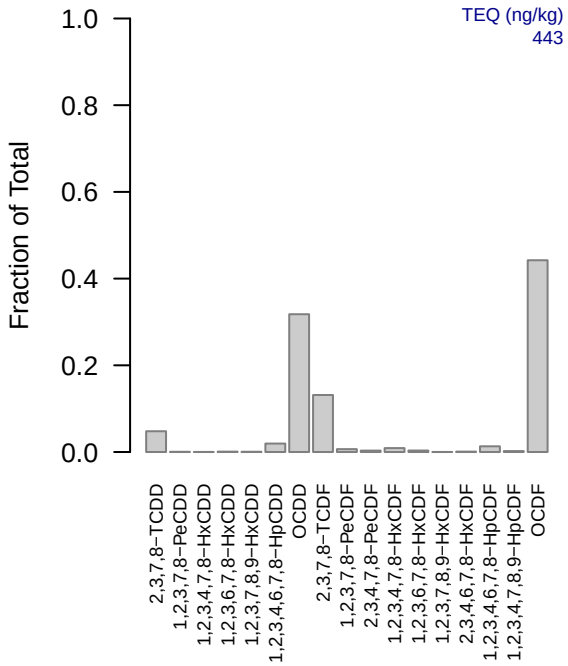

## SJSB022(30.48−60.96 cm)



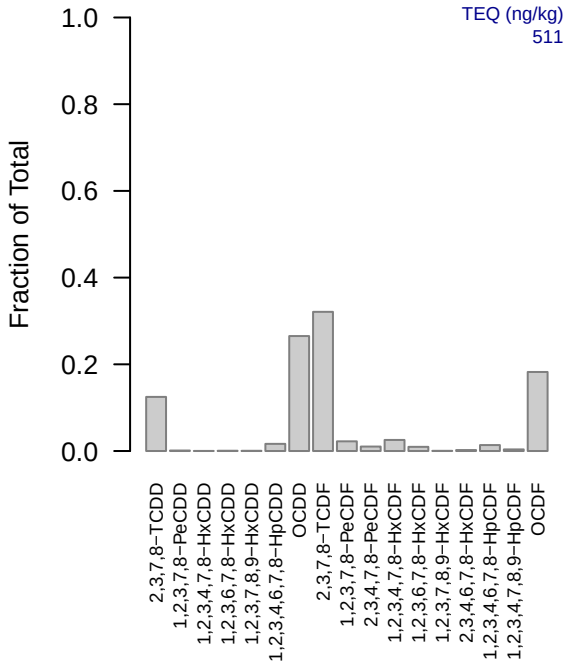

## SJSB023(304.8−365.76 cm)



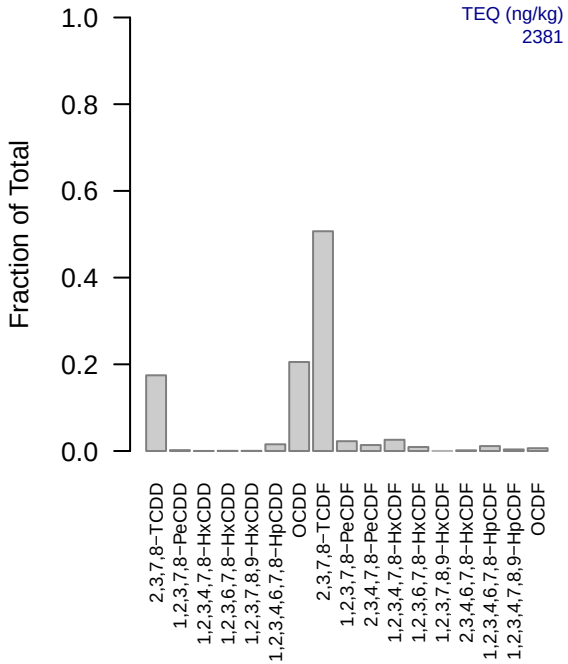

## SJSB023(365.76−426.72 cm)



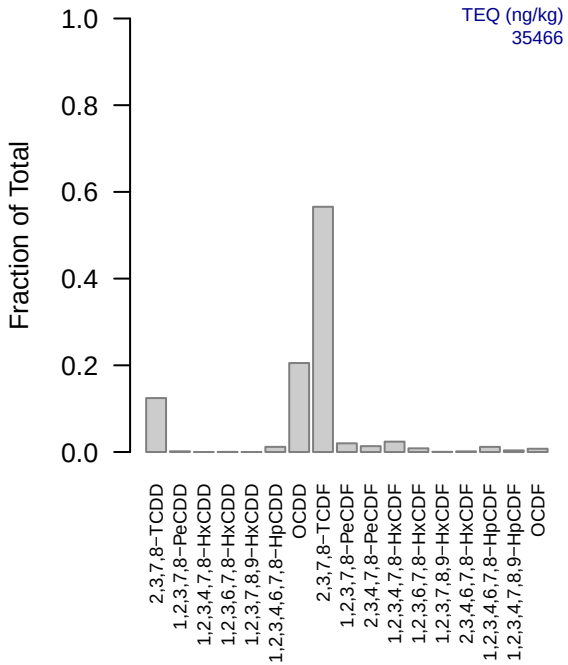
## SJSB023(426.72−487.68 cm)



