PORTLAND HARBOR RI/FS

# ROUND 3A JANUARY 2006 HIGH-FLOW SURFACE WATER DATA REPORT

DRAFT

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October 20, 2006

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IC06-0026

# TABLE OF CONTENTS

TABLE OF CONTENTS ..... i
LIST OF FIGURES ..... ii
LIST OF TABLES ..... ii
LIST OF ACRONYMS ..... iii
1.0 INTRODUCTION ..... 1
1.1 Round 3A Sampling Objectives ..... 2
1.2 Report Organization ..... 3
2.0 DATA COLLECTION ACTIVITIES ..... 4
2.1 Surface Water Sample Collection ..... 4
2.1.1 Surface Water Collection with Peristaltic Pump ..... 4
2.1.2 High-Volume Surface Water Sampling with XAD-2 Columns ..... 5
3.0 SAMPLE ANALYSES AND DATA MANAGEMENT ..... 6
3.1 Surface Water Sample Collection and Deviations ..... 6
3.2 Chemical Analyses and Deviations ..... 6
3.2.1 Peristaltic Pump Samples ..... 7
3.2.2 Infiltrex Pump Samples ..... 7
3.2.3 Laboratory Deviations from the Round 2 FSPs and QAPP ..... 7
3.3 Data Validation ..... 7
3.4 Data Quality and Usability ..... 9
3.4.1 Field Quality Control Samples ..... 9
3.4.2 Summary of Qualified Data ..... 10
3.5 Data Management ..... 10
4.0 ROUND 3A RESULTS ..... 12
4.1 Summary of Peristaltic Pump Results ..... 12
4.2 Summary of XAD Results ..... 12
5.0 REFERENCES ..... 13

Appendix A. Data Quality Summary
Appendix B. Data Validation Reports (on CD)
Appendix C. SCRA Database, Excel Flat File Format (on CD)

# LIST OF FIGURES

Figure 2-1. Surface Water Sampling Locations for Round 3A January 2006 High-Flow Surface Water Sampling Event

# LIST OF TABLES

Table 2-1. Surface Water Sampling Stations and Sampling Methods for January 2006 High-Flow Event

Table 2-2. Summary of Surface Water Stations and Sample Sets Collected for January 2006 High-Flow Event

Table 2-3. Surface Water Samples Collected, Dates Sampled, and Analyses Conducted for January 2006 High-Flow Event

Table 2-4. Surface Water Sampling Field QC Samples for January 2006 High-Flow Event

Table 2-5. Precipitation, River Flow, Stream Velocity, and Gage Height for January 2006 High-Flow Event

Table 2-6. Surface Water Sampling Data from Stationary Locations Using the Infiltrex 300 System for January 2006 High-Flow Event

Table 3-1. Data Validation Qualifiers and Definitions

Table 3-2. Percent Completeness by Parameter Group

Table 4-1. Surface Water Sampling Stations, Dates Sampled, Positional Data, and Conventional Water Quality Data for January 2006 High-Flow Event

Table 4-2. January 2006 Surface Water Data Results – Peristaltic Sample Collection

Table 4-3. January 2006 Surface Water Data Results – XAD Sample Collection

# LIST OF ACRONYMS

| | |
|---|---|
| Axys | Axys Analytical Services, Ltd. |
| CAS | Columbia Analytical Services |
| cfs | cubic feet per second |
| DOC | dissolved organic carbon |
| EDD | electronic data deliverable |
| EPA | U.S. Environmental Protection Agency |
| EQuIS | Environmental Quality Information System |
| ERA | ecological risk assessment |
| FSP | field sampling plan |
| FSR | field sampling report |
| HHRA | human health risk assessment |
| ICP | inductively coupled plasma |
| ISA | initial study area |
| LWG | Lower Willamette Group |
| NOAA | National Oceanic and Atmospheric Administration |
| PAHs | polycyclic aromatic hydrocarbons |
| PARCC | precision, accuracy, representativeness, completeness, and comparability |
| PCBs | polychlorinated biphenyls |
| PCDD/F | polychlorinated dibenzo-p-dioxin/furan |
| QA | quality assurance |
| QAPP | quality assurance project plan |
| QC | quality control |
| RI/FS | remedial investigation and feasibility study |
| RM | river mile |
| SCRA | Site Characterization and Risk Assessment |
| SDG | sample delivery group |
| SIM | selected ion monitoring |
| SOP | standard operating procedure |
| SVOC | semivolatile organic compounds |
| TDS | total dissolved solids |
| TOC | total organic carbon |
| TSS | total suspended solids |

# 1.0 INTRODUCTION

The remedial investigation and feasibility study (RI/FS) of the Portland Harbor Superfund Site in Portland, Oregon, includes several rounds of field sampling activities to investigate the nature and extent of contamination in the in-water portion of the Site, to assess potential risk to human health and the environment, and to develop cleanup alternatives.

The Round 2A surface water investigation consisted of three sampling events in November 2004, March 2005, and July 2005, and focused on data collection in the initial study area (ISA) of the lower Willamette River and areas immediately upstream and downstream of the ISA. The Round 2A investigation included surface water data collection to characterize the nature and extent of contamination, to assess water quality adjacent to amphibian habitats to support the ecological risk assessment (ERA), to assess water quality in swimming areas to support the human health risk assessment (HHRA), and to collect chemistry and conventional water quality data to support the FS. A fourth surface water sampling event was conducted for a high-flow event in January 2006. This high-flow event, described in the Addendum to the Round 2A Surface Water Field Sampling Plan (FSP; Integral 2006a), is the first Round 3A surface water sampling event. Three additional Round 3A surface water events are described in the Round 3A Surface Water Field Sampling Plan ( Integral 2006e) and its addendum ( Integral 2006b): a summer low flow event, a stormwater event, and a high flow event. The purpose of this sampling event, conducted at the request of U.S. Environmental Protection Agency (EPA), was to collect surface water samples during the January 2006 high-flow event on the lower Willamette River. The January 2006 high-flow event included sampling of two Round 2A locations (Stations W023 and W005) and one new location upstream of the Site (Station W024 at river mile [RM] 16) (Integral 2006d).

Summaries of the three Round 2A surface water sample collection events are included in the field sampling reports (FSRs; Integral 2005a,c, d). The Round 2A November 2004 and March 2005 Surface Water Data Report (Integral 2005b) summarized the results from the first two sample collection events for the Round 2A surface water program. A site characterization report for all three Round 2A surface water sampling events was submitted to EPA in April 2006 (Integral 2006c). A summary of the January 2006 surface water sample collection event is described in the Round 3 January High-Flow Surface Water FSR (Integral 2006d)

Except where noted, all surface water field activities, including navigational positioning, sample collection, sample handling and processing, and data management, followed guidelines specified in the Round 2A Field Sampling Plan: Surface Water Sampling (Integral 2004c), hereafter referred to as the Surface Water FSP; the Addendum to Round 2A Field Sampling Plan Surface Water Sampling (Integral 2006a), the Round 2 Quality Assurance Project Plan (QAPP; Integral and

Windward 2004); the Round 2 QAPP Addendum 1 (Integral 2004b); and the Round 2 Health and Safety Plan (Integral 2004a).

## 1.1 ROUND 3A SAMPLING OBJECTIVES

The primary objectives of the Round 3A surface water sampling effort are to:

- Assess water quality conditions in the ISA and adjacent areas under various flow conditions
- Collect data to support the FS evaluation of remedial alternatives, including monitored natural recovery, potential recontamination of sediment surface from surface water, and background conditions
- Continue to evaluate nature and extent of chemicals in surface water
- Refine the conceptual site model
- Provide additional water quality data to further support the food-web modeling effort for the ERA and HHRA.

The objectives of this Round 3A surface water sampling event identified in the Addendum to the Round 2A FSP for the surface water sampling program required collection of the following types of data:

- Surface water chemistry to characterize the nature and extent of contamination, including contaminant distribution and identification of potential source effects to the river.
- Surface water chemistry at RM 16, an upstream location from the Portland Harbor Superfund Site.
- Surface water chemistry at two Round 2A upstream and downstream transect stations, RM 11 and RM 4, respectively.
- Surface water chemistry and conventional water quality parameters to support the FS.
- Surface water samples from a single point, approximately one-third below the water surface, at a mid-channel location. Peristaltic pump and high-volume XAD samples were collected at each location.

The January 2006 High-Flow Event, conducted at the request of EPA, consisted of collection of single-point mid-river peristaltic and XAD samples at two Round 2A stations (W023 at RM 11, W005 at RM 4) and one Round 3A location (W024 upstream at RM 16) during flood conditions (Q>160,000 cubic feet per second

[cfs]). This data report summarizes results from this January 2006 sampling event.

## 1.2 REPORT ORGANIZATION

The remaining sections of this document describe the data collection activities (Section 2); sample analyses, data quality, and data management (Section 3); results for the January 2006 sample collection events (Section 4); and references (Section 5).

Supporting information is provided in three appendices included here or on the attached compact disk (CD):

- **Appendix A.** Data Quality Summary
- **Appendix B.** Data Validation Reports (on CD)
- **Appendix C.** Site Characterization and Risk Assessment (SCRA) Database, Excel Flat File Format (on CD).

# 2.0 DATA COLLECTION ACTIVITIES

This section summarizes the Round 3A surface water data collection activities during the January 2006 sampling event, conducted from January 19 to 21, 2006.

## 2.1 SURFACE WATER SAMPLE COLLECTION

Figure 2-1 shows all sampling stations for the Round 3A surface water sampling program. Surface water samples were collected at three target locations in the Willamette River using two methods: the peristaltic pump method and high-volume sampling with XAD-2 columns. Target stations included W005, W023, and W024 located at RM 4, RM 11, and RM 16, respectively.

Table 2-1 includes the sampling stations, station descriptions, and sampling methods used at each station. The sampling methods are described in more detail below. Additional information about sample collection procedures is included in Section 3 of the January High-Flow FSR (Integral 2006d).

### 2.1.1 Surface Water Collection with Peristaltic Pump

Surface water was collected at all the target stations using the peristaltic pump method (see Table 2-1). All stations identified in the Addendum to the FSP, including two upstream (W023 and W024) and one downstream (W005) locations were sampled (see Table 2-1). One station (W023) was occupied twice to generate a field replicate for the peristaltic sampling method. A summary of the total number of samples collected is provided in Table 2-2. Table 2-3 lists each surface water station sampled and the specific analyses to be conducted on each sample.

Field quality control (QC) samples were collected as required by the QAPP (Table 2-4), with the exception of the collection of an XAD field replicate. The field replicate was generated by collecting new surface water at the original target sampling location, not by subsampling composited samples. The field replicate was collected to assess the within-station heterogeneity associated with the overall sampling process from station positioning through sample homogenization. One rinsate blank (LW3-W1901) was collected for this sampling event. In accordance with the Surface Water FSP and QAPP, surface water samples from all target stations were submitted to analytical laboratories for chemical testing (see Section 4.1).

River stage and river flows on the Willamette River at Portland, as well as local precipitation levels that occurred during the surface water sampling period (January 19-21, 2006), are shown in Table 2-5.

### 2.1.2 High-Volume Surface Water Sampling with XAD-2 Columns

High-volume surface water sampling was accomplished using an Infiltrex 300 pump system connected to XAD-2 resin columns. This sampling method was used to collect hydrophobic organic compounds from water that require ultra-low analytical detection methods. High-volume XAD samples were collected at three mid-channel stations (see Figure 2-1). The high-volume stations and a summary of the total number of samples and replicates analyzed are listed in Table 2-2. Table 2-3 includes each high-volume surface water station sampled, the sample date, and the specific analyses to be conducted on each sample. The total volume for each high-volume XAD-2 sample collected at each of the three mid-channel sample locations is included on Table 2-6.

Field QC samples were collected, as required by the QAPP (see Table 2-4). One system blank sample for high-volume surface water samples, consisting of an XAD-2 column and a 0.5-µm glass fiber filter, respectively, was generated by passing ultra clean water through the Infiltrex system. A field replicate was not collected during this sampling event for the XAD method because the field effort was limited to three days due to the sample vessel availability. In accordance with the Surface Water FSP and QAPP, surface water samples from all three target stations were submitted to analytical laboratories for chemical testing (see Section 4.2).

# 3.0 SAMPLE ANALYSES AND DATA MANAGEMENT

This section briefly describes the sample processing and laboratory methods used to analyze the surface water samples. Any deviations from the analytical methods detailed in the QAPP are described below. The data management subsection includes a brief description on how the data validation process occurred from the laboratory data package receipt to a final validated electronic data deliverable (EDD). Furthermore, it describes how the Site Characterization and Risk Assessment (SCRA) database was compiled into a series of compatible Excel tables, which were then distributed to the SCRA data users. The data validation reports are provided as Appendix B.

## 3.1 SURFACE WATER SAMPLE COLLECTION AND DEVIATIONS

The January 2006 Round 3 peristaltic and high-volume surface water sample collection and processing generally followed the procedures specified in the Surface Water FSP (Integral 2004c), Addendum to the FSP (Integral 2006a), the Round 2 QAPP (Integral and Windward 2004), and QAPP Addendum 1 (Integral 2004b).

Several minor deviations from sampling methods described in the Surface Water FSP and Addendum to the FSP occurred during the first surface water sampling event of 2006 due to difficulties encountered with the high-flow river conditions. Minor adjustments to sampling equipment, locations, depth of sample collection, and other procedures are detailed in Section 3.10 of the FSR. Due to the field conditions (debris in river, high flow, and decreased daytime hours), the field crew was not able to collect the full 500 liters originally targeted as the sample volume for the Infiltrex 300 pump system at each sample station. These minor deviations did not impact the overall objectives and goals of the sampling program.

A detailed description of surface water sample handling and processing between the field collection and the analytical laboratory, including any deviations from the QAPP and FSP, is included in the Round 3 January High-Flow FSR (Integral 2006d). Deviations from the FSP and QAPP are discussed in Section 3.10 of the FSR.

## 3.2 CHEMICAL ANALYSES AND DEVIATIONS

The following subsections describe the analyses conducted and the laboratories responsible for the analyses for the two types of surface water samples collected.

### 3.2.1 Peristaltic Pump Samples

Columbia Analytical Services (CAS; Kelso, WA) is conducting all the chemical analysis of samples collected using the peristaltic pump.

### 3.2.2 Infiltrex Pump Samples

Axys (Sydney, B.C., Canada) extracted and analyzed the XAD resins and 0.5-µm glass fiber filters. Laboratory analysis for the high-volume XAD samples were conducted according to the FSP Addendum and the Round 2 QAPP Addendum 1, with the modification identified below:

- For the XAD samples, polychlorinated biphenyls (PCB) congeners were analyzed by high-resolution gas chromatography/mass spectrometry. The QAPP Addendum 1 specified PCB Aroclor analysis for these extracts; however, the method was changed during the Round 2A sampling events because of interference encountered during the PCB Aroclor analyses.
- To minimize the elevation of detection limits for PCB congeners for this high-flow event, the PCB congener analysis were conducted with two-sixth of the XAD extract rather than one-sixth of the extract as specified in the QAPP Addendum.
- Phthalate esters were not analyzed on the XAD extract. Laboratory contamination resulted in extensive qualification of the XAD phthalate data during Round 2A. The one-sixth-portion of the extract that could be designated for phthalate analysis was consumed for the PCB congener analysis. Phthalate esters were analyzed at each station from the peristaltic pump samples.

### 3.2.3 Laboratory Deviations from the Round 2 FSPs and QAPP

Samples were analyzed as described in the Round 2 QAPP (Integral and Windward 2004), and QAPP Addendum 1 (Integral 2004b), with the exceptions noted above for the XAD samples and in the FSR (Integral 2006d).

## 3.3 DATA VALIDATION

As required by the Round 2 QAPP (Integral and Windward 2004), approximately 10% of the surface water data were fully validated (Level 4), and the remaining data were subjected to Level 3 data validation, which includes the evaluation and assessment of the sample results and applicable QC results reported by the laboratory. For the January high-flow event, due to the small number of samples collected and limited number of data packages, all of the data for this event were fully validated. The data validation subcontractor for the Round 3A surface water data was EcoChem, Inc., located in Seattle, WA.

The inorganic, organic, PCB congener, and polychlorinated dibenzo-p-dioxin/furan (PCDD/F) data were validated in accordance with guidance specified by the U.S. EPA Contract Laboratory Program National Functional Guidelines for Inorganic and Organic Data Review, by EPA Region 10 standard operating procedures (SOPs) for validation of PCB congener data and PCDD/F data (EPA 1994, 1995, 1996, 1999), and by *Guidance on Environmental Data Verification and Validation* (EPA 2002). Modifications were made to the Functional Guidelines to accommodate quality assurance/quality control (QA/QC) requirements of the non-Contract Laboratory Program methods that were used for this project. Data qualifiers were assigned during data validation if applicable control limits were not met, in accordance with the EPA data validation guidelines and the QC requirements included in the referenced methods. The data validation qualifiers and definitions are summarized in Table 3-1. The following laboratory deliverables were reviewed during Level 3 and full data validation:

- The case narrative discussing analytical problems (if any) and procedures.
- Chain-of-custody documentation and laboratory sample receipt logs.
- Instrument calibration results.
- Method blank results.
- Results for laboratory QC samples required by the referenced method, including laboratory control sample/laboratory control sample duplicate analyses, matrix spike/matrix spike duplicate analyses, surrogate recoveries, and other method specific QC samples (e.g., serial dilutions for inductively coupled plasma [ICP] analyses).
- Results for field QC samples (i.e., equipment blanks, field duplicates, and field split samples).
- Analytical results for the surface water samples.
- For data packages subjected to full validation, in addition to review and assessment of the documentation identified above, the validation included verification of reported concentrations for the field and QC samples, verification of intermediate transcriptions, and review of instrument data such as mass spectra to verify analyte identification procedures.

After completing the data validation activities for each surface water sample type, a data quality report and a tabular summary of qualified data were generated by EcoChem. The EcoChem data quality reports are included in Appendix B. EcoChem chemists added data validation qualifiers that were assigned during validation to the laboratory report forms and to the laboratory EDDs. The revised EDDs and the hard-copy data validation reports were submitted as the project deliverable. The revised EDDs were then incorporated into the project database, as described in Section 3.6.

## 3.4 DATA QUALITY AND USABILITY

Data generated in the field and at the laboratories were verified and validated according to the criteria and procedures described in the Round 2 QAPP (Integral and Windward 2004). Data quality and usability were evaluated based on the results of the data validation and the data quality objectives for the Round 2 data. The performance criteria in the QAPP included project analytical goals for precision, accuracy, representativeness, completeness, and comparability (PARCC) of the Round 2 data.

The precision, accuracy, representativeness, and comparibility of the data were assessed during data validation, as described in the Round 2 QAPP. Completeness is calculated by comparing the total number of acceptable data (non-rejected data) to the total number of data points generated. Completeness for the Round 3A surface water chemistry data was 99% overall, which exceeds the QAPP completeness objective of 95%. Completeness for the Round 3A data is summarized by parameter group and sample type in Table 3-2. Completeness ranged from 95 to 100% for the various parameter groups and sample types.

The Ecochem data validation report (Appendix B) provides detailed information on the data quality issues and data validation qualifiers for each parameter group for each laboratory data package. Qualified data for the January high-flow Round 3A surface water sampling are included in Tables 4-1 through 4-3. A complete list of qualified results with reason codes is provided in the data validation reports in Appendix B. The Round 3A surface water data, excluding the rejected data, are usable for all project purposes. Overall, the data quality was acceptable and meets program objectives and goals for the RI/FS.

### 3.4.1 Field Quality Control Samples

Field QC samples are used to assess sample variability (replicates and splits), evaluate potential sources of contamination (equipment rinsate blanks), or confirm proper storage conditions (temperature blanks). Addendum 1 of the Round 2 QAPP (Integral 2004b) required collection of the following field QC samples:

- Field replicates – 5% of the sample total
- Equipment rinsate blanks – 5% of the sample total
- Decon blank – 1 per sampling event
- Temperature blanks – 1 per cooler.

The field QC samples were collected at the frequency specified in the QAPP, as detailed in Table 2-4, with the exception of a field replicate for the XAD sample collection method. Prior to the start of sample collection activities, a decon blank

of the peristaltic pump sampling equipment was generated by Battelle's laboratory and submitted for chemical anlaysis. One rinsate blank was collected for this sampling event for the peristaltic pump samples. One system blank sample for high-volume surface water samples, consisting of an XAD-2 column and a 0.5-µm glass fiber filter, respectively, was generated by passing ultra clean water through the Infiltrex system. Peristaltic pump rinsate blank samples and Infiltrex 300 pump system blank samples were submitted for analysis to the laboratories. Selected data points were qualified based on rinsate or system blank results (see Appendix A Data Quality Summary, Table A-6).

One field replicate sample was collected for peristaltic pump surface water samples. A replicate was not collected for high-volume surface water samples. Field splits were not requested by EPA or any other party during this sampling event and were not collected. The field replicate was submitted to the laboratories as a separate sample for analysis. Surface water data were not qualified based on the field replicate results. Field replicate results are summarized in Table A-8 of Appendix A.

### 3.4.2 Summary of Qualified Data

Selected data not meeting the data quality criteria were qualified as undetected, estimated, tentatively identified, or rejected during validation, in accordance with the QAPP. A tabular summary of the results, with the data qualifiers, is included in Tables 4-1 through 4-3. A complete list of qualified results with reason codes is provided in Appendix B (on CD). Data qualified as undetected are usable for all intended purposes. Data qualified as estimated or tentatively identified are usable for all intended purposes, with the knowledge that these data may be less precise or less accurate than unqualified data. Rejected data are not usable for any purpose and have been flagged as “not reportable” in the database. The Round 3A surface water data, excluding the rejected data, are usable for all project purposes. Overall, the data quality was acceptable and meets program objectives and goals for the RI/FS.

## 3.5 DATA MANAGEMENT

Once the laboratories completed their internal QA/QC checks, they exported the analytical data (sample, test, batch, and result information) into comma-delimited text files with data columns arranged in an order that was recognized by the project’s Environmental Quality Information System (EQuIS) database. These EDDs were e-mailed to Integral where they were checked for proper EQuIS structure and appended with specific information that was unknown by the labs, such as sampling location, composite information, and field replicate and split information. If any problems were found in the structure of the EDDs, then the laboratory was notified and asked to correct the problem and resubmit the EDD. Each emailed EDD transmission, with the original, unaltered EDD attachment, was

stored to document and track the laboratories' delivery of electronic data to Integral.

When the EDDs were corrected and complete, they were checked electronically by loading them into the temporary section of Integral's Lower Willamette Group (LWG) project database. In the process of loading, EQuIS checked the EDDs for correct lookup codes (such as for analytes, test methods, and sample matrices), proper relationships for results, tests, batches, and samples (to ensure all results matched with a test, tests with samples, and sample/test pairs with batches), and that all derived samples (such as replicates, splits, and matrix spikes) had corresponding parent samples.

In addition to these checks, EQuIS also checked "less important" characteristics, such as date and time formats and text field lengths, to ensure consistency throughout the database. Any error prevents the EDD from loading until the error is corrected. If errors were found that were related to the way the laboratory reported the data or constructed the EDD, then the laboratory was notified and asked to correct the problem and resubmit the EDD. If errors were related to Excel automatically formatting date and time fields, for example, then the error was corrected and steps were taken to avoid repeats of the problem (such as changing default settings in the software). Successfully loaded EDDs were saved to document and track the data that were loaded into Integral's LWG project database.

Each verified and accurate EDD was provided to EcoChem for data review and validation. These EDDs were also stored in a temporary section of the project database, where they could be queried and examined, if desired, until validation was complete. As EcoChem completed validation of the data by sample delivery group (SDG) or small groups of SDGs, the validator qualifiers and reason codes were applied to the data in the temporary section of the database. The validated data were then merged into the permanent project database. During the merging process, all previously performed electronic checks were repeated to ensure nothing was incorrectly modified with the application of the validation results.

