PORTLAND HARBOR RI/FS

WILLAMETTE COVE SEDIMENT DATA REPORT

DRAFT

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March 14, 2008

Prepared for
The Lower Willamette Group

Prepared by
Integral Consulting Inc.

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LIST OF ACRONYMS

CAS	Columbia Analytical Services
CLP	Contract Laboratory Program
DEQ	Oregon Department of Environmental Quality
EDD	electronic data deliverable
EPA	U.S. Environmental Protection Agency
EQuIS	Environmental Quality Information System
FSP	field sampling plan
LCS/LCSD	laboratory control sample/laboratory control sample duplicate
LWG	Lower Willamette Group
MDL	method detection limit
MRL	method reporting limit
MS/MSD	matrix spike/matrix spike duplicate
NAPL	non-aqueous phase liquid
NOAA	National Oceanic & Atmospheric Administration
PAH	polycyclic aromatic hydrocarbon
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
SCRA	site characterization and risk assessment
SDG	sample delivery group
SVOC	semivolatile organic compound
TPH	total petroleum hydrocarbons
VOC	volatile organic compound

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1.0 INTRODUCTION

Based on reported observations of non-aqueous phase liquid (NAPL)-impacted sediments by the Oregon Department of Environmental Quality (DEQ) during an August 28, 2007 site walk of the Willamette Cove property (DEQ 2007), the Lower Willamette Group (LWG) Executive Committee approved the sampling of surface sediments from one representative location consistent with the previous DEQ observations (Appendix A). This Willamette Cove Sediment Data Report summarizes the results from the September 21, 2007 sample collection effort. The Willamette Cove sediment data will be included in the Round 3B Sediment Data Report.

The surface sediment sample LW3-GWC1 was collected and processed according to the standard LWG field sampling protocol, as outlined in the Round 2 Field Sampling Plan (FSP; Integral 2004a). Additional information on the sample collection, including the DEQ August 2007 inspection summary, can be found in Section 2 and Appendix B of this report.

Except where noted in Section 3.4, all surface sediment field activities, including, sample collection, sample handling and processing, and data management, followed guidelines specified in the Round 2 Quality Assurance Project Plan (QAPP; Integral and Windward 2004), the Round 2 QAPP Addendum 9 (Integral 2007) and the Round 2 Health and Safety Plan (Integral 2004b).

1.1 WILLAMETTE COVE SAMPLING OBJECTIVE

The objective of the Willamette Cove sediment sampling program was to locate the NAPL-impacted sediments reported by DEQ and collect a representative surface sediment sample in accordance with the Round 2A surface sediment sampling protocol (Integral 2004a) for the chemical analyses outlined in Section 3.1.

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, and data management (Section 3); the chemical results (Section 4); and references (Section 5).

Supporting information is provided in the following four appendices:

- **Appendix A.** EPA - LWG Communications
- **Appendix B.** Integral Field Notebook and DEQ Inspection
- **Appendix C.** Data Validation Report
- **Appendix D.** SCRA Database, Excel® Flat File Format

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2.0 DATA COLLECTION ACTIVITIES

During the September 21, 2007 sampling event, three test pits were excavated to locate NAPL-impacted sediments reported during the August 28, 2007 site walk (DEQ 2007). A representative sample from the composited surface (0 – 30 cm) sediment was collected from one location for chemical analyses. The surface sediment sample LW3-GWC1 was collected according to the standard LWG field sampling protocol as outlined in the Round 2A FSP (Integral 2004a). The location of the Willamette Cove sediment sample is shown in Figure 2-1; coordinates and field logs are presented in Appendix B.

Sediment sampling and processing followed the procedures specified in the Round 2 QAPP (Integral and Windward 2004) and Round 2 QAPP Addendum 9 (Integral 2007). Deviations from the QAPP are summarized in Section 3.4 of this data report.