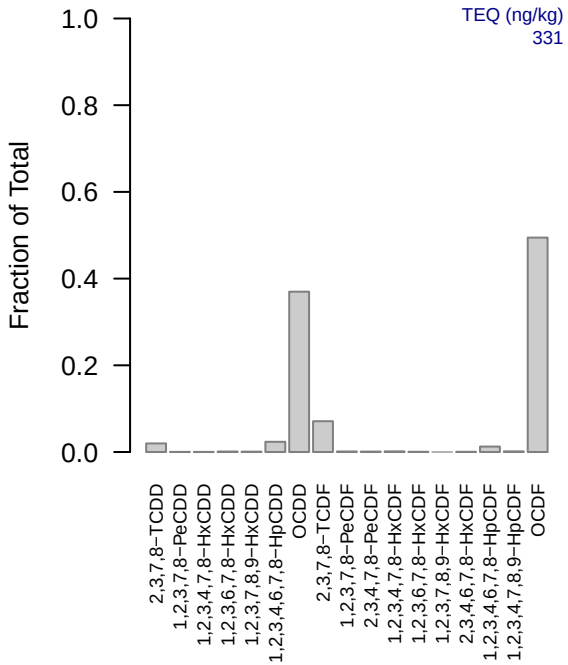

## SJSB023(60.96−121.92 cm)



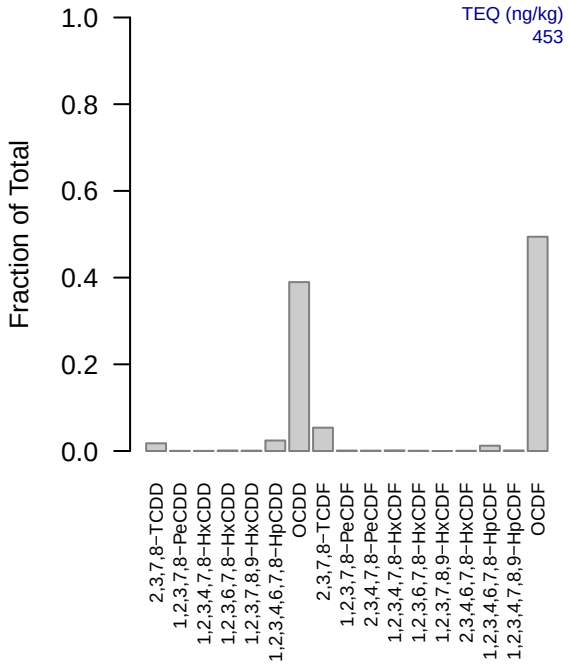

## SJSB023(121.92−182.88 cm)



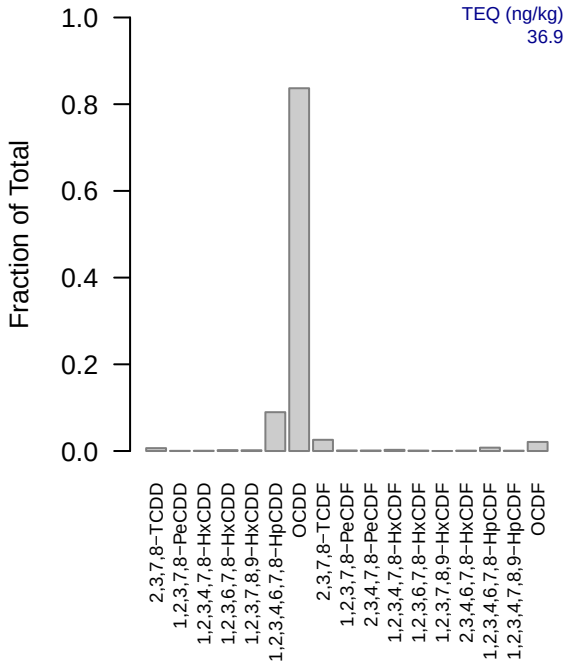

## SJSB023(182.88−243.84 cm)



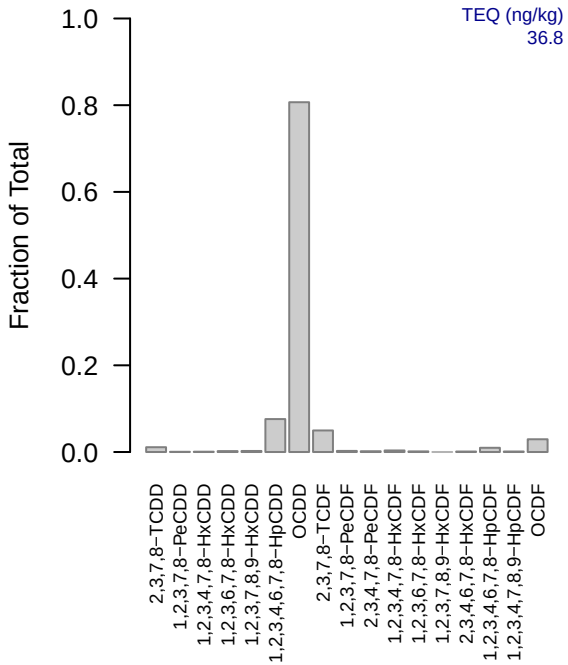
## SJSB023(243.84−304.8 cm)



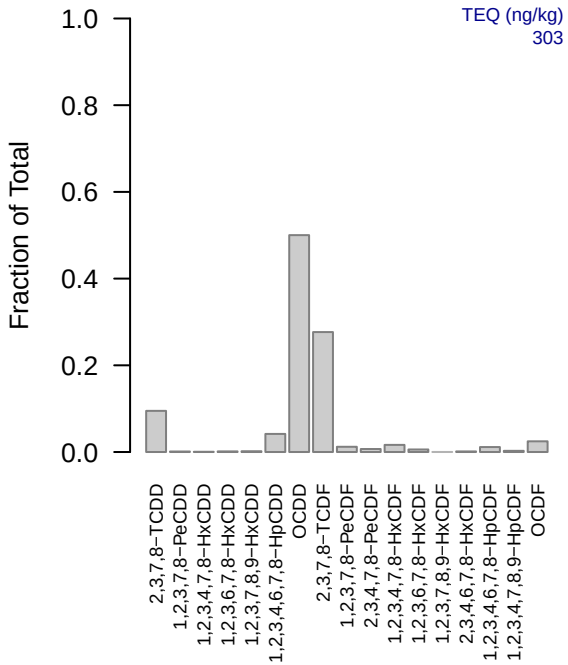

## SJSB023(0−15.24 cm)



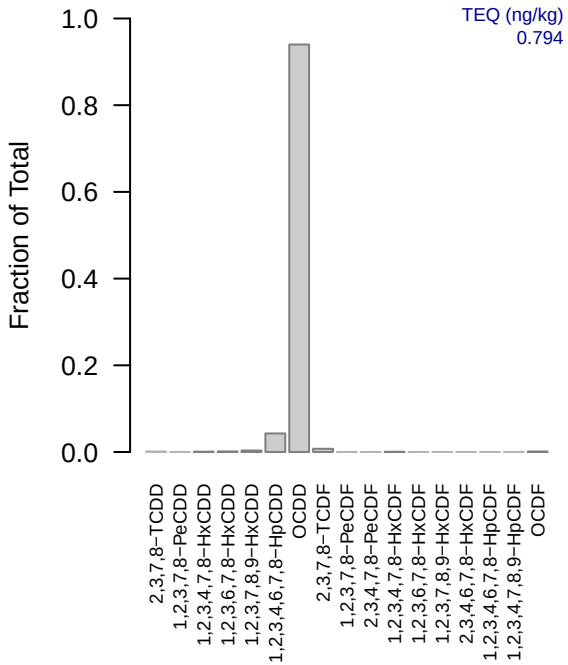

## SJSB023(15.24−30.48 cm)



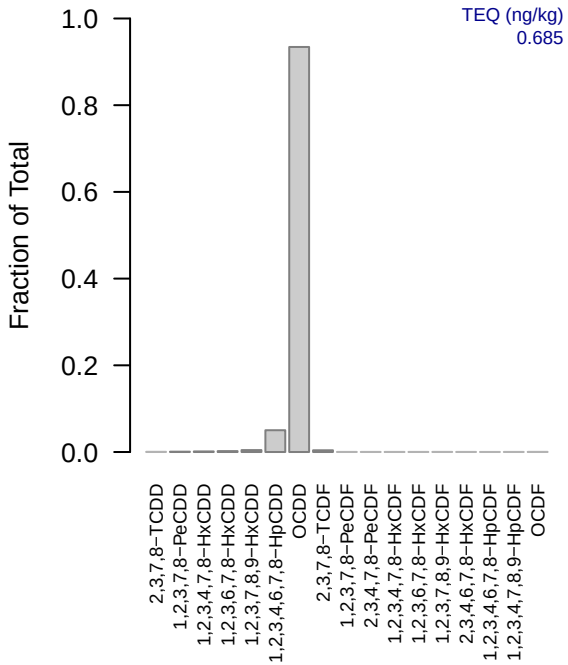

## SJSB023(30.48−60.96 cm)



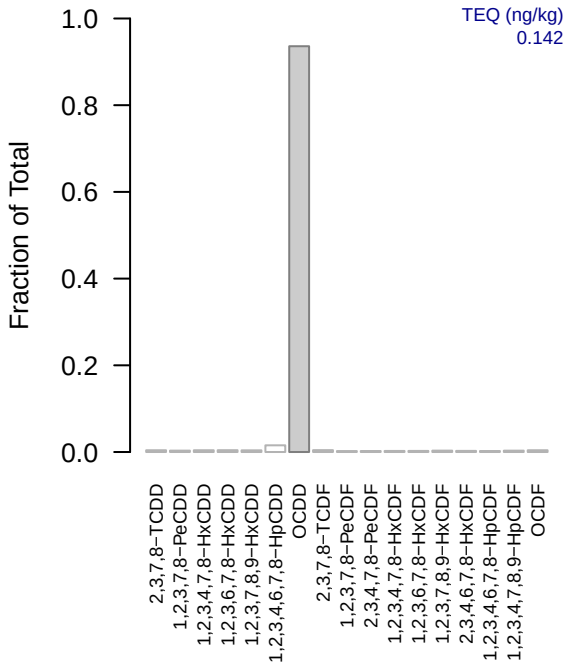
## SJSB024(304.8−365.76 cm)



