PORTLAND HARBOR RI/FS

ROUND 2 MULTIPLATE INVERTEBRATE TISSUE DATA REPORT

DRAFT

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Prepared for
The Lower Willamette Group

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LIST OF ACRONYMS

Axys	Axys Analytical Services, Ltd.
CAS	Columbia Analytical Services
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
HRGC/HRMS	high-resolution gas chromatography/high-resolution mass spectrometry
LWG	Lower Willamette Group
NOAA	National Oceanic Atmospheric Administration
PAHs	polycyclic aromatic hydrocarbons
PARCC	precision, accuracy, representativeness, completeness, comparability
PCB	polychlorinated biphenyl
PCDD/F	polychlorinated dibenzo-p-dioxin/furan
QA	quality assurance
QC	quality control
QAPP	quality assurance project plan
RI/FS	remedial investigation and feasibility study
RM	river mile
SCRA	site characterization and risk assessment
SOP	standard operating procedure
SDG	sample delivery group

1.0 INTRODUCTION

The remedial investigation and feasibility study (RI/FS) of the Portland Harbor Superfund Site 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. Round 1 chemical and biological sampling took place during the summer and fall of 2002 and included extensive fish and shellfish tissue and some surface sediment collections. These results as well as the results of physical studies that continued into the winter of 2004 (e.g., the February 2004 bathymetry survey) are described in the Round 1 Site Characterization Summary Report (Integral 2004).

Round 2 sampling activities included collection of the following types of data:

- Physical system survey data
- Surface and subsurface sediment chemistry and physical data
- Tissue chemistry data
- Benthic toxicity data
- Surface water chemistry data
- Groundwater, transition zone water, and sediment chemistry data
- Preliminary natural attenuation sampling (e.g., radioisotope cores).

Results from each of these collection efforts are documented under separate cover.

Round 1 sampling included the collection of crayfish and a limited number of clam samples for tissue chemistry analyses. Based on a review of these data, the Lower Willamette Group (LWG) and the U.S. Environmental Protection Agency (EPA) determined that additional invertebrate chemistry data were needed for several components of the ecological risk assessment (ERA). LWG reviewed a number of potential sampling approaches for collecting sufficient tissue for invertebrates predominantly exposed through surface water. It was concluded that the use of multiplate samplers, deployed in locations throughout the study area, would provide the best opportunity to assess the loading of chemicals to epibenthic and pelagic invertebrates via the surface water pathway.

This Round 2 Multiplate Invertebrate Tissue Data Report summarizes the results from the July through September 2005 sample collection effort designed to supplement the Round 1 multiplate tissue data set. A detailed description of the Round 2 multiplate tissue collection effort is included in the field sampling report (FSR; Windward 2005).

Except where noted in the FSR (Windward 2005), all Round 2 multiplate invertebrate tissue collection field activities, including navigational positioning, sample collection, sample handling and processing, and data management, followed guidelines approved by and specified in the *Portland Harbor Superfund Site Field Sampling Plan: Round 2 Sampling of Invertebrates Using Multiplate Samplers* (Multiplate FSP; Windward and Integral 2005), the Round 2 Quality Assurance Project Plan (QAPP; Integral and Windward 2004); the Round 2 QAPP Addendum 5: Invertebrate Tissue Collection Using Multiplate Samplers (Integral 2005a); and its supplement (Integral 2005b).

1.1 ROUND 2 SAMPLING OBJECTIVES

The purpose of the Round 2 sampling was to fill in data gaps for the RI and risk assessments as well as initiate data collection for the FS. The specific objectives of the Portland Harbor multiplate invertebrate sampling were to:

- Collect information on measured constituents in invertebrate tissue samples that represent epibenthic organisms within the study area for use in the fish, bird, and mammalian exposure models in the ERA.
- Collect information on measured constituents in invertebrate tissue samples that represent epibenthic organisms within the study area for use in the tissue-residue line-of-evidence for estimating risk to benthic invertebrates in the ERA.
- Collect information on measured constituents in invertebrate tissue samples that represent epibenthic organisms within the study area for use in the food web model to develop risk-based cleanup goals. It is anticipated that the multiplate biomass will represent accumulation via the surface water pathway.

This data report presents and summarizes the results from the Round 2 multiplate invertebrate tissue collection field activities.

1.2 REPORT ORGANIZATION

The remaining sections of this document include a summary of the data collection activities (Section 2); details on the laboratory sample analyses, data quality reviews, data management, and laboratory deviations (Section 3); the chemical and taxonomic results (Section 4); and references (Section 5).

Supporting information is provided in the following three appendices:

- **Appendix A**: Data Quality Summary
- **Appendix B**: Data Validation Reports (on CD)

- **Appendix C**: SCRA (site characterization and risk assessment) Database, Excel Flat File Format (on CD)
- **Appendix D**. Laboratory Taxonomic Data.

2.0 DATA COLLECTION ACTIVITIES

This section summarizes the Round 2 multiplate tissue collection activities during the July through September 2005 sampling event. Station navigation and positioning, record keeping, and sample handling and storage details are presented in the FSR (Windward 2005).

Multiplate samplers were placed at 10 EPA-approved locations within the study area between river mile (RM) 2 and RM 11, between July 26 and 28, 2005, as shown in Figure 2-1. On August 15, 2005, two of the sampler arrays at Station MIT005 were reported damaged near the Rhone Poulenc outfall diffuser. The damaged arrays were retrieved on August 15 and 17, and replacement samplers were deployed just downstream of the remaining two samplers at MIT005 on August 18. On August 31, one sampler array from Station MIT002 was observed on the shore without anchors, and buoys from another array were observed at the surface of the water. On September 1, the array on the shore was attached to new anchors and redeployed in the original location. The other array with buoys at the surface was left untouched. The multiplate samplers were retrieved from all locations between September 6 and 15, 2005.

Round 2 multiplate tissue collection and processing followed the procedures specified in the Multiplate FSP (Windward and Integral 2005) and associated QAPP, QAPP Addendum 5, and its supplement (Integral and Windward 2004; Integral 2005a,b). Deviations from the FSP and associated QAPP documentation are discussed in Section 3.3.3 of this data report.

3.0 LABORATORY ANALYSIS AND DATA MANAGEMENT

This section describes the laboratory methods used to analyze the multiplate invertebrate tissue samples. Deviations from the analytical methods detailed in the QAPP and associated QAPP documentation are described below. The data management subsection describes the data validation process from receipt of the laboratory data package to the generation of a final validated electronic data deliverable (EDD). Furthermore, it describes how the SCRA database was compiled into a series of compatible Excel tables, which were then distributed to the SCRA data users. A summary of Round 2 multiplate invertebrate tissue data quality is provided in Appendix A, and the data validation reports are provided in Appendix B.

3.1 CHEMICAL AND TAXONOMICAL ANALYSES

This section summarizes the chemical analyses performed on the multiplate invertebrate tissue samples. Because of the limited number of tissue samples from all stations, a revised analytical approach was developed in cooperation with and approved by EPA and its partners. This revised analytical approach is described in a supplement (Integral 2005b) to the multiplate tissue QAPP Addendum 5 (Integral 2005a) and includes combining tissue samples from several stations to achieve sufficient mass for chemical analysis.

The QAPP supplement also provides information regarding the analyses to be completed for the multiplate samples and replaces information provided in QAPP Addendum 5. Because of limited sample sizes, analyses for mercury, butyltins, polycyclic aromatic hydrocarbons (PAHs), and phthalate esters could not be completed. Furthermore, toxaphene was removed from the list of pesticide analyses completed by high-resolution gas chromatography/high-resolution mass spectrometry (HRGC/HRMS).

3.1.1 Invertebrate Tissue Samples

Two laboratories conducted the chemical analyses of collected samples. Axys Analytical Services, Ltd. (Axys; Sydney, B.C., Canada) homogenized the tissue samples and conducted the analyses for polychlorinated biphenyl (PCB) congeners, polychlorinated dibenzo-p-dioxins/furans (PCDD/Fs), organochlorine pesticides, lipid content, and percent moisture. Columbia Analytical Services (CAS; Kelso, Washington) conducted analyses for metals and total solids. Table 3-1 lists the analyses conducted on each multiplate tissue sample. Analytical methods are provided in Table 3-2.

3.1.2 Taxonomical Analysis

EcoAnalysts, Inc. (Moscow, Idaho) performed taxonomic identification of invertebrates on 24 multiplate samplers collected at the 10 sampling stations. The number of multiplate samplers per station was as follows: three samplers each at stations LW2-MIT001, LW2-MIT003, LW2-MIT004, LW2-MIT005, LW2-MIT006, and LW2-MIT009, two samplers each at stations LW2-MIT002 and LW2-MT010, and one sampler each at stations LW2-MT007 and LW2-MIT008. The organisms were identified to the lowest practical taxonomic level.