Several queries were set up in the permanent project database to translate the data structure to a form compatible with National Oceanic and Atmospheric Administration's (NOAA) Query Manager. The data translation included creating station and sample identifiers, converting the sample type code, and changing the date format. The translated data were imported into an Access file provided by NOAA that contained template tables for the Query Manager structure.

Integral's LWG project database contained all of the data reported by the analytical laboratories. This included field and lab replicates, lab dilutions, results for the same analyte from multiple analytical methods (SW8270 and SW8270-SIM, for example), and laboratory QA samples such as matrix spikes, surrogates, and method blanks.

# 4.0 ROUND 3A RESULTS

Round 3A chemistry results for the January high-flow surface water sampling event are presented in this section. Review and evaluation of the surface water data in conjunction with other data types (e.g., sediment), evaluation of spatial trends in the distribution of contaminants in surface water, source evaluation, and risk analyses will be presented in the draft RI report.

The standard chemical suite for all stations includes total and dissolved metals, semivolatile organic compounds (SVOCs), butyltin compounds, and herbicides. Samples for conventional parameters, including total dissolved solids (TDS), total suspended solids (TSS), total organic carbon (TOC), and dissolved organic carbon (DOC), were collected at all stations. XAD resin and filter samples were collected at all stations and analyzed for chemicals of interest, including PCDD/Fs, PCB congeners, pesticides, and polycyclic aromatic hydrocarbons (PAHs). Water quality parameters (temperature, dissolved oxygen, specific conductance, pH, turbidity, and oxidation reduction potential) were also measured at all stations in the field; however, due to problems with calibration, dissolved oxygen, and conductivity, data were not collected at W005 and W023.

Analytical chemistry results are tabulated by sampling methods. Field surface water quality parameters are summarized in Table 4-1. Surface water samples collected by peristaltic pump are displayed in Table 4-2. Similarly, results for surface water samples collected using the Infiltrex pump, and XAD-2 columns are shown in Table 4-3.

## 4.1 SUMMARY OF PERISTALTIC PUMP RESULTS

CAS performed all chemical analysis of samples collected using the peristaltic pump. Results for the peristaltic pump samples are summarized in Table 4-2

## 4.2 SUMMARY OF XAD RESULTS

Axys performed all chemical analysis of high-volume surface water samples collected using the Infiltrex pump. Results for the Infiltrex pump samples are summarized in Table 4-3.

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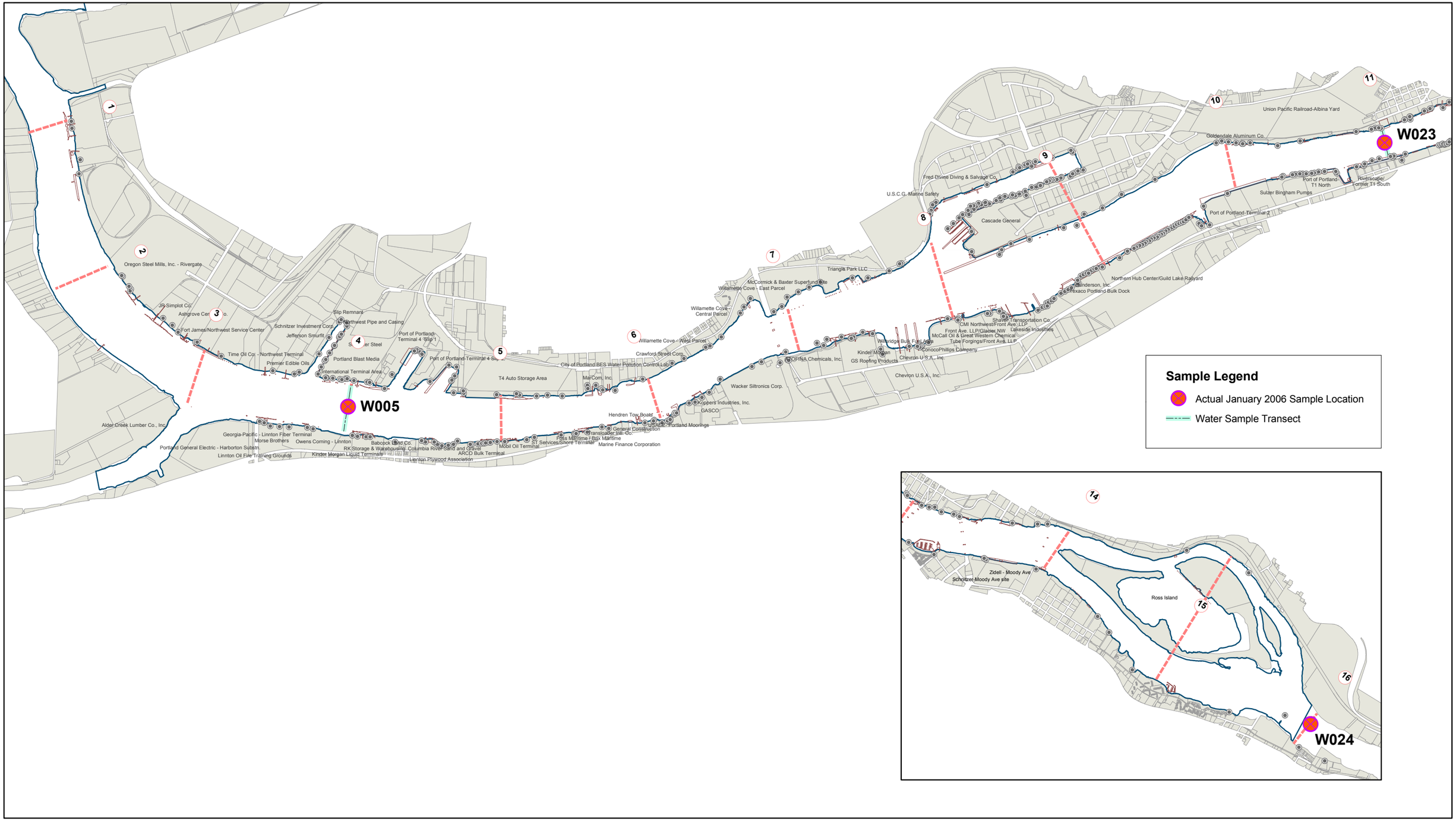


Map Document: (O:\Projects\Portland_Harbor\LWG-Map-Projects\Surfacewater-2\MXDs\R3_Winter_2006_FSR.mxd)
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LWG Lower Willamette Group

integral consulting inc.

FEATURE SOURCES: Metro RLIS, US Army Corps of Engineers.

N

0 1,500 3,000 6,000 Feet

**Map Legend**

- River Miles
- Outfalls
- Docks & Structures
- Waterfront Taxlots
- River Edge

**DRAFT**

DO NOT QUOTE OR CITE
This document is currently under review by US EPA and its federal, state, and tribal partners, and is subject to change in whole or in part.

Figure 2-1. Round 3 January 2006, High-Flow Surface Water Data Report Surface Water Sample Locations

Table 2-1. Surface Water Sampling Stations and Sampling Methods for January 2006 High-Flow Event.

| | | | **Sampling Method** | |
|---|---|---|---|---|
| **Station ID** | **River Mile** | **Sampling Station Description** | **Peristaltic Pump** | **High-Volume XAD-2 Column** |
| W005 | MILE 3-4 | Downstream Transect - (RM 4.0) | X | X |
| W023[(1)] | MILE 10-11 | Upstream Transect - (RM 11) | X | X |
| W024 | MILE 16 | Upstream Transect - (RM 16) | X | X |

**Notes:**
[1] A field replicate was collected at Station W023 using the peristaltic pump sample collection method.

Table 2-2. Summary of Surface Water Stations and Sample Sets Collected for January 2006 High-Flow Event.

| Sample Type | Stations | Number of Samples Sets Collected[1] | | Comments |
|---|---|---|---|---|
| ***Peristaltic Pump*** | | | | |
| Downstream (RM 4) | W005 | 1 | | |
| Upstream Transect (RM 11.0) | W023 | 2 | | One replicate collected at W023. |
| Upstream (RM 16) | W024 | 2 | | One rinsate collected in field laboratory. |
| ***Totals*** | | ***5*** | | |
| ***XAD-2 Resin and Pre-filter*** | | **XAD-2 Resin** | **0.5µm-filter** | |
| Downstream (RM 4) | W005 | 1 | 1 | |
| Upstream Transect (RM 11.0) | W023 | 1 | 1 | |
| Upstream (RM 16) | W024 | 2 | 2 | One system blank (XAD column and filter) collected in field laboratory. |
| ***Totals*** | | ***4*** | ***4*** | |

**Note:**
[1] Number of samples sets includes all analytes listed in Table 3-3 of Integral (2006c) . It also includes surface water QC samples (i.e., field replicates).

Table 2-3. Surface Water Samples Collected, Dates Sampled, and Analyses Conducted for January 2006 High-Flow Event.

| Date Sampled | Sample ID | XAD-2 Resin & Prefilter | | | | Peristaltic Pump | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | PCDD/Fs | PCB cong | Pesticides | PAHs | TSS | TDS | TOC | DOC (filt) | Metals Unfiltered | Metals Filtered & Hardness | TBT | Herbicides | SVOCs (including phthalates) |
| 1/21/2006 | **LW3-W1005** | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 1/20/2006 | **LW3-W1023-1** | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 1/20/2006 | **LW3-W1023-2** | | | | | X | X | X | X | X | X | X | X | X |
| 1/19/2006 | **LW3-W1024** | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 1/18/2006 | **LW3-W1901*** | | | | | X | X | X | X | X | X | X | X | X |
| 1/18/2006 | **LW3-W1902**** | X | X | X | X | | | | | | | | | |

**Note:**
[1] A field replicate sample was collected at Station W023.
* Field persitaltic pump sampling system rinsate.
** Field Infiltrex pump sampling system blank collected in XAD-2 column and 0.5-µm filter.

Table 2-4. Surface Water Sampling Field QC Samples for January 2006 High-Flow Event.

| Parameter | Samples | Blind Field Replicates[1] | Blind Field Sample Splits[2] | Field Rinsate Blanks[3,4] | Decon Blank[5] | Total Number of Samples[6] |
|---|---|---|---|---|---|---|
| **Peristaltic Pump** | | | | | | |
| Metals (unfiltered) | 3 | 1 | 0 | 1 | 1 | 6 |
| Metals (filtered) | 3 | 1 | 0 | 1 | 1 | 6 |
| Herbicides | 3 | 1 | 0 | 1 | 1 | 6 |
| SVOCs (incl phthalates) | 3 | 1 | 0 | 1 | 1 | 6 |
| Butyltin compounds | 3 | 1 | 0 | 1 | 1 | 6 |
| TSS | 3 | 1 | 0 | 1 | 0 | 5 |
| TDS | 3 | 1 | 0 | 1 | 0 | 5 |
| DOC (filtered) | 3 | 1 | 0 | 1 | 1 | 6 |
| TOC | 3 | 1 | 0 | 1 | 1 | 6 |
| **XAD-2 Resin** | | | | | | |
| PCB Congeners | 3 | 0 | 0 | 1 | 0 | 4 |
| Organochlorine Pesticides | 3 | 0 | 0 | 1 | 0 | 4 |
| PAHs | 3 | 0 | 0 | 1 | 0 | 4 |
| PCDD/Fs | 3 | 0 | 0 | 1 | 0 | 4 |

**Note:**

[1] Field QC sample numbers were based on a frequency of 5% or minimum of 1 per 20 samples.

[2] Field split samples were not requested by EPA or any other parties.

[3] A field rinsate blank was collected near the beginning of the sampling event for the peristaltic pump.

[4] Prior to start of sampling event, 4 liters of certified ultra clean water (Axys) were passed through a new XAD-2 resin column and a new 0.5-um filter at the field lab. The column and filter were sent out to Axys as a system blank.

[5] Prior to the start of sample collection activities, a decon blank of the peristaltic pump sampling equipment was generated by Battelle's laboratory.

[6] Total number of samples includes laboratory QA/QC samples.

Table 2-5. Precipitation, River Flow, Stream Velocity, and Gage Height for January 2006 High-Flow Event.

| Sampling Dates | Gage Height (ft)[1] | | | Average Stream velocity (ft/s)[1] | Precipitation (in)[2] | River Flow ($ft^3/s$)[3,4] |
|---|---|---|---|---|---|---|
| | Min | Max | Avg | | | |
| 1/19/2006 | 12.47 | 13.08 | 12.74 | 3.73 | 0.03 | 168,875 |
| 1/20/2006 | 12.52 | 13.75 | 13.2 | 3.69 | 0.45 | 168,646 |
| 1/21/2006 | 12.37 | 13.91 | 13.15 | 3.65 | 0.05 | 166,667 |

**Notes:**

[1] USGS Water Resources Web Page - USGS 14211720 Willamete River at Portland, OR - http://waterdata.usgs.gov/nwis.

[2] National Weather Service Forecast Office, Portland, OR - http://newweb.wrh.noaa.gov/climate/index.php?wfo=pqr.

[3] River flow data are estimated daily mean values.

[4] USGS Water Resources Department, Portland, OR.

Table 2-6. Surface Water Sampling Data from Stationary Locations Using the Infiltrex 300 System for January 2006 High-Flow Event.

| Sample Location | Actual Depth (m)[1] | Estimated Total Sampling Time (hour)[2] | Actual Total Sampling Time (hour:min)[3] | Estimated rate of descent/ascent (m/min) | Measured rate of descent/ascent (m/min) | Infiltrex 300 Average pumping rate (mL/min)[4] | Total Volume Pumped per Station (L)[5] |
|---|---|---|---|---|---|---|---|
| W005 | 5.18 | 7:00 | 6:26 | stationary | stationary | 1,224 | 391 |
| W023 | 3.67 | 7:00 | 5:57 | stationary | stationary | 1,220 | 369 |
| W024 | 1.29 | 7:00 | 6:22 | stationary | stationary | 1,200 | 370 |

**Notes:**

[1] Actual depth was measured with a YSI 6600 sonde.

[2] Estimated sampling times are for sampling 500 L with an Infiltrex pump at an average pumping rate of 1.25 L/min.

[3] Actual total sampling time was calculated from entries in the Infiltrex 300 log sheets in Appendix B of Integral (2006c).

[4] Average pumping rate was calculated from field calibrated entries in the Infiltrex 300 log sheets in Appendix B of Integral (2006c).

[5] Total volume reported is field calibrated value determined from field pumping rate measurements. The % error between Infiltrex flow meter volume readings and calibrated flow measurements varied between 2% and 5%.

NA = not applicable

Table 3-1. Data Validation Qualifiers and Definitions.

| Data Qualifier | Definition |
|---|---|
| U | The material was analyzed for, but was not detected. The associated numerical value is the sample quantitation limit. |
| J | The associated numerical value is an estimated quantity. |
| R | The data are unusable (compound may or may not be present). Resampling and reanalysis are necessary for verification. (Overrides all quals and their codes.) |
| N | Presumptive evidence of presence of material. |
| NJ | Presumptive evidence of the presence of the material at an estimated quantity. |
| UJ | The material was analyzed for, but was not detected. The sample quantitation limit is an estimated quantity. |
| T | The associated numerical value was mathematically derived (e.g., from summing multiple analyte results such as Aroclors, or calculating the average of multiple results for a single analyte). Also indicates all results that are selected for reporting in preference to other available results (e.g., for parameters reported by multiple methods) for the Round 2 data. |

Table 3-2. Percent Completeness by Parameter Group.

| Analysis | Total # of Data Points[a] | Number of Data Points | | Completeness (%) |
|---|---|---|---|---|
| | | Accepted | Rejected | |
| Butyltins | 16 | 16 | 0 | 100 |
| Conventionals [b] | 20 | 20 | 0 | 100 |
| PCDD/F homologs | 60 | 60 | 0 | 100 |
| PCDD/Fs | 93 | 93 | 0 | 100 |
| Herbicides | 16 | 16 | 0 | 100 |
| Metals | 96 | 96 | 0 | 100 |
| Organochlorine pesticides | 156 | 148 | 8 | 95 |
| PAHs | 170 | 170 | 0 | 100 |
| PCB Aroclors | 42 | 42 | 0 | 100 |
| PCB congener homologs | 54 | 54 | 0 | 100 |
| PCB congeners | 960 | 960 | 0 | 100 |
| Phenols | 60 | 60 | 0 | 100 |
| Phthalates | 24 | 24 | 0 | 100 |
| SVOCs | 140 | 139 | 1 | 99 |
| **R3 Surface Water Sampling Project Total** | **1907** | **1898** | **9** | **>99** |

**Notes:**

[a] Totals include field replicates and split samples and exclude field blanks.

[b] Includes TDS, TSS, DOC, TOC, and hardness.

Table 4-1. Surface Water Sampling Stations, Dates Sampled, Positional Data, and Conventional Water Quality Data for January 2006 High-Flow Event.

| Station ID | Date | Start Time | End Time | Anchored | State Plane Coordinates Oregon North Zone | | Water Quality Parameters Measured with YSI[1] | | | | | | | | | Total sampling time |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Northing | Easting | log in time | log out time | Temperature (°C) | EC (uS/cm) | DO (mg/L) | Depth[(2)] (m) | pH | ORP (mV) | Turbidity (NTU) | |
| ***Peristaltic Samples*** | | | | | | | | | | | | | | | | |
| W005 | 1/21/2006 | 9:16 | 10:00 | Yes | 7617628 | 715621 | 8:46 | 15:40 | 7.78 | -- | -- | 5.18 | 6.89 | 223 | 87 | 0:44 |
| W023 | 1/20/2006 | 9:20 | 10:00 | Yes | 7642521 | 690101 | -- | -- | -- | -- | -- | -- | -- | -- | -- | 0:40 |
| W023-2 | 1/20/2006 | 11:05 | 11:33 | Yes | 7642521 | 690101 | 9:25 | 16:00 | 7.89 | -- | -- | 3.67 | 6.83 | 248 | 139 | 0:28 |
| W024 | 1/19/2006 | 10:25 | 11:20 | Yes | 7646466 | 665593 | 10:25 | 16:44 | 7.84 | 82.0 | 14.07 | 1.29 | 6.82 | 220 | 110 | 0:55 |
| ***XAD Samples*** | | | | | | | | | | | | | | | | |
| W005 | 1/21/2006 | 9:16 | 15:42 | Yes | 7617628 | 715621 | -- | -- | -- | -- | -- | -- | -- | -- | -- | 6:26 |
| W023 | 1/20/2006 | 9:15 | 12:16 | Yes | 7642521 | 690101 | -- | -- | -- | -- | -- | -- | -- | -- | -- | 3:01 |
| | | 13:00 | 14:15 | Yes | 7642540 | 690074 | -- | -- | -- | -- | -- | -- | -- | -- | -- | 1:15 |
| | | 14:19 | 16:00 | Yes | 7642505 | 690084 | -- | -- | -- | -- | -- | -- | -- | -- | -- | 1:41 |
| W024 | 1/19/2006 | 10:25 | 16:47 | Yes | 7646466 | 665593 | -- | -- | -- | -- | -- | -- | -- | -- | -- | 6:22 |

**Note:**
[1] Averaged data were collected with a YSI 6600 sonde with MDS650.
[2] Depth estimated for stations W005 and W023 due to YSI calibration problems.
Total pumping time is calculated on last column.
-- No YSI data available, calibration problem.

Table 4-2. January 2006 Surface Water Data Results - Peristaltic Sample Collection.

| Chemical Name | Total/ Dissolved | Sample ID / Unit | LW3-W1005 | LW3-W1023-1 | LW3-W1023-2 | LW3-W1024 |
|---|---|---|---|---|---|---|
| **Butyltins** | | | | | | |
| Butyltin ion | N | µg/l | 0.0017 U | 0.0017 U | 0.0017 U | 0.0017 U |
| Dibutyltin ion | N | µg/l | 0.002 U | 0.011 U | 0.0011 U | 0.0007 U |
| Tetrabutyltin | N | µg/l | 0.0015 U | 0.0015 U | 0.0015 U | 0.0015 U |
| Tributyltin ion | N | µg/l | 0.013 U | 0.013 U | 0.014 U | 0.013 U |
| **Conventionals** | | | | | | |
| Dissolved organic carbon | N | mg/l | 2.1 | 2.2 | 2.2 | 2 |
| Hardness as CaCO3 | T | mg/l | 18.9 | 19.3 | 19 | 19.8 |
| Total dissolved solids | N | mg/l | 96 | 74 U | 53 U | 73 U |
| Total organic carbon | N | mg/l | 2.1 | 2.3 | 2.3 | 2.2 |
| Total suspended solids | N | mg/l | 49 | 62 T | 54 | 49 J |
| **Herbicides** | | | | | | |
| 2,4,5-T | N | µg/l | 0.046 U | 0.043 U | 0.045 U | 0.046 U |
| 2,4-D | N | µg/l | 0.051 U | 0.048 U | 0.05 U | 0.051 U |
| Dichloroprop | N | µg/l | 0.062 U | 0.058 U | 0.061 U | 0.062 U |
| Silvex | N | µg/l | 0.051 U | 0.048 U | 0.05 U | 0.051 U |
| **Metals** | | | | | | |
| Aluminum | D | µg/l | 12.3 | 10.3 | 5 U | 8 |
| Aluminum | T | µg/l | 1350 | 1860 | 1610 | 1840 |
| Antimony | D | µg/l | 0.02 U | 0.023 U | 0.023 U | 0.021 U |
| Antimony | T | µg/l | 0.031 U | 0.033 U | 0.027 U | 0.032 U |
| Arsenic | D | µg/l | 0.21 | 0.21 | 0.21 | 0.2 |
| Arsenic | T | µg/l | 0.54 | 0.48 | 0.54 | 0.28 |
| Cadmium | D | µg/l | 0.003 U | 0.004 U | 0.002 U | 0.002 U |
| Cadmium | T | µg/l | 0.019 U | 0.014 U | 0.012 U | 0.019 U |
| Chromium | D | µg/l | 0.18 U | 0.2 U | 0.18 U | 0.17 U |
| Chromium | T | µg/l | 1.25 | 1.62 | 1.53 | 1.68 |
| Copper | D | µg/l | 0.77 J | 2.39 J | 0.76 J | 0.68 J |
| Copper | T | µg/l | 3.05 J | 3.68 J | 3.53 J | 3.57 J |
| Lead | D | µg/l | 0.016 U | 0.022 | 0.009 U | 0.007 U |
| Lead | T | µg/l | 0.656 | 0.855 | 0.79 | 0.822 |
| Mercury | D | µg/l | 0.08 U | 0.08 U | 0.08 U | 0.08 U |
| Mercury | T | µg/l | 0.08 U | 0.08 U | 0.08 U | 0.08 U |
| Nickel | D | µg/l | 0.45 | 0.52 | 0.43 | 0.43 |
| Nickel | T | µg/l | 1.55 | 1.89 | 1.73 | 1.93 |
| Selenium | D | µg/l | 0.2 J | 0.2 U | 0.2 U | 0.2 U |
| Selenium | T | µg/l | 0.2 U | 0.2 U | 0.2 U | 0.2 U |
| Silver | D | µg/l | 0.003 U | 0.009 U | 0.004 U | 0.002 U |
| Silver | T | µg/l | 0.013 U | 0.013 U | 0.012 U | 0.015 U |
| Zinc | D | µg/l | 2.5 | 2.1 U | 0.81 U | 0.67 U |
| Zinc | T | µg/l | 5.02 | 6.38 | 5.76 | 6.38 |
| **PAHs** | | | | | | |
| 2-Methylnaphthalene | N | µg/l | 0.0041 U | 0.0027 U | 0.0034 U | 0.0027 U |
| Acenaphthene | N | µg/l | 0.006 J | 0.002 U | 0.002 U | 0.002 U |
| Acenaphthylene | N | µg/l | 0.0018 U | 0.0018 U | 0.0018 U | 0.0018 U |
| Anthracene | N | µg/l | 0.0011 U | 0.0011 U | 0.0011 U | 0.0011 U |
| Benzo(a)anthracene | N | µg/l | 0.0024 J | 0.0021 U | 0.0021 U | 0.0021 U |
| Benzo(a)pyrene | N | µg/l | 0.0016 U | 0.0016 U | 0.0016 U | 0.0016 U |
| Benzo(b)fluoranthene | N | µg/l | 0.0021 J | 0.002 U | 0.002 U | 0.002 U |
| Benzo(g,h,i)perylene | N | µg/l | 0.0037 U | 0.0037 U | 0.0037 U | 0.0037 U |
| Benzo(k)fluoranthene | N | µg/l | 0.0017 J | 0.0014 U | 0.0014 U | 0.0014 U |
| Chrysene | N | µg/l | 0.0029 J | 0.0013 U | 0.0013 U | 0.0013 U |
| Dibenzo(a,h)anthracene | N | µg/l | 0.0017 U | 0.0017 U | 0.0017 U | 0.0017 U |
| Fluoranthene | N | µg/l | 0.011 | 0.0024 U | 0.0024 U | 0.0024 U |
| Fluorene | N | µg/l | 0.0039 J | 0.0026 U | 0.0026 U | 0.0026 U |