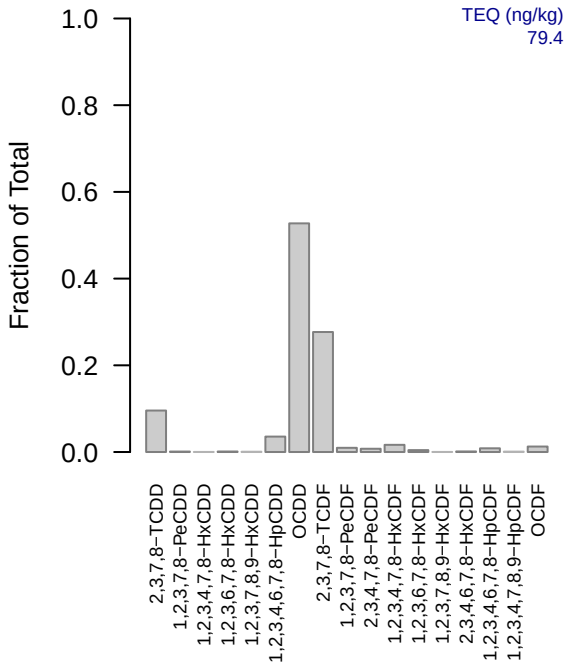

## SJSB024(365.76−426.72 cm)



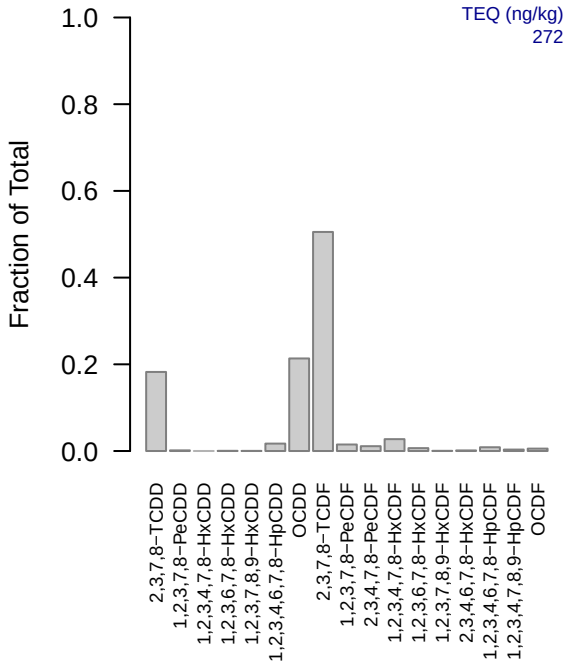

## SJSB024(426.72−487.68 cm)



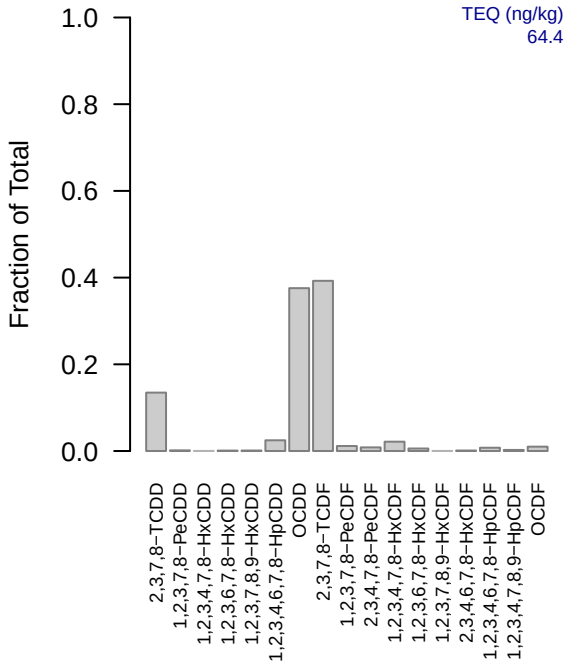

## SJSB024(60.96−121.92 cm)



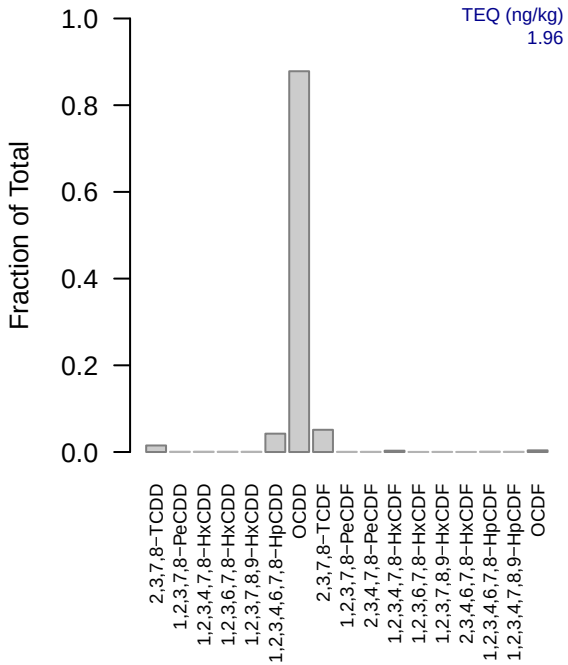
## SJSB024(121.92−182.88 cm)