3.2 DATA VALIDATION

As required by the Round 2 QAPP (Integral and Windward 2004), approximately 10% of the multiplate invertebrate tissue data were fully validated, and the remaining data were subjected to Level 3 data validation, which included the evaluation and assessment of the sample results and applicable quality control results reported by the laboratory. The data validation subcontractor for the Round 2 multiplate tissue data was EcoChem, Inc. (EcoChem), located in Seattle, WA. The first data package for each analytical method was additionally submitted to EPA for data validation by their QA Office.

The inorganic, organic, PCB congener, and PCDD/F data were validated as approved by EPA in accordance with guidance specified by the *USEPA 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 quality control requirements included in the referenced methods. The data validation qualifiers and definitions are summarized in Table 3-3.

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 quality control 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 quality control samples (e.g., serial dilutions for inductively coupled plasma analyses).

- Results for field quality control samples (i.e., equipment blanks).
- 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.

A data quality report and a tabular summary of qualified data were generated by EcoChem after completing the data validation activities for each multiplate invertebrate tissue sample type. 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 3.5.

3.3 CHEMICAL 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 Addendum 5 (Integral 2005a), as approved by EPA. 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 2 multiplate invertebrate tissue chemistry data was 100% overall, which exceeds the QAPP completeness objective of 95%. Completeness for the Round 2 data is summarized by parameter group in Table 3-4. Completeness was 100% for the various parameter groups.

The EcoChem validation reports (Appendix B) provide detailed information on the data quality issues and data validation qualifiers for each parameter group for each laboratory data package. Qualified chemistry data for the multiplate invertebrate tissue samples are included in Table 4-1. A complete list of qualified results with reason codes is provided in the data validation reports in Appendix B.

3.3.1 Field Quality Control Samples

Quality control samples were prepared in the field and at the laboratories to monitor the bias and precision of the sample collection and analysis procedures. Field QC samples for this study were limited to the collection of one rinse blank for sample processing equipment. Field splits were not collected due to the nature of the multiplate sample devices and the limited mass of invertebrate tissue that was collected from each sampler.

3.3.2 Summary of Qualified Chemical Data

Selected data not meeting the data quality criteria were qualified as undetected, estimated, or tentatively identified during validation, in accordance with the QAPP. A tabular summary of the results, with the data qualifiers, is included in Table 4-1. 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.

3.3.3 Laboratory Deviations from the QAPP

This section discusses laboratory deviations from the Round 2 QAPP (Integral and Windward 2004), QAPP Addendum 5, and its supplement (Integral 2005a,b). Deviations from the Multiplate FSP (Windward and Integral 2005) were included in the FSR (Windward 2005).

Analyses for PAHs and phthalate esters could not be completed for any of the multiplate samples because insufficient sample mass was available for these analyses. PAH analyses had been planned for samples LW2-MIT001, LW2-MIT003/005/006, LW2-MIT008/010, and LW2-MIT009; phthalate ester analysis had been planned for sample LW2-MIT001. The actual sample masses measured by Axys for the multiplate tissue samples were lower than the original estimated masses for most of the samples. The available sample masses were consumed at Axys for the combined dioxin/PCB/pesticide/lipid procedure and for percent moisture. Percent moisture was analyzed out of priority sequence by the laboratory; as a result, the PAH and phthalate ester analyses could not be completed. Analyses for pesticides, PCB congeners, PCDD/Fs, lipids, percent moisture, and metals were completed as planned.

3.4 TAXONOMIC DATA QUALITY

The QA/QC process for taxonomic identification consisted of the re-sorting of each sample and re-identification of all organisms in selected samples. The re-sorting process QA/QC is discussed in Section 3.4.1; the taxonomic identification QA/QC is discussed in Section 3.4.2.

3.4.1 Re-Sorting Process QA/QC

The re-sorting process QA/QC consisted of a 20% re-sorting of each sample, which involved the examination of a sample that had been sorted once and was considered free of organisms. If a removal criterion of 90% was not met, the whole sample was re-sorted and the process repeated until the criterion was met. The QA/QC criterion was met for all samples except one, which was re-sorted. QA/QC information for the re-sorting process is presented in Table 3-5.

3.4.2 Taxonomic Identification QA/QC

The taxonomic identification QA/QC consisted of re-identification and re-enumeration of all invertebrates in at least 10% of the total number of samples by a second group of taxonomists. A 100% concurrency was found between the taxonomists for invertebrates other than chironomids. For chironomids, the same taxa were identified by the taxonomists, and the percent similarity in counts ranged between 96.5 and 98.5% (Table 3-6). No changes were made to the original data based on the re-identification and re-enumeration process.

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 and composite 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 EDDs. 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 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 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 laboratories reported the data or constructed the EDD, then the laboratories were 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 the Round 2 data validation contractor (EcoChem, Seattle, WA) 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 the National Oceanic & 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 contains all of the data reported by the analytical laboratories. This includes field and lab replicates, lab dilutions, and laboratory QA samples such as matrix spikes, surrogates, and method blanks. The data handling rules described in *Guidelines for Data Averaging and Treatment of Non-detected Values for the Round 1 Database* (Kennedy Jenks et al. 2004) were used to create a data set for the SCRA data users that was simpler: the data set contained only one result per analyte per sample and excluded all of the laboratory QA results. This involved creating a SCRA database that excluded lab QA results, contained only the most appropriate dilution result and analytical method for each analyte, and contained the average of replicates. Excluding the lab QA results was a simple database querying step. Selection of the most appropriate dilution was either done by the reporting laboratory or by the data validator. Selection of the most appropriate analytical method was described in the guidelines document and was accomplished by flagging the appropriate method in the project database.

The guidelines document described the rules used for averaging data and carrying qualifiers. Because it was the most data manipulation intensive procedure, the data were divided into subgroups and approximately 40% of each subgroup was verified. If any problems were found with the averaging, then 100% of the subgroup was verified and problems were corrected. The preliminary SCRA database was compiled into a series of database-compatible Excel tables and distributed to the SCRA data users.

4.0 ROUND 2 RESULTS

Round 2 results for multiplate invertebrate tissue chemistry and taxonomic analysis are provided in this section.

4.1 SUMMARY OF CHEMISTRY RESULTS

Multiplate invertebrate tissue samples were collected at 10 locations (see Figure 2-1) during the July through September 2005 sampling event. Table 4-1 summarizes the results for chemical analyses of the multiplate invertebrate tissue samples.

4.2 SUMMARY OF TAXONOMIC RESULTS

Table 4-2 summarizes the results of the taxonomic analyses of 24 multiplate samplers collected at the 10 sampling stations (see Figure 2-1). The total abundance of invertebrates identified at each station ranged between 736 and 2,738 individuals. Because the total abundance depended on the number of multiplate samplers processed, the abundance per 0.116 m^2 (the area of one multiplate) was calculated for each station. The abundance per 0.116 m^2 ranged between 263.7 and 912.7 individuals. The number of taxa identified ranged from 17 at Stations LW2-MIT002 and LW2-MIT007 to 38 at Station LW2-MIT001.

The most commonly identified invertebrates belonged to four major taxonomic groups: Annelida (worms), Chironomidae (midges/blood worms), Crustacea (amphipods), and Anthozoa (which include sea anemones, sea pens, and, in this study, the freshwater *Hydra* sp.). The complete taxonomic data set, as well as the diversity and other metrics derived from the data, are presented in Appendix D.

Daphnids were found in 17 of the 24 multiplate samplers. Because daphnids are not part of the benthic community, they were sorted and identified in a separate effort. The abundance of daphnids at each station ranged between 0 and 1,281 individuals (0 to 640.5 individuals per 0.116 m^2), with the highest abundance at Station LW2-MIT002 (Table 4-3). Only two daphnid species were identified, with *Sida crystallina* being the most abundant. The complete daphnid taxonomic data set is presented in Appendix D.