Table 4-2. January 2006 Surface Water Data Results - Peristaltic Sample Collection.

| Chemical Name | Total/ Dissolved | Sample ID<br>Unit | LW3-W1005 | LW3-W1023-1 | LW3-W1023-2 | LW3-W1024 |
|---|---|---|---|---|---|---|
| High Molecular Weight PAH | N | µg/l | 0.0263 JT | 0.0026 JT | 0.0037 UT | 0.0028 JT |
| Indeno(1,2,3-cd)pyrene | N | µg/l | 0.0021 U | 0.0021 U | 0.0021 U | 0.0021 U |
| Low Molecular Weight PAH | N | µg/l | 0.0099 JT | 0.008 UT | 0.0093 UT | 0.0064 UT |
| Naphthalene | N | µg/l | 0.013 U | 0.008 U | 0.0093 U | 0.0064 U |
| Phenanthrene | N | µg/l | 0.008 U | 0.0044 U | 0.0055 U | 0.0039 U |
| Polycyclic Aromatic Hydrocarbons | N | µg/l | 0.0362 JT | 0.0026 JT | 0.0093 UT | 0.0028 JT |
| Pyrene | N | µg/l | 0.0062 J | 0.0026 J | 0.0023 U | 0.0028 J |
| **Phenols** | | | | | | |
| 2,3,4,6-Tetrachlorophenol | N | µg/l | 1.1 UJ | 1.1 UJ | 1.1 UJ | 1 UJ |
| 2,4,5-Trichlorophenol | N | µg/l | 0.027 U | 0.027 U | 0.027 U | 0.026 U |
| 2,4,6-Trichlorophenol | N | µg/l | 0.039 U | 0.039 U | 0.039 U | 0.037 U |
| 2,4-Dichlorophenol | N | µg/l | 0.025 U | 0.025 U | 0.025 U | 0.024 U |
| 2,4-Dimethylphenol | N | µg/l | 0.34 U | 0.34 U | 0.34 U | 0.32 U |
| 2,4-Dinitrophenol | N | µg/l | 0.56 U | 0.56 U | 0.56 U | 0.53 U |
| 2-Chlorophenol | N | µg/l | 0.016 U | 0.016 U | 0.016 U | 0.015 U |
| 2-Methylphenol | N | µg/l | 0.062 U | 0.063 U | 0.063 U | 0.06 U |
| 2-Nitrophenol | N | µg/l | 0.014 U | 0.015 U | 0.015 U | 0.014 U |
| 4,6-Dinitro-2-methylphenol | N | µg/l | 0.014 U | 0.014 U | 0.014 U | 0.013 U |
| 4-Chloro-3-methylphenol | N | µg/l | 0.031 U | 0.031 U | 0.031 U | 0.029 U |
| 4-Methylphenol | N | µg/l | 0.053 U | 0.054 U | 0.054 U | 0.051 U |
| 4-Nitrophenol | N | µg/l | 0.56 U | 0.57 U | 0.57 U | 0.54 U |
| Pentachlorophenol | N | µg/l | 0.03 U | 0.03 U | 0.03 U | 0.029 U |
| Phenol | N | µg/l | 0.021 U | 0.021 U | 0.021 U | 0.02 U |
| **Phthalates** | | | | | | |
| Bis(2-ethylhexyl) phthalate | N | µg/l | 0.29 U | 0.29 U | 0.29 U | 0.27 U |
| Butylbenzyl phthalate | N | µg/l | 0.058 U | 0.027 U | 0.027 U | 0.026 U |
| Dibutyl phthalate | N | µg/l | 0.18 U | 0.15 U | 0.11 U | 0.14 U |
| Diethyl phthalate | N | µg/l | 0.12 U | 0.092 U | 0.13 U | 0.097 U |
| Dimethyl phthalate | N | µg/l | 0.014 U | 0.014 U | 0.014 U | 0.013 U |
| Di-n-octyl phthalate | N | µg/l | 0.034 U | 0.034 U | 0.034 U | 0.032 U |
| **SVOCs** | | | | | | |
| 1,2,4-Trichlorobenzene | N | µg/l | 0.016 U | 0.017 U | 0.017 U | 0.016 U |
| 1,2-Dichlorobenzene | N | µg/l | 0.015 U | 0.015 U | 0.015 U | 0.015 U |
| 1,3-Dichlorobenzene | N | µg/l | 0.012 U | 0.012 U | 0.012 U | 0.011 U |
| 1,4-Dichlorobenzene | N | µg/l | 0.014 U | 0.014 U | 0.014 U | 0.014 U |
| 2,4-Dinitrotoluene | N | µg/l | 0.02 U | 0.021 U | 0.021 U | 0.02 U |
| 2,6-Dinitrotoluene | N | µg/l | 0.0092 U | 0.0093 U | 0.0093 U | 0.0088 U |
| 2-Chloronaphthalene | N | µg/l | 0.016 U | 0.016 U | 0.016 U | 0.016 U |
| 2-Nitroaniline | N | µg/l | 0.016 U | 0.016 U | 0.016 U | 0.015 U |
| 3,3'-Dichlorobenzidine | N | µg/l | 0.45 U | 0.46 U | 0.46 U | 0.43 U |
| 3-Nitroaniline | N | µg/l | 0.24 U | 0.24 U | 0.24 U | 0.23 U |
| 4-Bromophenyl phenyl ether | N | µg/l | 0.019 U | 0.019 U | 0.019 U | 0.018 U |
| 4-Chloroaniline | N | µg/l | 0.019 U | 0.019 U | 0.019 U | 0.018 U |
| 4-Chlorophenyl phenyl ether | N | µg/l | 0.0088 U | 0.0089 U | 0.0089 U | 0.0085 U |
| 4-Nitroaniline | N | µg/l | 0.17 U | 0.18 U | 0.18 U | 0.17 U |
| Aniline | N | µg/l | 0.27 U | 0.27 U | 0.27 U | 0.25 U |
| Azobenzene | N | µg/l | 0.013 U | 0.013 U | 0.013 U | 0.012 U |
| Benzoic acid | N | µg/l | 1.8 U | 2 U | 1.9 U | 1.8 U |
| Benzyl alcohol | N | µg/l | 1.1 U | 1.1 U | 1.1 U | 0.98 U |
| Bis(2-chloroethoxy) methane | N | µg/l | 0.012 U | 0.012 U | 0.012 U | 0.012 U |
| Bis(2-chloroethyl) ether | N | µg/l | 0.015 U | 0.015 U | 0.015 U | 0.015 U |
| Bis(2-chloroisopropyl) ether | N | µg/l | 0.018 U | 0.018 U | 0.018 U | 0.017 U |
| Carbazole | N | µg/l | 0.014 U | 0.014 U | 0.014 U | 0.013 U |
| Dibenzofuran | N | µg/l | 0.0071 U | 0.0071 U | 0.0071 U | 0.0071 U |
| Hexachlorobenzene | N | µg/l | 0.015 U | 0.015 U | 0.015 U | 0.015 U |

Table 4-2. January 2006 Surface Water Data Results - Peristaltic Sample Collection.

| Chemical Name | Total/ Dissolved | Sample ID<br>Unit | LW3-W1005 | LW3-W1023-1 | LW3-W1023-2 | LW3-W1024 |
|---|---|---|---|---|---|---|
| Hexachlorobutadiene | N | µg/l | 0.021 U | 0.021 U | 0.021 U | 0.02 U |
| Hexachlorocyclopentadiene | N | µg/l | 0.043 U | 0.043 U | 0.043 U | 0.041 U |
| Hexachloroethane | N | µg/l | 0.02 U | 0.02 U | 0.02 U | 0.019 U |
| Isophorone | N | µg/l | 0.0088 U | 0.0089 U | 0.0089 U | 0.0085 U |
| Nitrobenzene | N | µg/l | 0.0078 U | 0.0078 U | 0.0078 U | 0.0074 U |
| N-Nitrosodimethylamine | N | µg/l | 0.44 U | 0.45 U | 0.45 U | 0.42 U |
| N-Nitrosodiphenylamine | N | µg/l | 0.029 U | 0.03 U | 0.03 U | 0.028 U |
| N-Nitrosodipropylamine | N | µg/l | 0.034 U | 0.034 U | 0.034 U | 0.033 U |

T = total
D = dissolved
N = not applicable

Table 4-3. January 2006 Surface Water Data Results - XAD Sample Collection.

| Chemical Name | Total/ Dissolved | Sample ID Unit | LW3-W1005 C | LW3-W1005 F | LW3-W1023 C | LW3-W1023 F | LW3-W1024 C | LW3-W1024 F |
|---|---|---|---|---|---|---|---|---|
| **Aroclors** | | | | | | | | |
| Aroclor 1016 | N | pg/l | 0.255 U | 0.0883 U | 0.0154 U | 0.158 U | 0.314 U | 0.0824 U |
| Aroclor 1221 | N | pg/l | 0.132 U | 0.0458 U | 0.0109 U | 0.082 U | 0.163 U | 0.0427 U |
| Aroclor 1232 | N | pg/l | 0.0629 U | 0.0527 U | 0.0265 U | 0.0918 U | 0.0724 U | 0.0272 U |
| Aroclor 1242 | N | pg/l | 33.9 NJ | 15.3 NJ | 26.2 NJ | 14.4 NJ | 25.1 NJ | 8.66 NJ |
| Aroclor 1248 | N | pg/l | 0.0439 U | 0.166 U | 0.0451 U | 0.115 U | 0.0586 U | 0.0555 U |
| Aroclor 1254 | N | pg/l | 26.5 NJ | 50.4 NJ | 23.5 NJ | 50.4 NJ | 18.8 NJ | 29.8 NJ |
| Aroclor 1260 | N | pg/l | 6.41 NJ | 43 NJ | 5.35 U | 37.4 NJ | 5.45 U | 22.8 NJ |
| Aroclors | N | pg/l | 66.8 JT | 109 JT | 49.7 JT | 102 JT | 43.9 JT | 61.3 JT |
| **Dioxin Furan Homolog** | | | | | | | | |
| Heptachlorodibenzofuran homologs | N | pg/l | 0.183 | 1.24 | 0.158 | 1.36 | 0.176 | 0.926 |
| Heptachlorodibenzo-p-dioxin homologs | N | pg/l | 0.725 | 5.3 | 0.813 | 3.96 | 0.926 | 3.44 |
| Hexachlorodibenzofuran homologs | N | pg/l | 0.092 | 0.537 | 0.099 | 0.591 | 0.091 | 0.438 |
| Hexachlorodibenzo-p-dioxin homologs | N | pg/l | 0.127 | 0.711 | 0.157 | 0.605 | 0.22 | 0.537 |
| Octachlorodibenzofuran | N | pg/l | 0.163 | 1.2 | 0.148 J | 1.39 | 0.132 J | 0.905 |
| Octachlorodibenzo-p-dioxin | N | pg/l | 2.38 | 30.7 | 2.42 | 20.4 | 2.46 | 19.2 |
| Pentachlorodibenzofuran homologs | N | pg/l | 0.048 | 0.224 | 0.04 | 0.185 | 0.074 | 0.163 |
| Pentachlorodibenzo-p-dioxin homologs | N | pg/l | 0.029 | 0.094 | 0.021 | 0.074 | 0.03 | 0.08 |
| Tetrachlorodibenzofuran homologs | N | pg/l | 0.049 | 0.14 | 0.047 U | 0.116 | 0.046 U | 0.114 |
| Tetrachlorodibenzo-p-dioxin homologs | N | pg/l | 0.028 | 0.047 | 0.00309 U | 0.081 | 0.025 | 0.057 |
| **Dioxins Furans** | | | | | | | | |
| 1,2,3,4,6,7,8-Heptachlorodibenzofuran | N | pg/l | 0.064 J | 0.42 | 0.055 J | 0.465 | 0.062 J | 0.303 |
| 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin | N | pg/l | 0.345 | 2.43 | 0.4 | 2.02 | 0.436 | 1.65 |
| 1,2,3,4,7,8,9-Heptachlorodibenzofuran | N | pg/l | 0.012 J | 0.027 J | 0.014 U | 0.032 J | 0.019 J | 0.024 J |
| 1,2,3,4,7,8-Hexachlorodibenzofuran | N | pg/l | 0.01 U | 0.032 J | 0.01 J | 0.03 J | 0.021 J | 0.022 J |
| 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin | N | pg/l | 0.007 J | 0.02 J | 0.009 U | 0.02 U | 0.016 J | 0.018 J |
| 1,2,3,6,7,8-Hexachlorodibenzofuran | N | pg/l | 0.008 J | 0.02 J | 0.009 U | 0.023 J | 0.016 J | 0.014 J |
| 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin | N | pg/l | 0.02 J | 0.086 | 0.021 J | 0.083 | 0.032 J | 0.077 J |
| 1,2,3,7,8,9-Hexachlorodibenzofuran | N | pg/l | 0.0116 U | 0.002 U | 0.002 J | 0.004 U | 0.009 U | 0.003 U |
| 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin | N | pg/l | 0.012 U | 0.058 J | 0.016 J | 0.062 J | 0.024 J | 0.052 J |
| 1,2,3,7,8-Pentachlorodibenzofuran | N | pg/l | 0.002 U | 0.009 J | 0.002 J | 0.007 U | 0.01 J | 0.007 J |
| 1,2,3,7,8-Pentachlorodibenzo-p-dioxin | N | pg/l | 0.005 J | 0.011 J | 0.004 J | 0.015 J | 0.012 U | 0.011 U |
| 2,3,4,6,7,8-Hexachlorodibenzofuran | N | pg/l | 0.002 U | 0.012 U | 0.003 J | 0.016 J | 0.011 J | 0.01 U |
| 2,3,4,7,8-Pentachlorodibenzofuran | N | pg/l | 0.005 J | 0.013 U | 0.005 U | 0.01 U | 0.012 U | 0.008 U |
| 2,3,7,8-Tetrachlorodibenzofuran | N | pg/l | 0.003 U | 0.014 U | 0.003 J | 0.012 J | 0.007 U | 0.01 J |
| 2,3,7,8-Tetrachlorodibenzo-p-dioxin | N | pg/l | 0.003 U | 0.007 U | 0.004 U | 0.007 J | 0.005 U | 0.007 U |
| Dioxin/furan TCDD toxicity equivalent | N | pg/l | 0.0155 T | 0.065 T | 0.0144 T | 0.0719 T | 0.0179 T | 0.0414 T |
| Dioxin-like PCB congener TCDD toxicity equivalent | N | pg/l | 0.000263 T | 0.00125 T | 0.000309 T | 0.00131 T | 0.000274 T | 0.000799 T |
| Total TCDD toxicity equivalent | N | pg/l | 0.0157 T | 0.0663 T | 0.0147 T | 0.0733 T | 0.0182 T | 0.0422 T |
| **PAHs** | | | | | | | | |
| 2-Methylnaphthalene | N | ng/l | 8.72 | 0.248 U | 4.16 | 0.353 U | 3.93 | 0.256 U |
| Acenaphthene | N | ng/l | 3.42 | 0.113 J | 0.505 | 0.038 J | 0.374 J | 0.029 J |
| Acenaphthylene | N | ng/l | 1.22 | 0.214 U | 0.482 | 0.156 U | 0.471 | 0.093 U |
| Anthracene | N | ng/l | 1.08 U | 0.375 U | 0.555 U | 0.191 U | 0.575 | 0.143 U |
| Benzo(a)anthracene | N | ng/l | 0.112 J | 0.735 | 0.048 J | 0.339 J | 0.034 J | 0.232 J |
| Benzo(a)pyrene | N | ng/l | 0.061 J | 0.822 | 0.035 J | 0.381 J | 0.0795 U | 0.246 J |
| Benzo(b+j)fluoranthene | N | ng/l | 0.056 J | 0.772 | 0.036 J | 0.462 | 0.033 J | 0.347 J |
| Benzo(g,h,i)perylene | N | ng/l | 0.05 J | 0.857 | 0.155 U | 0.536 | 0.033 J | 0.332 J |
| Benzo(k)fluoranthene | N | ng/l | 0.046 J | 0.545 | 0.033 J | 0.329 J | 0.031 J | 0.214 J |
| Chrysene | N | ng/l | 0.204 J | 1.15 | 0.123 J | 0.655 | 0.11 J | 0.496 |
| Dibenzo(a,h)anthracene | N | ng/l | 0.216 J | 0.113 J | 0.325 U | 0.072 U | 0.293 U | 0.047 U |
| Fluoranthene | N | ng/l | 1.65 | 1.77 | 0.573 | 0.91 | 0.452 | 0.683 |
| Fluorene | N | ng/l | 2.8 | 0.118 J | 1.28 | 0.072 U | 1.18 | 0.061 J |
| High Molecular Weight PAH | N | ng/l | 4.39 JT | 8.97 JT | 1.39 JT | 4.67 JT | 1.12 JT | 3.24 JT |
| Indeno(1,2,3-cd)pyrene | N | ng/l | 0.054 U | 0.689 U | 0.172 U | 0.382 U | 0.036 U | 0.244 U |
| Low Molecular Weight PAH | N | ng/l | 43.9 T | 2.1 JT | 25 T | 1.89 JT | 23.5 JT | 0.793 JT |
| Naphthalene | N | ng/l | 22.9 | 0.785 | 16.6 | 1.02 | 14.8 | 0.721 U |
| Phenanthrene | N | ng/l | 4.88 | 1.08 | 1.93 | 0.832 | 2.16 | 0.703 |
| Polycyclic Aromatic Hydrocarbons | N | ng/l | 48.3 JT | 11.1 JT | 26.4 JT | 6.56 JT | 24.6 JT | 4.04 JT |
| Pyrene | N | ng/l | 1.99 | 2.21 | 0.545 | 1.06 | 0.429 | 0.693 |
| **PCB Congeners** | | | | | | | | |
| PCB001 | N | pg/l | 0.625 U | 0.092 J | 0.529 U | 0.093 U | 0.559 U | 0.077 J |
| PCB002 | N | pg/l | 0.265 J | 0.114 | 0.218 U | 0.161 J | 0.25 U | 0.132 |
| PCB003 | N | pg/l | 0.366 U | 0.168 | 0.316 U | 0.244 J | 0.411 U | 0.308 |
| PCB004 | N | pg/l | 2.7 U | 0.3 | 1.84 | 0.195 J | 1.5 U | 0.138 |
| PCB005 | N | pg/l | 0.443 U | 0.162 U | 0.031 J | 0.473 U | 0.471 U | 0.142 U |
| PCB006 | N | pg/l | 0.476 U | 0.106 J | 0.354 | 0.092 U | 0.373 U | 0.065 U |
| PCB007 | N | pg/l | 0.116 U | 3.16 U | 0.11 U | 9.19 U | 9.16 U | 2.76 U |
| PCB008 | N | pg/l | 1.9 U | 0.377 | 1.31 | 0.341 | 1.35 U | 0.247 |
| PCB009 | N | pg/l | 0.377 U | 0.138 U | 0.094 | 0.402 U | 0.401 U | 0.121 U |
| PCB010 | N | pg/l | 0.547 U | 0.2 U | 0.066 | 0.583 U | 0.581 U | 0.175 U |
| PCB011 | N | pg/l | 1.97 U | 1.77 | 2.1 | 2.06 U | 1.83 U | 2.92 U |
| PCB012 & 013 | N | pg/l | 0.217 U | 0.174 J | 0.258 | 0.211 J | 0.578 U | 0.266 |
| PCB014 | N | pg/l | 0.385 U | 0.141 U | 0.041 U | 0.411 U | 0.41 U | 0.123 U |
| PCB015 | N | pg/l | 0.698 U | 0.556 | 0.686 U | 0.532 | 0.543 U | 0.408 |
| PCB016 | N | pg/l | 1.23 U | 0.318 | 0.744 | 0.255 U | 0.955 U | 0.163 |
| PCB017 | N | pg/l | 1.89 | 0.452 | 1.13 | 0.359 | 1.19 | 0.228 |
| PCB018 & 030 | N | pg/l | 3.29 | 0.793 | 2.06 | 0.772 | 2.48 | 0.411 |
| PCB019 | N | pg/l | 1.31 | 0.234 | 0.574 | 0.108 U | 0.505 | 0.064 J |

Table 4-3. January 2006 Surface Water Data Results - XAD Sample Collection.