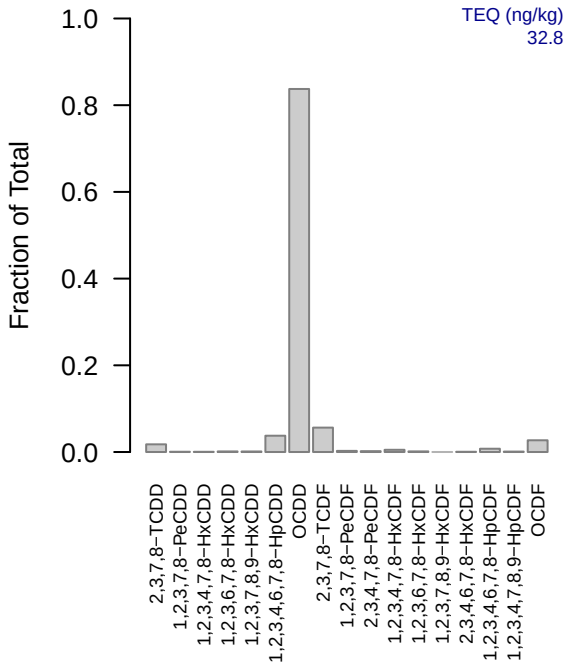

## SJSB024(182.88−243.84 cm)

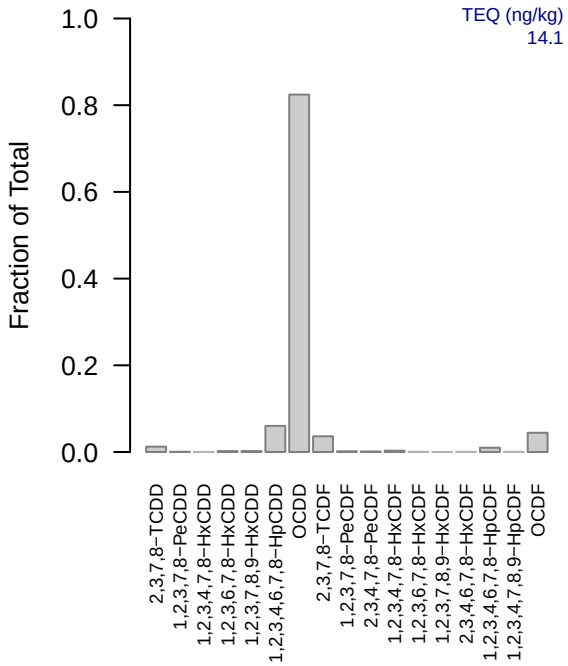


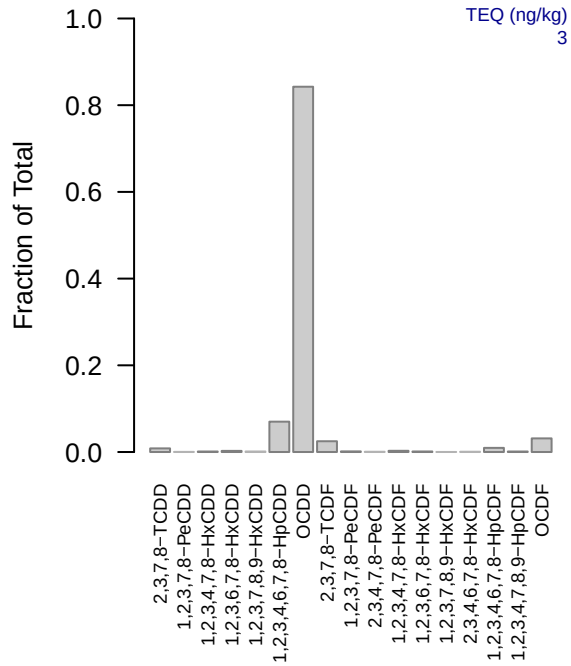

## SJSB024(243.84−304.8 cm)

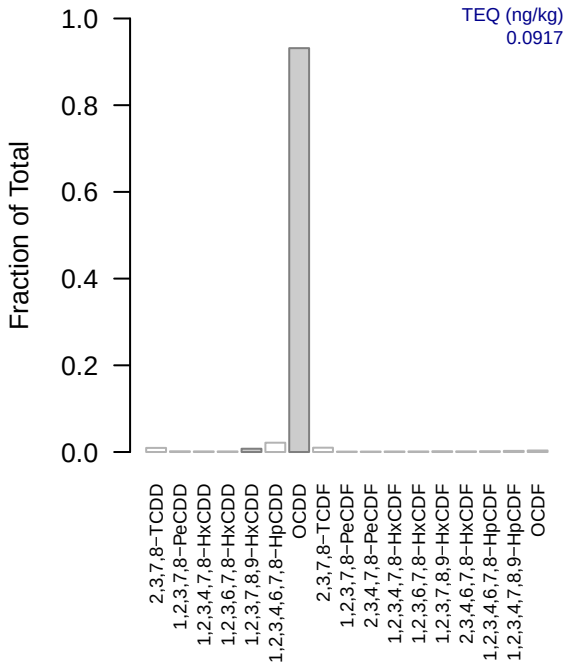


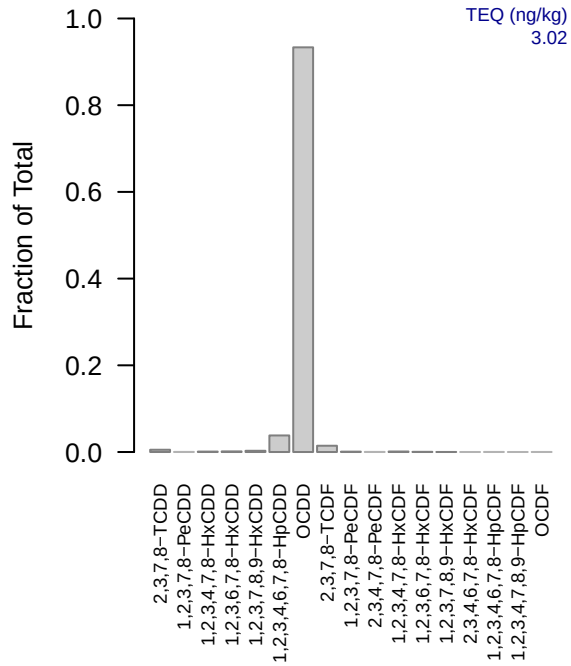

## SJSB024(0−15.24 cm)

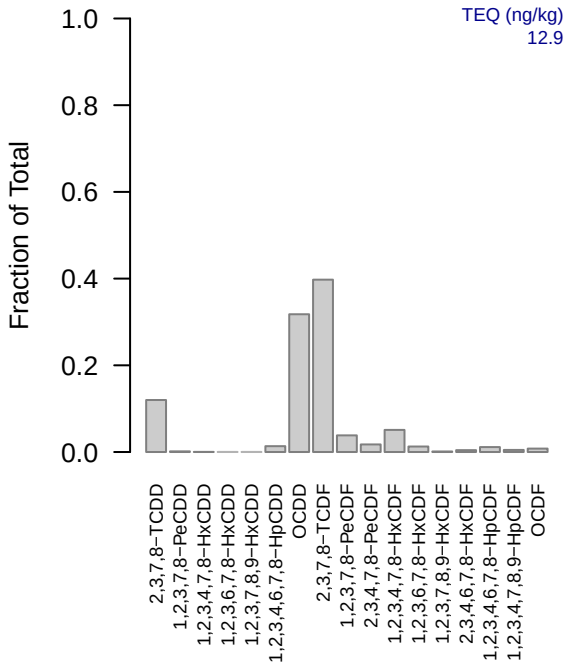


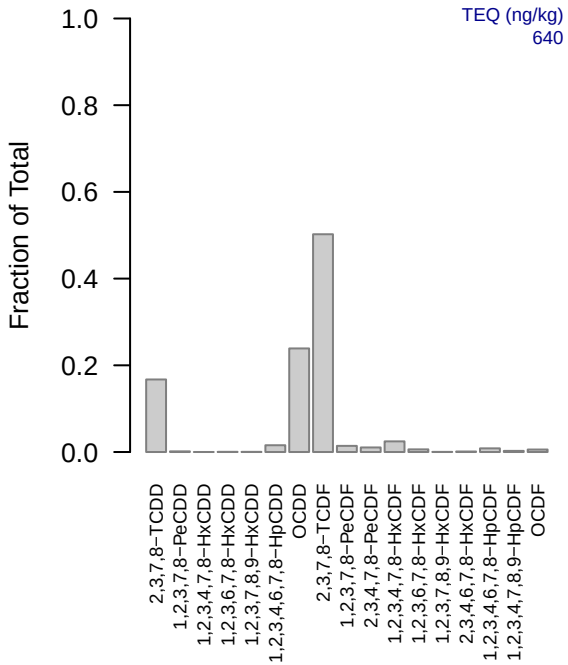

SJSB024(15.24−30.48 cm)
TEQ (ng/kg)
14.1
Fraction of Total
1.0
0.8
0.6
0.4
0.2
0.0
2,3,7,8−TCDD
1,2,3,7,8−PeCDD
1,2,3,4,7,8−HxCDD
1,2,3,6,7,8−HxCDD
1,2,3,7,8,9−HxCDD
1,2,3,4,6,7,8−HpCDD
OCDD
2,3,7,8−TCDF
1,2,3,7,8−PeCDF
2,3,4,7,8−PeCDF
1,2,3,4,7,8−HxCDF
1,2,3,6,7,8−HxCDF
1,2,3,7,8,9−HxCDF
2,3,4,6,7,8−HxCDF
1,2,3,4,6,7,8−HpCDF
1,2,3,4,7,8,9−HpCDF
OCDF

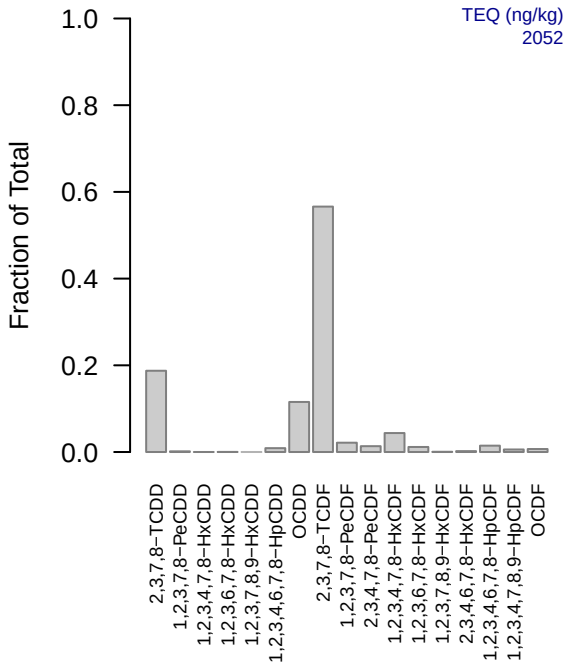

SJSB024(30.48−60.96 cm)
TEQ (ng/kg)
3
Fraction of Total
1.0
0.8
0.6
0.4
0.2
0.0
2,3,7,8−TCDD
1,2,3,7,8−PeCDD
1,2,3,4,7,8−HxCDD
1,2,3,6,7,8−HxCDD
1,2,3,7,8,9−HxCDD
1,2,3,4,6,7,8−HpCDD
OCDD
2,3,7,8−TCDF
1,2,3,7,8−PeCDF
2,3,4,7,8−PeCDF
1,2,3,4,7,8−HxCDF
1,2,3,6,7,8−HxCDF
1,2,3,7,8,9−HxCDF
2,3,4,6,7,8−HxCDF
1,2,3,4,6,7,8−HpCDF
1,2,3,4,7,8,9−HpCDF
OCDF

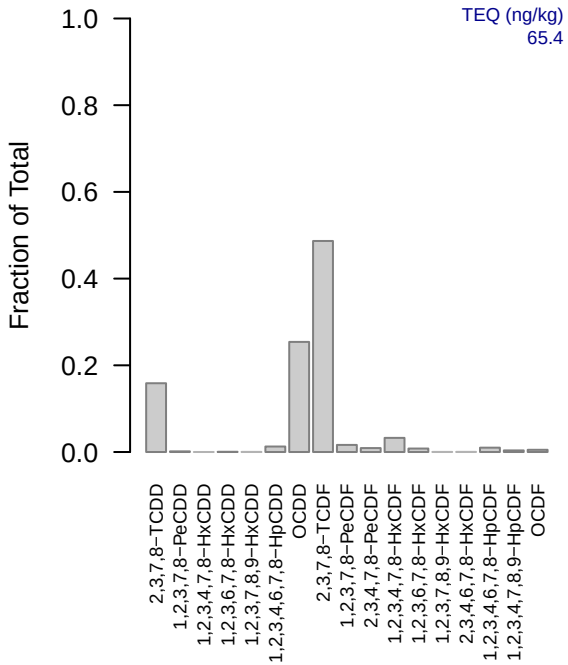

SJSB025(304.8−365.76 cm)
TEQ (ng/kg)
0.0917
Fraction of Total
1.0
0.8
0.6
0.4
0.2
0.0
2,3,7,8−TCDD
1,2,3,7,8−PeCDD
1,2,3,4,7,8−HxCDD
1,2,3,6,7,8−HxCDD
1,2,3,7,8,9−HxCDD
1,2,3,4,6,7,8−HpCDD
OCDD
2,3,7,8−TCDF
1,2,3,7,8−PeCDF
2,3,4,7,8−PeCDF
1,2,3,4,7,8−HxCDF
1,2,3,6,7,8−HxCDF
1,2,3,7,8,9−HxCDF
2,3,4,6,7,8−HxCDF
1,2,3,4,6,7,8−HpCDF
1,2,3,4,7,8,9−HpCDF
OCDF