5.0 REFERENCES

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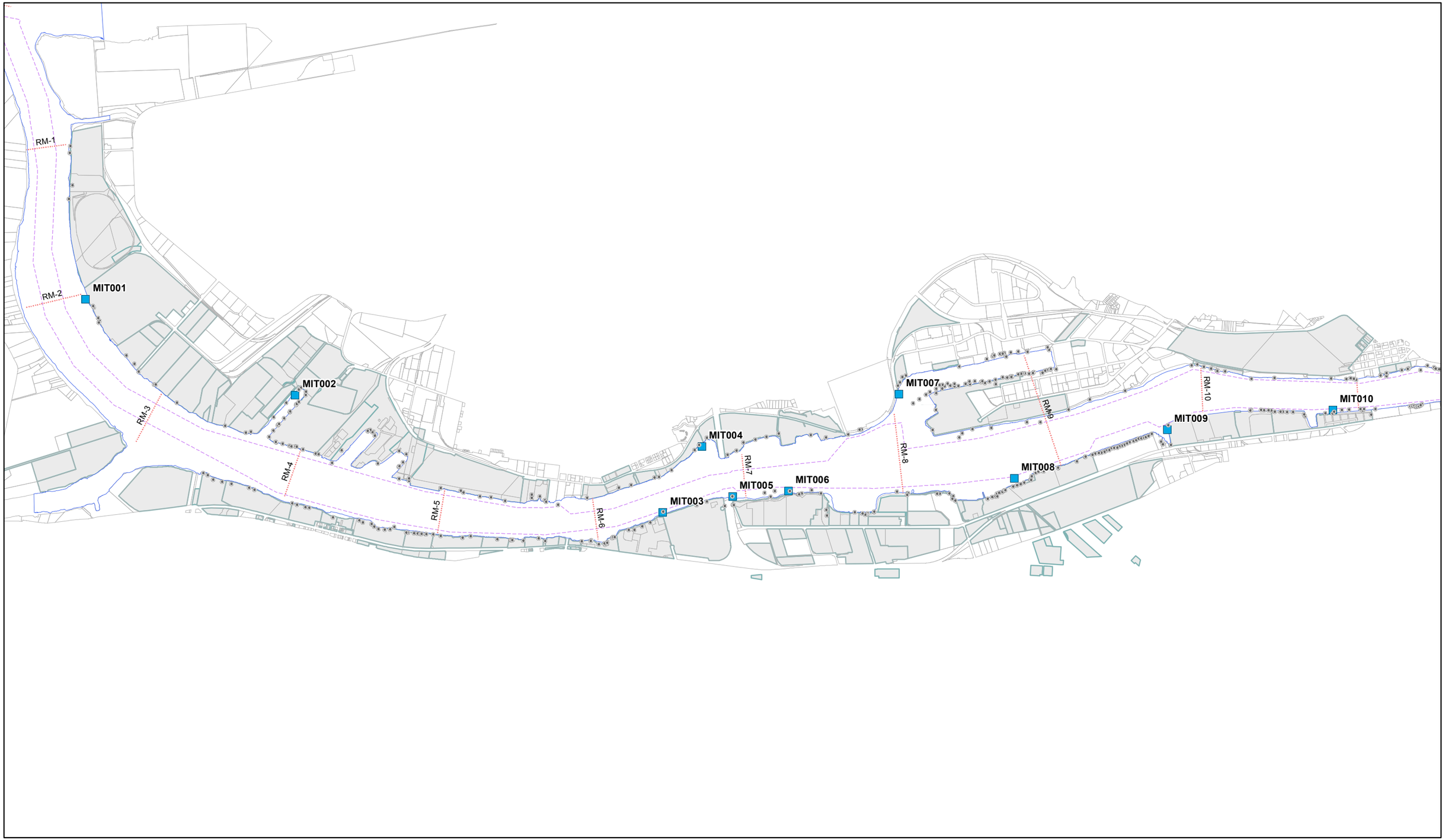

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integral consulting inc.

LWG LOWER WILLAMETTE GROUP

FEATURE SOURCES:
Transportation, Property, or Boundaries: Metro RLIS. Channel &
River miles: Developed from US Army Corps of Engineers information.
River Edge: Referencing the October 2001 0.33 ft. resolution color orthophotos.

N

0 1,000 2,000 3,000 Feet

Multiplate Station
Outfalls
River miles
Navigation Channel

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Figure 2-1
Portland Harbor RI/FS
Round 2 Invertebrate Multiplate Tissue Sample Locations

Table 3-1. Proposed and Actual Chemical Analysis of Multiplate Tissue Samples.

Station	Location	Estimated Total Invertebrate Biomass (g ww)	Proposed Subsample Distribution for Proposed Chemical Analyses (g ww)					
			PCDD/Fs/PCBs/ DDTs/Lipids	PAHs	Phthalates	Metals/Total Solids	Moisture	Total Biomass Used
MIT001	OSM	24.25	10	3 [b]	4	5	2	24
MIT002	International Slip	10.56	10	--	--	--	--	10
MIT004	Willamette Cove	5.31	5 [a]	--	--	--	--	5
MIT003/005/006	GASCO/Rhone Poulenc/Arkema	18.66	10	6	--	--	2	18
MIT007	Swan Island Lagoon	1.43	1 [a]	--	--	--	--	1.43
MIT008/010	Gunderson/Near Fremont Bridge	13.25	10	3	--	--	--	13
MIT009	Fireboat Cove	20.98	10	3 [b]	--	5	2	20

Station	Location	Actual Total Invertebrate Biomass (g ww)	Actual Subsample Distribution for Actual Chemical Analyses (g ww)					
			PCDD/Fs/PCBs/ Pest/Lipids [c]	PAHs	Phthalates	Metals/Total Solids	Moisture	Total Biomass Used
MIT001	OSM	20.38	13.54	--	--	5	1.84	20.38
MIT002	International Slip	13.15	13	--	--	--	--	13.15
MIT004	Willamette Cove	5.83	5.83 [a]	--	--	--	--	5.83
MIT003/005/006	GASCO/Rhone Poulenc/Arkema	12.7	10.69	--	--	--	2.01	12.70
MIT007	Swan Island Lagoon	1.52	1.52 [a]	--	--	--	--	1.52
MIT008/010	Gunderson/Near Fremont Bridge	10.22	10.22	--	--	--	--	10.22
MIT009	Fireboat Cove	15.98	9.11	--	--	5	1.87	15.98

Notes:

[a] No lipid analysis.

[b] PAHs will be the last analyte to be taken from the sample.

[c] Proposed DDTs were expanded to include all EPA 8081 pesticides (except toxaphene)

"--" - not analyzed
ww - wet weight

Table 3-2. Laboratory Methods for the Round 2 Multiplate Tissue Samples.

Analytes	Laboratory	Sample Preparation		Quantitative Analysis	
		Protocol	Procedure	Protocol	Procedure
Total Solids	CAS	CAS SOP	Freeze dry	CAS SOP	Gravimetric
Metals	CAS				
Aluminum, chromium		EPA 3050B	Acid digestion	EPA 6010B	ICP/AES
Aluminum, antimony, arsenic, cadmium, chromium, copper, lead, nickel, selenium, silver, zinc		EPA 3050B	Acid digestion	EPA 6020	ICP/MS
Selenium		EPA 3050B/7742	Acid digestion/hydride generation	EPA 7742	AAS
Lipids	Axys	Axys SOP MLA-013 [a]	Soxhlet extraction	Axys SOP	Gravimetric
Percent Moisture	Axys	--	--	Axys SOP	Oven/Gravimetric
Chlorinated PCDD/Fs [b]	Axys	Axys Method MLA-013 Rev 05	Soxhlet extraction Gel permeation chromatography Florisil® chromatography Carbon celite Layered silver nitrate/acid/base silica 1% deactivated basic alumina	Axys Method MLA-017/EPA 1613B	HRGC/HRMS
PCB Congeners [c]	Axys	Axys Method MLA-013 Rev 05	Soxhlet extraction Gel permeation chromatography Florisil® chromatography Acid/base silica column 1% deactivated basic alumina	Axys Method MLA-010/EPA 1668A	HRGC/HRMS
Organochlorine Pesticides	Axys	Axys Method MLA-013 Rev 05	Soxhlet extraction Gel permeation chromatography Florisil® chromatography	Axys Method MLA-028 Rev 01	HRGC/HRMS

Notes:

[a] PCDD/Fs, PCBs, pesticides, and lipids analyzed from the same extract.

[b] Includes analyses for PCDD/F homologs.

[c] Includes all 209 congeners. Includes analyses for PCB congener homologs and PCB Aroclors.

AAS - atomic absorption spectrometry
CAS - Columbia Analytical Services
EPA - U.S. Environmental Protection Agency
HRGC/HRMS - high resolution gas chromatography/high resolution mass spectrometry
ICP/AES - inductively coupled plasma/atomic emission spectrometry
ICP/MS - inductively coupled plasma/mass spectrometry
PCB - polychlorinated biphenyl
SOP - standard operating procedure

Table 3-3. 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.
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 3-4. Percent Completeness by Parameter Group.

Analysis	Total # of Data Points [a]	Number of Data Points		Completeness (%)
		Accepted	Rejected	
Conventionals [b]	2	2	0	100
PCDD/F homologs	70	70	0	100
PCDD/Fs	112	112	0	100
Metals	22	22	0	100
Organochlorine Pesticides	196	196	0	100
PCB Aroclors	49	49	0	100
PCB congener homologs	63	63	0	100
PCB congeners	1120	1120	0	100
Multiplate Tissue Sampling Project Total	**1634**	**1634**	**0**	**100**

Notes:

[a] Totals exclude field blanks.

[b] Includes total solids.

Table 3-5. Re-sorting QA/QC Information.