| Chemical Name | Total/ Dissolved | Sample ID Unit | LW3-W1005 C | LW3-W1005 F | LW3-W1023 C | LW3-W1023 F | LW3-W1024 C | LW3-W1024 F |
|---|---|---|---|---|---|---|---|---|
| PCB020 & 028 | N | pg/l | 3.42 | 2.23 | 2.99 | 2.18 | 2.61 | 1.27 |
| PCB021 & 033 | N | pg/l | 1.2 | 0.725 | 0.875 | 0.627 J | 0.79 U | 0.366 |
| PCB022 | N | pg/l | 0.967 | 0.562 | 0.863 | 0.561 | 0.782 | 0.365 |
| PCB023 | N | pg/l | 0.294 U | 0.108 U | 0.009 J | 0.314 U | 0.313 U | 0.0942 U |
| PCB024 | N | pg/l | 0.057 U | 0.142 U | 0.032 J | 0.413 U | 0.044 J | 0.006 U |
| PCB025 | N | pg/l | 0.346 U | 0.192 | 0.263 | 0.185 J | 0.23 U | 0.1 |
| PCB026 & 029 | N | pg/l | 0.665 | 0.346 | 0.58 | 0.344 J | 0.48 J | 0.199 |
| PCB027 | N | pg/l | 0.371 | 0.088 J | 0.203 | 0.045 J | 0.267 J | 0.037 J |
| PCB031 | N | pg/l | 2.7 | 1.71 | 2.37 | 1.52 | 1.92 | 0.956 |
| PCB032 | N | pg/l | 1.01 | 0.255 | 0.791 | 0.224 J | 0.78 | 0.132 |
| PCB034 | N | pg/l | 0.04 U | 0.02 J | 0.03 J | 0.541 U | 0.03 U | 0.011 U |
| PCB035 | N | pg/l | 0.053 U | 0.063 J | 0.079 | 0.31 U | 0.074 U | 0.053 U |
| PCB036 | N | pg/l | 0.197 U | 0.012 J | 0.01 J | 0.21 U | 0.21 U | 0.014 U |
| PCB037 | N | pg/l | 0.422 | 0.775 | 0.363 | 0.777 | 0.349 | 0.482 |
| PCB038 | N | pg/l | 0.304 U | 0.112 U | 0.005 U | 0.325 U | 0.324 U | 0.0974 U |
| PCB039 | N | pg/l | 0.05 U | 0.026 U | 0.04 U | 0.24 U | 0.036 U | 0.015 J |
| PCB040 & 041 & 071 | N | pg/l | 1.68 | 1.38 | 1.44 | 1.34 | 1.24 | 0.779 |
| PCB042 | N | pg/l | 0.848 | 0.784 | 0.731 | 0.822 | 0.611 | 0.46 |
| PCB043 | N | pg/l | 0.14 | 0.082 J | 0.12 | 0.096 J | 0.115 | 0.051 U |
| PCB044 & 047 & 065 | N | pg/l | 4.16 | 3.06 | 3.26 | 2.95 | 2.78 | 1.67 |
| PCB045 & 051 | N | pg/l | 0.872 | 0.459 | 0.62 | 0.373 | 0.586 | 0.193 J |
| PCB046 | N | pg/l | 0.24 | 0.128 | 0.21 | 0.117 | 0.196 | 0.077 J |
| PCB048 | N | pg/l | 0.632 | 0.443 | 0.555 | 0.46 | 0.503 | 0.269 |
| PCB049 & 069 | N | pg/l | 2.78 | 2.19 | 2.2 | 2.14 | 1.82 | 1.19 |
| PCB050 & 053 | N | pg/l | 0.863 | 0.458 | 0.556 | 0.311 | 0.504 | 0.174 J |
| PCB052 | N | pg/l | 5 | 3.5 | 4.13 | 3.56 | 3.47 | 2.09 |
| PCB054 | N | pg/l | 0.114 | 0.06 J | 0.019 U | 0.007 U | 0.018 J | 0.007 J |
| PCB055 | N | pg/l | 0.0443 U | 0.048 J | 0.0472 U | 0.033 J | 0.0471 U | 0.024 J |
| PCB056 | N | pg/l | 0.939 | 1.48 | 0.787 | 1.51 | 0.664 | 0.896 |
| PCB057 | N | pg/l | 0.0827 U | 0.303 U | 0.088 U | 0.264 U | 0.0879 U | 0.265 U |
| PCB058 | N | pg/l | 0.161 U | 0.588 U | 0.012 J | 0.513 U | 0.171 U | 0.012 U |
| PCB059 & 062 & 075 | N | pg/l | 0.307 | 0.254 J | 0.256 | 0.256 J | 0.23 | 0.145 J |
| PCB060 | N | pg/l | 0.265 | 0.427 | 0.251 | 0.498 | 0.237 | 0.278 |
| PCB061 & 070 & 074 & 076 | N | pg/l | 4.22 | 5.63 | 3.45 | 6.27 | 2.75 | 3.56 |
| PCB063 | N | pg/l | 0.095 | 0.117 | 0.073 | 0.121 | 0.058 | 0.07 J |
| PCB064 | N | pg/l | 1.39 | 1.2 | 1.19 | 1.26 | 1.05 | 0.759 |
| PCB066 | N | pg/l | 2.21 | 3.39 | 1.79 | 3.82 | 1.46 | 2.14 |
| PCB067 | N | pg/l | 0.062 | 0.075 J | 0.041 | 0.073 J | 0.04 | 0.042 U |
| PCB068 | N | pg/l | 0.055 U | 0.054 J | 0.041 U | 0.059 J | 0.028 U | 0.03 U |
| PCB072 | N | pg/l | 0.046 | 0.065 J | 0.033 | 0.059 J | 0.023 J | 0.039 J |
| PCB073 | N | pg/l | 0.0813 U | 0.298 U | 0.0866 U | 0.26 U | 0.0865 U | 0.26 U |
| PCB077 | N | pg/l | 0.122 | 0.445 | 0.109 | 0.489 | 0.109 | 0.291 |
| PCB078 | N | pg/l | 0.0401 U | 0.147 U | 0.0427 U | 0.128 U | 0.0426 U | 0.128 U |
| PCB079 | N | pg/l | 0.036 | 0.068 J | 0.025 J | 0.057 J | 0.015 U | 0.044 J |
| PCB080 | N | pg/l | 0.0518 U | 0.19 U | 0.0551 U | 0.166 U | 0.0551 U | 0.166 U |
| PCB081 | N | pg/l | 0.0628 U | 0.032 U | 0.0669 U | 0.201 U | 0.0668 U | 0.022 U |
| PCB082 | N | pg/l | 0.265 J | 0.562 U | 0.261 J | 0.541 | 0.281 J | 0.216 J |
| PCB083 & 099 | N | pg/l | 1.71 | 3.27 | 1.48 | 3.14 | 1.19 | 1.86 |
| PCB084 | N | pg/l | 0.754 | 1.11 | 0.718 | 1.1 | 0.578 | 0.613 |
| PCB085 & 116 & 117 | N | pg/l | 0.468 | 0.965 | 0.43 | 1.02 | 0.344 | 0.637 |
| PCB086 & 087 & 097 & 108 & 119 & 125 | N | pg/l | 1.6 | 3.03 | 1.46 | 3.15 | 1.17 | 1.88 |
| PCB088 & 091 | N | pg/l | 0.519 | 0.781 | 0.428 | 0.73 | 0.328 | 0.408 |
| PCB089 | N | pg/l | 0.034 | 0.056 J | 0.035 | 0.052 U | 0.03 U | 0.039 U |
| PCB090 & 101 & 113 | N | pg/l | 2.7 | 5.05 | 2.35 | 4.92 | 1.87 | 3.06 |
| PCB092 | N | pg/l | 0.54 | 1.02 | 0.454 | 0.885 | 0.376 | 0.574 |
| PCB093 & 095 & 098 & 100 & 102 | N | pg/l | 2.78 | 3.62 | 2.34 | 3.37 | 1.88 | 2.1 |
| PCB094 | N | pg/l | 0.036 U | 0.045 U | 0.017 J | 0.026 U | 0.013 U | 0.015 J |
| PCB096 | N | pg/l | 0.04 | 0.04 J | 0.026 J | 0.034 J | 0.023 J | 0.022 J |
| PCB103 | N | pg/l | 0.064 | 0.098 U | 0.032 J | 0.044 J | 0.026 U | 0.027 U |
| PCB104 | N | pg/l | 0.007 J | 0.006 J | 0.003 J | 0.563 U | 0.007 U | 0.003 U |
| PCB105 | N | pg/l | 0.598 | 1.94 | 0.569 | 2.22 | 0.485 | 1.35 |
| PCB106 | N | pg/l | 0.177 U | 0.648 U | 0.188 U | 0.566 U | 0.188 U | 0.566 U |
| PCB107 & 124 | N | pg/l | 0.074 | 0.198 J | 0.07 | 0.213 | 0.061 U | 0.146 U |
| PCB109 | N | pg/l | 0.154 | 0.47 | 0.127 | 0.423 | 0.102 | 0.273 |
| PCB110 & 115 | N | pg/l | 2.89 | 5.83 | 2.68 | 6 | 2.14 | 3.75 |
| PCB111 | N | pg/l | 0.0784 U | 0.01 U | 0.004 U | 0.251 U | 0.0834 U | 0.251 U |
| PCB112 | N | pg/l | 0.0324 U | 0.119 U | 0.0345 U | 0.104 U | 0.0344 U | 0.104 U |
| PCB114 | N | pg/l | 0.03 J | 0.104 U | 0.032 U | 0.096 U | 0.029 U | 0.056 U |
| PCB118 | N | pg/l | 1.72 | 5.21 | 1.57 | 5.42 | 1.3 | 3.28 |
| PCB120 | N | pg/l | 0.014 J | 0.032 J | 0.009 J | 0.028 J | 0.006 U | 0.017 J |
| PCB121 | N | pg/l | 0.005 U | 0.245 U | 0.003 U | 0.214 U | 0.0711 U | 0.214 U |
| PCB122 | N | pg/l | 0.018 U | 0.072 J | 0.015 J | 0.067 U | 0.015 U | 0.041 J |
| PCB123 | N | pg/l | 0.036 | 0.102 J | 0.036 | 0.121 | 0.043 | 0.08 U |
| PCB126 | N | pg/l | 0.0478 U | 0.036 U | 0.008 U | 0.043 U | 0.0508 U | 0.032 U |
| PCB127 | N | pg/l | 0.0494 U | 0.181 U | 0.0526 U | 0.158 U | 0.0526 U | 0.158 U |
| PCB128 & 166 | N | pg/l | 0.304 J | 1.21 | 0.253 | 1.26 | 0.237 | 0.815 |
| PCB129 & 138 & 160 & 163 | N | pg/l | 2.34 | 8.25 | 2.07 | 7.97 | 1.96 | 5.33 |
| PCB130 | N | pg/l | 0.165 U | 0.523 | 0.114 | 0.447 | 0.095 | 0.29 |
| PCB131 | N | pg/l | 0.826 U | 0.068 J | 0.021 U | 0.067 U | 0.014 U | 0.035 J |

Table 4-3. January 2006 Surface Water Data Results - XAD Sample Collection.

| Chemical Name | Total/ Dissolved | Sample ID Unit | LW3-W1005 C | LW3-W1005 F | LW3-W1023 C | LW3-W1023 F | LW3-W1024 C | LW3-W1024 F |
|---|---|---|---|---|---|---|---|---|
| PCB132 | N | pg/l | 0.606 U | 2.18 | 0.574 | 1.96 | 0.506 | 1.22 |
| PCB133 | N | pg/l | 1.09 U | 0.168 | 0.033 | 0.106 | 0.028 J | 0.073 J |
| PCB134 & 143 | N | pg/l | 0.105 U | 0.347 | 0.1 | 0.273 | 0.078 | 0.151 U |
| PCB135 & 151 & 154 | N | pg/l | 0.993 | 2.56 | 0.654 | 1.95 | 0.544 | 1.24 |
| PCB136 | N | pg/l | 0.288 J | 0.805 | 0.216 | 0.573 | 0.178 | 0.367 |
| PCB137 | N | pg/l | 0.102 U | 0.301 | 0.083 | 0.31 | 0.076 | 0.195 |
| PCB139 & 140 | N | pg/l | 0.416 U | 0.122 J | 0.033 U | 0.103 J | 0.023 J | 0.072 J |
| PCB141 | N | pg/l | 0.434 | 1.37 | 0.293 | 1.16 | 0.241 | 0.783 |
| PCB142 | N | pg/l | 0.456 U | 0.167 U | 0.0486 U | 0.146 U | 0.0485 U | 0.146 U |
| PCB144 | N | pg/l | 0.101 U | 0.297 | 0.074 U | 0.22 | 0.072 | 0.147 |
| PCB145 | N | pg/l | 0.616 U | 0.226 U | 0.0656 U | 0.197 U | 0.0655 U | 0.197 U |
| PCB146 | N | pg/l | 0.388 U | 1.41 | 0.308 | 1.09 | 0.26 | 0.692 |
| PCB147 & 149 | N | pg/l | 2 | 5.45 | 1.56 | 4.56 | 1.39 | 2.87 |
| PCB148 | N | pg/l | 0.411 U | 0.032 J | 0.003 U | 0.01 U | 0.002 U | 0.131 UJ |
| PCB150 | N | pg/l | 0.023 U | 0.024 U | 0.004 J | 0.007 J | 0.003 U | 0.007 J |
| PCB152 | N | pg/l | 0.507 U | 0.186 U | 0.002 U | 0.162 U | 0.002 U | 0.004 U |
| PCB153 & 168 | N | pg/l | 2.17 | 7.62 | 1.82 | 6.54 | 1.58 | 4.3 |
| PCB155 | N | pg/l | 0.784 U | 0.287 U | 0.004 J | 0.251 U | 0.007 U | 0.251 U |
| PCB156 & 157 | N | pg/l | 0.21 U | 0.932 | 0.16 | 0.964 | 0.16 | 0.597 |
| PCB158 | N | pg/l | 0.192 U | 0.675 | 0.159 | 0.656 | 0.14 | 0.42 |
| PCB159 | N | pg/l | 0.429 U | 0.097 J | 0.015 J | 0.081 J | 0.014 U | 0.052 J |
| PCB161 | N | pg/l | 0.781 U | 0.286 U | 0.0831 U | 0.25 U | 0.083 U | 0.25 U |
| PCB162 | N | pg/l | 0.693 U | 0.026 J | 0.007 U | 0.222 U | 0.0737 U | 0.02 U |
| PCB164 | N | pg/l | 0.176 U | 0.606 | 0.135 | 0.55 | 0.121 | 0.362 |
| PCB165 | N | pg/l | 0.795 U | 0.291 U | 0.0847 U | 0.254 U | 0.0845 U | 0.254 U |
| PCB167 | N | pg/l | 0.06 U | 0.35 | 0.06 | 0.347 | 0.059 | 0.221 |
| PCB169 | N | pg/l | 0.505 U | 0.019 U | 0.0538 U | 0.162 U | 0.0537 U | 0.012 U |
| PCB170 | N | pg/l | 0.281 | 2.13 | 0.237 | 1.83 | 0.23 | 1.18 |
| PCB171 & 173 | N | pg/l | 0.106 | 0.652 J | 0.081 | 0.608 J | 0.095 | 0.339 |
| PCB172 | N | pg/l | 0.063 | 0.411 | 0.056 U | 0.362 U | 0.062 | 0.23 |
| PCB174 | N | pg/l | 0.397 | 2.24 | 0.324 | 1.95 | 0.325 | 1.21 |
| PCB175 | N | pg/l | 0.015 J | 0.111 U | 0.014 U | 0.076 J | 0.014 U | 0.044 J |
| PCB176 | N | pg/l | 0.047 | 0.269 J | 0.041 | 0.214 U | 0.037 | 0.127 |
| PCB177 | N | pg/l | 0.224 | 1.38 | 0.18 | 1.19 | 0.198 | 0.755 |
| PCB178 | N | pg/l | 0.11 | 0.573 U | 0.092 | 0.526 U | 0.086 | 0.289 |
| PCB179 | N | pg/l | 0.186 | 1.03 | 0.149 | 0.821 | 0.147 | 0.474 |
| PCB180 & 193 | N | pg/l | 0.745 U | 4.92 | 0.619 U | 4.24 | 0.639 U | 2.58 |
| PCB181 | N | pg/l | 0.003 U | 1.21 U | 0.004 U | 0.017 U | 0.105 U | 0.317 U |
| PCB182 | N | pg/l | 0.004 U | 0.031 U | 0.004 U | 0.013 U | 0.011 J | 0.014 U |
| PCB183 & 185 | N | pg/l | 0.255 | 1.55 | 0.214 U | 1.4 | 0.22 U | 0.804 |
| PCB184 | N | pg/l | 0.002 U | 0.006 U | 0.0422 U | 0.007 U | 0.002 U | 0.127 U |
| PCB186 | N | pg/l | 0.0836 U | 1.02 U | 0.0891 U | 0.892 U | 0.089 U | 0.268 U |
| PCB187 | N | pg/l | 0.653 | 3.28 | 0.543 U | 2.92 | 0.555 U | 1.68 |
| PCB188 | N | pg/l | 0.002 U | 0.105 U | 0.002 J | 0.0913 U | 0.008 J | 0.0913 U |
| PCB189 | N | pg/l | 0.011 U | 0.096 J | 0.014 U | 0.083 U | 0.017 U | 0.057 J |
| PCB190 | N | pg/l | 0.068 | 0.49 | 0.057 | 0.407 | 0.058 | 0.276 |
| PCB191 | N | pg/l | 0.012 J | 0.094 J | 0.015 J | 0.075 U | 0.01 U | 0.049 J |
| PCB192 | N | pg/l | 0.0708 U | 0.865 U | 0.0754 U | 0.002 U | 0.0753 U | 0.003 U |
| PCB194 | N | pg/l | 0.164 U | 1.31 | 0.153 U | 1.17 | 0.127 U | 0.654 |
| PCB195 | N | pg/l | 0.081 U | 0.528 | 0.075 U | 0.478 | 0.054 U | 0.282 |
| PCB196 | N | pg/l | 0.136 U | 0.636 | 0.124 U | 0.627 | 0.108 U | 0.311 |
| PCB197 & 200 | N | pg/l | 0.062 U | 0.241 U | 0.067 U | 0.251 | 0.055 U | 0.129 J |
| PCB198 & 199 | N | pg/l | 0.375 U | 1.84 | 0.387 U | 1.78 | 0.339 U | 0.946 |
| PCB201 | N | pg/l | 0.063 U | 0.2 | 0.07 U | 0.192 U | 0.073 U | 0.107 |
| PCB202 | N | pg/l | 0.104 U | 0.453 | 0.126 U | 0.414 | 0.129 U | 0.232 U |
| PCB203 | N | pg/l | 0.247 U | 1.1 | 0.266 U | 1.02 | 0.231 U | 0.584 |
| PCB204 | N | pg/l | 0.0932 U | 0.004 U | 0.0993 U | 0.298 U | 0.0991 U | 0.002 U |
| PCB205 | N | pg/l | 0.012 J | 0.067 U | 0.012 U | 0.067 J | 0.017 U | 0.03 J |
| PCB206 | N | pg/l | 0.172 | 1.31 | 0.209 | 1.44 | 0.161 | 0.666 |
| PCB207 | N | pg/l | 0.043 U | 0.141 | 0.045 U | 0.127 | 0.041 U | 0.089 J |
| PCB208 | N | pg/l | 0.102 U | 0.546 | 0.126 | 0.574 | 0.11 U | 0.303 |
| PCB209 | N | pg/l | 0.301 | 2.65 | 0.292 | 3.29 | 0.23 | 2.01 |
| Polychlorinated biphenyls | N | pg/l | 84.9 | 136 | 71.8 | 127 | 62.2 | 77.9 |
| **PCB Homologs** | | | | | | | | |
| Dichlorobiphenyl homologs | N | pg/l | 7.74 | 3.29 | 6.85 | 1.28 | 5.23 | 1.06 |
| Heptachlorobiphenyl homologs | N | pg/l | 3.16 | 18.5 | 2.55 | 15.4 | 2.67 | 10.1 |
| Hexachlorobiphenyl homologs | N | pg/l | 8.54 | 35.4 | 8.62 | 31.1 | 7.75 | 20.1 |
| Monochlorobiphenyl homologs | N | pg/l | 1.26 | 0.374 | 1.06 | 0.405 | 0.97 | 0.517 |
| Nonachlorobiphenyl homologs | N | pg/l | 0.215 | 2 | 0.38 | 2.14 | 0.271 | 1.06 |
| Octachlorobiphenyl homologs | N | pg/l | 1.11 | 6.06 | 1.05 | 5.8 | 1.06 | 3.04 |
| Pentachlorobiphenyl homologs | N | pg/l | 17 | 32.8 | 15.1 | 33.4 | 12.1 | 20.1 |
| Tetrachlorobiphenyl homologs | N | pg/l | 27.1 | 25.8 | 21.9 | 26.7 | 18.5 | 15.1 |
| Trichlorobiphenyl homologs | N | pg/l | 18.5 | 8.77 | 14 | 7.59 | 13.4 | 4.79 |
| **Pesticides** | | | | | | | | |
| 2,4'-DDD | N | ng/l | 0.00444 J | 0.00497 J | 0.00368 J | 0.0041 J | 0.00362 J | 0.00321 J |
| 2,4'-DDE | N | ng/l | 0.00114 J | 0.00247 J | 0.0012 J | 0.00191 J | 0.00113 J | 0.00172 J |
| 2,4'-DDT | N | ng/l | 0.00899 J | 0.0118 J | 0.00733 J | 0.0134 J | 0.00731 J | 0.0104 J |
| 4,4'-DDD | N | ng/l | 0.0168 J | 0.0404 | 0.0138 J | 0.0315 J | 0.0121 J | 0.0272 J |
| 4,4'-DDE | N | ng/l | 0.0642 | 0.137 | 0.058 | 0.127 | 0.0608 | 0.121 |

Table 4-3. January 2006 Surface Water Data Results - XAD Sample Collection.

| Chemical Name | Total/ Dissolved | Sample ID Unit | LW3-W1005 C | LW3-W1005 F | LW3-W1023 C | LW3-W1023 F | LW3-W1024 C | LW3-W1024 F |
|---|---|---|---|---|---|---|---|---|
| 4,4'-DDT | N | ng/l | 0.079 | 0.227 | 0.0709 | 0.251 | 0.0649 | 0.198 |
| Aldrin | N | ng/l | 0.00186 J | 0.00175 J | 0.00192 J | 0.00197 J | 0.00194 J | 0.00125 J |
| alpha-Endosulfan | N | ng/l | 0.0201 J | 0.000627 U | 0.0124 U | 0.0012 J | 0.0144 U | 0.00451 U |
| alpha-Hexachlorocyclohexane | N | ng/l | 0.0249 J | 0.000168 U | 0.0284 J | 0.00018 U | 0.0254 J | 0.000278 U |
| beta-Endosulfan | N | ng/l | 0.0913 | R | 0.0835 | R | 0.0767 | R |
| beta-Hexachlorocyclohexane | N | ng/l | 0.00259 J | 0.00797 U | 0.00346 U | 0.000107 U | 0.00381 J | 0.000312 U |
| cis-Chlordane | N | ng/l | 0.0149 J | 0.00715 J | 0.0167 J | 0.00799 J | 0.0172 J | 0.00753 J |
| cis-Nonachlor | N | ng/l | 0.00376 J | 0.00354 J | 0.00382 J | 0.00347 J | 0.00406 J | 0.00353 J |
| delta-Hexachlorocyclohexane | N | ng/l | 0.000877 J | 0.00286 U | 0.00117 U | 0.00303 U | 0.0011 U | 0.00302 U |
| Dieldrin | N | ng/l | 0.33 | 0.0537 | 0.302 | 0.051 | 0.27 | 0.0461 |
| Endosulfan sulfate | N | ng/l | 0.581 | 0.0124 J | 0.544 | 0.0198 J | 0.488 | 0.0136 J |
| Endrin | N | ng/l | 0.000981 U | R | 0.000785 U | R | 0.000969 U | 0.000149 J |
| Endrin aldehyde | N | ng/l | 0.000061 U | R | 0.0324 U | R | 0.0323 U | R |
| Endrin ketone | N | ng/l | 0.00322 J | 0.000354 J | 0.00294 J | 0.00027 J | 0.00315 J | 0.000155 J |
| gamma-Hexachlorocyclohexane | N | ng/l | 0.0185 J | 0.000394 U | 0.0194 J | 0.000237 U | 0.018 J | 0.000205 J |
| Heptachlor | N | ng/l | 0.000726 U | 0.000152 J | 0.000686 U | 0.000202 U | 0.00102 J | 0.00371 U |
| Heptachlor epoxide | N | ng/l | 0.0212 J | 0.00185 J | 0.0227 J | 0.0018 J | 0.0225 J | 0.00182 J |
| Methoxychlor | N | ng/l | 0.00434 U | 0.00366 J | 0.00327 U | 0.00484 J | 0.00278 U | 0.00329 J |
| Oxychlordane | N | ng/l | 0.00371 J | 0.000955 U | 0.0038 J | 0.00126 U | 0.00356 J | 0.000749 U |
| Total Chlordanes | N | ng/l | 0.0436 JT | 0.0258 JT | 0.0457 JT | 0.0275 JT | 0.0474 JT | 0.0253 JT |
| Total of 2,4' and 4,4'-DDD | N | ng/l | 0.0212 JT | 0.0454 JT | 0.0175 JT | 0.0356 JT | 0.0157 JT | 0.0304 JT |
| Total of 2,4' and 4,4'-DDD, -DDE, -DDT | N | ng/l | 0.175 JT | 0.424 JT | 0.155 JT | 0.429 JT | 0.15 JT | 0.362 JT |
| Total of 2,4' and 4,4'-DDE | N | ng/l | 0.0653 JT | 0.139 JT | 0.0592 JT | 0.129 JT | 0.0619 JT | 0.123 JT |
| Total of 2,4' and 4,4'-DDT | N | ng/l | 0.088 JT | 0.239 JT | 0.0782 JT | 0.264 JT | 0.0722 JT | 0.208 JT |
| Total of 4,4'-DDD, -DDE, -DDT | N | ng/l | 0.16 JT | 0.404 T | 0.143 JT | 0.41 JT | 0.138 JT | 0.346 JT |
| trans-Chlordane | N | ng/l | 0.0091 J | 0.00553 J | 0.00944 J | 0.00606 J | 0.0101 J | 0.00489 J |
| trans-Nonachlor | N | ng/l | 0.0121 J | 0.00953 J | 0.0119 J | 0.01 J | 0.0125 J | 0.00937 J |
| **SVOCs** | | | | | | | | |
| Hexachlorobenzene | N | ng/l | 0.0186 J | 0.00871 J | 0.019 J | 0.0107 J | 0.0161 J | 0.00719 J |
| Hexachlorobutadiene | N | ng/l | 0.00111 U | 0.000446 UJ | R | 0.000548 UJ | 0.00104 UJ | 0.00043 J |

T = total
D = dissolved
N = not applicable

# PORTLAND HARBOR RI/FS
# ROUND 3A JANUARY 2006 HIGH FLOW SURFACE WATER DATA REPORT

## APPENDIX A
## DATA QUALITY SUMMARY

**DRAFT**

**DO NOT QUOTE OR CITE**
This document is currently under review by US EPA and its federal, state, and tribal partners, and is subject to change in whole or in part.