SJSB025(365.76−426.72 cm)
TEQ (ng/kg)
3.02
Fraction of Total
1.0
0.8
0.6
0.4
0.2
0.0
2,3,7,8−TCDD
1,2,3,7,8−PeCDD
1,2,3,4,7,8−HxCDD
1,2,3,6,7,8−HxCDD
1,2,3,7,8,9−HxCDD
1,2,3,4,6,7,8−HpCDD
OCDD
2,3,7,8−TCDF
1,2,3,7,8−PeCDF
2,3,4,7,8−PeCDF
1,2,3,4,7,8−HxCDF
1,2,3,6,7,8−HxCDF
1,2,3,7,8,9−HxCDF
2,3,4,6,7,8−HxCDF
1,2,3,4,6,7,8−HpCDF
1,2,3,4,7,8,9−HpCDF
OCDF

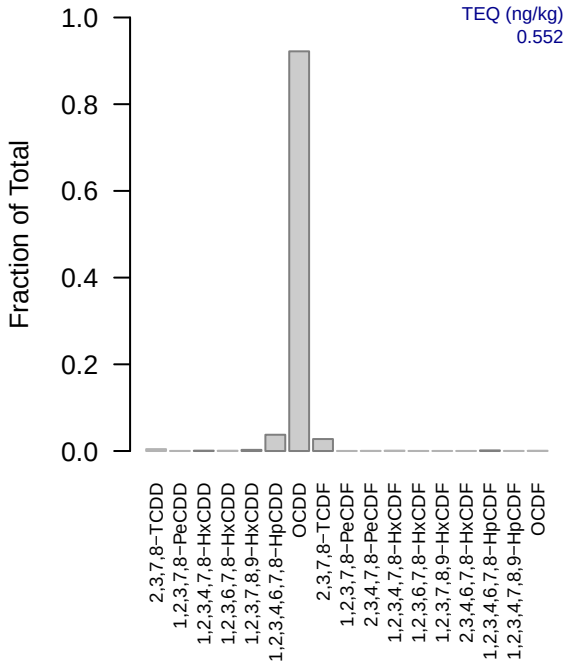

SJSB025(426.72−487.68 cm)
TEQ (ng/kg)
12.9
Fraction of Total
1.0
0.8
0.6
0.4
0.2
0.0
2,3,7,8−TCDD
1,2,3,7,8−PeCDD
1,2,3,4,7,8−HxCDD
1,2,3,6,7,8−HxCDD
1,2,3,7,8,9−HxCDD
1,2,3,4,6,7,8−HpCDD
OCDD
2,3,7,8−TCDF
1,2,3,7,8−PeCDF
2,3,4,7,8−PeCDF
1,2,3,4,7,8−HxCDF
1,2,3,6,7,8−HxCDF
1,2,3,7,8,9−HxCDF
2,3,4,6,7,8−HxCDF
1,2,3,4,6,7,8−HpCDF
1,2,3,4,7,8,9−HpCDF
OCDF


SJSB025(60.96−121.92 cm)
TEQ (ng/kg)
640
Fraction of Total
1.0
0.8
0.6
0.4
0.2
0.0
2,3,7,8−TCDD
1,2,3,7,8−PeCDD
1,2,3,4,7,8−HxCDD
1,2,3,6,7,8−HxCDD
1,2,3,7,8,9−HxCDD
1,2,3,4,6,7,8−HpCDD
OCDD
2,3,7,8−TCDF
1,2,3,7,8−PeCDF
2,3,4,7,8−PeCDF
1,2,3,4,7,8−HxCDF
1,2,3,6,7,8−HxCDF
1,2,3,7,8,9−HxCDF
2,3,4,6,7,8−HxCDF
1,2,3,4,6,7,8−HpCDF
1,2,3,4,7,8,9−HpCDF
OCDF

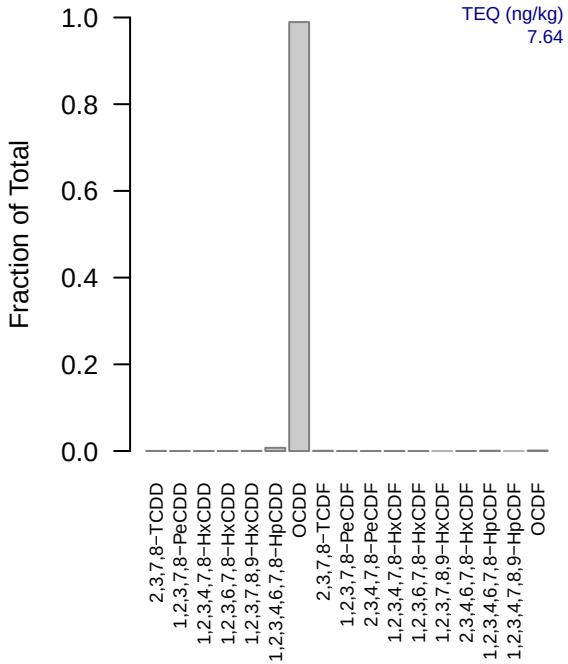

SJSB025(121.92−182.88 cm)
TEQ (ng/kg)
2052
Fraction of Total
1.0
0.8
0.6
0.4
0.2
0.0
2,3,7,8−TCDD
1,2,3,7,8−PeCDD
1,2,3,4,7,8−HxCDD
1,2,3,6,7,8−HxCDD
1,2,3,7,8,9−HxCDD
1,2,3,4,6,7,8−HpCDD
OCDD
2,3,7,8−TCDF
1,2,3,7,8−PeCDF
2,3,4,7,8−PeCDF
1,2,3,4,7,8−HxCDF
1,2,3,6,7,8−HxCDF
1,2,3,7,8,9−HxCDF
2,3,4,6,7,8−HxCDF
1,2,3,4,6,7,8−HpCDF
1,2,3,4,7,8,9−HpCDF
OCDF


SJSB025(182.88−243.84 cm)
TEQ (ng/kg)
65.4
Fraction of Total
1.0
0.8
0.6
0.4
0.2
0.0
2,3,7,8−TCDD
1,2,3,7,8−PeCDD
1,2,3,4,7,8−HxCDD
1,2,3,6,7,8−HxCDD
1,2,3,7,8,9−HxCDD
1,2,3,4,6,7,8−HpCDD
OCDD
2,3,7,8−TCDF
1,2,3,7,8−PeCDF
2,3,4,7,8−PeCDF
1,2,3,4,7,8−HxCDF
1,2,3,6,7,8−HxCDF
1,2,3,7,8,9−HxCDF
2,3,4,6,7,8−HxCDF
1,2,3,4,6,7,8−HpCDF
1,2,3,4,7,8,9−HpCDF
OCDF

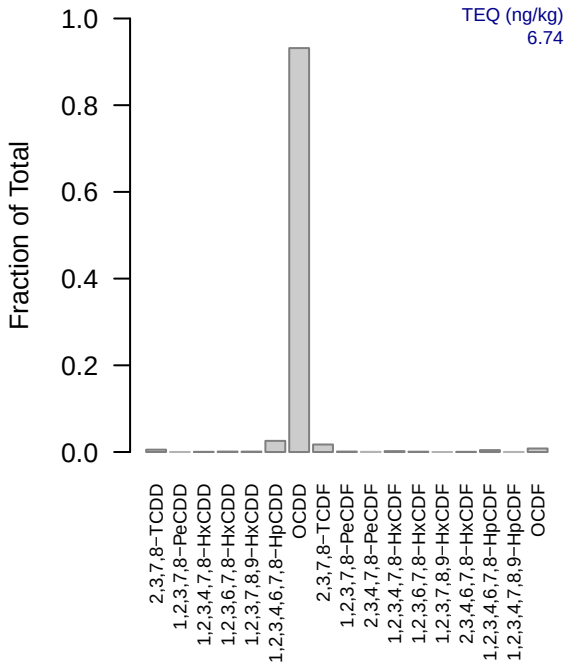
## SJSB025(243.84−304.8 cm)