Station	Rep	Sorter	Sort Date	Sorted Grids	Total Grids	Sort Count	Total Sort Time	QC Sorter	QC Date	QC Count	QC Time	Efficacy 1	Efficacy 2	Total Time	Pre-Rinse Volume	Post-Rinse Volume
MIT001	1	Noel Jensen	12/06/05	4	4	263	4.75	Mike Fritts	12/07/05	0	0.50	100.00	na	5.25	0.05	0.05
	2	Debra Tamosauskas	12/07/05	4	4	326	10.42	Lori Robinson	12/08/05	5	0.75	94.22	na	11.17	0.02	0.02
	3	Lori Robinson	12/06/05	4	4	535	13.75	Debra Tamosauskas	12/08/05	3	0.92	97.81	na	14.67	0.05	0.05
MIT002	1	Rachel Bockmier	12/06/05	4	4	343	2.00	Susie Yount	12/08/05	1	0.25	98.85	na	2.25	0.05	0.05
	2	Karen Johnson	12/06/05	8	8	527	3.00	Heather Bohac	12/08/05	11	1.00	92.29	na	4.00	0.01	0.01
MIT003	1	Karen Johnson	12/06/05	8	8	146	1.50	Heather Bohac	12/08/05	6	1.00	85.88	97.69	3.75	0.01	0.01
	2	Mike Fritts	12/07/05	8	8	147	5.25	Susie Yount	12/08/05	0	0.25	100.00	na	5.50	0.02	0.02
	3	Susie Yount	12/07/05	4	4	551	4.25	Jacob Howell	12/08/05	0	0.50	100.00	na	4.75	0.10	0.10
MIT004	1	Rachel Bockmier	12/07/05	4	4	301	3.00	Mike Fritts	12/08/05	9	1.00	97.10	na	4.00	0.05	0.05
	2	Susie Yount	12/07/05	4	4	428	4.00	Jacob Howell	12/08/05	0	0.50	100.00	na	4.50	0.10	0.10
	3	Jacob Howell	12/08/05	4	4	180	3.00	Rachel Bockmier	12/08/05	9	0.25	95.24	na	3.25	0.01	0.01
MIT005	1	Rachel Bockmier	12/08/05	4	4	230	2.00	Debra Tamosauskas	12/08/05	1	1.08	98.29	na	3.08	0.05	0.05
	2	Susie Yount	12/08/05	4	4	167	2.25	Rachel Bockmier	12/08/05	3	0.50	98.24	na	2.75	0.10	0.10
	3	Debra Tamosauskas	12/08/05	4	4	400	10.00	Lori Robinson	12/08/05	3	0.75	99.26	na	10.75	0.02	0.02
MIT006	1	Mike Fritts	12/08/05	8	8	193	5.50	Debra Tamosauskas	12/08/05	0	1.37	100.00	na	6.87	0.02	0.02
	2	Susie Yount	12/08/05	4	4	326	2.75	Rachel Bockmier	12/08/05	1	0.25	99.69	na	3.00	0.10	0.10
	3	Jacob Howell	12/09/05	4	4	382	5.00	Susie Yount	12/09/05	6	0.50	94.09	na	5.50	0.01	0.01
MIT007	1	H.Bohac/K Johnson	12/13/05	4	4	702	6.25	Susie Yount	12/14/05	0	0.25	100.00	na	6.50	0.02	0.01
MIT008	1	Susie Yount	12/09/05	4	4	706	5.50	Jacob Howell	12/09/05	3	0.50	98.33	na	6.00	0.10	0.10
MIT009	1	Kristy Decker	12/12/05	4	4	894	16.50	Susie Yount	12/13/05	0	0.25	100.00	na	16.75	0.05	0.05
	2	Rachel Bockmier	12/11/05	4	4	904	9.75	Susie Yount	12/12/05	1	0.50	99.56	na	10.25	0.08	0.08
	3	Mike Fritts	12/13/05	4	4	692	15.25	Susie Yount	12/14/05	0	0.25	100.00	na	15.50	0.03	0.03
MIT0010	1	Lori Robinson	12/08/05	4	4	505	8.50	Rachel Bockmier	12/12/05	0	0.50	100.00	na	9.00	0.05	0.05
	2	Susie Yount	12/09/05	4	4	269	2.00	Jacob Howell	12/09/05	4	0.50	94.39	na	2.50	0.10	0.10

Table 3-6. Taxonomic Identification QA/QC Information.

Sample/Organisms	Percent Similarity	Original Count	QC Count
MIT002-Replicate 1			
Corophium spinicorne		2	2
	100.0	2	2
Cricotopus sp.		6	6
Dicrotendipes sp.		104	99
Glyptotendipes sp.		12	13
Parachironomus sp.		3	3
Paratanytarsus sp.		4	3
	98.5	129	124
MIT004-Replicate 3			
Anisogammarus sp.		6	6
Polycentropus sp.		1	1
	100.0	7	7
Cricotopus sp.		5	5
Demeijerea sp.		4	5
Dicrotendipes sp.		51	54
Glyptotendipes sp.		37	36
Parachironomus sp.		2	2
Paratanytarsus sp.		28	27
Phaenopsectra sp.		1	1
Tanytarsus sp.		1	1
	97.6	129	131
MIT009-Replicate 1			
Anisogammarus sp.		2	2
Corophium spinicorne		2	2
	100.0	4	4
Chironomus sp.		1	1
Cricotopus sp.		101	103
Demeijerea sp.		3	3
Dicrotendipes sp.		32	29
Glyptotendipes sp.		135	118
Nanocladius sp.		1	1
Parachironomus sp.		28	28
Paratanytarsus sp.		3	3
	96.5	304	286

Table 4-1. Analytical Results for the Round 2 Multiplate Tissue Samples.

		Location Name	MIT001	MIT002	MIT004	MIT007	MIT009	MIT356	MIT810
		X_Easting	7617663.46	7619698.71	7627123.4	7632689.04	7637538.23	7626430	7637373
		Y_Northing	724684.37	717254.37	705754.61	701833.8	694204.01	704103	694168
		Sample ID	LW2-MIT001	LW2-MIT002	LW2-MIT004	LW2-MIT007	LW2-MIT009	LW2-MIT003/005/006	LW2-MIT008/010
		Sample Date	9/14/2005	9/15/2005	9/12/2005	9/9/2005	9/7/2005	9/10/2005	9/6/2005
Chemical Name	**CAS No**	**Unit**							
PCB Aroclors									
Aroclor 1016	12674-11-2	pg/g	0.532 U	0.65 U	1.46 U	2.47 U	0.696 U	0.725 U	1.07 U
Aroclor 1221	11104-28-2	pg/g	0.276 U	0.168 U	0.718 U	1.28 U	0.228 U	0.31 U	0.365 U
Aroclor 1232	11141-16-5	pg/g	0.241 U	0.228 U	0.76 U	1.88 U	0.312 U	0.214 U	0.391 U
Aroclor 1242	53469-21-9	pg/g	0.591 U	0.723 U	3630 NJ	1950 NJ	7450 NJ	0.806 U	1.19 U
Aroclor 1248	12672-29-6	pg/g	25700 NJ	14400 NJ	9.2 U	5.22 U	3.81 U	19900 NJ	16100 NJ
Aroclor 1254	11097-69-1	pg/g	3.74 U	5.46 U	110000 NJ	13500 NJ	21000 NJ	2.67 U	7.29 U
Aroclor 1260	11096-82-5	pg/g	11700 NJ	10800 NJ	376000 NJ	13900 NJ	45300 NJ	14900 NJ	11500 NJ
Total PCB Aroclors	12767-79-2	pg/g	37400 JT	25200 JT	490000 JT	29400 JT	73800 JT	34800 JT	27600 JT
Conventionals									
Total solids	TSO	percent	13.3 T				12.9		
Percent moisture	--	percent	87.0				89.3	85.1	
Lipids	--	percent	0.83	0.33			0.78	1.3	0.89
Chlorinated PCDD/F homologs									
Tetrachlorodibenzo-p-dioxin homologs	41903-57-5	pg/g	4.03	0.974	2.79	1.17	4.11	6.8	5.72
Pentachlorodibenzo-p-dioxin homologs	36088-22-9	pg/g	0.91	0.238	0.175 U	0.672 U	1.39	1.11	1.4
Hexachlorodibenzo-p-dioxin homologs	34465-46-8	pg/g	1.99	2.52	2.78	5.78	7.56	3.16	3.83
Heptachlorodibenzo-p-dioxin homologs	37871-00-4	pg/g	6.34	13.9	9.81	44.4	35.8	10.3	16.8
Octachlorodibenzo-p-dioxin	3268-87-9	pg/g	18.9	53.2	30.1	122	130	32.2	60.3
Tetrachlorodibenzofuran homologs	30402-14-3	pg/g	7.32	4.73	4.84	1.18	5.15	31.7	5.3
Pentachlorodibenzofuran homologs	30402-15-4	pg/g	3.95	2.4	4.58	0.446	4.96	21.2	3.79
Hexachlorodibenzofuran homologs	55684-94-1	pg/g	2.02	2.81	3.22	3.29	6.38	11.9	3.22
Heptachlorodibenzofuran homologs	38998-75-3	pg/g	1.86	3.93	2.31	4.45	8.51	4.32	4
Octachlorodibenzofuran	39001-02-0	pg/g	1.75	3.27	1.77 J	3.29 J	8.66	3.47	3.95
Chlorinated PCDD/Fs									
2,3,7,8-Tetrachlorodibenzo-p-dioxin	1746-01-6	pg/g	0.112 J	0.061 U	0.149 U	0.329 U	0.163 U	0.189	0.29
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	40321-76-4	pg/g	0.15 J	0.079 J	0.166 U	0.672 U	0.29 U	0.218 J	0.184 J
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	39227-28-6	pg/g	0.1 J	0.09 J	0.12 U	0.95 U	0.346 J	0.167 J	0.182 J
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	57653-85-7	pg/g	0.372 J	0.417 J	0.571 J	1.63 J	1.07 J	0.586 J	0.651 J
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	19408-74-3	pg/g	0.153 J	0.188 J	0.197 J	0.429 U	0.555 U	0.235 J	0.252 U
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	35822-46-9	pg/g	2.92	6.59	4.74	23.1	16.2	4.64	7.44
2,3,7,8-Tetrachlorodibenzofuran	51207-31-9	pg/g	0.629	0.397	0.263 U	0.329 U	0.296	11	0.341 U
1,2,3,7,8-Pentachlorodibenzofuran	57117-41-6	pg/g	0.286 J	0.135 J	0.182 J	0.779 U	0.127 U	6.71	0.11 J
2,3,4,7,8-Pentachlorodibenzofuran	57117-31-4	pg/g	0.229 U	0.182 U	0.25 J	0.446 J	0.262 U	2.69	0.177 J
1,2,3,4,7,8-Hexachlorodibenzofuran	70648-26-9	pg/g	0.288 U	0.26 J	0.429 J	0.625 U	0.282 J	5.2	0.192 J
1,2,3,6,7,8-Hexachlorodibenzofuran	57117-44-9	pg/g	0.092 J	0.11 U	0.093 J	0.537 U	0.189 J	1.24	0.11 J
1,2,3,7,8,9-Hexachlorodibenzofuran	72918-21-9	pg/g	0.0854 U	0.0879 U	0.198 U	0.761 U	0.127 U	0.108 U	0.0489 U
2,3,4,6,7,8-Hexachlorodibenzofuran	60851-34-5	pg/g	0.063 U	0.097 U	0.126 U	0.331 U	0.178 U	0.217 U	0.096 U
1,2,3,4,6,7,8-Heptachlorodibenzofuran	67562-39-4	pg/g	0.545 J	1.34	0.755 J	1.65 J	2.75	1.72	1.36