October 20, 2006

**Prepared for**

The Lower Willamette Group

**Prepared by**

Integral Consulting Inc.

# TABLE OF CONTENTS

TABLE OF CONTENTS ..... i
LIST OF TABLES ..... ii
LIST OF ACRONYMS ..... iii
1.0 INTRODUCTION ..... 1
2.0 DATA QUALITY AND USABILITY ..... 2
2.1 Data Validation ..... 2
2.2 Data Quality ..... 3
2.2.1 Reported Detection Limits ..... 3
2.2.2 Field Quality Control Samples ..... 4
2.2.3 Summary of Qualified Data ..... 5
3.0 REFERENCES ..... 6

# LIST OF TABLES

Table A-1. Laboratory Methods for January 2006 High-Flow Surface Water Samples
Table A-2. Percent Completeness by Parameter Group
Table A-3. Laboratory Surrogate Control Limits for R3A Surface Water
Table A-4. Laboratory Control Limits for Surface Water Matrix Spike, Laboratory Control Samples, and Ongoing Precision and Recovery
Table A-5. Data Validation Qualifiers and Definitions
Table A-6. Summary of Qualified Data by Parameter Group for R3A Surface Water Samples
Table A-7. Reported Detection Limits for the January 2006 Surface Water Sampling Event
Table A-8 Results for Surface Water Field Replicate Samples

# LIST OF ACRONYMS

| | |
|---|---|
| CAS | Columbia Analytical Services |
| CLP | Contract Laboratory Program |
| DQO | data quality objectives |
| EPA | U.S. Environmental Protection Agency |
| FSP | field sampling plan |
| ICP | inductively coupled plasma |
| LCS/LCSD | laboratory control sample/laboratory control sample duplicate |
| MDL | method detection limit |
| MRL | method reporting limit |
| MS/MSD | matrix spike/matrix spike duplicate |
| OPR | ongoing precision and recovery |
| PAH | polycyclic aromatic hydrocarbon |
| PARCC | precision, accuracy, representativeness, completeness, comparability |
| PCB | polychlorinated biphenyl |
| PCDD/F | polychlorinated dibenzo-p-dioxin/furans |
| QA | quality assurance |
| QAPP | quality assurance project plan |
| QC | quality control |
| RI/FS | remedial investigation and feasibility study |
| RPD | relative percent difference |
| SOP | standard operating procedure |
| SVOC | semivolatile organic compounds |

# 1.0 INTRODUCTION

This report summarizes the data quality of surface water samples collected during the January High Flow 2006 event, Round 3A of the Portland Harbor Remedial Investigation and Feasibility Study (RI/FS). This high-flow event, described in the Addendum to the Round 2A Surface Water Field Sampling Plan (FSP; Integral 2006), is the first Round 3A surface water sampling event. Samples were collected and analyzed for organic, inorganic, and conventional parameters according to the sample preparation and analytical procedures specified in the Round 2A Field Sampling Plan: Surface Water Sampling (Integral 2004a), hereafter referred to as the Surface Water FSP; the Addendum to Round 2A Field Sampling Plan Surface Water Sampling (Integral 2006), the Round 2 Quality Assurance Project Plan (QAPP; Integral and Windward 2004); and the Round 2 Quality Assurance Project Plan Addendum 1: Surface Water (Integral 2004b).

The laboratory methods of analysis for the surface water samples are included in Table A-1. All surface water samples collected by peristaltic pump were analyzed for conventionals, metals, butyltins, chlorinated herbicides, semivolatile organic compounds (SVOCs), phenols, phthalate esters, and polycyclic aromatic hydrocarbons (PAHs). All surface water samples collected by the XAD system were analyzed for organochlorine pesticides, PAHs, polychlorinated dibenzo-p-dioxins and furans (PCDD/Fs), and polychlorinated biphenyl (PCB) congeners. Chemical analyses of surface water samples were completed by two laboratories:

- Axys Analytical (Axys; Sidney, BC, Canada) prepared XAD extracts and completed analyses for pesticides, PAHs, dioxins and furans, and PCB congeners in XAD extracts.
- Columbia Analytical Services (CAS; Kelso, WA) completed all other analyses on bulk water samples (i.e., conventional analyses, metals, butyltin compounds, chlorinated herbicides, and SVOCs).

The sample analyses were conducted according to the Round 2 QAPP Addendum 1 (Integral 2004b). Deviations from the QAPP are detailed in section 3-1 of the main body of this report.

# 2.0 DATA QUALITY AND USABILITY

Data generated in the field and at the laboratories were verified and validated according to the criteria and procedures described in the Round 2 QAPP (Integral and Windward 2004). Data quality and usability were evaluated based on the results of the data validation and the data quality objectives (DQOs) for the Round 2 data. The performance criteria in the QAPP included project analytical goals for precision, accuracy, representativeness, completeness, and comparability (PARCC) of the Round 2 data.

The precision, accuracy, representativeness, and comparability of the data were assessed during data validation, as described in the *Data Validation* section below and in the Round 2 QAPP. Completeness is calculated by comparing the total number of acceptable data (nonrejected data) to the total number of data points generated. Completeness for the Round 3A surface water chemistry data is summarized by parameter group and sample type in Table A-2. Completeness was >99% overall and ranged from 95 to 100% for the various parameter groups and sample types.

## 2.1 DATA VALIDATION

Data validation was conducted as required by the Round 2 QAPP (Integral and Windward 2004) and is summarized in Section 3.3 of the main body of this report. The inorganic, organic, PCB congener, and PCDD/F data were validated in accordance with guidance specified in *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic and Organic Data Review*, by U.S Environmental Protection Agency (EPA) Region 10 standard operating procedures (SOPs) for validation of PCB congener data and PCDD/F data (EPA 1994a, 1995, 1996, 1999a), and by *Guidance on Environmental Data Verification and Validation* (EPA 2002). Modifications were made to the Functional Guidelines to accommodate quality assurance/quality control (QA/QC) requirements of the non-Contract Laboratory Program (CLP) methods that were used for this project.

Data validation was completed by EcoChem (Seattle, WA). Because the sample set was small, only one data package for each parameter group was generated and the data packages for this event were fully validated by EcoChem The following deliverables were reviewed during Level 3 and full data validation:

- The case narrative discussing analytical problems (if any) and procedures
- Chain-of-custody documentation and laboratory sample receipt logs
- Instrument calibration results
- Method blank results

- Results for laboratory quality control samples required by the referenced method, including laboratory control sample/laboratory control sample duplicate (LCS/LCSD) analyses, matrix spike/matrix spike duplicate (MS/MSD) analyses, surrogate recoveries, and other method-specific QC samples (e.g. serial dilutions for inductively coupled plasma [ICP] analyses)
- Results for field QC samples (i.e., equipment blanks, field duplicates, and field split samples)
- Analytical results for the surface water samples.

In addition to review and assessment of the documentation identified above, full validation included verification of reported concentrations of the results for field samples and QC samples, verification of intermediate transcriptions, and review of instrument data, such as mass spectra, to verify analyte identification procedures.

Data qualifiers were assigned during data validation if applicable control limits were not met, in accordance with the EPA data validation guidelines (EPA 1994a, 1995, 1996, 1999a) and the QC requirements included in the referenced methods. The QC limits for surrogate spikes, MS/MSD samples, laboratory control samples, and ongoing precision and recovery (OPR) for the Round 3A laboratories are summarized in Tables A-3 and A-4. The data validation qualifiers and definitions are summarized in Table A-5. Data quality reports generated by EcoChem are included in Appendix B of the main body of this report.

## 2.2 DATA QUALITY

The EcoChem data validation reports (Appendix B of the main body of this report) provide detailed information on the data quality issues and data validation qualifiers for each parameter group for each laboratory data package. A summary of the qualified data by parameter group, with the reasons for qualification, is included in Table A-6.

The discussion below includes a comparison of the reported detection limits to the detection limits specified in the QAPP Addendum 1 (Integral 2004b), followed by a summary of the qualified data for each parameter group and any limitations to the usability of the data.

### 2.2.1 Reported Detection Limits

Surface water data for Round 3A of the Portland Harbor RI/FS were reported to the method detection limit (MDL) in most cases (Tables A-7). Sample-specific detection limits were reported for PCB congeners and PCDD/Fs, as specified in the respective method protocols (EPA methods 1668A and 1613B; EPA 1999b, 1994b). These detection limits are based on the signal-to-noise ratio of the analytical system for each analyte and sample.

MDLs and method reporting limits (MRLs) were also elevated when results were restated as undetected during data validation because of possible sample contamination, as indicated by the presence of target analytes in an associated method blank or equipment blank.

### 2.2.2 Field Quality Control Samples

Field quality control samples are used to assess sample variability (field replicates), evaluate potential sources of contamination (equipment rinsate blanks), or confirm proper storage conditions (temperature blanks). The Round 2 QAPP Addendum 1 (Integral 2004b) required collection of the following field QC samples:

- Field replicate samples – 5% of the sample total
- Equipment rinsate blanks – near the beginning and end of the sampling event
- Decontamination blanks for the peristaltic pump - analyzed to ensure that the decontamination procedure used for the peristaltic pump equipment was adequate
- Temperature blanks – 1 per cooler.

The field QC samples were collected at the frequency specified in the QAPP, with the exception of a field replicate for the XAD samples. An XAD replicate was not collected because the timeframe of sample collection was limited to 3 days due to limited availability of a sampling vessel.

In several cases, target analytes were detected at low levels in the surface water equipment rinsate blanks. Selected data from the surface water samples were restated as undetected on the basis of detection of target analytes in the equipment rinsate blanks (see Table A-6).

Field replicates were collected to assess the variability of the results. Field replicate samples were generated by collecting an additional surface water sample at a designated station, processing this sample separately in the same manner as the original sample, and submitting the replicate as a separate sample for analysis at the laboratory. The peristaltic field replicate sample results are summarized in Table A-8.

The comparability of the replicate results was assessed by calculating the relative percent difference (RPD) of the results. Because there is no standard control limit for comparison of field replicate results, a target RPD of 50 was established for detected results greater than 5 times the reporting limit. Greater variability is expected for results within 5-10 times the reporting limit because the background signal variations (i.e., “noise”) are greater relative to the lower analyte levels. Overall, the precision of the surface water results is acceptable. Surface water data were not qualified based solely on the field replicate results.

### 2.2.3 Summary of Qualified Data

Selected data not meeting the data quality criteria were qualified as undetected, estimated, tentatively identified, or rejected during validation, in accordance with the QAPP. A summary of the qualified data by parameter group, including the reasons for qualification, is included in Table A-6. A complete list of qualified results with reason codes is provided in Appendix B. Data qualified as undetected are usable for all intended purposes. Data qualified as estimated or tentatively identified are usable for all intended purposes, with the knowledge that these data may be less precise or less accurate than unqualified data. Rejected data are not usable for any purpose and have been flagged as "not reportable" in the database.

The precision and accuracy of the Round 2 surface water data was acceptable, with the exception of the data (<1%) that were rejected during data validation. The completeness of the Round 2 surface water data was >99% (Table A-2). The Round 2 surface water data, excluding the rejected data, are usable for all project purposes. Overall, the data quality was good and will meet program objectives and goals for the RI/FS.

# 3.0 REFERENCES

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Integral and Windward. 2004. Portland Harbor RI/FS Round 2 Quality Assurance Project Plan. Prepared for the Lower Willamette Group, Portland, OR. Integral Consulting Inc., Mercer Island, WA.

Table A-1. Laboratory Methods for January 2006 High-Flow Surface Water Samples.

| | | Sample Preparation | | Quantitative Analysis | |
|---|---|---|---|---|---|
| **Analytes** | **Laboratory** | **Protocol** | **Procedure** | **Protocol** | **Procedure** |
| ***Peristaltic Pump Samples*** | | | | | |
| **Conventional Analyses** | CAS | | | | |
| Total Suspended Solids | | EPA 160.2 | Filtration and drying | EPA 160.2 | Balance |
| Total Dissolved Solids | | EPA 160.1 | Filtration and drying | EPA 160.1 | Balance |
| Total Organic Carbon | | EPA 415.1 | Chemical oxidation | EPA 415.1 | Infrared detector |
| Dissolved Organic Carbon | | EPA 415.1 | Filtration, chemical oxidation | EPA 415.1 | Infrared detector |
| **Metals** | CAS | | | | |
| Aluminum, antimony, cadmium, total chromium, copper, lead, nickel, selenium, silver, zinc | | EPA 3005 | Acid digestion | EPA 200.8 | ICP/MS |
| Arsenic | | EPA 3005A (Modified) | Acid Digestion/pre-concentration | EPA 200.8 | ICP/MS |
| Hardness (Ca, Mg) | | EPA 3005 | Acid digestion | EPA 200.8 or 6010B<br>SM2340B | ICP/MS or ICP/OES<br>Calculation |
| ***Butyltins*** | CAS | Unger et al. 1988 | Solvent extraction<br>Derivatization | M.A. Unger et al. 1988 | GC/FPD |
| **Chlorinated Herbicides** | CAS | EPA 8151A | Solvent extraction<br>Esterification | EPA 8151A | GC/ECD |
| **Semivolatile Organic Compounds (including phthalates)** | CAS | EPA 3520C | Continuous liquid-liquid extraction | EPA 8270C | GC/MS with LVI<br>GC/MS-SIM (PAHs only) |
| ***XAD-2 Extracts*** | | | | | |
| **Column Extraction** | Axys | EPA 3540 | Soxhlet extraction | -- | -- |
| **Organochlorine Pesticides** | Axys | AXYS SOP MLA-028 | Florisil® cleanup<br>Extract fractionation | AXYS SOP MLA-028 | HRGC/HRMS |
| **Polycyclic Aromatic Hydrocarbons** | Axys | AXYS SOP MLA-021 | Extract fractionation | AXYS SOP MLA-021 | HRGC/LRMS |
| **Chlorinated Dioxins and Furans** | Axys | EPA 1613B[1] | Layered Acid/Base/$SiO_3$ column<br>Florisil® cleanup<br>Carbon/Celite clean-up column<br>1% deactivated basic Alumina | EPA 1613B | HRGC/HRMS |
| **PCB congeners** | Axys | EPA 1668A | Florisil® cleanup<br>Extract fractionation<br>Layered Acid/Base $SiO_3$ Alumina | EPA 1668A | HRGC/HRMS |

**Notes:**

[1]Cleanup procedures indicated in this table will be used as needed for chlorinated dioxin and furan analyses.

CAS - Columbia Analytical Services
EPA - U.S. Environmental Protection Agency
GC/ECD - gas chromatography/electron capture detection
GC/MS - gas chromatography/mass spectrometry
HRGC/HRMS - high resolution gas chromatography/high resolution mass spectrometry
HRGC/LRMS - high resolution gas chromatography/low resolution mass spectrometry
ICP/OES - inductively coupled plasma/optical emission spectrometry
ICP/MS - inductively coupled plasma - mass spectrometry
LVI - large-volume injector
SIM - selected ion monitoring
SOP - standard operating procedures

Table A-2. Percent Completeness by Parameter Group.

| Analysis | Total # of Data Points[a] | Number of Data Points | | Completeness (%) |
|---|---|---|---|---|
| | | Accepted | Rejected | |
| Butyltins | 16 | 16 | 0 | 100 |
| Conventionals [b] | 20 | 20 | 0 | 100 |
| Dioxin/furan homologs | 60 | 60 | 0 | 100 |
| Dioxins/furans | 93 | 93 | 0 | 100 |
| Herbicides | 16 | 16 | 0 | 100 |
| Metals | 96 | 96 | 0 | 100 |
| Organochlorine pesticides | 156 | 148 | 8 | 95 |
| PAHs | 170 | 170 | 0 | 100 |
| PCB Aroclors | 42 | 42 | 0 | 100 |
| PCB congener homologs | 54 | 54 | 0 | 100 |
| PCB congeners | 960 | 960 | 0 | 100 |
| Phenols | 60 | 60 | 0 | 100 |
| Phthalates | 24 | 24 | 0 | 100 |
| SVOCs | 140 | 139 | 1 | 99 |
| **R3 Surface Water Sampling Project Total** | **1907** | **1898** | **9** | **>99** |

**Notes:**

[a] Totals include field replicates and exclude field blanks.

[b] Includes total dissolved solids, total suspended solids, dissolved organic carbon, total organic carbon, and hardness.

Table A-3. Laboratory Surrogate Control Limits for R3A Surface Water.

| Analysis | Percent Recovery |
|---|---|
| ***Semivolatile Organic Compounds*** | |
| 2-Fluoro-1,1'-biphenyl | 41 - 117 |
| Nitrobenzene-d5 | 47 - 128 |
| p-Terphenyl-d14 | 32 - 155 |
| ***Phenols*** | |
| 2,4,6-Tribromophenol | 44 - 135 |
| 2-Fluorophenol | 38 - 119 |
| Phenol-d6 | 36 - 134 |
| ***Butyltins*** | |
| Tripropyltin hydride | 23 - 137 |
| ***PCB Congeners*** | |
| PCB001L | 15 - 150 |
| PCB003L | 15 - 150 |
| PCB004L | 25 - 150 |
| PCB015L | 25 - 150 |
| PCB019L | 25 - 150 |
| PCB028L | 30 - 135 |
| PCB037L | 25 - 150 |
| PCB054L | 25 - 150 |
| PCB077L | 25 - 150 |
| PCB081L | 25 - 150 |
| PCB104L | 25 - 150 |
| PCB105L | 25 - 150 |
| PCB111L | 30 - 135 |
| PCB114L | 25 - 150 |
| PCB118L | 25 - 150 |
| PCB123L | 25 - 150 |
| PCB126L | 25 - 150 |
| PCB155L | 25 - 150 |
| PCB156L & 157L | 25 - 150 |
| PCB167L | 25 - 150 |
| PCB169L | 25 - 150 |
| PCB170L | 25 - 150 |
| PCB178L | 30 - 135 |
| PCB180L | 25 - 150 |
| PCB188L | 25 - 150 |
| PCB189L | 25 - 150 |
| PCB202L | 25 - 150 |
| PCB205L | 25 - 150 |
| PCB206L | 25 - 150 |
| PCB208L | 25 - 150 |
| PCB209L | 25 - 150 |
| ***Herbicides*** | |
| 2,4-Dichlorophenylacetic acid | 10 - 116 |
| ***Organochlorine pesticides*** | |
| $^{13}$C-1,2,3-Trichlorobenzene | 20 - 130 |
| $^{13}$C-2,4'-DDE | 40 - 150 |
| $^{13}$C-2,4'-DDT | 40 - 150 |

Table A-3. Laboratory Surrogate Control Limits for R3A Surface Water.

| Analysis | Percent Recovery |
|---|---|
| $^{13}$C-4,4'-DDE | 40 - 150 |
| $^{13}$C-4,4'-DDT | 40 - 150 |
| $^{13}$C-Aldrin | 30 - 200 |
| $^{13}$C-alpha-Endosulfan | 30 - 150 |
| $^{13}$C-beta-Endosulfan | 30 - 150 |
| $^{13}$C-beta-Hexachlorocyclohexane | 30 - 150 |
| $^{13}$C-cis-Nonachlor | 40 - 150 |
| $^{13}$C-delta-Hexachlorocyclohexane | 30 - 150 |
| $^{13}$C-Dieldrin | 30 - 150 |
| $^{13}$C-Endrin | 30 - 150 |
| $^{13}$C-gamma-Hexachlorocyclohexane | 30 - 150 |
| $^{13}$C-Heptachlor | 30 - 150 |
| $^{13}$C-Heptachlor epoxide | 30 - 150 |
| $^{13}$C-Hexachlorobenzene | 20 - 150 |
| $^{13}$C-Methoxychlor | 30 - 150 |
| $^{13}$C-Oxychlordane | 30 - 200 |
| $^{13}$C-trans-Chlordane | 30 - 150 |
| $^{13}$C-trans-Nonachlor | 30 - 150 |
| ***PAHs*** | |
| 2-Methylnaphthalene-d10 | 30 - 120 |
| Acenaphthylene-d8 | 20 - 120 |
| Anthracene-d10 | - |
| Benz(a)anthracene-d12 | 30 - 120 |
| Benzo(a)pyrene-d12 | 30 - 120 |
| Benzo(b+k)fluoranthene-d12 | 30 - 120 |
| Benzo(g,h,i)perylene-d12 | 30 - 120 |
| Chrysene-d12 | 30 - 120 |
| Dibenz(a,h)anthracene-d14 | 30 - 120 |
| Fluoranthene-d10 | 26 - 123 |
| Fluorene-d10 | 24 - 111 |
| Indeno(1,2,3-cd)pyrene-d12 | 30 - 120 |
| Naphthalene-d8 | 15 - 120 |
| Phenanthrene-d10 | 30 - 120 |
| p-Terphenyl-d14 | 25 - 146 |

Table A-4. Laboratory Control Limits for Surface Water Matrix Spike, Laboratory Control Samples, and Ongoing Precsion and Recovery.

| Analysis | Matrix Spike Recovery (percent) | Laboratory Control Sample Recovery (percent) | Type of Duplicate | Control Limit<br>Relative Percent Difference |
|---|---|---|---|---|
| ***Metals*** | | | | |
| Aluminum | -- | 53 - 181 | BD | 20 |
| Antimony | -- | 88 - 109 | BD | 20 |
| Arsenic | -- | 86 - 112 | BD | 20 |
| Cadmium | -- | 86 - 112 | BD | 20 |
| Chromium | -- | 88 - 110 | BD | 20 |
| Copper | -- | 86 - 112 | BD | 20 |
| Lead | -- | 89 - 109 | BD | 20 |
| Mercury | 72 - 121 | 81 - 108 | LR | 20 |
| Nickel | -- | 87 - 110 | BD | 20 |
| Selenium | -- | 85 - 116 | BD | 20 |
| Silver | -- | 85 - 112 | BD | 20 |
| Zinc | -- | 84 - 116 | BD | 20 |
| ***Butyltins*** | | | | |
| Butyltin ion | 23 - 130 | 28 - 143 | BD | 30 |
| Dibutyltin ion | 16 - 120 | 21 - 119 | BD | 30 |
| Tetrabutyltin | 10 - 95 | 10 - 104 | BD | 30 |
| Tributyltin ion | 28 - 121 | 24 - 129 | BD | 30 |
| ***Conventionals*** | | | | |
| Dissolved organic carbon | 68 - 132 | 90 - 109 | LR | 20 |
| Hardness as CaCO3 | -- | -- | LR | 30 |
| Total dissolved solids | -- | 85 - 115 | LR | 20 |
| Total organic carbon | 68 - 132 | 90 - 109 | LR | 20 |
| Total suspended solids | -- | 85 - 115 | LR | 20 |
| ***Herbicides*** | | | | |
| 2,4,5-T | -- | 19 - 128 | BD | 30 |
| 2,4-D | -- | 22 - 110 | BD | 30 |
| Dichloroprop | -- | 21 - 116 | BD | 30 |
| Silvex | -- | 24 - 120 | BD | 30 |
| ***Semivolatile Organic Compounds*** | | | | |
| 1,2,4-Trichlorobenzene | -- | 25 - 103 | BD | 30 |
| 1,2-Dichlorobenzene | -- | 26 - 103 | BD | 30 |
| 1,3-Dichlorobenzene | -- | 20 - 96 | BD | 30 |
| 1,4-Dichlorobenzene | -- | 21 - 97 | BD | 30 |
| 2,4-Dinitrotoluene | -- | 52 - 149 | BD | 30 |
| 2,6-Dinitrotoluene | -- | 55 - 140 | BD | 30 |
| 2-Chloronaphthalene | -- | 42 - 117 | BD | 30 |
| 2-Nitroaniline | -- | 51 - 136 | BD | 30 |
| 3,3'-Dichlorobenzidine | -- | 10 - 123 | BD | 30 |
| 3-Nitroaniline | -- | 47 - 134 | BD | 30 |
| 4-Bromophenyl phenyl ether | -- | 49 - 126 | BD | 30 |
| 4-Chloroaniline | -- | 10 - 126 | BD | 30 |
| 4-Chlorophenyl phenyl ether | -- | 47 - 126 | BD | 30 |
| 4-Nitroaniline | -- | 48 - 132 | BD | 30 |
| Aniline | -- | 10 - 121 | BD | 30 |
| Azobenzene | -- | 48 - 133 | BD | 30 |
| Benzoic acid | -- | 10 - 92 | BD | 30 |
| Benzyl alcohol | -- | 49 - 133 | BD | 30 |
| Bis(2-chloroethoxy) methane | -- | 50 - 124 | BD | 30 |
| Bis(2-chloroethyl) ether | -- | 51 - 129 | BD | 30 |
| Bis(2-chloroisopropyl) ether | -- | 48 - 124 | BD | 30 |
| Carbazole | -- | 37 - 148 | BD | 30 |
| Dibenzofuran | -- | 10 - 167 | BD | 30 |
| Hexachlorobenzene | -- | 50 - 130 | BD | 30 |
| Hexachlorobutadiene | -- | 10 - 93 | BD | 30 |
| Hexachlorocyclopentadiene | -- | 10 - 64 | BD | 30 |
| Hexachloroethane | -- | 10 - 94 | BD | 30 |
| Isophorone | -- | 52 - 140 | BD | 30 |