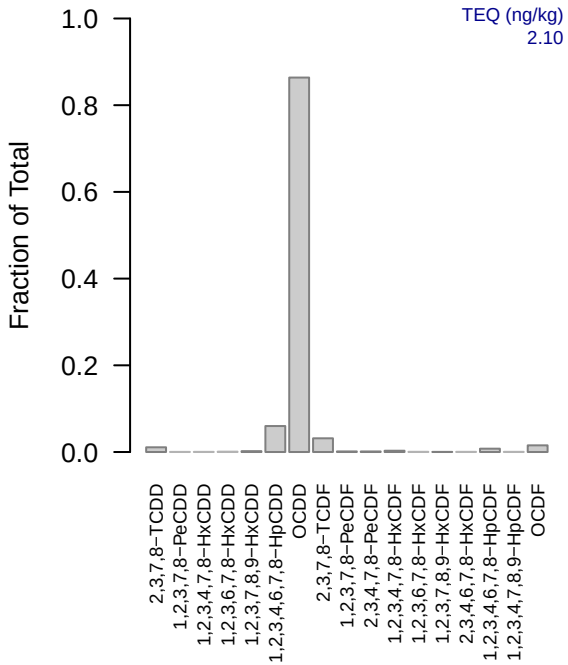

## SJSB025(0−15.24 cm)



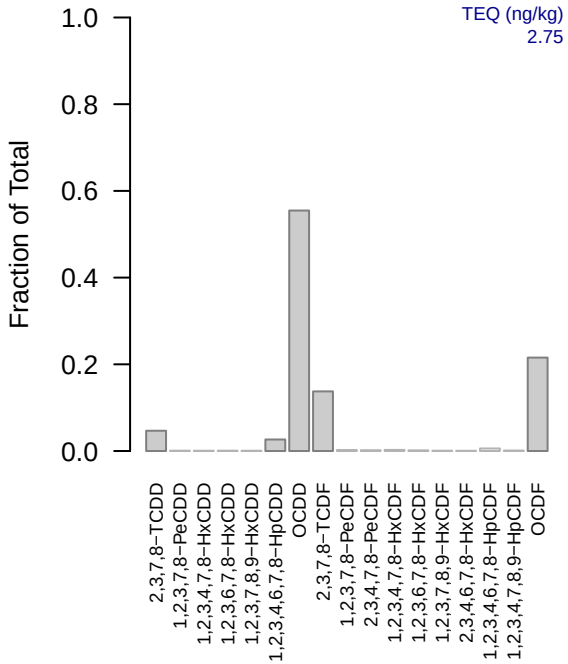

## SJSB025(15.24−30.48 cm)



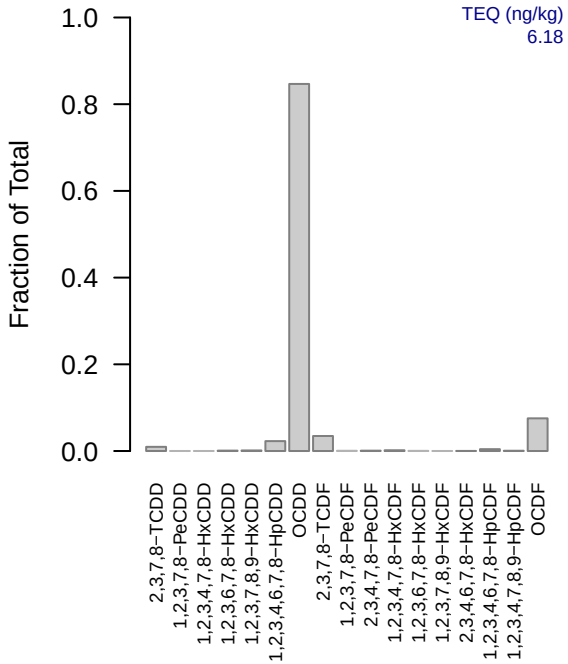

## SJSB025(30.48−60.96 cm)



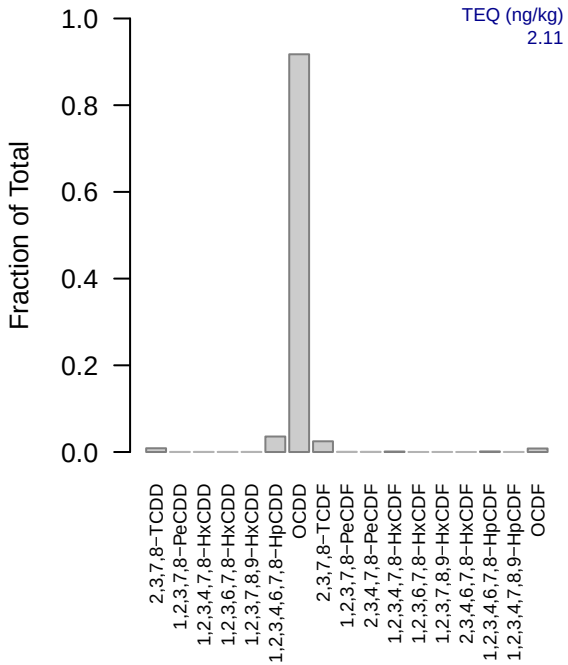
## SJSB026(304.8−365.76 cm)



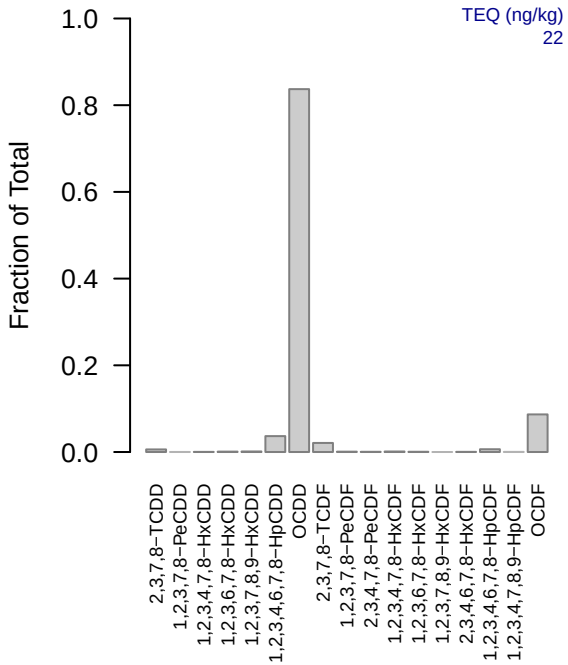

## SJSB026(365.76−426.72 cm)



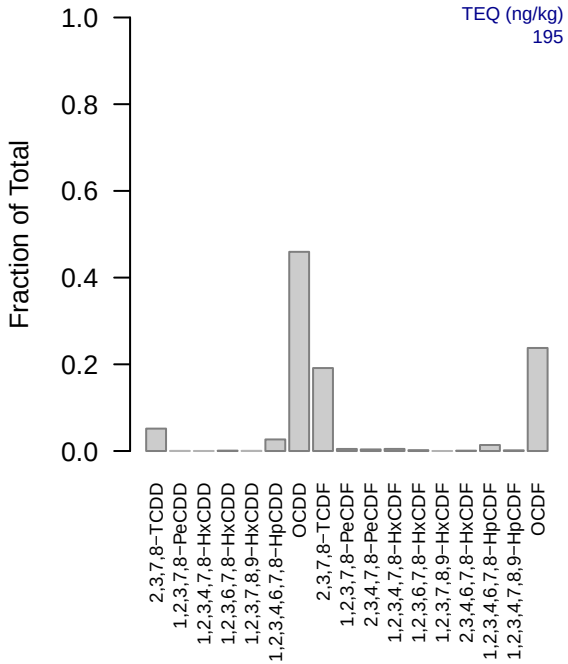

## SJSB026(426.72−487.68 cm)



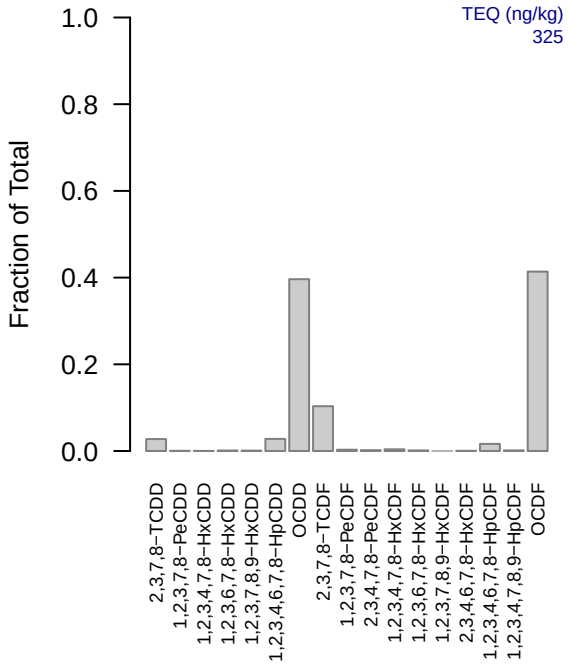

## SJSB026(60.96−121.92 cm)



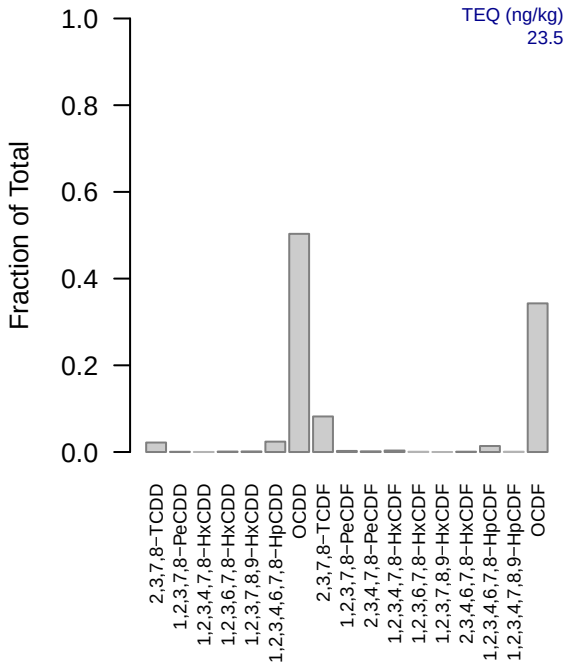
## SJSB026(121.92−182.88 cm)