Table 4-1. Analytical Results for the Round 2 Multiplate Tissue Samples.

		Location Name	MIT001	MIT002	MIT004	MIT007	MIT009	MIT356	MIT810
		X_Easting	7617663.46	7619698.71	7627123.4	7632689.04	7637538.23	7626430	7637373
		Y_Northing	724684.37	717254.37	705754.61	701833.8	694204.01	704103	694168
		Sample ID	LW2-MIT001	LW2-MIT002	LW2-MIT004	LW2-MIT007	LW2-MIT009	LW2-MIT003/005/006	LW2-MIT008/010
		Sample Date	9/14/2005	9/15/2005	9/12/2005	9/9/2005	9/7/2005	9/10/2005	9/6/2005
Chemical Name	**CAS No**	**Unit**							
1,2,3,4,7,8,9-Heptachlorodibenzofuran	55673-89-7	pg/g	0.072 U	0.122 J	0.142 J	0.757 U	0.225 U	0.535 J	0.078 J
Octachlorodibenzo-p-dioxin	3268-87-9	pg/g	18.9	53.2	30.1	122	130	32.2	60.3
Octachlorodibenzofuran	39001-02-0	pg/g	1.75	3.27	1.77 J	3.29 J	8.66	3.47	3.95
Metals									
Aluminum	7429-90-5	mg/kg	446				1420		
Antimony	7440-36-0	mg/kg	0.0011 U				0.0022 J		
Arsenic	7440-38-2	mg/kg	0.45				0.349		
Cadmium	7440-43-9	mg/kg	0.0321				0.0366		
Chromium	7440-47-3	mg/kg	0.64				1.73		
Copper	7440-50-8	mg/kg	6 J				3.01 J		
Lead	7439-92-1	mg/kg	0.245 J				1.06 J		
Nickel	7440-02-0	mg/kg	0.401				1.12		
Selenium	7782-49-2	mg/kg	0.06				0.04 J		
Silver	7440-22-4	mg/kg	0.0287 J				0.0235 J		
Zinc	7440-66-6	mg/kg	12.6 J				24.8 J		
PCB Congeners									
PCB001	2051-60-7	pg/g	26.9	8.94	33.4	24.7	19.6	34.3	28.2
PCB002	2051-61-8	pg/g	1.89	0.872	2.55	3.3 J	1.99	2.77	3.02
PCB003	2051-62-9	pg/g	7.57	3.59	13.7	14.6	9.86	10.7	12.9
PCB004	13029-08-8	pg/g	148	83.4	1290	96.2	207	159	145
PCB005	16605-91-7	pg/g	3.04	0.988	3.32	3.57	3.23	4.63	4.79
PCB006	25569-80-6	pg/g	27.4	14.7	40.5	30.8	79.6	40.3	46.7
PCB007	33284-50-3	pg/g	6.14	3.46	12.8	7.47	9.65	9.48	10.7
PCB008	34883-43-7	pg/g	125	70.1	162	170	259	186	225
PCB009	34883-39-1	pg/g	8.96	4.97	14.2	11.6	15.7	13.7	15.6
PCB010	33146-45-1	pg/g	5.99	3.11	71.2	4.04	6.33	6.82	5.83
PCB011	2050-67-1	pg/g	96.3	40.4	139	97	221	223	220
PCB012 & 013	PCB012_013	pg/g	8.41	10.3	27.9	10.9	24.5	12.3	13.2
PCB014	34883-41-5	pg/g	0.382 U	0.393 U	0.887 U	3.4 U	0.567 U	0.484 U	0.506 U
PCB015	2050-68-2	pg/g	52.1	112	81.8	60.2	156	59.2	75.3
PCB016	38444-78-9	pg/g	53.9	68.7	55.3	33.5	115	73.5	97.4
PCB017	37680-66-3	pg/g	156	127	1440	74.5	346	179	204
PCB018 & 030	PCB018_030	pg/g	181	195	282	90.6	396	236	306
PCB019	38444-73-4	pg/g	171	84.2	5150	88.8	179	167	103
PCB020 & 028	PCB020_028	pg/g	536	755	505	225	948	538	731
PCB021 & 033	PCB021_033	pg/g	88.4	154	220	62.1	352	151	256
PCB022	38444-85-8	pg/g	83.2	129	56.4	42.7	281	124	201
PCB023	55720-44-0	pg/g	0.233 J	0.413 U	1.84	3.57 U	0.675	0.413 U	0.592
PCB024	55702-45-9	pg/g	2.54	3.26	0.847 U	1.83 J	6.11	3.69	3.8
PCB025	55712-37-3	pg/g	37.7	46	243	20	104	48.3	49.4

Table 4-1. Analytical Results for the Round 2 Multiplate Tissue Samples.