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3.0 LABORATORY ANALYSES AND DATA MANAGEMENT

This section describes the laboratory methods used to analyze the sediment samples (Table 3-1). Any deviations from the analytical methods detailed in the Round 2 QAPP and QAPP Addendum 9 are described below in Section 3.4. 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 site characterization and risk assessment (SCRA) database was compiled into a series of compatible Excel tables (Appendix D), which were then distributed to the SCRA data users. A summary of sediment data quality is provided in Section 3.3 and are provided in Appendix C.

The following subsections describe the chemical analysis and data validation of the sediment sample and include a summary of data quality and any deviations from the analytical methods.

1.1 CHEMICAL ANALYSES

Three laboratories conducted the chemical analyses of the Willamette Cove sediment sample. Columbia Analytical Services (CAS, Kelso, WA) analyzed for conventional parameters including total solids, and total organic carbon, metals, semivolatile organic compounds (SVOCs), butyltins, volatile organic compounds (VOCs), total petroleum hydrocarbons (TPH), organochlorine pesticides, polychlorinated biphenyl (PCB) Aroclors, and herbicides. CAS (Houston, TX) completed all analyses for polychlorinated dibenzo-p-dioxin/furans (PCDD/Fs). Vista Analytical Laboratory (El Dorado Hills, CA) completed analyses for PCB congeners (Table 3-1).

The laboratories and methods of analysis for the sediment samples are included in Table 3-1. Analytical methods followed those described in the Round 2 QAPP and QAPP Addendum 9; deviations from the QAPP are summarized in Section 3.4 below.

3.1 DATA VALIDATION

Because a single sample was collected for analysis, 100% of the data were fully validated using procedures specified in the Round 2 QAPP. The data validation was conducted by EcoChem, Inc., located in Seattle, WA.

The inorganic, organic, and PCDD/F data were validated in accordance with guidance specified by the U.S. Environmental Protection Agency (EPA) Contract Laboratory Program (CLP) National Functional Guidelines for Inorganic and Organic Data Review, by EPA Region 10 standard operating procedures for validation of PCDD/F data (EPA 1994, 1996, 1999), and by *Guidance on*

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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- CLP 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 3-2.

The following laboratory deliverables were reviewed during full data validation:

- 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, and surrogate recoveries, and other method-specific QC samples (e.g., serial dilutions for inductively coupled plasma analyses)
- Results for field QC samples (i.e., equipment blanks, field duplicates, and field split samples)
- Analytical results for the sediment sample.

In addition to the review and assessment of the documentation identified above, the data validation included the verification of calculations 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.

Upon completion of the data validation activities, a data quality report and a tabular summary of qualified data were generated by EcoChem. The EcoChem data quality reports are included in Appendix C. Data qualifiers that were assigned during validation were added to the laboratory EDDs by EcoChem. The revised EDDs and the hard-copy s were submitted as the project deliverable. The revised EDDs were then incorporated into the project database, as described in Section 3.6.

3.2 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. 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

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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 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 Willamette Cove sediment sampling effort was greater than 99% overall, which exceeds the QAPP completeness objective of 95%. Completeness ranged from 98% for SVOCs and volatiles to 100% for all other parameter groups.

The discussion below includes a comparison of the reported detection limits to the detection limits specified in the Round 2 QAPP and QAPP Addendum 9, followed by a summary of the qualified data for each parameter group and any limitations to the usability of the data.

The EcoChem validation report (Appendix C) provides detailed information on the data quality issues and data validation qualifiers for each parameter group in the laboratory data package. A summary of the qualified data by parameter group, with the reasons for qualification, is included in Table 3-3. Qualified chemistry data for the Willamette Cove sediment sample are included in Table 4-1. A complete list of qualified results with reason codes is provided in the data validation reports in Appendix C.

3.2.1 Reported Detection Limits

Sediment data for the Willamette Cove effort were reported to the method detection limit (MDL) in most cases. Sample-specific detection limits were reported for PCDD/Fs, as specified in the method protocol (EPA method 1613B; EPA 1994). These detection limits are based on the signal-to-noise ratio of the analytical system for each analyte and sample.