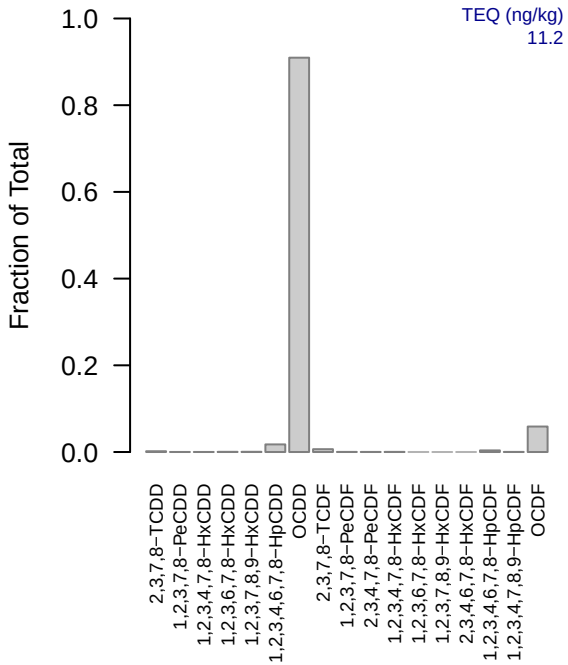

## SJSB026(182.88−243.84 cm)



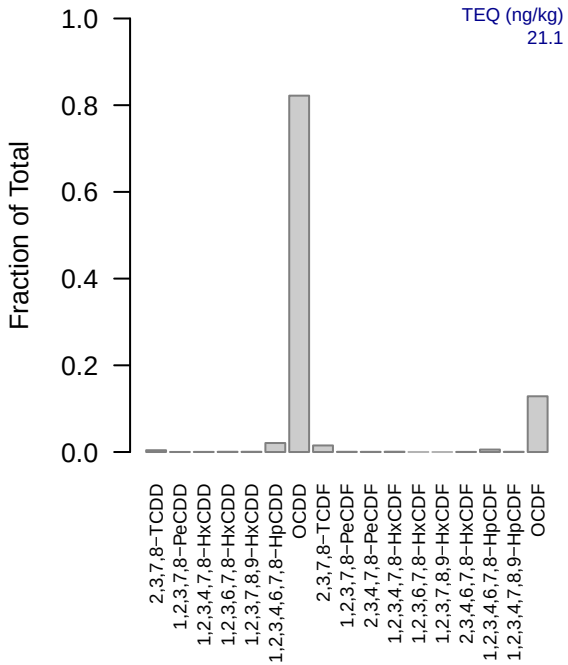

## SJSB026(243.84−304.8 cm)



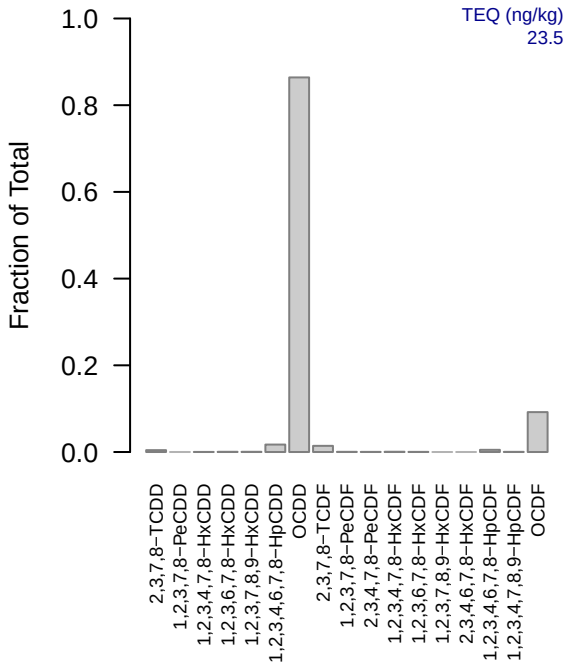

## SJSB026(0−15.24 cm)



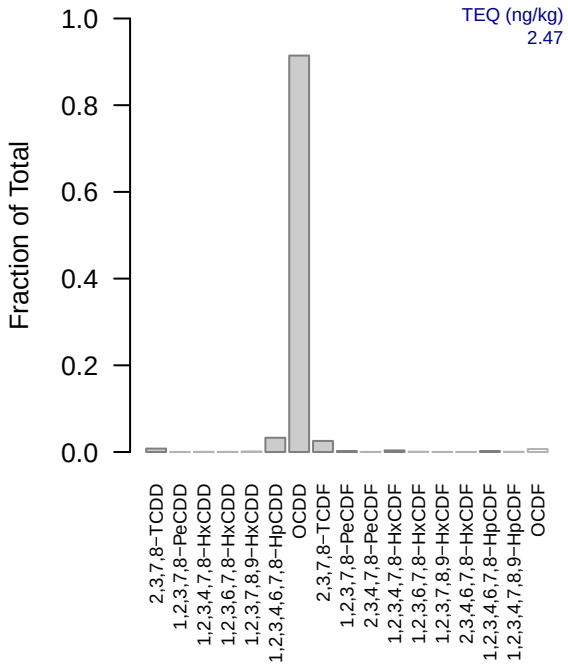
## SJSB026(15.24−30.48 cm)