Table A-4. Laboratory Control Limits for Surface Water Matrix Spike, Laboratory Control Samples, and Ongoing Precsion and Recovery.

| Analysis | Matrix Spike Recovery (percent) | Laboratory Control Sample Recovery (percent) | Type of Duplicate | Control Limit<br>Relative Percent Difference |
|---|---|---|---|---|
| Nitrobenzene | -- | 50 - 130 | BD | 30 |
| N-Nitrosodimethylamine | -- | 41 - 134 | BD | 30 |
| N-Nitrosodiphenylamine | -- | 40 - 145 | BD | 30 |
| N-Nitrosodipropylamine | -- | 47 - 139 | BD | 30 |
| ***Phenols*** | | | | |
| 2,3,4,6-Tetrachlorophenol | -- | 70 - 130 | -- | -- |
| 2,4,5-Trichlorophenol | -- | 49 - 132 | BD | 30 |
| 2,4,6-Trichlorophenol | -- | 57 - 124 | BD | 30 |
| 2,4-Dichlorophenol | -- | 47 - 133 | BD | 30 |
| 2,4-Dimethylphenol | -- | 10 - 105 | BD | 30 |
| 2,4-Dinitrophenol | -- | 10 - 137 | BD | 30 |
| 2-Chlorophenol | -- | 52 - 125 | BD | 30 |
| 2-Methylphenol | -- | 44 - 121 | BD | 30 |
| 2-Nitrophenol | -- | 51 - 131 | BD | 30 |
| 4,6-Dinitro-2-methylphenol | -- | 34 - 139 | BD | 30 |
| 4-Chloro-3-methylphenol | -- | 42 - 140 | BD | 30 |
| 4-Methylphenol | -- | 42 - 123 | BD | 30 |
| 4-Nitrophenol | -- | 50 - 141 | BD | 30 |
| Pentachlorophenol | -- | 37 - 122 | BD | 30 |
| Phenol | -- | 46 - 139 | BD | 30 |
| ***Phthalate Esters*** | | | | |
| Bis(2-ethylhexyl) phthalate | -- | 48 - 151 | BD | 30 |
| Butylbenzyl phthalate | -- | 49 - 144 | BD | 30 |
| Dibutyl phthalate | -- | 51 - 141 | BD | 30 |
| Diethyl phthalate | -- | 39 - 148 | BD | 30 |
| Dimethyl phthalate | -- | 53 - 133 | BD | 30 |
| Di-n-octyl phthalate | -- | 55 - 143 | BD | 30 |
| ***Polycyclic Aromatic Hydrocarbons*** | | | | |
| 2-Methylnaphthalene | -- | 19 - 133 | BD | 30 |
| Acenaphthene | -- | 36 - 130 | BD | 30 |
| Acenaphthylene | -- | 36 - 140 | BD | 30 |
| Anthracene | -- | 36 - 131 | BD | 30 |
| Benzo(a)anthracene | -- | 45 - 131 | BD | 30 |
| Benzo(a)pyrene | -- | 40 - 138 | BD | 30 |
| Benzo(b)fluoranthene | -- | 51 - 135 | BD | 30 |
| Benzo(g,h,i)perylene | -- | 42 - 139 | BD | 30 |
| Benzo(k)fluoranthene | -- | 46 - 139 | BD | 30 |
| Chrysene | -- | 47 - 132 | BD | 30 |
| Dibenzo(a,h)anthracene | -- | 42 - 143 | BD | 30 |
| Fluoranthene | -- | 45 - 139 | BD | 30 |
| Fluorene | -- | 41 - 130 | BD | 30 |
| Indeno(1,2,3-cd)pyrene | -- | 35 - 148 | BD | 30 |
| Naphthalene | -- | 32 - 130 | BD | 30 |
| Phenanthrene | -- | 43 - 130 | BD | 30 |
| Pyrene | -- | 38 - 143 | BD | 30 |

**Notes:**
Laboratory Control Sample (LCS) and LCS duplicate analysis was performed for the January 2006 samples.

LR - laboratory replicate
BD - blank spike duplicate

Table A-5. Data Validation Qualifiers and Definitions.

| Data Qualifier | Definition |
|---|---|
| U | The material was analyzed for, but was not detected. The associated numerical value is the sample quantitation limit. |
| J | The associated numerical value is an estimated quantity. |
| R | Rejected. |
| NJ | Presumptive evidence of the presence of the material at an estimated quantity. |
| UJ | The material was analyzed for, but was not detected. The sample quantitation limit is an estimated quantity. |
| T | The associated numerical value was mathematically derived (e.g., from summing multiple analyte results such as Aroclors, or calculating the average of multiple results for a single analyte). Also indicates all results that are selected for reporting in preference to other available results (e.g., for parameters reported by multiple methods) for the Round 2 data. |

Table A-6. Summary of Qualified Data by Parameter Group for R3A Surface Water Samples.

| Analyte Group | Number of Samples | Number of Data Points | | Total # of Data Points | Detection and Qualification Frequencies (percent) | | Reason for Qualification |
|---|---|---|---|---|---|---|---|
| | | Detected | Undetected | | | | |
| Conventionals | 4 | 17 | 3 | 20 | 85 | detected | |
| | | | | | 15 | undetected | |
| | | | | | 5 | J | HT |
| | | | | | 15 | U | FB |
| Metals | 4 | 46 | 50 | 96 | 48 | detected | |
| | | | | | 52 | undetected | |
| | | | | | 8 | J | ICPSD |
| | | | | | 33 | U | FB, LB |
| Butyltins | 4 | 0 | 16 | 16 | 0 | detected | |
| | | | | | 100 | undetected | |
| | | | | | 25 | U | LB |
| Herbicides | 4 | 0 | 16 | 16 | 0 | detected | |
| | | | | | 100 | undetected | |
| Organochlorine Pesticides | 6 | 114 | 34 | 148 | 77 | detected | |
| | | | | | 23 | undetected | |
| | | | | | 7 | J | LCSR |
| | | | | | 17 | U | PFP |
| Semivolatile Organic Compounds | 10 | 8 | 131 | 139 | 6 | detected | |
| | | | | | 94 | undetected | |
| | | | | | 1 | J | HT, Ci, Cc, LB, LCSR |
| | | | | | 1 | U | FB |
| | | | | | 2 | UJ | HT, Ci,Cc, LCSR |
| Phenols | 4 | 0 | 60 | 60 | 0 | detected | |
| | | | | | 100 | undetected | |
| | | | | | 100 | UJ | LCSR |
| Phthalate Esters | 4 | 0 | 24 | 24 | 0 | detected | |
| | | | | | 100 | undetected | |
| | | | | | 38 | U | FB, LB |
| Polycyclic Aromatic Hydrocarbons | 10 | 87 | 83 | 170 | 51 | detected | |
| | | | | | 49 | undetected | |
| | | | | | 2 | J | SSR |
| | | | | | 20 | U | FB, LB, PFP |
| PCB Aroclors | 6 | 16 | 26 | 42 | 38 | detected | |
| | | | | | 62 | undetected | |
| | | | | | 38 | NJ | TIC, Other |
| | | | | | 5 | U | FB |
| PCB congener homologs | 6 | 54 | 0 | 54 | 100 | detected | |
| | | | | | 0 | undetected | |
| PCB congeners | 6 | 589 | 371 | 960 | 61 | detected | |
| | | | | | 39 | undetected | |
| | | | | | 0 | J | Other |
| | | | | | 21 | U | FB, LB, PFP |
| | | | | | 0 | UJ | Other |
| Dioxin/Furan Homologs | 6 | 57 | 3 | 60 | 95 | detected | |
| | | | | | 5 | undetected | |
| | | | | | 3 | U | FB |
| Dioxin/Furans | 6 | 62 | 31 | 93 | 67 | detected | |
| | | | | | 33 | undetected | |
| | | | | | 32 | U | FB, LB, PFP |

**Notes:**

Includes replicates and splits, excludes field blanks.

The analyte groupings for SVOCs, phenols, PAHs, and phthalates are as defined in the Round 2 QAPP Addendum 1, Table A6-2 (see Integral 2004c).

Reasons:

Cc - Calibration (continuing)
Ci - Calibration (initial)
FB- Field Blank Contamination
HT-Holding time
ICPSD-ICP Serial Dilution % Difference
LB - Lab blank contamination
LCSR - Laboratory control sample recoveries
Other - defined in validation report.
PFP - Potential false positive
SSR - Surrogate spike recoveries
TIC- Tentatively Identified Compound

Table A-7. Reported Detection Limits - Jaunary 2006 Surface Water Sampling Event.

| Analyte | CAS Number | Units | Round 2 QAPP MDL | Reported Detection Limits Minimum | Reported Detection Limits Maximum | Total # Data Points | # Undetected Results |
|---|---|---|---|---|---|---|---|
| **Perastaltic Samples** | | | | | | | |
| **Metals** | | | | | | | |
| Aluminum | 7429-90-5 | ug/l | 0.0007 | 0.5 | 10 | 8 | 1 |
| Antimony | 7440-36-0 | ug/l | 0.00002 | 0.02 | 0.033 | 8 | 8 |
| Arsenic | 7440-38-2 | ug/l | TBD | -- | -- | 8 | -- |
| Cadmium | 7440-43-9 | ug/l | 0.00001 | 0.002 | 0.019 | 8 | 8 |
| Chromium | 7440-47-3 | ug/l | 0.00006 | 0.02 | 0.2 | 8 | 4 |
| Copper | 7440-50-8 | ug/l | 0.00004 | -- | -- | 8 | -- |
| Lead | 7439-92-1 | ug/l | 0.00001 | 0.002 | 0.016 | 8 | 3 |
| Mercury | 7439-97-6 | ug/l | 0.0001 | 0.08 | 0.08 | 8 | 8 |
| Nickel | 7440-02-0 | ug/l | 0.00004 | -- | -- | 8 | -- |
| Selenium | 7782-49-2 | ug/l | 0.0002 | 0.2 | 0.2 | 8 | 7 |
| Silver | 7440-22-4 | ug/l | 0.00001 | 0.002 | 0.015 | 8 | 8 |
| Zinc | 7440-66-6 | ug/l | 0.0002 | 0.05 | 2.1 | 8 | 3 |
| **Butyltins** | | | | | | | |
| Butyltin ion | 78763-54-9 | ug/l | 0.0047 | 0.0017 | 0.0017 | 4 | 4 |
| Dibutyltin ion | 14488-53-0 | ug/l | 0.005 | 0.0007 | 0.011 | 4 | 4 |
| Tetrabutyltin | 1461-25-2 | ug/l | 0.0071 | 0.0015 | 0.0015 | 4 | 4 |
| Tributyltin ion | 36643-28-4 | ug/l | 0.0032 | 0.013 | 0.014 | 4 | 4 |
| **Conventionals** | | | | | | | |
| Dissolved organic carbon | DOC | mg/l | 0.07 | -- | -- | 4 | -- |
| Hardness as CaCO3 | HARD | mg/l | 0.2 | -- | -- | 4 | -- |
| Total dissolved solids | TDS | mg/l | 5 | 5 | 74 | 4 | 3 |
| Total organic carbon | TOC | mg/l | 0.07 | -- | -- | 4 | -- |
| Total suspended solids | TSS | mg/l | 1 | -- | -- | 4 | -- |
| **Herbicides** | | | | | | | |
| 2,4,5-T | 93-76-5 | ug/l | 0.017 | 0.043 | 0.046 | 4 | 4 |
| 2,4-D | 94-75-7 | ug/l | 0.079 | 0.048 | 0.051 | 4 | 4 |
| Dichloroprop | 120-36-5 | ug/l | 0.061 | 0.058 | 0.062 | 4 | 4 |
| Silvex | 93-72-1 | ug/l | 0.085 | 0.048 | 0.051 | 4 | 4 |
| **Semivolatile Organic Compounds** | | | | | | | |
| 1,2,4-Trichlorobenzene | 120-82-1 | ug/l | 0.016 | 0.016 | 0.017 | 4 | 4 |
| 1,2-Dichlorobenzene | 95-50-1 | ug/l | 0.014 | 0.015 | 0.015 | 4 | 4 |
| 1,3-Dichlorobenzene | 541-73-1 | ug/l | 0.011 | 0.011 | 0.012 | 4 | 4 |
| 1,4-Dichlorobenzene | 106-46-7 | ug/l | 0.014 | 0.014 | 0.014 | 4 | 4 |
| 2,4-Dinitrotoluene | 121-14-2 | ug/l | 0.019 | 0.02 | 0.021 | 4 | 4 |
| 2,6-Dinitrotoluene | 606-20-2 | ug/l | 0.0088 | 0.0088 | 0.0093 | 4 | 4 |
| 2-Chloronaphthalene | 91-58-7 | ug/l | 0.015 | 0.016 | 0.016 | 4 | 4 |
| 2-Nitroaniline | 88-74-4 | ug/l | 0.015 | 0.015 | 0.016 | 4 | 4 |
| 3,3'-Dichlorobenzidine | 91-94-1 | ug/l | 0.43 | 0.43 | 0.46 | 4 | 4 |
| 3-Nitroaniline | 99-09-2 | ug/l | 0.23 | 0.23 | 0.24 | 4 | 4 |
| 4-Bromophenyl phenyl ether | 101-55-3 | ug/l | 0.018 | 0.018 | 0.019 | 4 | 4 |
| 4-Chloroaniline | 106-47-8 | ug/l | 0.017 | 0.018 | 0.019 | 4 | 4 |
| 4-Chlorophenyl phenyl ether | 7005-72-3 | ug/l | 0.0084 | 0.0085 | 0.0089 | 4 | 4 |
| 4-Nitroaniline | 100-01-6 | ug/l | 0.16 | 0.17 | 0.18 | 4 | 4 |
| Aniline | 62-53-3 | ug/l | TBD | 0.25 | 0.27 | 4 | 4 |
| Azobenzene | 103-33-3 | ug/l | -- | 0.012 | 0.013 | 4 | 4 |
| Benzoic acid | 65-85-0 | ug/l | 1.71 | 1.8 | 2 | 4 | 4 |
| Benzyl alcohol | 100-51-6 | ug/l | 0.97 | 0.98 | 1.1 | 4 | 4 |
| Bis(2-chloroethoxy) methane | 111-91-1 | ug/l | 0.012 | 0.012 | 0.012 | 4 | 4 |
| Bis(2-chloroethyl) ether | 111-44-4 | ug/l | 0.014 | 0.015 | 0.015 | 4 | 4 |
| Bis(2-chloroisopropyl) ether | 39638-32-9 | ug/l | -- | 0.017 | 0.018 | 4 | 4 |
| Carbazole | 86-74-8 | ug/l | 0.013 | 0.013 | 0.014 | 4 | 4 |
| Dibenzofuran | 132-64-9 | ug/l | 0.013 | 0.0071 | 0.0071 | 4 | 4 |
| Hexachlorobenzene | 118-74-1 | ng/l | 0.00006-0.0003 | -- | -- | 6 | -- |
| Hexachlorobenzene | 118-74-1 | ug/l | 0.014 | 0.015 | 0.015 | 4 | 4 |
| Hexachlorobutadiene | 87-68-3 | ug/l | 0.019 | 0.02 | 0.021 | 4 | 4 |
| Hexachlorobutadiene | 87-68-3 | ng/l | 0.00006-0.0003 | 0.0000089 | 0.00104 | 6 | 4 |
| Hexachlorocyclopentadiene | 77-47-4 | ug/l | 0.041 | 0.041 | 0.043 | 4 | 4 |
| Hexachloroethane | 67-72-1 | ug/l | 0.018 | 0.019 | 0.02 | 4 | 4 |
| Isophorone | 78-59-1 | ug/l | 0.0084 | 0.0085 | 0.0089 | 4 | 4 |
| Nitrobenzene | 98-95-3 | ug/l | 0.0074 | 0.0074 | 0.0078 | 4 | 4 |
| N-Nitrosodimethylamine | 62-75-9 | ug/l | 0.00026 | 0.42 | 0.45 | 4 | 4 |

Table A-7. Reported Detection Limits - Jaunary 2006 Surface Water Sampling Event.

| Analyte | CAS Number | Units | Round 2 QAPP MDL | Reported Detection Limits | | Total # Data Points | # Undetected Results |
|---|---|---|---|---|---|---|---|
| | | | | Minimum | Maximum | | |
| N-Nitrosodiphenylamine | 86-30-6 | ug/l | 0.028 | 0.028 | 0.03 | 4 | 4 |
| N-Nitrosodipropylamine | 621-64-7 | ug/l | 0.032 | 0.033 | 0.034 | 4 | 4 |
| **Phenols** | | | | | | | |
| 2,3,4,6-Tetrachlorophenol | 58-90-2 | ug/l | TBD | 1 | 1.1 | 4 | 4 |
| 2,4,5-Trichlorophenol | 95-95-4 | ug/l | 0.025 | 0.026 | 0.027 | 4 | 4 |
| 2,4,6-Trichlorophenol | 88-06-2 | ug/l | 0.037 | 0.037 | 0.039 | 4 | 4 |
| 2,4-Dichlorophenol | 120-83-2 | ug/l | 0.024 | 0.024 | 0.025 | 4 | 4 |
| 2,4-Dimethylphenol | 105-67-9 | ug/l | 0.32 | 0.32 | 0.34 | 4 | 4 |
| 2,4-Dinitrophenol | 51-28-5 | ug/l | 0.53 | 0.53 | 0.56 | 4 | 4 |
| 2-Chlorophenol | 95-57-8 | ug/l | 0.015 | 0.015 | 0.016 | 4 | 4 |
| 2-Methylphenol | 95-48-7 | ug/l | 0.059 | 0.06 | 0.063 | 4 | 4 |
| 2-Nitrophenol | 88-75-5 | ug/l | 0.014 | 0.014 | 0.015 | 4 | 4 |
| 4,6-Dinitro-2-methylphenol | 534-52-1 | ug/l | 0.013 | 0.013 | 0.014 | 4 | 4 |
| 4-Chloro-3-methylphenol | 59-50-7 | ug/l | 0.029 | 0.029 | 0.031 | 4 | 4 |
| 4-Methylphenol | 106-44-5 | ug/l | 0.051 | 0.051 | 0.054 | 4 | 4 |
| 4-Nitrophenol | 100-02-7 | ug/l | 0.54 | 0.54 | 0.57 | 4 | 4 |
| Pentachlorophenol | 87-86-5 | ug/l | 0.028 | 0.029 | 0.03 | 4 | 4 |
| Phenol | 108-95-2 | ug/l | 0.02 | 0.02 | 0.021 | 4 | 4 |
| **Phthalate Esters** | | | | | | | |
| Bis(2-ethylhexyl) phthalate | 117-81-7 | ug/l | 0.27 | 0.27 | 0.29 | 4 | 4 |
| Butylbenzyl phthalate | 85-68-7 | ug/l | 0.025 | 0.026 | 0.058 | 4 | 4 |
| Dibutyl phthalate | 84-74-2 | ug/l | 0.026 | 0.11 | 0.18 | 4 | 4 |
| Diethyl phthalate | 84-66-2 | ug/l | 0.013 | 0.092 | 0.13 | 4 | 4 |
| Dimethyl phthalate | 131-11-3 | ug/l | 0.026 | 0.013 | 0.014 | 4 | 4 |
| Di-n-octyl phthalate | 117-84-0 | ug/l | 0.032 | 0.032 | 0.034 | 4 | 4 |
| **Polycyclic Aromatic Hydrocarbons** | | | | | | | |
| 2-Methylnaphthalene | 91-57-6 | ug/l | 0.012 | 0.0027 | 0.0041 | 4 | 4 |
| Acenaphthene | 83-32-9 | ug/l | 0.0097 | 0.002 | 0.002 | 4 | 3 |
| Acenaphthylene | 208-96-8 | ug/l | 0.0089 | 0.0018 | 0.0018 | 4 | 4 |
| Anthracene | 120-12-7 | ug/l | 0.01 | 0.0011 | 0.0011 | 4 | 4 |
| Benzo(a)anthracene | 56-55-3 | ug/l | 0.013 | 0.0021 | 0.0021 | 4 | 3 |
| Benzo(a)pyrene | 50-32-8 | ug/l | 0.0087 | 0.0016 | 0.0016 | 4 | 4 |
| Benzo(b)fluoranthene | 205-99-2 | ug/l | 0.0098 | 0.002 | 0.002 | 4 | 3 |
| Benzo(g,h,i)perylene | 191-24-2 | ug/l | 0.009 | 0.0037 | 0.0037 | 4 | 4 |
| Benzo(k)fluoranthene | 207-08-9 | ug/l | 0.011 | 0.0014 | 0.0014 | 4 | 3 |
| Chrysene | 218-01-9 | ug/l | 0.012 | 0.0013 | 0.0013 | 4 | 3 |
| Dibenzo(a,h)anthracene | 53-70-3 | ug/l | 0.0079 | 0.0017 | 0.0017 | 4 | 4 |
| Fluoranthene | 206-44-0 | ug/l | 0.013 | 0.0024 | 0.0024 | 4 | 3 |
| Fluorene | 86-73-7 | ug/l | 0.011 | 0.0026 | 0.0026 | 4 | 3 |
| Indeno(1,2,3-cd)pyrene | 193-39-5 | ug/l | 0.0087 | 0.0021 | 0.0021 | 4 | 4 |
| Naphthalene | 91-20-3 | ug/l | 0.014 | 0.0064 | 0.013 | 4 | 4 |
| Phenanthrene | 85-01-8 | ug/l | 0.013 | 0.0039 | 0.008 | 4 | 4 |
| Pyrene | 129-00-0 | ug/l | 0.012 | 0.0023 | 0.0023 | 4 | 1 |
| **XAD samples** | | | | | | | |
| **Organochlorine pesticides** | | | | | | | |
| 2,4'-DDD | 53-19-0 | ng/l | 0.00006-0.0003 | -- | -- | 6 | -- |
| 2,4'-DDE | 3424-82-6 | ng/l | 0.00006-0.0003 | -- | -- | 6 | -- |
| 2,4'-DDT | 789-02-6 | ng/l | 0.00006-0.0003 | -- | -- | 6 | -- |
| 4,4'-DDD | 72-54-8 | ng/l | 0.00006-0.0003 | -- | -- | 6 | -- |
| 4,4'-DDE | 72-55-9 | ng/l | 0.00006-0.0003 | -- | -- | 6 | -- |
| 4,4'-DDT | 50-29-3 | ng/l | 0.00006-0.0003 | -- | -- | 6 | -- |
| Aldrin | 309-00-2 | ng/l | 0.00006-0.0003 | -- | -- | 6 | -- |
| alpha-Endosulfan | 959-98-8 | ng/l | 0.00006-0.0003 | 0.000136 | 0.0144 | 6 | 4 |
| alpha-Hexachlorocyclohexane | 319-84-6 | ng/l | 0.00006-0.0003 | 0.0000404 | 0.000278 | 6 | 3 |
| beta-Endosulfan | 33213-65-9 | ng/l | 0.00006-0.0003 | -- | -- | 6 | -- |
| beta-Hexachlorocyclohexane | 319-85-7 | ng/l | 0.00006-0.0003 | 0.0000616 | 0.00797 | 6 | 4 |
| cis-Chlordane | 5103-71-9 | ng/l | 0.00006-0.0003 | -- | -- | 6 | -- |
| cis-Nonachlor | 5103-73-1 | ng/l | 0.00006-0.0003 | -- | -- | 6 | -- |
| delta-Hexachlorocyclohexane | 319-86-8 | ng/l | 0.00006-0.0003 | 0.000213 | 0.00303 | 6 | 5 |
| Dieldrin | 60-57-1 | ng/l | 0.00006-0.0003 | -- | -- | 6 | -- |
| Endosulfan sulfate | 1031-07-8 | ng/l | 0.00006-0.0003 | -- | -- | 6 | -- |
| Endrin | 72-20-8 | ng/l | 0.00006-0.0003 | 0.000063 | 0.000981 | 6 | 3 |