The reported detection limit is the collective term for the detection limit or reporting limit used to quantify non-detects, as applicable to each sample and analyte. Expected MDLs and method reporting limits (MRLs) are listed in Table A6-6 from the Round 2 QAPP Addendum 9 and in Table A6-2 in the Round 2 QAPP.

Comparison of the MDL and MRL results reported for the Willamette Cove sediment sample with the QAPP values noted above show that overall detection limit goals were achieved. In selected cases, the MDL and/or MRL were elevated at the laboratory or during data validation because matrix interference or the presence of another analyte interfered with the quantification of a given analyte. MDLs and 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.

3.2.2 Field Quality Control/Quality Assurance

Due to the limited scope of the Willamette Cove sediment collection, no additional field replicate or split sample analyses were collected during the field effort. A trip blank sample was prepared for shipment of volatile samples; no other field blanks were collected. In accordance with the QAPP, additional sample mass was used by the laboratories to analyze laboratory QC samples, such as matrix spike, matrix spike duplicate, and laboratory duplicate analyses as noted below.

3.2.3 Laboratory Quality Control Samples

Laboratory QC samples were prepared in accordance with the Round 2 QAPP and cited methods to monitor the bias and precision of the sample analysis procedures. Additional sample volume was used to analyze MS/MSD or laboratory duplicate samples for all applicable analyses. Precision was also measured using a LCS/LCSD.

The control limits for surrogate spike compounds, matrix spikes and LCSs are summarized in the Round 2 QAPP and QAPP Addendum 9. The evaluation of these QC samples is included as part of the data validation as described in Section 3.2 above. Selected metals and semivolatile results for the Willamette Cove sediment sample were qualified based on results for these and other laboratory QC samples and procedures, as summarized in Table 3-3.

3.2.4 Trip Blanks

For all volatile analyses (EPA 8260 and TPH-Gx), introduction of chemical contaminants during sampling and analytical activities was assessed by the analysis of trip blanks. For the purposes of this investigation, a trip blank was prepared at the field laboratory on September 28, 2007 and then stored and transported along with the project sediment samples. Data for selected volatiles (acetone) from the Willamette Cove sediment sample was qualified based on results of the associated trip blank, as summarized in Table 3-3.

3.2.5 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 Round 2 QAPP. A tabular summary of the results, with the data qualifiers, is included in Table 4-1. 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

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accurate than unqualified data. Rejected data are not usable for any purpose. Concentrations associated with rejected data have been removed from the database, and an "R" qualifier is retained to flag the results that were removed. Selected volatile and semivolatile data were rejected due primarily to calibration issues. Additional information regarding why data were qualified or rejected is included in Table 3-3.

The precision and accuracy of the Willamette Cove sediment data was acceptable, and overall completeness for the sediment data was greater than 99%. Overall, the data quality was acceptable and will meet program objectives and goals for the RI/FS. The selected data qualified as noted above are fully usable for all data uses.

3.3 LABORATORY DEVIATIONS FROM ROUND 2 QAPP

At the time the sediment sample LW3-GWC1 was collected on September 21, 2007, the analytical suite had not been completely finalized and trip blanks for the volatile analyses (usually prepared by CAS) were not available. Multiple containers of sediment were collected in accordance to the standard LWG field sampling protocols and Round 2 QAPP, including the collection of sediment containers suitable for analysis of volatiles and TPH as gasoline. However, the associated trip blank samples for volatile analyses were not created until September 28, 2007 in the field laboratory, as noted in Section 3.3 above. After preparation, the trip blank was stored along with the associated sediment samples at the field laboratory until all Willamette Cove samples were shipped to CAS for analysis.

The Willamette Cove sediment samples were analyzed according to methods described in the Round 2 QAPP and QAPP Addendum 9 and no other deviations occurred during the analysis.