		Location Name	MIT001	MIT002	MIT004	MIT007	MIT009	MIT356	MIT810
		X_Easting	7617663.46	7619698.71	7627123.4	7632689.04	7637538.23	7626430	7637373
		Y_Northing	724684.37	717254.37	705754.61	701833.8	694204.01	704103	694168
		Sample ID	LW2-MIT001	LW2-MIT002	LW2-MIT004	LW2-MIT007	LW2-MIT009	LW2-MIT003/005/006	LW2-MIT008/010
		Sample Date	9/14/2005	9/15/2005	9/12/2005	9/9/2005	9/7/2005	9/10/2005	9/6/2005
Chemical Name	**CAS No**	**Unit**							
PCB026 & 029	PCB026_029	pg/g	78.4	92.2	214	31.1	187	90.8	109
PCB027	38444-76-7	pg/g	36.2	35.2	731	16.9	44	33.6	29.7
PCB031	16606-02-3	pg/g	318	534	260	165	881	388	587
PCB032	38444-77-8	pg/g	96.4	101	498	50.7	225	111	129
PCB034	37680-68-5	pg/g	2.94	2.03	5.99	1.14 J	3.9	3.39	3.68
PCB035	37680-69-6	pg/g	4.48	8.63	4.35	4 U	11.2	6.44	7.88
PCB036	38444-87-0	pg/g	1.05 U	0.528 U	0.834 U	1.12 U	1.61	2.52	2.17
PCB037	38444-90-5	pg/g	86.6	164	38.2	30.9	176	76	116
PCB038	53555-66-1	pg/g	0.612 U	0.306 U	0.69 U	2.65 U	0.442 U	0.444 U	0.423 U
PCB039	38444-88-1	pg/g	0.292 U	3.43	4.34	1.59 U	4.2	0.37 U	4.71
PCB040 & 041 & 071	PCB040_041_071	pg/g	481	384	1390	150	509	355	339
PCB042	36559-22-5	pg/g	257	212	296	62.1	236	191	187
PCB043	70362-46-8	pg/g	51	38.1	241	7.74 U	26.1	41.2	35.3
PCB044 & 047 & 065	PCB044_047_065	pg/g	1720	905	26100	1230	2330	1440	1090
PCB045 & 051	PCB045_051	pg/g	257	134	5380	180	439	243	170
PCB046	41464-47-5	pg/g	33	29.6	163	11.1	20.7	28.1	20.1
PCB048	70362-47-9	pg/g	199	146	156	38.8	144	176	170
PCB049 & 069	PCB049_069	pg/g	908	660	5830	583	1400	808	673
PCB050 & 053	PCB050_053	pg/g	268	123	4080	162	243	279	166
PCB052	35693-99-3	pg/g	1550	1310	3850	608	1150	1360	1040
PCB054	15968-05-5	pg/g	56.3	14.9	1900	27.4	35	48.6	23.2
PCB055	74338-24-2	pg/g	0.985 U	1.01 U	2.29 U	8.78 U	1.46 U	1.25 U	1.31 U
PCB056	41464-43-1	pg/g	589	255	81.4	64.8	339	383	368
PCB057	70424-67-8	pg/g	7.1	4.72	99.3	1.74 U	3.77	5.52	4.21 U
PCB058	41464-49-7	pg/g	3.8	3.67	1.95 U	3.01 U	2.87	4.65	3.16
PCB059 & 062 & 075	PCB059_062_075	pg/g	124	78.1	863	44.1	93.6	94.5	79.3
PCB060	33025-41-1	pg/g	327	157	46.9	33.8	155	198	194
PCB061 & 070 & 074 & 076	PCB061_070_074_	pg/g	2060	1490	683	461	1440	1560	1510
PCB063	74472-34-7	pg/g	62.9	37	72.7	16.1	34	50.9	39.3
PCB064	52663-58-8	pg/g	614	446	164	126	411	440	400
PCB066	32598-10-0	pg/g	1590	800	837	293	788	1010	883
PCB067	73575-53-8	pg/g	31.8	24.1	114	9.6	31	30.7	27.3
PCB068	73575-52-7	pg/g	15.9	8.62	268	21.2	19.3	19	12.4
PCB072	41464-42-0	pg/g	19.4	15.5	83.6	15	19	20	12.9
PCB073	74338-23-1	pg/g	26.9	0.869 U	644	26	23.8	24.5	14.1
PCB077	32598-13-3	pg/g	83.9	51.8	20.5	20	57.5	57.5	54.3
PCB078	70362-49-1	pg/g	0.95 U	0.857 U	1.7 U	5.53 U	0.923 U	0.786 U	0.869 U
PCB079	41464-48-6	pg/g	21	13	31.7	8.49	15.3	18.2	14.1
PCB080	33284-52-5	pg/g	1.08 U	1.11 U	2.5 U	9.59 U	1.6 U	1.36 U	1.43 U
PCB081	70362-50-4	pg/g	5.14 U	2.34 U	1.66 U	2.23 U	2.17 U	2.37 U	2.88 U
PCB082	52663-62-4	pg/g	123	163	79.3 U	41.5	129	75.8	87.7
PCB083 & 099	PCB083_099	pg/g	1670	1460	10100	1130	1600	1480	1060

Table 4-1. Analytical Results for the Round 2 Multiplate Tissue Samples.

		Location Name	MIT001	MIT002	MIT004	MIT007	MIT009	MIT356	MIT810
		X_Easting	7617663.46	7619698.71	7627123.4	7632689.04	7637538.23	7626430	7637373
		Y_Northing	724684.37	717254.37	705754.61	701833.8	694204.01	704103	694168
		Sample ID	LW2-MIT001	LW2-MIT002	LW2-MIT004	LW2-MIT007	LW2-MIT009	LW2-MIT003/005/006	LW2-MIT008/010
		Sample Date	9/14/2005	9/15/2005	9/12/2005	9/9/2005	9/7/2005	9/10/2005	9/6/2005
Chemical Name	**CAS No**	**Unit**							
PCB084	52663-60-2	pg/g	344	353	801	98.5	209	286	205
PCB085 & 116 & 117	PCB085_116_117	pg/g	530	408	702	165	254	356	270
PCB086 & 087 & 097 & 108 & 119 & 125	PCB086_087_097_	pg/g	1270	1250	3660	557	1020	984	790
PCB088 & 091	PCB088_091	pg/g	397	303	2990	356	671	404	299
PCB089	73575-57-2	pg/g	12.3	11.7	12.2	1.91 U	8.53	7.81	7.5
PCB090 & 101 & 113	PCB090_101_113	pg/g	2290	2490	14200	1900	2880	2280	1630
PCB092	52663-61-3	pg/g	530	474	4810	386	612	540	361
PCB093 & 095 & 098 & 100 & 102	PCB093_095_098_	pg/g	1760	1550	15400	1080	1740	1810	1170
PCB094	73575-55-0	pg/g	45.9	17.4	1370	35.6	28.1	40.7	21.1
PCB096	73575-54-9	pg/g	24.9	10.7	329	15.2	24	25.8	13.7
PCB103	60145-21-3	pg/g	40.9	23.9	1090	68.9	125	66.9	43.5
PCB104	56558-16-8	pg/g	12	2.68	498	5.05	8.99	11.3	6.02
PCB105	32598-14-4	pg/g	662	603	290	207	359	431	352
PCB106	70424-69-0	pg/g	0.395 U	0.382 U	22.1	3.3 U	0.551 U	0.47 U	0.491 U
PCB107 & 124	PCB107_124	pg/g	84.3	76.9	71.7	28.8	46.8	55.4	41.6
PCB109	74472-35-8	pg/g	174	138	278	95.8	132	134	99
PCB110 & 115	PCB110_115	pg/g	2110	2550	3740	1200	2100	1830	1500
PCB111	39635-32-0	pg/g	3.04	1.42 U	56	5.48 U	8.21	4.12 U	2.76
PCB112	74472-36-9	pg/g	0.339 U	0.495 U	725	2.89 U	0.482 U	0.411 U	0.661 U
PCB114	74472-37-0	pg/g	43.9	32.6	19.4	10.5	21	27.5	21.7
PCB118	31508-00-6	pg/g	1540	1790	2490	800	1120	1160	960
PCB120	68194-12-7	pg/g	11.5	6.82	111	19.2	29.1	16.9	10.7
PCB121	56558-18-0	pg/g	5.25	1.46 U	168	5.68	10.9	7.53	4.8
PCB122	76842-07-4	pg/g	32.8	24.3	1.03 U	10.4 U	16.7	20.6	16.7
PCB123	65510-44-3	pg/g	41.1	28.1	32.2	11.7 U	15.4	24.5	17.7
PCB126	57465-28-8	pg/g	4.2	3.08	6.55 U	2.28 J	4.54	3.83 U	2.87
PCB127	39635-33-1	pg/g	0.463 U	0.477 U	12.4	4.12 U	0.688 U	0.586 U	0.613 U
PCB128 & 166	PCB128_166	pg/g	307	426	1610	236	382	297	235
PCB129 & 138 & 160 & 163	PCB129_138_160_	pg/g	3010	3160	42800	3130	6300	3250	2400
PCB130	52663-66-8	pg/g	152	180	1200	136	264	164	122
PCB131	61798-70-7	pg/g	9.84	23.1	79.3	5.83	22	7.28	8.59
PCB132	38380-05-1	pg/g	636	762	6220	495	1370	702	512
PCB133	35694-04-3	pg/g	70.2	46.5	1100	79.9	146	98.7	60.9
PCB134 & 143	PCB134_143	pg/g	125	112	1620	73.6	193	137	88.6
PCB135 & 151 & 154	PCB135_151_154	pg/g	1190	872	20000	1080	2550	3.23 U	1020
PCB136	38411-22-2	pg/g	296	215	3360	182	370	395	218
PCB137	35694-06-5	pg/g	108	138	446	53.3	67.7	79.9	67.7
PCB139 & 140	PCB139_140	pg/g	47.6	50.2	279	38.4	73.2	52.2	38.2
PCB141	52712-04-6	pg/g	498	498	9970	501	1280	590	436
PCB142	41411-61-4	pg/g	0.611 U	0.649 U	3.02 U	2.71 U	0.64 U	0.434 U	0.403 U
PCB144	68194-14-9	pg/g	107	104	1570	90.4	238	126	85.5
PCB145	74472-40-5	pg/g	1.28 U	0.853	8.67	0.502 U	0.83 U	1.04 U	0.62 U

Table 4-1. Analytical Results for the Round 2 Multiplate Tissue Samples.