Table A-7. Reported Detection Limits - Jaunary 2006 Surface Water Sampling Event.

| Analyte | CAS Number | Units | Round 2 QAPP MDL | Reported Detection Limits | | Total # Data Points | # Undetected Results |
|---|---|---|---|---|---|---|---|
| | | | | Minimum | Maximum | | |
| Endrin aldehyde | 7421-93-4 | ng/l | 0.00006-0.0003 | 0.000061 | 0.0324 | 6 | 6 |
| Endrin ketone | 53494-70-5 | ng/l | 0.00006-0.0003 | -- | -- | 6 | -- |
| gamma-Hexachlorocyclohexane | 58-89-9 | ng/l | 0.00006-0.0003 | 0.000033 | 0.000394 | 6 | 2 |
| Heptachlor | 76-44-8 | ng/l | 0.00006-0.0003 | 0.0000097 | 0.00371 | 6 | 4 |
| Heptachlor epoxide | 1024-57-3 | ng/l | 0.00006-0.0003 | -- | -- | 6 | -- |
| Methoxychlor | 72-43-5 | ng/l | 0.00006-0.0003 | 0.000394 | 0.00434 | 6 | 3 |
| Oxychlordane | 27304-13-8 | ng/l | 0.00006-0.0003 | 0.000164 | 0.00126 | 6 | 3 |
| trans-Chlordane | 5103-74-2 | ng/l | 0.00006-0.0003 | -- | -- | 6 | -- |
| trans-Nonachlor | 39765-80-5 | ng/l | 0.00006-0.0003 | -- | -- | 6 | -- |
| **Polycyclic Aromatic Hydrocarbons** | | | | | | | |
| 2-Methylnaphthalene | 91-57-6 | ng/l | 0.1-0.6 | 0.0236 | 0.353 | 6 | 3 |
| Acenaphthene | 83-32-9 | ng/l | 0.1-0.6 | -- | -- | 6 | -- |
| Acenaphthylene | 208-96-8 | ng/l | 0.1-0.6 | 0.0103 | 0.214 | 6 | 3 |
| Anthracene | 120-12-7 | ng/l | 0.1-0.6 | 0.0823 | 1.08 | 6 | 5 |
| Benzo(a)anthracene | 56-55-3 | ng/l | 0.1-0.6 | -- | -- | 6 | -- |
| Benzo(a)pyrene | 50-32-8 | ng/l | 0.1-0.6 | 0.0162 | 0.0795 | 6 | 1 |
| Benzo(b+j)fluoranthene | BBJFLANTH | ng/l | 0.1-0.6 | -- | -- | 6 | -- |
| Benzo(g,h,i)perylene | 191-24-2 | ng/l | 0.1-0.6 | 0.0233 | 0.155 | 6 | 1 |
| Benzo(k)fluoranthene | 207-08-9 | ng/l | 0.1-0.6 | -- | -- | 6 | -- |
| Chrysene | 218-01-9 | ng/l | 0.1-0.6 | -- | -- | 6 | -- |
| Dibenzo(a,h)anthracene | 53-70-3 | ng/l | 0.1-0.6 | 0.0143 | 0.325 | 6 | 4 |
| Fluoranthene | 206-44-0 | ng/l | 0.1-0.6 | -- | -- | 6 | -- |
| Fluorene | 86-73-7 | ng/l | 0.1-0.6 | 0.0159 | 0.198 | 6 | 1 |
| Indeno(1,2,3-cd)pyrene | 193-39-5 | ng/l | 0.1-0.6 | 0.036 | 0.689 | 6 | 6 |
| Naphthalene | 91-20-3 | ng/l | 0.1-0.6 | 0.0087 | 0.721 | 6 | 1 |
| Phenanthrene | 85-01-8 | ng/l | 0.1-0.6 | -- | -- | 6 | -- |
| Pyrene | 129-00-0 | ng/l | 0.1-0.6 | -- | -- | 6 | -- |
| **Dioxin/Furans** | | | | | | | |
| Heptachlorodibenzofuran homologs | 38998-75-3 | pg/l | 0.003 - 0.01 | -- | -- | 6 | -- |
| Heptachlorodibenzo-p-dioxin homologs | 37871-00-4 | pg/l | 0.003 - 0.01 | -- | -- | 6 | -- |
| Hexachlorodibenzofuran homologs | 55684-94-1 | pg/l | 0.003 - 0.01 | -- | -- | 6 | -- |
| Hexachlorodibenzo-p-dioxin homologs | 34465-46-8 | pg/l | 0.003 - 0.01 | -- | -- | 6 | -- |
| Octachlorodibenzofuran | 39001-02-0 | pg/l | 0.003 - 0.01 | -- | -- | 6 | -- |
| Octachlorodibenzo-p-dioxin | 3268-87-9 | pg/l | 0.003 - 0.01 | -- | -- | 6 | -- |
| Pentachlorodibenzofuran homologs | 30402-15-4 | pg/l | 0.003 - 0.01 | -- | -- | 6 | -- |
| Pentachlorodibenzo-p-dioxin homologs | 36088-22-9 | pg/l | 0.003 - 0.01 | -- | -- | 6 | -- |
| Tetrachlorodibenzofuran homologs | 30402-14-3 | pg/l | 0.003 - 0.01 | 0.00128 | 0.047 | 6 | 2 |
| Tetrachlorodibenzo-p-dioxin homologs | 41903-57-5 | pg/l | 0.003 - 0.01 | 0.00128 | 0.00309 | 6 | 1 |
| 1,2,3,4,6,7,8-Heptachlorodibenzofuran | 67562-39-4 | pg/l | 0.003 - 0.01 | -- | -- | 6 | -- |
| 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin | 35822-46-9 | pg/l | 0.003 - 0.01 | -- | -- | 6 | -- |
| 1,2,3,4,7,8,9-Heptachlorodibenzofuran | 55673-89-7 | pg/l | 0.003 - 0.01 | 0.00128 | 0.014 | 6 | 1 |
| 1,2,3,4,7,8-Hexachlorodibenzofuran | 70648-26-9 | pg/l | 0.003 - 0.01 | 0.00128 | 0.01 | 6 | 1 |
| 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin | 39227-28-6 | pg/l | 0.003 - 0.01 | 0.00128 | 0.02 | 6 | 2 |
| 1,2,3,6,7,8-Hexachlorodibenzofuran | 57117-44-9 | pg/l | 0.003 - 0.01 | 0.00128 | 0.009 | 6 | 1 |
| 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin | 57653-85-7 | pg/l | 0.003 - 0.01 | -- | -- | 6 | -- |
| 1,2,3,7,8,9-Hexachlorodibenzofuran | 72918-21-9 | pg/l | 0.003 - 0.01 | 0.00136 | 0.0116 | 6 | 5 |
| 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin | 19408-74-3 | pg/l | 0.003 - 0.01 | 0.00135 | 0.012 | 6 | 1 |
| 1,2,3,7,8-Pentachlorodibenzofuran | 57117-41-6 | pg/l | 0.003 - 0.01 | 0.00135 | 0.007 | 6 | 2 |
| 1,2,3,7,8-Pentachlorodibenzo-p-dioxin | 40321-76-4 | pg/l | 0.003 - 0.01 | 0.00128 | 0.012 | 6 | 2 |
| 2,3,4,6,7,8-Hexachlorodibenzofuran | 60851-34-5 | pg/l | 0.003 - 0.01 | 0.00136 | 0.012 | 6 | 3 |
| 2,3,4,7,8-Pentachlorodibenzofuran | 57117-31-4 | pg/l | 0.003 - 0.01 | 0.00128 | 0.013 | 6 | 5 |
| 2,3,7,8-Tetrachlorodibenzofuran | 51207-31-9 | pg/l | 0.003 - 0.01 | 0.00135 | 0.014 | 6 | 3 |
| 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 1746-01-6 | pg/l | 0.003 - 0.01 | 0.00136 | 0.007 | 6 | 5 |
| **PCB Aroclors** | | | | | | | |
| Aroclor 1016 | 12674-11-2 | pg/l | -- | 0.0154 | 0.314 | 6 | 6 |
| Aroclor 1221 | 11104-28-2 | pg/l | -- | 0.0109 | 0.163 | 6 | 6 |
| Aroclor 1232 | 11141-16-5 | pg/l | -- | 0.0265 | 0.0918 | 6 | 6 |
| Aroclor 1242 | 53469-21-9 | pg/l | -- | -- | -- | 6 | -- |
| Aroclor 1248 | 12672-29-6 | pg/l | -- | 0.0439 | 0.166 | 6 | 6 |
| Aroclor 1254 | 11097-69-1 | pg/l | -- | -- | -- | 6 | -- |
| Aroclor 1260 | 11096-82-5 | pg/l | -- | 0.0064 | 5.45 | 6 | 2 |

Table A-7. Reported Detection Limits - Jaunary 2006 Surface Water Sampling Event.

| Analyte | CAS Number | Units | Round 2 QAPP MDL | Reported Detection Limits | | Total # Data Points | # Undetected Results |
|---|---|---|---|---|---|---|---|
| | | | | Minimum | Maximum | | |
| **PCB congeners** | | | | | | | |
| PCB001 | 2051-60-7 | pg/l | 0.03-3 | 0.0071 | 0.625 | 6 | 4 |
| PCB002 | 2051-61-8 | pg/l | 0.03-3 | 0.0076 | 0.25 | 6 | 2 |
| PCB003 | 2051-62-9 | pg/l | 0.03-3 | 0.008 | 0.411 | 6 | 3 |
| PCB004 | 13029-08-8 | pg/l | 0.03-3 | 0.0123 | 2.7 | 6 | 2 |
| PCB005 | 16605-91-7 | pg/l | 0.03-3 | 0.0077 | 0.473 | 6 | 5 |
| PCB006 | 25569-80-6 | pg/l | 0.03-3 | 0.0065 | 0.476 | 6 | 4 |
| PCB007 | 33284-50-3 | pg/l | 0.03-3 | 0.11 | 9.19 | 6 | 6 |
| PCB008 | 34883-43-7 | pg/l | 0.03-3 | 0.0057 | 1.9 | 6 | 2 |
| PCB009 | 34883-39-1 | pg/l | 0.03-3 | 0.0069 | 0.402 | 6 | 5 |
| PCB010 | 33146-45-1 | pg/l | 0.03-3 | 0.0066 | 0.583 | 6 | 5 |
| PCB011 | 2050-67-1 | pg/l | 0.03-3 | 0.0074 | 2.92 | 6 | 4 |
| PCB012 & 013 | PCB012_013 | pg/l | 0.03-3 | 0.0073 | 0.578 | 6 | 2 |
| PCB014 | 34883-41-5 | pg/l | 0.03-3 | 0.041 | 0.411 | 6 | 6 |
| PCB015 | 2050-68-2 | pg/l | 0.03-3 | 0.0387 | 0.698 | 6 | 3 |
| PCB016 | 38444-78-9 | pg/l | 0.03-3 | 0.0019 | 1.23 | 6 | 3 |
| PCB017 | 37680-66-3 | pg/l | 0.03-3 | -- | -- | 6 | -- |
| PCB018 & 030 | PCB018_030 | pg/l | 0.03-3 | -- | -- | 6 | -- |
| PCB019 | 38444-73-4 | pg/l | 0.03-3 | 0.0024 | 0.108 | 6 | 1 |
| PCB020 & 028 | PCB020_028 | pg/l | 0.03-3 | -- | -- | 6 | -- |
| PCB021 & 033 | PCB021_033 | pg/l | 0.03-3 | 0.0029 | 0.79 | 6 | 1 |
| PCB022 | 38444-85-8 | pg/l | 0.03-3 | -- | -- | 6 | -- |
| PCB023 | 55720-44-0 | pg/l | 0.03-3 | 0.0031 | 0.314 | 6 | 5 |
| PCB024 | 55702-45-9 | pg/l | 0.03-3 | 0.0014 | 0.413 | 6 | 4 |
| PCB025 | 55712-37-3 | pg/l | 0.03-3 | 0.0026 | 0.346 | 6 | 2 |
| PCB026 & 029 | PCB026_029 | pg/l | 0.03-3 | -- | -- | 6 | -- |
| PCB027 | 38444-76-7 | pg/l | 0.03-3 | -- | -- | 6 | -- |
| PCB031 | 16606-02-3 | pg/l | 0.03-3 | -- | -- | 6 | -- |
| PCB032 | 38444-77-8 | pg/l | 0.03-3 | -- | -- | 6 | -- |
| PCB034 | 37680-68-5 | pg/l | 0.03-3 | 0.0032 | 0.541 | 6 | 4 |
| PCB035 | 37680-69-6 | pg/l | 0.03-3 | 0.0033 | 0.31 | 6 | 4 |
| PCB036 | 38444-87-0 | pg/l | 0.03-3 | 0.0032 | 0.21 | 6 | 4 |
| PCB037 | 38444-90-5 | pg/l | 0.03-3 | -- | -- | 6 | -- |
| PCB038 | 53555-66-1 | pg/l | 0.03-3 | 0.005 | 0.325 | 6 | 6 |
| PCB039 | 38444-88-1 | pg/l | 0.03-3 | 0.008 | 0.24 | 6 | 5 |
| PCB040 & 041 & 071 | PCB040_041_071 | pg/l | 0.03-3 | -- | -- | 6 | -- |
| PCB042 | 36559-22-5 | pg/l | 0.03-3 | -- | -- | 6 | -- |
| PCB043 | 70362-46-8 | pg/l | 0.03-3 | 0.0014 | 0.051 | 6 | 1 |
| PCB044 & 047 & 065 | PCB044_047_065 | pg/l | 0.03-3 | -- | -- | 6 | -- |
| PCB045 & 051 | PCB045_051 | pg/l | 0.03-3 | -- | -- | 6 | -- |
| PCB046 | 41464-47-5 | pg/l | 0.03-3 | -- | -- | 6 | -- |
| PCB048 | 70362-47-9 | pg/l | 0.03-3 | -- | -- | 6 | -- |
| PCB049 & 069 | PCB049_069 | pg/l | 0.03-3 | -- | -- | 6 | -- |
| PCB050 & 053 | PCB050_053 | pg/l | 0.03-3 | -- | -- | 6 | -- |
| PCB052 | 35693-99-3 | pg/l | 0.03-3 | -- | -- | 6 | -- |
| PCB054 | 15968-05-5 | pg/l | 0.03-3 | 0.0013 | 0.019 | 6 | 2 |
| PCB055 | 74338-24-2 | pg/l | 0.03-3 | 0.0099 | 0.0472 | 6 | 3 |
| PCB056 | 41464-43-1 | pg/l | 0.03-3 | -- | -- | 6 | -- |
| PCB057 | 70424-67-8 | pg/l | 0.03-3 | 0.0827 | 0.303 | 6 | 6 |
| PCB058 | 41464-49-7 | pg/l | 0.03-3 | 0.0078 | 0.588 | 6 | 5 |
| PCB059 & 062 & 075 | PCB059_062_075 | pg/l | 0.03-3 | -- | -- | 6 | -- |
| PCB060 | 33025-41-1 | pg/l | 0.03-3 | -- | -- | 6 | -- |
| PCB061 & 070 & 074 & 076 | PCB061_070_074_ | pg/l | 0.03-3 | -- | -- | 6 | -- |
| PCB063 | 74472-34-7 | pg/l | 0.03-3 | -- | -- | 6 | -- |
| PCB064 | 52663-58-8 | pg/l | 0.03-3 | -- | -- | 6 | -- |
| PCB066 | 32598-10-0 | pg/l | 0.03-3 | -- | -- | 6 | -- |
| PCB067 | 73575-53-8 | pg/l | 0.03-3 | 0.0064 | 0.042 | 6 | 1 |
| PCB068 | 73575-52-7 | pg/l | 0.03-3 | 0.0191 | 0.055 | 6 | 4 |
| PCB072 | 41464-42-0 | pg/l | 0.03-3 | -- | -- | 6 | -- |
| PCB073 | 74338-23-1 | pg/l | 0.03-3 | 0.0813 | 0.298 | 6 | 6 |
| PCB077 | 32598-13-3 | pg/l | 0.03-3 | -- | -- | 6 | -- |
| PCB078 | 70362-49-1 | pg/l | 0.03-3 | 0.0401 | 0.147 | 6 | 6 |
| PCB079 | 41464-48-6 | pg/l | 0.03-3 | 0.0067 | 0.0245 | 6 | 1 |
| PCB080 | 33284-52-5 | pg/l | 0.03-3 | 0.0518 | 0.19 | 6 | 6 |

Table A-7. Reported Detection Limits - Jaunary 2006 Surface Water Sampling Event.

| Analyte | CAS Number | Units | Round 2 QAPP MDL | Reported Detection Limits | | Total # Data Points | # Undetected Results |
|---|---|---|---|---|---|---|---|
| | | | | Minimum | Maximum | | |
| PCB081 | 70362-50-4 | pg/l | 0.03-3 | 0.022 | 0.201 | 6 | 6 |
| PCB082 | 52663-62-4 | pg/l | 0.03-3 | 0.0044 | 0.562 | 6 | 1 |
| PCB083 & 099 | PCB083_099 | pg/l | 0.03-3 | -- | -- | 6 | -- |
| PCB084 | 52663-60-2 | pg/l | 0.03-3 | -- | -- | 6 | -- |
| PCB085 & 116 & 117 | PCB085_116_117 | pg/l | 0.03-3 | -- | -- | 6 | -- |
| PCB086 & 087 & 097 & 108 & 119 & 125 | PCB086_087_097_ | pg/l | 0.03-3 | -- | -- | 6 | -- |
| PCB088 & 091 | PCB088_091 | pg/l | 0.03-3 | -- | -- | 6 | -- |
| PCB089 | 73575-57-2 | pg/l | 0.03-3 | 0.003 | 0.052 | 6 | 3 |
| PCB090 & 101 & 113 | PCB090_101_113 | pg/l | 0.03-3 | -- | -- | 6 | -- |
| PCB092 | 52663-61-3 | pg/l | 0.03-3 | -- | -- | 6 | -- |
| PCB093 & 095 & 098 & 100 & 102 | PCB093_095_098_ | pg/l | 0.03-3 | -- | -- | 6 | -- |
| PCB094 | 73575-55-0 | pg/l | 0.03-3 | 0.004 | 0.045 | 6 | 4 |
| PCB096 | 73575-54-9 | pg/l | 0.03-3 | -- | -- | 6 | -- |
| PCB103 | 60145-21-3 | pg/l | 0.03-3 | 0.0024 | 0.098 | 6 | 3 |
| PCB104 | 56558-16-8 | pg/l | 0.03-3 | 0.0013 | 0.563 | 6 | 3 |
| PCB105 | 32598-14-4 | pg/l | 0.03-3 | -- | -- | 6 | -- |
| PCB106 | 70424-69-0 | pg/l | 0.03-3 | 0.177 | 0.648 | 6 | 6 |
| PCB107 & 124 | PCB107_124 | pg/l | 0.03-3 | 0.0054 | 0.146 | 6 | 2 |
| PCB109 | 74472-35-8 | pg/l | 0.03-3 | -- | -- | 6 | -- |
| PCB110 & 115 | PCB110_115 | pg/l | 0.03-3 | -- | -- | 6 | -- |
| PCB111 | 39635-32-0 | pg/l | 0.03-3 | 0.004 | 0.251 | 6 | 6 |
| PCB112 | 74472-36-9 | pg/l | 0.03-3 | 0.0324 | 0.119 | 6 | 6 |
| PCB114 | 74472-37-0 | pg/l | 0.03-3 | 0.006 | 0.104 | 6 | 5 |
| PCB118 | 31508-00-6 | pg/l | 0.03-3 | -- | -- | 6 | -- |
| PCB120 | 68194-12-7 | pg/l | 0.03-3 | 0.0021 | 0.009 | 6 | 1 |
| PCB121 | 56558-18-0 | pg/l | 0.03-3 | 0.003 | 0.245 | 6 | 6 |
| PCB122 | 76842-07-4 | pg/l | 0.03-3 | 0.0058 | 0.067 | 6 | 3 |
| PCB123 | 65510-44-3 | pg/l | 0.03-3 | 0.0057 | 0.08 | 6 | 1 |
| PCB126 | 57465-28-8 | pg/l | 0.03-3 | 0.008 | 0.0508 | 6 | 6 |
| PCB127 | 39635-33-1 | pg/l | 0.03-3 | 0.0494 | 0.181 | 6 | 6 |
| PCB128 & 166 | PCB128_166 | pg/l | 0.03-3 | -- | -- | 6 | -- |
| PCB129 & 138 & 160 & 163 | PCB129_138_160_ | pg/l | 0.03-3 | -- | -- | 6 | -- |
| PCB130 | 52663-66-8 | pg/l | 0.03-3 | 0.0067 | 0.165 | 6 | 1 |
| PCB131 | 61798-70-7 | pg/l | 0.03-3 | 0.0113 | 0.826 | 6 | 4 |
| PCB132 | 38380-05-1 | pg/l | 0.03-3 | 0.0067 | 0.606 | 6 | 1 |
| PCB133 | 35694-04-3 | pg/l | 0.03-3 | 0.0062 | 1.09 | 6 | 1 |
| PCB134 & 143 | PCB134_143 | pg/l | 0.03-3 | 0.0064 | 0.151 | 6 | 2 |
| PCB135 & 151 & 154 | PCB135_151_154 | pg/l | 0.03-3 | -- | -- | 6 | -- |
| PCB136 | 38411-22-2 | pg/l | 0.03-3 | -- | -- | 6 | -- |
| PCB137 | 35694-06-5 | pg/l | 0.03-3 | 0.0066 | 0.102 | 6 | 1 |
| PCB139 & 140 | PCB139_140 | pg/l | 0.03-3 | 0.0081 | 0.416 | 6 | 2 |
| PCB141 | 52712-04-6 | pg/l | 0.03-3 | -- | -- | 6 | -- |
| PCB142 | 41411-61-4 | pg/l | 0.03-3 | 0.0485 | 0.456 | 6 | 6 |
| PCB144 | 68194-14-9 | pg/l | 0.03-3 | 0.0013 | 0.101 | 6 | 2 |
| PCB145 | 74472-40-5 | pg/l | 0.03-3 | 0.0655 | 0.616 | 6 | 6 |
| PCB146 | 51908-16-8 | pg/l | 0.03-3 | 0.0058 | 0.388 | 6 | 1 |
| PCB147 & 149 | PCB147_149 | pg/l | 0.03-3 | -- | -- | 6 | -- |
| PCB148 | 74472-41-6 | pg/l | 0.03-3 | 0.002 | 0.411 | 6 | 5 |
| PCB150 | 68194-08-1 | pg/l | 0.03-3 | 0.0014 | 0.024 | 6 | 3 |
| PCB152 | 68194-09-2 | pg/l | 0.03-3 | 0.002 | 0.507 | 6 | 6 |
| PCB153 & 168 | PCB153_168 | pg/l | 0.03-3 | -- | -- | 6 | -- |
| PCB155 | 33979-03-2 | pg/l | 0.03-3 | 0.0014 | 0.784 | 6 | 5 |
| PCB156 & 157 | PCB156_157 | pg/l | 0.03-3 | 0.0058 | 0.21 | 6 | 1 |
| PCB158 | 74472-42-7 | pg/l | 0.03-3 | 0.0042 | 0.192 | 6 | 1 |
| PCB159 | 39635-35-3 | pg/l | 0.03-3 | 0.0047 | 0.429 | 6 | 2 |
| PCB161 | 74472-43-8 | pg/l | 0.03-3 | 0.083 | 0.781 | 6 | 6 |
| PCB162 | 39635-34-2 | pg/l | 0.03-3 | 0.007 | 0.693 | 6 | 5 |
| PCB164 | 74472-45-0 | pg/l | 0.03-3 | 0.0047 | 0.176 | 6 | 1 |
| PCB165 | 74472-46-1 | pg/l | 0.03-3 | 0.0845 | 0.795 | 6 | 6 |
| PCB167 | 52663-72-6 | pg/l | 0.03-3 | 0.0045 | 0.06 | 6 | 1 |
| PCB169 | 32774-16-6 | pg/l | 0.03-3 | 0.012 | 0.505 | 6 | 6 |
| PCB170 | 35065-30-6 | pg/l | 0.03-3 | -- | -- | 6 | -- |
| PCB171 & 173 | PCB171_173 | pg/l | 0.03-3 | -- | -- | 6 | -- |
| PCB172 | 52663-74-8 | pg/l | 0.03-3 | 0.0013 | 0.362 | 6 | 2 |