3.4 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 laboratories were 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.

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When the EDD was 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 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 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 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's) 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, 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. The data handling rules described in *Portland Harbor RI/FS Technical Memorandum: 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

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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. The SCRA database is provided on CD in Appendix D.

4.0 WILLAMETTE COVE SEDIMENT RESULTS

Results of the Willamette Cove sediment sampling effort are summarized in Table 4-1. Sums of Aroclors, total PCB congeners, total PAHs, and total DDTs are calculated by adding detected individual compounds (e.g., total LPAHs and total HPAHs) or isomers (e.g., total DDTs). Where chemical analyses result in undetected values for each individual compound or isomer, then the single highest detection limit represents the sum of respective compounds/isomers. A "T" qualifier is added to all results in the SCRA database that are mathematically derived in a post-processing step (e.g., sums of Aroclors) as well as all results that are selected for reporting in preference to other available results (e.g., for parameters reported by multiple methods). If any of the individual values used in the sum are estimated ("J" qualified), then the total value is estimated ("J" qualified).

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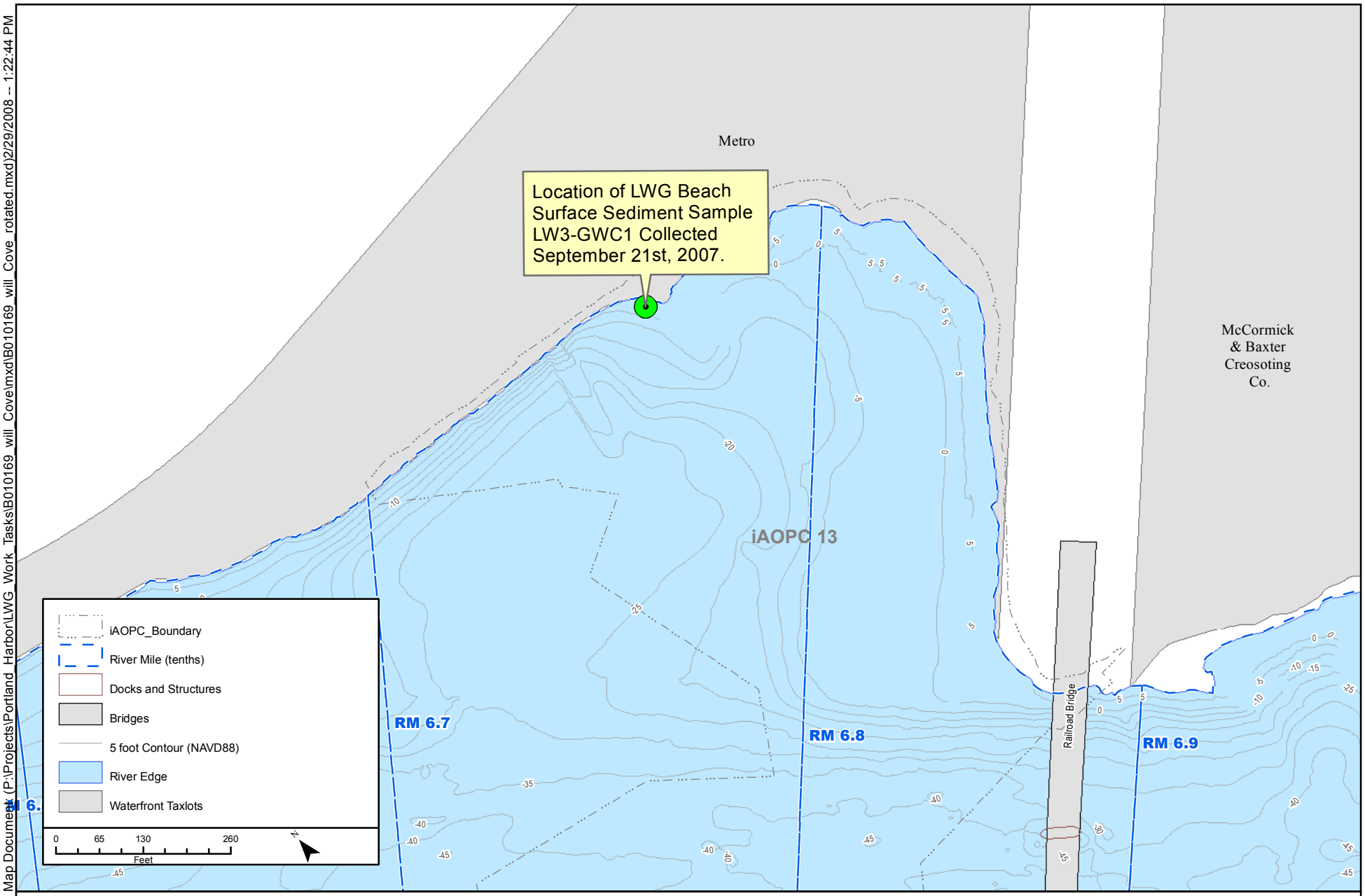