		Location Name	MIT001	MIT002	MIT004	MIT007	MIT009	MIT356	MIT810
		X_Easting	7617663.46	7619698.71	7627123.4	7632689.04	7637538.23	7626430	7637373
		Y_Northing	724684.37	717254.37	705754.61	701833.8	694204.01	704103	694168
		Sample ID	LW2-MIT001	LW2-MIT002	LW2-MIT004	LW2-MIT007	LW2-MIT009	LW2-MIT003/005/006	LW2-MIT008/010
		Sample Date	9/14/2005	9/15/2005	9/12/2005	9/9/2005	9/7/2005	9/10/2005	9/6/2005
Chemical Name	**CAS No**	**Unit**							
PCB146	51908-16-8	pg/g	508	435	7310	655	1540	707	483
PCB147 & 149	PCB147_149	pg/g	2230	2000	34600	2180	5200	2800	1900
PCB148	74472-41-6	pg/g	15.5	5.96	331	19.4	43.1	24.9	15.4
PCB150	68194-08-1	pg/g	11.7	4.32	183	14	32.8	19.7	12
PCB152	68194-09-2	pg/g	8.84	3.29	268	7.44	10.5	9.99	5.29
PCB153 & 168	PCB153_168	pg/g	2540	2820	49600	3580	7330	2990	2340
PCB155	33979-03-2	pg/g	3.11	0.649 U	109	1.99 U	3.47	3.61	2.1
PCB156 & 157	PCB156_157	pg/g	238	263	2250	176	299	224	171
PCB158	74472-42-7	pg/g	263	263	2810	196	461	276	201
PCB159	39635-35-3	pg/g	21.3	19.2	555	15.7	66.4	29.3	20.1
PCB161	74472-43-8	pg/g	0.404 U	0.474 U	2.21 U	3.06 U	0.511 U	0.435 U	0.455 U
PCB162	39635-34-2	pg/g	7.26	7.75	46.9	4.75 U	8.47 U	5.27	4.98 U
PCB164	74472-45-0	pg/g	190	174	2570	155	396	219	161
PCB165	74472-46-1	pg/g	4.17	1.55	106	4.35	9.16	6	3.79
PCB167	52663-72-6	pg/g	92.4	102	1050	80.9	145	94.7	70.5
PCB169	32774-16-6	pg/g	0.97 U	0.678 U	15.9 U	2.44 U	3.95 U	2.13 U	1.6 U
PCB170	35065-30-6	pg/g	531	476	17100	667	2030	665	501
PCB171 & 173	PCB171_173	pg/g	186	152	4710	167	608	250	172
PCB172	52663-74-8	pg/g	89.8	88.7	2670	105	321	122	88.4
PCB174	38411-25-5	pg/g	551	493	16300	420	1850	736	539
PCB175	40186-70-7	pg/g	26.6	23.7	700	26.2	78.4	36.8	26
PCB176	52663-65-7	pg/g	78.7	57.6	1740	42.6	172	105	65.5
PCB177	52663-70-4	pg/g	425	313	10500	372	1370	539	389
PCB178	52663-67-9	pg/g	175	129	4160	151	477	251	176
PCB179	52663-64-6	pg/g	323	222	6920	179	632	445	282
PCB180 & 193	PCB180_193	pg/g	1310	1250	43200	1630	5370	1660	1310
PCB181	74472-47-2	pg/g	5.32	4.87	95.5	4.25	9	25.7	4.25 U
PCB182	60145-23-5	pg/g	5.97	4.02 U	94.6	7.17	17.6	8.27	6.73
PCB183 & 185	PCB183_185	pg/g	496	431	14800	489	1670	656	492
PCB184	74472-48-3	pg/g	0.987	0.472 U	7.46	0.45 J	1.28	1.84	1.11 U
PCB186	74472-49-4	pg/g	0.328 U	0.338 U	0.762 U	2.92 U	0.487 U	0.908	0.434 U
PCB187	52663-68-0	pg/g	1010	809	26500	888	3190	1430	1030
PCB188	74487-85-7	pg/g	3.41	1.49	68	3.49	9.96	5.16	3.63
PCB189	39635-31-9	pg/g	16.1	12.6	481	18.7 U	53.3	19	13.5
PCB190	41411-64-7	pg/g	132	91.6	3870	123	492	167	122
PCB191	74472-50-7	pg/g	24	20.3	698	26.5	91	31	23
PCB192	74472-51-8	pg/g	0.763 U	0.785 U	1.77 U	6.79 U	1.13 U	0.966 U	1.01 U
PCB194	35694-08-7	pg/g	127	165	4350	150	629	159	141
PCB195	52663-78-2	pg/g	78.6	67	2230	66.3	315	109	81.6
PCB196	42740-50-1	pg/g	97.6	105	3020	91.5	347	130	100
PCB197 & 200	PCB197_200	pg/g	35.9	31.9	881	18.4	99.1	52.6	36.2
PCB198 & 199	PCB198_199	pg/g	165	252	5060	162	706	237	195

Table 4-1. Analytical Results for the Round 2 Multiplate Tissue Samples.

		Location Name	MIT001	MIT002	MIT004	MIT007	MIT009	MIT356	MIT810
		X_Easting	7617663.46	7619698.71	7627123.4	7632689.04	7637538.23	7626430	7637373
		Y_Northing	724684.37	717254.37	705754.61	701833.8	694204.01	704103	694168
		Sample ID	LW2-MIT001	LW2-MIT002	LW2-MIT004	LW2-MIT007	LW2-MIT009	LW2-MIT003/005/006	LW2-MIT008/010
		Sample Date	9/14/2005	9/15/2005	9/12/2005	9/9/2005	9/7/2005	9/10/2005	9/6/2005
Chemical Name	**CAS No**	**Unit**							
PCB201	40186-71-8	pg/g	34.6	31.2	782	21.2	89.3	50.1	35.3
PCB202	2136-99-4	pg/g	55.2	61.6	1060	38.4	142	78.3	59.8
PCB203	52663-76-0	pg/g	141	151	3830	123	534	192	162
PCB204	74472-52-9	pg/g	0.198 U	0.108 U	1.41 U	8.22 U	1.37 U	0.876 U	0.21 U
PCB205	74472-53-0	pg/g	6.41	8.64	235	8.39	42.7	9.53	8.32
PCB206	40186-72-9	pg/g	36.8	72	527	34.6	116	59.5	58
PCB207	52663-79-3	pg/g	6.97	9.75	100	4.65	16.1	12.4	7.8
PCB208	52663-77-1	pg/g	15	23	98	9.87	26	23.5	22.6
PCB209	2051-24-3	pg/g	13.1	17.3	15.8	11.2	15.6	32.9	29.7
Total PCBs	1336-36-3	pg/g	46500	42200	498000	33100	78700	45600	37100
PCB homologs									
Monochlorobiphenyl	27323-18-8	pg/g	36.4	13.4	49.6	42.6	31.4	47.9	44.1
Dichlorobiphenyl	25512-42-9	pg/g	481	343	1850	492	982	715	763
Trichlorobiphenyl	25323-68-6	pg/g	1930	2500	9710	935	4260	2230	2940
Tetrachlorobiphenyl	26914-33-0	pg/g	11300	7340	53400	4190	9960	8880	7530
Pentachlorobiphenyl	25429-29-2	pg/g	13800	13800	64100	8210	13200	12100	9000
Hexachlorobiphenyl	26601-64-9	pg/g	12700	12700	192000	13200	28800	13300	10700
Heptachlorobiphenyl	28655-71-2	pg/g	5380	4580	155000	5300	18400	7160	5240
Octachlorobiphenyl	55722-26-4	pg/g	743	873	21400	678	2900	1020	819
Nonachlorobiphenyl	53742-07-7	pg/g	58.8	105	725	49.2	158	95.4	88.4
Organochlorine Pesticides									
2,4'-DDD	53-19-0	µg/kg	1.47	0.393	0.328 J	0.214 J	0.136	14.1	0.476
2,4'-DDE	3424-82-6	µg/kg	0.17	0.0736	0.0775	0.0525 J	0.0382 J	1.28	0.117
2,4'-DDT	789-02-6	µg/kg	0.313	0.0532	0.12 J	0.0374 U	0.0172 U	7.54	0.0962
4,4'-DDD	72-54-8	µg/kg	3.08	0.831	0.841 J	0.746	0.646	30.3	1.62
4,4'-DDE	72-55-9	µg/kg	6.42	1.21	3.13	1.96	2.14	29.4	6.07
4,4'-DDT	50-29-3	µg/kg	0.463	0.111	0.236	0.0517 J	0.0502	12.2	0.192
Total of 4,4'-DDD, -DDE, -DDT	PP_DDT3ISO	µg/kg	9.96 T	2.15 T	4.21 JT	2.76 JT	2.84 T	71.9 T	7.88 T
Aldrin	309-00-2	µg/kg	0.0513 J	0.00926 J	0.0231 J	0.0128 U	0.025 J	0.0828	0.0872
alpha-Hexachlorocyclohexane	319-84-6	µg/kg	0.00928 U	0.00446 J	0.011 J	0.0178 U	0.0112 U	0.0195 J	0.0167 J
beta-Hexachlorocyclohexane	319-85-7	µg/kg	0.00457 J	0.00295 U	0.0125 U	0.0268 U	0.00542 J	0.00933 U	0.00794 J
delta-Hexachlorocyclohexane	319-86-8	µg/kg	0.0117 U	0.0121 U	0.004 U	0.013 U	0.0174 U	0.004 U	0.00185 U
gamma-Hexachlorocyclohexane	58-89-9	µg/kg	0.0111 J	0.00458 U	0.0124 J	0.0163 U	0.0129 J	0.0214 J	0.0192 U
cis-Chlordane	5103-71-9	µg/kg	0.373	0.0977	0.216	0.186 J	0.159	0.6	0.451
trans-Chlordane	5103-74-2	µg/kg	0.312	0.0686	0.139	0.114 J	0.127	0.466	0.389
Oxychlordane	27304-13-8	µg/kg	0.0375 J	0.0204 U	0.0573 U	0.0682 U	0.183	0.0614 J	0.132
cis-Nonachlor	5103-73-1	µg/kg	0.163	0.0405 J	0.0954 J	0.0833 J	0.0812 J	0.24	0.181
trans-Nonachlor	39765-80-5	µg/kg	0.452	0.106	0.291	0.256 J	0.302	0.697	0.587
Total Chlordanes	TOTCHLDANE	µg/kg	1.34 JT	0.313 JT	0.741 JT	0.639 JT	0.852 JT	2.06 JT	1.74 T
Dieldrin	60-57-1	µg/kg	0.228	0.098	0.243	0.161	0.178	0.396	0.362