Table A-7. Reported Detection Limits - Jaunary 2006 Surface Water Sampling Event.

| Analyte | CAS Number | Units | Round 2 QAPP MDL | Reported Detection Limits | | Total # Data Points | # Undetected Results |
|---|---|---|---|---|---|---|---|
| | | | | Minimum | Maximum | | |
| PCB174 | 38411-25-5 | pg/l | 0.03-3 | -- | -- | 6 | -- |
| PCB175 | 40186-70-7 | pg/l | 0.03-3 | 0.0013 | 0.111 | 6 | 3 |
| PCB176 | 52663-65-7 | pg/l | 0.03-3 | 0.0013 | 0.214 | 6 | 1 |
| PCB177 | 52663-70-4 | pg/l | 0.03-3 | -- | -- | 6 | -- |
| PCB178 | 52663-67-9 | pg/l | 0.03-3 | 0.0013 | 0.573 | 6 | 2 |
| PCB179 | 52663-64-6 | pg/l | 0.03-3 | -- | -- | 6 | -- |
| PCB180 & 193 | PCB180_193 | pg/l | 0.03-3 | 0.0014 | 0.745 | 6 | 3 |
| PCB181 | 74472-47-2 | pg/l | 0.03-3 | 0.003 | 1.21 | 6 | 6 |
| PCB182 | 60145-23-5 | pg/l | 0.03-3 | 0.0014 | 0.031 | 6 | 5 |
| PCB183 & 185 | PCB183_185 | pg/l | 0.03-3 | 0.0013 | 0.22 | 6 | 2 |
| PCB184 | 74472-48-3 | pg/l | 0.03-3 | 0.002 | 0.127 | 6 | 6 |
| PCB186 | 74472-49-4 | pg/l | 0.03-3 | 0.0836 | 1.02 | 6 | 6 |
| PCB187 | 52663-68-0 | pg/l | 0.03-3 | 0.0013 | 0.555 | 6 | 2 |
| PCB188 | 74487-85-7 | pg/l | 0.03-3 | 0.0014 | 0.105 | 6 | 4 |
| PCB189 | 39635-31-9 | pg/l | 0.03-3 | 0.0017 | 0.083 | 6 | 4 |
| PCB190 | 41411-64-7 | pg/l | 0.03-3 | -- | -- | 6 | -- |
| PCB191 | 74472-50-7 | pg/l | 0.03-3 | 0.0013 | 0.075 | 6 | 2 |
| PCB192 | 74472-51-8 | pg/l | 0.03-3 | 0.002 | 0.865 | 6 | 6 |
| PCB194 | 35694-08-7 | pg/l | 0.03-3 | 0.0039 | 0.164 | 6 | 3 |
| PCB195 | 52663-78-2 | pg/l | 0.03-3 | 0.0042 | 0.081 | 6 | 3 |
| PCB196 | 42740-50-1 | pg/l | 0.03-3 | 0.0014 | 0.136 | 6 | 3 |
| PCB197 & 200 | PCB197_200 | pg/l | 0.03-3 | 0.0014 | 0.241 | 6 | 4 |
| PCB198 & 199 | PCB198_199 | pg/l | 0.03-3 | 0.0014 | 0.387 | 6 | 3 |
| PCB201 | 40186-71-8 | pg/l | 0.03-3 | 0.0013 | 0.192 | 6 | 4 |
| PCB202 | 2136-99-4 | pg/l | 0.03-3 | 0.0013 | 0.232 | 6 | 4 |
| PCB203 | 52663-76-0 | pg/l | 0.03-3 | 0.0013 | 0.266 | 6 | 3 |
| PCB204 | 74472-52-9 | pg/l | 0.03-3 | 0.002 | 0.298 | 6 | 6 |
| PCB205 | 74472-53-0 | pg/l | 0.03-3 | 0.0013 | 0.067 | 6 | 3 |
| PCB206 | 40186-72-9 | pg/l | 0.03-3 | -- | -- | 6 | -- |
| PCB207 | 52663-79-3 | pg/l | 0.03-3 | 0.0174 | 0.045 | 6 | 3 |
| PCB208 | 52663-77-1 | pg/l | 0.03-3 | 0.004 | 0.11 | 6 | 2 |
| PCB209 | 2051-24-3 | pg/l | 0.03-3 | -- | -- | 6 | -- |

Table A-8. Results for Surface Water Field Replicate Samples.

| | | | | | | **Samle ID** | **LW3-W1023-1** | **LW3-W1023-2** | **RPD** |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | **Sampling Date:** | **20-Jan-06** | **20-Jan-06** | |
| | | | | | | **Parent Sample:** | | **LW3-W1023-1** | |
| **Analyte** | **Basis** | **Lab** | **Method** | **Units** | **# Collected FR and FD** | **Nr Detected FR and FD** | | | |
| **Butyltins** | | | | | | | | | |
| Dibutyltin ion | NA | CASK | KRONE | µg/l | 1 | -- | 0.011 *U* | 0.0011 *U* | NA |
| Tetrabutyltin | NA | CASK | KRONE | µg/l | 1 | -- | 0.0015 *U* | 0.0015 *U* | NA |
| Tributyltin ion | NA | CASK | KRONE | µg/l | 1 | -- | 0.013 *U* | 0.014 *U* | NA |
| Butyltin ion | NA | CASK | KRONE | µg/l | 1 | -- | 0.0017 *U* | 0.0017 *U* | NA |
| **Conventionals** | | | | | | | | | |
| Dissolved organic carbon | NA | CASK | E415.1 | mg/l | 1 | 1 | 2.2 | 2.2 | 0 |
| Hardness as CaCO3 | NA | CASK | SW6010B | mg/l | 1 | 1 | 19.3 | 19 | 2 |
| Total dissolved solids | NA | CASK | E160.1 | mg/l | 1 | -- | 74 *U* | 53 *U* | NA |
| Total organic carbon | NA | CASK | E415.1 | mg/l | 1 | 1 | 2.3 | 2.3 | 0 |
| Total suspended solids | NA | CASK | E160.2 | mg/l | 1 | 1 | 60 | 54 | 11 |
| **Herbicides** | | | | | | | | | |
| Dichloroprop | NA | CASK | SW8151 | µg/l | 1 | -- | 0.058 *U* | 0.061 *U* | NA |
| Silvex | NA | CASK | SW8151 | µg/l | 1 | -- | 0.048 *U* | 0.05 *U* | NA |
| 2,4,5-T | NA | CASK | SW8151 | µg/l | 1 | -- | 0.043 *U* | 0.045 *U* | NA |
| 2,4-D | NA | CASK | SW8151 | µg/l | 1 | -- | 0.048 *U* | 0.05 *U* | NA |
| **Metals** | | | | | | | | | |
| Aluminum | D | CASK | SW6020 | µg/l | 1 | -- | 10.3 | 5 *U* | NA |
| Lead | D | CASK | SW6020 | µg/l | 1 | -- | 0.022 | 0.009 *U* | NA |
| Mercury | D | CASK | SW7470A | µg/l | 1 | -- | 0.08 *U* | 0.08 *U* | NA |
| Nickel | D | CASK | SW6020 | µg/l | 1 | 1 | 0.52 | 0.43 | 19 |
| Silver | D | CASK | SW6020 | µg/l | 1 | -- | 0.009 *U* | 0.004 *U* | NA |
| Antimony | D | CASK | SW6020 | µg/l | 1 | -- | 0.023 *U* | 0.023 *U* | NA |
| Arsenic | D | CASK | SW6020 | µg/l | 1 | 1 | 0.21 | 0.21 | 0 |
| Cadmium | D | CASK | SW6020 | µg/l | 1 | -- | 0.004 *U* | 0.002 *U* | NA |
| Chromium | D | CASK | SW6020 | µg/l | 1 | -- | 0.2 *U* | 0.18 *U* | NA |
| Copper | D | CASK | SW6020 | µg/l | 1 | 1 | 2.39 *J* | 0.76 *J* | 103 |
| Zinc | D | CASK | SW6020 | µg/l | 1 | -- | 2.1 *U* | 0.81 *U* | NA |
| Selenium | D | CASK | SW6020 | µg/l | 1 | -- | 0.2 *U* | 0.2 *U* | NA |
| Aluminum | T | CASK | SW6020 | µg/l | 1 | 1 | 1860 | 1610 | 14 |
| Lead | T | CASK | SW6020 | µg/l | 1 | 1 | 0.855 | 0.79 | 8 |
| Mercury | T | CASK | SW7470A | µg/l | 1 | -- | 0.08 *U* | 0.08 *U* | NA |
| Nickel | T | CASK | SW6020 | µg/l | 1 | 1 | 1.89 | 1.73 | 9 |
| Silver | T | CASK | SW6020 | µg/l | 1 | -- | 0.013 *U* | 0.012 *U* | NA |
| Antimony | T | CASK | SW6020 | µg/l | 1 | -- | 0.033 *U* | 0.027 *U* | NA |
| Arsenic | T | CASK | SW6020 | µg/l | 1 | 1 | 0.48 | 0.54 | -12 |
| Cadmium | T | CASK | SW6020 | µg/l | 1 | -- | 0.014 *U* | 0.012 *U* | NA |
| Chromium | T | CASK | SW6020 | µg/l | 1 | 1 | 1.62 | 1.53 | 6 |
| Copper | T | CASK | SW6020 | µg/l | 1 | 1 | 3.68 *J* | 3.53 *J* | 4 |
| Zinc | T | CASK | SW6020 | µg/l | 1 | 1 | 6.38 | 5.76 | 10 |
| Selenium | T | CASK | SW6020 | µg/l | 1 | -- | 0.2 *U* | 0.2 *U* | NA |
| **PAHs** | | | | | | | | | |
| Anthracene | NA | CASK | SW8270-SIM | µg/l | 1 | -- | 0.0011 *U* | 0.0011 *U* | NA |
| Pyrene | NA | CASK | SW8270-SIM | µg/l | 1 | -- | 0.0026 *J* | 0.0023 *U* | NA |
| Benzo(g,h,i)perylene | NA | CASK | SW8270-SIM | µg/l | 1 | -- | 0.0037 *U* | 0.0037 *U* | NA |
| Indeno(1,2,3-cd)pyrene | NA | CASK | SW8270-SIM | µg/l | 1 | -- | 0.0021 *U* | 0.0021 *U* | NA |
| Benzo(b)fluoranthene | NA | CASK | SW8270-SIM | µg/l | 1 | -- | 0.002 *U* | 0.002 *U* | NA |
| Fluoranthene | NA | CASK | SW8270-SIM | µg/l | 1 | -- | 0.0024 *U* | 0.0024 *U* | NA |
| Benzo(k)fluoranthene | NA | CASK | SW8270-SIM | µg/l | 1 | -- | 0.0014 *U* | 0.0014 *U* | NA |
| Acenaphthylene | NA | CASK | SW8270-SIM | µg/l | 1 | -- | 0.0018 *U* | 0.0018 *U* | NA |
| Chrysene | NA | CASK | SW8270-SIM | µg/l | 1 | -- | 0.0013 *U* | 0.0013 *U* | NA |
| Benzo(a)pyrene | NA | CASK | SW8270-SIM | µg/l | 1 | -- | 0.0016 *U* | 0.0016 *U* | NA |
| Dibenzo(a,h)anthracene | NA | CASK | SW8270-SIM | µg/l | 1 | -- | 0.0017 *U* | 0.0017 *U* | NA |
| Benzo(a)anthracene | NA | CASK | SW8270-SIM | µg/l | 1 | -- | 0.0021 *U* | 0.0021 *U* | NA |
| Acenaphthene | NA | CASK | SW8270-SIM | µg/l | 1 | -- | 0.002 *U* | 0.002 *U* | NA |
| Phenanthrene | NA | CASK | SW8270-SIM | µg/l | 1 | -- | 0.0044 *U* | 0.0055 *U* | NA |
| Fluorene | NA | CASK | SW8270-SIM | µg/l | 1 | -- | 0.0026 *U* | 0.0026 *U* | NA |
| Naphthalene | NA | CASK | SW8270-SIM | µg/l | 1 | -- | 0.008 *U* | 0.0093 *U* | NA |
| 2-Methylnaphthalene | NA | CASK | SW8270-SIM | µg/l | 1 | -- | 0.0027 *U* | 0.0034 *U* | NA |

Table A-8. Results for Surface Water Field Replicate Samples.

| | | | | | | **Samle ID** | **LW3-W1023-1** | **LW3-W1023-2** | **RPD** |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | **Sampling Date:** | **20-Jan-06** | **20-Jan-06** | |
| | | | | | | **Parent Sample:** | | **LW3-W1023-1** | |
| **Analyte** | **Basis** | **Lab** | **Method** | **Units** | **# Collected FR and FD** | **Nr Detected FR and FD** | | | |
| **Phenols** | | | | | | | | | |
| 4-Nitrophenol | NA | CASK | SW8270C | µg/l | 1 | -- | 0.57 *U* | 0.57 *U* | NA |
| 2,4-Dimethylphenol | NA | CASK | SW8270C | µg/l | 1 | -- | 0.34 *U* | 0.34 *U* | NA |
| 4-Methylphenol | NA | CASK | SW8270C | µg/l | 1 | -- | 0.054 *U* | 0.054 *U* | NA |
| Phenol | NA | CASK | SW8270C | µg/l | 1 | -- | 0.021 *U* | 0.021 *U* | NA |
| 2,4-Dichlorophenol | NA | CASK | SW8270C | µg/l | 1 | -- | 0.025 *U* | 0.025 *U* | NA |
| 2,4-Dinitrophenol | NA | CASK | SW8270C | µg/l | 1 | -- | 0.56 *U* | 0.56 *U* | NA |
| 4,6-Dinitro-2-methylphenol | NA | CASK | SW8270C | µg/l | 1 | -- | 0.014 *U* | 0.014 *U* | NA |
| 2,3,4,6-Tetrachlorophenol | NA | CASK | SW8270C | µg/l | 1 | -- | 1.1 *UJ* | 1.1 *UJ* | NA |
| 4-Chloro-3-methylphenol | NA | CASK | SW8270C | µg/l | 1 | -- | 0.031 *U* | 0.031 *U* | NA |
| Pentachlorophenol | NA | CASK | SW8270C | µg/l | 1 | -- | 0.03 *U* | 0.03 *U* | NA |
| 2,4,6-Trichlorophenol | NA | CASK | SW8270C | µg/l | 1 | -- | 0.039 *U* | 0.039 *U* | NA |
| 2-Nitrophenol | NA | CASK | SW8270C | µg/l | 1 | -- | 0.015 *U* | 0.015 *U* | NA |
| 2-Methylphenol | NA | CASK | SW8270C | µg/l | 1 | -- | 0.063 *U* | 0.063 *U* | NA |
| 2-Chlorophenol | NA | CASK | SW8270C | µg/l | 1 | -- | 0.016 *U* | 0.016 *U* | NA |
| 2,4,5-Trichlorophenol | NA | CASK | SW8270C | µg/l | 1 | -- | 0.027 *U* | 0.027 *U* | NA |
| **Phthalates** | | | | | | | | | |
| Bis(2-ethylhexyl) phthalate | NA | CASK | SW8270C | µg/l | 1 | -- | 0.29 *U* | 0.29 *U* | NA |
| Di-n-octyl phthalate | NA | CASK | SW8270C | µg/l | 1 | -- | 0.034 *U* | 0.034 *U* | NA |
| Dimethyl phthalate | NA | CASK | SW8270C | µg/l | 1 | -- | 0.014 *U* | 0.014 *U* | NA |
| Diethyl phthalate | NA | CASK | SW8270C | µg/l | 1 | -- | 0.092 *U* | 0.13 *U* | NA |
| Dibutyl phthalate | NA | CASK | SW8270C | µg/l | 1 | -- | 0.15 *U* | 0.11 *U* | NA |
| Butylbenzyl phthalate | NA | CASK | SW8270C | µg/l | 1 | -- | 0.027 *U* | 0.027 *U* | NA |
| **SVOCs** | | | | | | | | | |
| 4-Nitroaniline | NA | CASK | SW8270C | µg/l | 1 | -- | 0.18 *U* | 0.18 *U* | NA |
| Benzyl alcohol | NA | CASK | SW8270C | µg/l | 1 | -- | 1.1 *U* | 1.1 *U* | NA |
| 4-Bromophenyl phenyl ether | NA | CASK | SW8270C | µg/l | 1 | -- | 0.019 *U* | 0.019 *U* | NA |
| Azobenzene | NA | CASK | SW8270C | µg/l | 1 | -- | 0.013 *U* | 0.013 *U* | NA |
| 1,4-Dichlorobenzene | NA | CASK | SW8270C | µg/l | 1 | -- | 0.014 *U* | 0.014 *U* | NA |
| 4-Chloroaniline | NA | CASK | SW8270C | µg/l | 1 | -- | 0.019 *U* | 0.019 *U* | NA |
| Bis(2-chloroethyl) ether | NA | CASK | SW8270C | µg/l | 1 | -- | 0.015 *U* | 0.015 *U* | NA |
| Bis(2-chloroethoxy) methane | NA | CASK | SW8270C | µg/l | 1 | -- | 0.012 *U* | 0.012 *U* | NA |
| Hexachlorobenzene | NA | CASK | SW8270C | µg/l | 1 | -- | 0.015 *U* | 0.015 *U* | NA |
| 1,2,4-Trichlorobenzene | NA | CASK | SW8270C | µg/l | 1 | -- | 0.017 *U* | 0.017 *U* | NA |
| 2,4-Dinitrotoluene | NA | CASK | SW8270C | µg/l | 1 | -- | 0.021 *U* | 0.021 *U* | NA |
| Dibenzofuran | NA | CASK | SW8270-SIM | µg/l | 1 | -- | 0.0071 *U* | 0.0071 *U* | NA |
| Bis(2-chloroisopropyl) ether | NA | CASK | SW8270C | µg/l | 1 | -- | 0.018 *U* | 0.018 *U* | NA |
| 1,3-Dichlorobenzene | NA | CASK | SW8270C | µg/l | 1 | -- | 0.012 *U* | 0.012 *U* | NA |
| 2,6-Dinitrotoluene | NA | CASK | SW8270C | µg/l | 1 | -- | 0.0093 *U* | 0.0093 *U* | NA |
| N-Nitrosodipropylamine | NA | CASK | SW8270C | µg/l | 1 | -- | 0.034 *U* | 0.034 *U* | NA |
| Aniline | NA | CASK | SW8270C | µg/l | 1 | -- | 0.27 *U* | 0.27 *U* | NA |
| N-Nitrosodimethylamine | NA | CASK | SW8270C | µg/l | 1 | -- | 0.45 *U* | 0.45 *U* | NA |
| Benzoic acid | NA | CASK | SW8270C | µg/l | 1 | -- | 2 *U* | 1.9 *U* | NA |
| Hexachloroethane | NA | CASK | SW8270C | µg/l | 1 | -- | 0.02 *U* | 0.02 *U* | NA |
| 4-Chlorophenyl phenyl ether | NA | CASK | SW8270C | µg/l | 1 | -- | 0.0089 *U* | 0.0089 *U* | NA |
| Hexachlorocyclopentadiene | NA | CASK | SW8270C | µg/l | 1 | -- | 0.043 *U* | 0.043 *U* | NA |
| Isophorone | NA | CASK | SW8270C | µg/l | 1 | -- | 0.0089 *U* | 0.0089 *U* | NA |
| N-Nitrosodiphenylamine | NA | CASK | SW8270C | µg/l | 1 | -- | 0.03 *U* | 0.03 *U* | NA |
| Carbazole | NA | CASK | SW8270C | µg/l | 1 | -- | 0.014 *U* | 0.014 *U* | NA |
| Hexachlorobutadiene | NA | CASK | SW8270C | µg/l | 1 | -- | 0.021 *U* | 0.021 *U* | NA |
| 2-Nitroaniline | NA | CASK | SW8270C | µg/l | 1 | -- | 0.016 *U* | 0.016 *U* | NA |
| 2-Chloronaphthalene | NA | CASK | SW8270C | µg/l | 1 | -- | 0.016 *U* | 0.016 *U* | NA |
| 3,3'-Dichlorobenzidine | NA | CASK | SW8270C | µg/l | 1 | -- | 0.46 *U* | 0.46 *U* | NA |
| 1,2-Dichlorobenzene | NA | CASK | SW8270C | µg/l | 1 | -- | 0.015 *U* | 0.015 *U* | NA |
| Nitrobenzene | NA | CASK | SW8270C | µg/l | 1 | -- | 0.0078 *U* | 0.0078 *U* | NA |
| 3-Nitroaniline | NA | CASK | SW8270C | µg/l | 1 | -- | 0.24 *U* | 0.24 *U* | NA |

PORTLAND HARBOR RI/FS

# ROUND 3A JANUARY 2006 HIGH FLOW SURFACE WATER DATA REPORT

## APPENDIX B

DATA VALIDATION REPORTS

(provided on accompanying CD)

October 20, 2006

**Prepared for**

The Lower Willamette Group

**Prepared by**

Integral Consulting Inc.

PORTLAND HARBOR RI/FS

# ROUND 3A JANUARY 2006 HIGH FLOW SURFACE WATER DATA REPORT

## APPENDIX C

SCRA DATABASE, EXCEL FLAT FILE FORMAT

(provided on accompanying CD)

October 20, 2006

**Prepared for**

The Lower Willamette Group

**Prepared by**

Integral Consulting Inc.