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Figure 2-1

Willamette Cove Sediment Station Location

Table 3-1. Laboratory Methods for Willamette Cove Sediment Sample.

Analysis	Laboratory	Sample Preparation		Quantitative Analysis	
		Protocol	Procedure	Protocol	Procedure
Conventional Analyses	CAS Kelso				
Total solids		--	--	PSEP 1986	Gravimetric
Total organic carbon		Plumb 1981	Acid pretreatment	Plumb et al. 1981	Combustion; coulometric titration
Metals	CAS Kelso				
Antimony, arsenic, cadmium, chromium, copper, lead, nickel, manganese, silver		EPA 3050	Strong acid digestion	EPA 6020	ICP/MS
Aluminum, zinc[a]		EPA 3050	Strong acid digestion	EPA 6010B	ICP/AES
Mercury		EPA 7471A	Acid digestion/oxidation	EPA 7471A	CVAAS
Selenium		EPA 3050 EPA 7742	Strong acid digestion Hydride generation	EPA 7742	AAS
Butyltins	CAS Kelso	Krone et al. 1988	Solvent extraction Derivatization	Krone et al. 1988	GC/FPD
Organochlorine pesticides	CAS Kelso	EPA 3541 EPA 3620B EPA 3660B	Soxhlet extraction Florisil® cleanup Sulfur cleanup	EPA 8081A	GC/ECD
PCB Aroclors	CAS Kelso	EPA 3541 EPA 3665A EPA 3640A	Soxhlet extraction Sulfuric acid cleanup Gel permeation chromatography	EPA 8082	GC/ECD
Polycyclic aromatic hydrocarbons	CAS Kelso	EPA 3541 EPA 3640A EPA 3630C	Automated Soxhlet Extraction Gel permeation chromatography Silica Gel cleanup	EPA 8270C-SIM	GC/MS-SIM
Tri-, Tetra-, and Pentachlorophenols	CAS Kelso	EPA 8151	Sonication extraction Esterification	EPA 8151M	GC/ECD
Semivolatile organic compounds [b]	CAS Kelso	EPA 3541 EPA 3640A	Automated Soxhlet Extraction Gel permeatioin chromatography	EPA 8270C	GC/MS
Volatile organic compounds	CAS Kelso	EPA 5035	Purge and trap	EPA 8260B	GC/MS

Table 3-1. Laboratory Methods for Willamette Cove Sediment Sample.