Table 4-1. Analytical Results for the Round 2 Multiplate Tissue Samples.

		Location Name	MIT001	MIT002	MIT004	MIT007	MIT009	MIT356	MIT810
		X_Easting	7617663.46	7619698.71	7627123.4	7632689.04	7637538.23	7626430	7637373
		Y_Northing	724684.37	717254.37	705754.61	701833.8	694204.01	704103	694168
		Sample ID	LW2-MIT001	LW2-MIT002	LW2-MIT004	LW2-MIT007	LW2-MIT009	LW2-MIT003/005/006	LW2-MIT008/010
		Sample Date	9/14/2005	9/15/2005	9/12/2005	9/9/2005	9/7/2005	9/10/2005	9/6/2005
Chemical Name	**CAS No**	**Unit**							
alpha-Endosulfan	959-98-8	µg/kg	0.064	0.02 U	0.045	0.137 U	0.055	0.097 J	0.092 J
beta-Endosulfan	33213-65-9	µg/kg	0.047	0.021	0.046 U	0.156 U	0.04 U	0.098 J	0.058 U
Endosulfan sulfate	1031-07-8	µg/kg	0.14	0.067 U	0.097	0.061 U	0.128	0.296	0.227
Endrin	72-20-8	µg/kg	0.004 U	0.0168 U	0.038 U	0.146 U	0.0243 U	0.007 U	0.008 J
Endrin aldehyde	7421-93-4	µg/kg	0.0123 U	0.0127 U	0.0285 U	0.109 U	0.0183 U	0.0101 U	0.00551 U
Endrin ketone	53494-70-5	µg/kg	0.0256 U	0.0263 U	0.0594 U	0.228 U	0.038 U	0.00324 U	0.00339 U
Heptachlor	76-44-8	µg/kg	0.00497 J	0.00228 U	0.0043 U	0.012 J	0.00605 U	0.00606 U	0.00655 J
Heptachlor epoxide	1024-57-3	µg/kg	0.017	0.006	0.016	0.015 U	0.018	0.024 J	0.025 J
Methoxychlor	72-43-5	µg/kg	0.007 U	0.0126 U	0.0284 U	0.109 U	0.0182 U	0.00635 U	0.012 U
Hexachlorobenzene	118-74-1	µg/kg	0.264	0.12	0.26	0.308	0.235	0.544	0.345
Hexachlorobutadiene	87-68-3	µg/kg	0.006 UJ	0.0066 UJ	0.0137 UJ	0.063 UJ	0.0118 UJ	0.015 UJ	0.0097 UJ

Qualifiers	*Description*
J	Estimate.
JT	Combined qualifier.
N	Presumptive evidence of a compound.
NJ	Combined qualifier.
NJT	Combined qualifier.
R	Rejected.
T	Value is an average or selected result (see Kennedy Jenks et al. 2004).
U	Not detected at value shown.
UJ	Combined qualifier.
UJT	Combined qualifier.
UT	Combined qualifier.

Table 4-2. Summary of Taxonomic Results.

Station	Location Description	Total Abundance (Number of Multiplates)	Abundance per 0.116 m^2	Number of Taxa	1st Dominant Taxon[a] (Percent of Total Abundance)	2nd Dominant Taxon[a] (Percent of Total Abundance)	3rd Dominant Taxon[a] (Percent of Total Abundance)
LW2-MIT001	Surface water Station W001 near OSM	1,263 (3)	421.0	38	*Corophium spinicorne* (60.9%)	*Glyptotendipes* sp. (11.2%)	*Nais pardalis* (10.3%)
LW2-MIT002	Surface water Station W004 in the International Slip	909 (2)	454.5	17	*Dero digitata* (41.4%)	*Dicrotendipes* sp. (39.4%)	*Cricotopus* sp. (7.7%)
LW2-MIT003	Surface water transect Station W011 on the west bank near GASCO	839 (3)	279.7	30	*Hydra* sp. (47.2%)	*Nais pardalis* (18.8%)	*Dero digitata* (5.8%)
LW2-MIT004	Surface water Station W013 in Willamette Cove	1,007 (3)	335.7	23	*Dero digitata* (37.2%)	*Dicrotendipes* sp. (21.3%)	*Cricotopus* sp. (9.6%)
LW2-MIT005	Surface water Station W015 adjacent to railroad bridge near Rhone Poulenc	814 (3)	271.3	30	*Nais pardalis* (49.5%)	*Dicrotendipes* sp. (11.2%)	*Cricotopus/Hydra* sp. (7.0%)
LW2-MIT006	Surface water Station W016 near Arkema	791 (3)	263.7	25	*Nais pardalis* (39.8%)	*Corophium spinicorne* (29.1%)	*Dicrotendipes* sp. (7.8%)
LW2-MIT007	Proposed surface water Station W018 near the Coast Guard Station (before it was moved across the lagoon)	736 (1)	736	17	*Dero digitata* (51.4%)	*Dicrotendipes* sp. (9.5%)	*Glyptotendipes* sp. (23.8%)
LW2-MIT008	Slightly upstream of surface water Station W019	753 (1)	753	18	*Dero digitata* (47.0%)	*Nais pardalis* (38.1%)	*Glyptotendipes* sp. (5.4%)
LW2-MIT009	Surface water Station W022 in Fireboat Cove	2,738 (3)	912.7	20	*Dero digitata* (55.3%)	*Nais pardalis* (16.2%)	*Glyptotendipes* sp. (12.9%)
LW2-MIT010	Surface water transect Station W023 on the west bank	766 (2)	383	23	*Dero digitata* (51.3%)	*Nais pardalis* (29.9%)	*Dicrotendipes* sp. (4.2%)

[a] *Dero digitata*, *Nais pardalis* (Annelida -- worms); *Cricotopus* sp., *Dicrotendipes* sp., *Glyptotendipes* sp. (Chironomid -- midges/blood worms); *Corophium spinicorne* (Crustaceans); *Hydra* sp. (Anthozoa, which includes sea anemones, sea pens, and corals)

Table 4-3. Summary of Daphnid Results.

Station	Location Description	Total Abundance (Number of Multiplates)	Abundance per 0.116 m^2	Species (Percent of Total Abundance)
LW2-MIT001	Surface water Station W001 near OSM	1 (3)	0.3	*Sida crystallina* (100%)
LW2-MIT002	Surface water Station W004 in the International Slip	1,281 (2)	640.5	*Sida crystallina* (100%)
LW2-MIT003	Surface water transect Station W011 on the west bank near GASCO	0 (3)	0.0	na
LW2-MIT004	Surface water Station W013 in Willamette Cove	192 (3)	64.0	*Sida crystallina* (100%)
LW2-MIT005	Surface water Station W015 adjacent to railroad bridge near Rhone Poulenc	29 (3)	9.7	*Sida crystallina* (100%)
LW2-MIT006	Surface water Station W016 near Arkema	50 (3)	16.7	*Sida crystallina* (100%)
LW2-MIT007	Proposed surface water Station W018 near the Coast Guard Station (before it was moved across the lagoon)	130 (1)	130	*Sida crystallina* (100%)
LW2-MIT008	Slightly upstream of surface water Station W019	40 (1)	40	*Sida crystallina* (100%)
LW2-MIT009	Surface water Station W022 in Fireboat Cove	529 (3)	176.3	*Sida crystallina* (98.9%) *Ilyocryptus spinifer* [a] (1.1%)
LW2-MIT010	Surface water transect Station W023 on the west bank	15 (2)	7.5	*Sida crystallina* (93.3%) *Ilyocryptus spinifer* [a] (6.7%)

[a] The taxonomist listed *I. acutifrons* as alternative species.