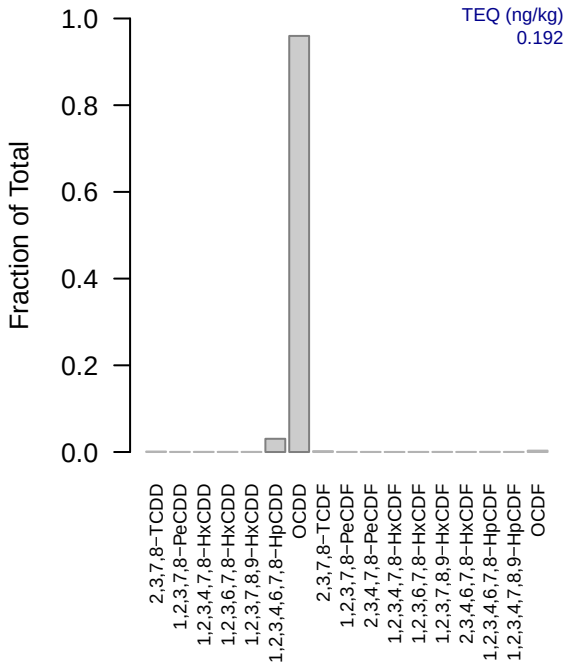

## SJSB026(30.48−60.96 cm)



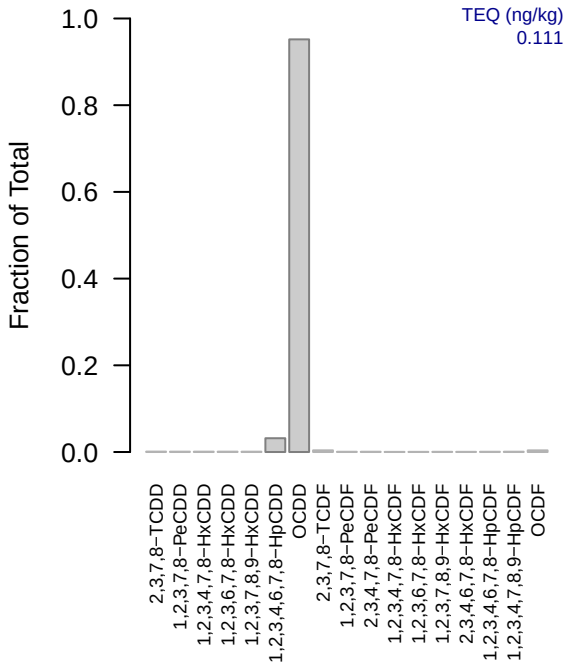

## SJSB027(304.8−365.76 cm)



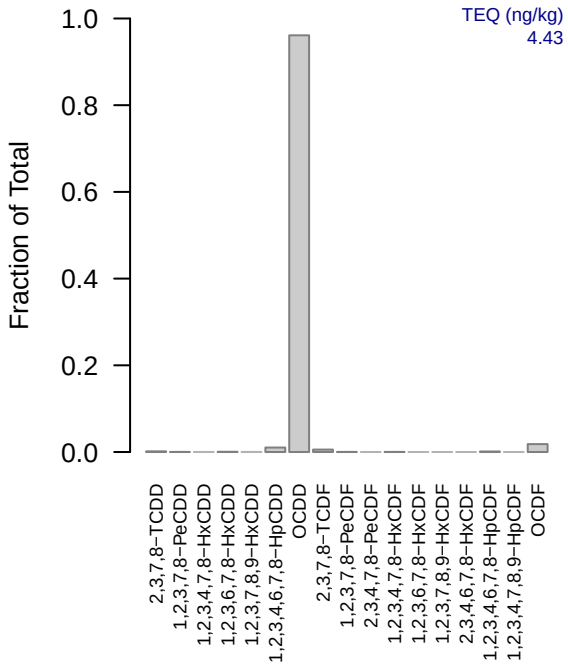

## SJSB027(365.76−426.72 cm)



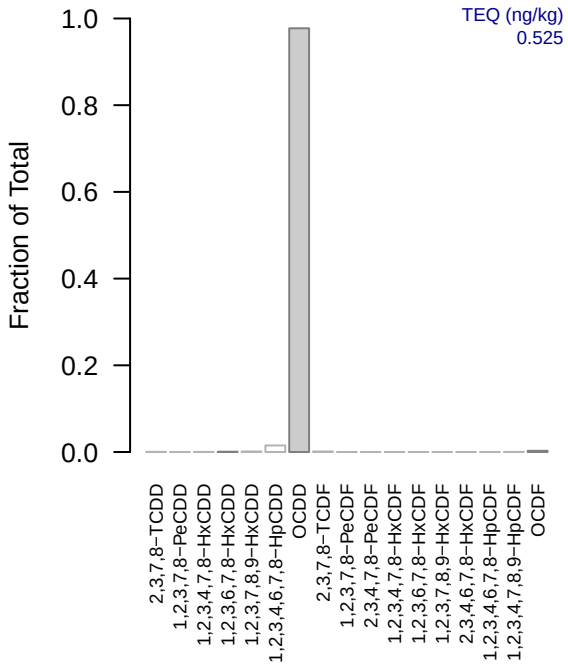
## SJSB027(426.72−487.68 cm)



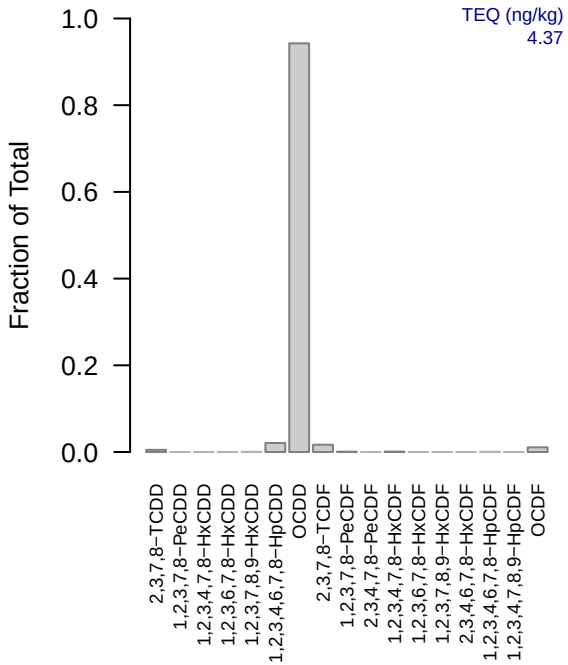

## SJSB027(60.96−121.92 cm)



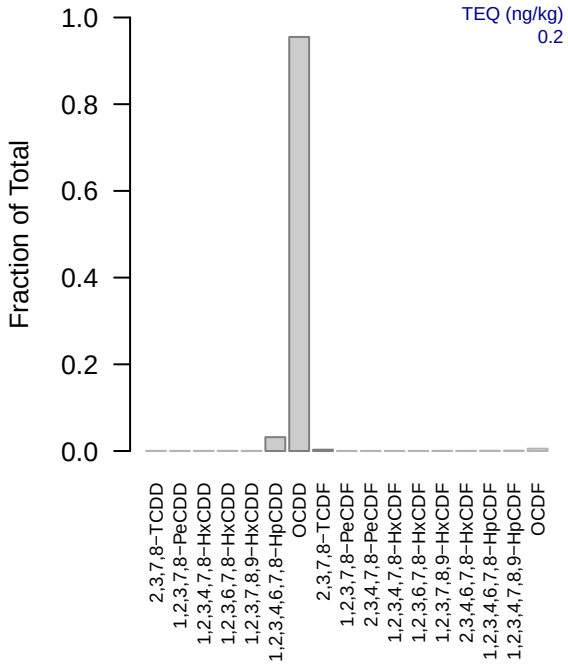

## SJSB027(121.92−182.88 cm)



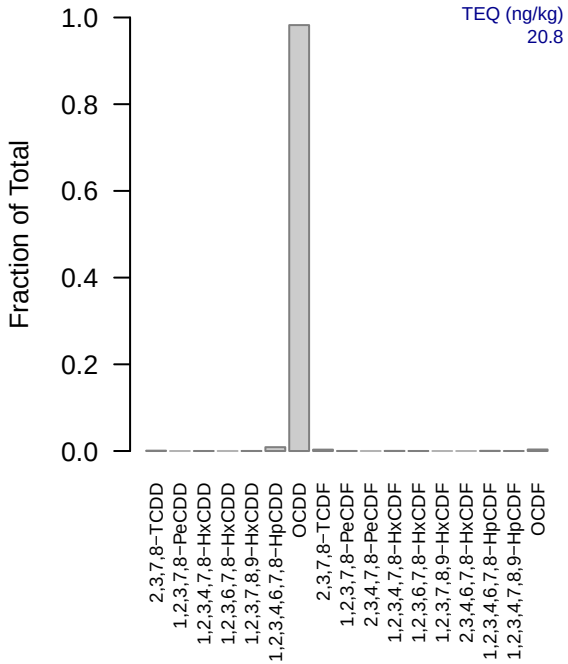

## SJSB027(182.88−243.84 cm)



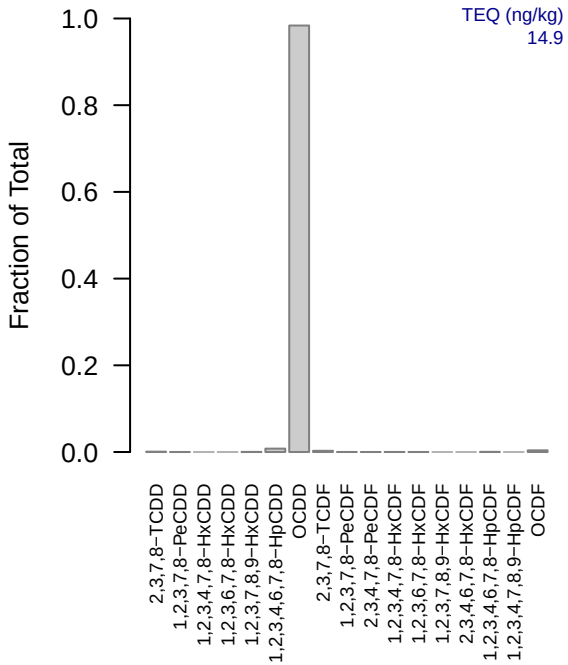
## SJSB027(243.84−304.8 cm)

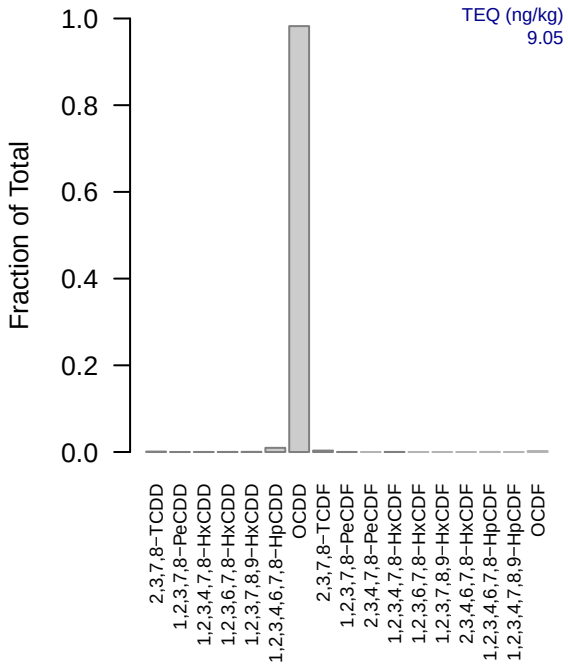



## SJSB027(0−15.24 cm)




## SJSB027(15.24−30.48 cm)




## SJSB027(30.48−60.96 cm)