Analysis	Laboratory	Sample Preparation		Quantitative Analysis	
		Protocol	Procedure	Protocol	Procedure
Petroleum Hydrocarbons	CAS Kelso				
Gasoline-range hydrocarbons		NWTPH-Gx	Methanol extraction Purge and trap	NWTPH-Gx	GC/FID
Diesel- and oil-range hydrocarbons		NWTPH-Dx	Sovent extraction Silica gel cleanup (as needed)	NWTPH-Dx	GC/FID
Chlorinated herbicides	CAS Kelso	EPA 8151A	Solvent extraction Esterification	EPA 8151A	GC/ECD
Chlorinated dioxins and furans	CAS Houston	EPA 1613B	Soxhlet/Dean Stark extraction Sulfuric acid cleanup Silica/carbon column cleanup	EPA 1613B	HRGC/HRMS
PCB congeners [c]	Vista	EPA 1668A	Soxhlet/Dean Stark extraction Sulfuric acid cleanup Silica column cleanup	EPA 1668A	HRGC/HRMS

Notes:

[a] Aluminum and Zinc will be analyzed by EPA Method 6020 if not detected at the MRL by EPA Method 6010.

[b] Includes phthalate esters and mono-, dichlorophenols.

[c] Analysis will be completed for all 209 PCB congeners.

AAS - atomic absorption spectrometry
CAS - Columbia Analytical Services
CVAAS - cold vapor atomic absorption spectrometry
EPA - U.S. Environmental Protection Agency
GC/ECD - gas chromatography/electron capture detection
GC/FID - gas chromatography/flame ionization detection
GC/FPD - gas chromatography/flame photometric detection
GC/MS - gas chromatography/mass spectrometry
HRGC/HRMS - high-resolution gas chromatography/high-resolution mass spectrometry
ICP/AES - inductively coupled plasma/atomic emission spectrometry
NWTPH - Northwest total petroleum hydrocarbons
ICP/MS - inductively coupled plasma - mass spectrometry
PCB - polychlorinated biphenyl
PSEP - Puget Sound Estuary Program
SIM - selected ion monitoring

Table 3-2. 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 3-3. Summary of Qualified Data by Parameter Group for Round 3 Willamette Cove Sample.

	Number of Samples	Number of Data Points		Total # of Data Points	Detection and Qualification Frequencies (percent)		Reason Codes for Qualification
		Detected	Undetected				
Butyltins	1	0	4	4	0	detected	
					100	undetected	
Conventionals	1	2	0	2	100	detected	
					0	undetected	
Dioxin/Furan Homologs	1	10	0	10	100	detected	
					0	undetected	
Dioxin/Furans	1	10	5	15	67	detected	
					33	undetected	
					13	U	PFP
Herbicides	1	0	10	10	0	detected	
					100	undetected	
Metals	1	12	0	12	100	detected	
					0	undetected	
					25	J	MS, Pc, ICPSD
Organochlorine Pesticides	1	0	31	31	0	detected	
					100	undetected	
Polycyclic Aromatic Hydrocarbons	1	18	0	18	100	detected	
					0	undetected	
PCB Aroclors	1	0	9	9	0	detected	
					100	undetected	
PCB congeners	1	39	129	168	23	detected	
					77	undetected	
					0.6	UJ	Mi
Petroleum	1	2	1	3	66.7	detected	
					33.3	undetected	
					66.7	J	Chrom
					33.3	U	LB
Phenols	1	0	5	5	0	detected	
					100	undetected	
Semivolatile Organic Compounds	1	0	48	48	0	detected	
					100	undetected	
					2	R	LCSR

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Table 3-3. Summary of Qualified Data by Parameter Group for Round 3 Willamette Cove Sample.

	Number of Samples	Number of Data Points		Total # of Data Points	Detection and Qualification Frequencies (percent)		Reason Codes for Qualification
		Detected	Undetected				
Volatiles	1	1	51	52	2	detected	
					98	undetected	
					6	R	Cc,Ci
					4	U	LB
					2	UJ	Cc,Ci,TB

Notes:
Reason for Qualification:
Cc - Calibration (continuing)
Chrom-Chromatographic pattern does not match pattern of calibration standard
Ci - Calibration (initial)
ICPSD-ICP Serial Dilution % Difference
LB - Lab blank contamination
LCSR - Laboratory control sample recoveries
Mi- Matrix interference
MS- Matrix Spike recoveries
Pc - Precision (all replicates)
PFP - Potential false positive (mass spectrum does not meet all identification criteria)
TB-Trip Blank Contamination

Table 4-1. Results for Round 3 Willamette Cove Sample.

CAS No.	Analyte	Concentration	
Butyltins (ug/Kg)			
78763-54-9	Butyltin ion	0.042	U
14488-53-0	Dibutyltin ion	0.04	U
1461-25-2	Tetrabutyltin	0.098	U
36643-28-4	Tributyltin ion	0.079	U
Conventionals (percent)			
TOC	Total organic carbon	1.24	
TSO	Total solids	71	T
Dioxin/Furan Homologs (pg/g)			
38998-75-3	Heptachlorodibenzofuran homologs	7.59	
37871-00-4	Heptachlorodibenzo-p-dioxin homologs	34.6	
55684-94-1	Hexachlorodibenzofuran homologs	10.8	
34465-46-8	Hexachlorodibenzo-p-dioxin homologs	9.83	
39001-02-0	Octachlorodibenzofuran	8.77	J
3268-87-9	Octachlorodibenzo-p-dioxin	177	
30402-15-4	Pentachlorodibenzofuran homologs	14.3	
36088-22-9	Pentachlorodibenzo-p-dioxin homologs	1.64	J
30402-14-3	Tetrachlorodibenzofuran homologs	13.8	
41903-57-5	Tetrachlorodibenzo-p-dioxin homologs	1.98	
TOTPCDD_F	Total PCDD/F	280	JT
Dioxins/Furans (pg/g)			
67562-39-4	1,2,3,4,6,7,8-Heptachlorodibenzofuran	3.23	J
35822-46-9	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	13.7	
55673-89-7	1,2,3,4,7,8,9-Heptachlorodibenzofuran	0.434	J
70648-26-9	1,2,3,4,7,8-Hexachlorodibenzofuran	1.42	J
39227-28-6	1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	0.311	J
57117-44-9	1,2,3,6,7,8-Hexachlorodibenzofuran	0.738	J
57653-85-7	1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	0.902	J
72918-21-9	1,2,3,7,8,9-Hexachlorodibenzofuran	0.193	U
19408-74-3	1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	1.1	J
57117-41-6	1,2,3,7,8-Pentachlorodibenzofuran	0.292	U
40321-76-4	1,2,3,7,8-Pentachlorodibenzo-p-dioxin	0.303	U
60851-34-5	2,3,4,6,7,8-Hexachlorodibenzofuran	1.2	J
57117-31-4	2,3,4,7,8-Pentachlorodibenzofuran	0.968	J
51207-31-9	2,3,7,8-Tetrachlorodibenzofuran	0.933	U
1746-01-6	2,3,7,8-Tetrachlorodibenzo-p-dioxin	0.147	U
TEQ_DIOXIN.0	Dioxin/furan TCDD toxicity equivalent (ND = 0)	1.24	JT
TEQ_TOTAL.0	Total TCDD toxicity equivalent (ND = 0)	1.25	JT
Herbicides (ug/Kg)			
93-76-5	2,4,5-T	45	U
94-75-7	2,4-D	54	U
94-82-6	2,4-DB	49	U
75-99-0	Dalapon	200	U
1918-00-9	Dicamba	61	U
120-36-5	Dichloroprop	44	U
88-85-7	Dinoseb	230	U

Table 4-1. Results for Round 3 Willamette Cove Sample.

CAS No.	Analyte	Concentration	
94-74-6	MCPA	38000	U
93-65-2	MCPP	33000	U
93-72-1	Silvex	44	U
Metals (mg/Kg)			
7429-90-5	Aluminum	11100	T
7440-36-0	Antimony	2.29	JT
7440-38-2	Arsenic	15.8	T
7440-43-9	Cadmium	2.01	T
7440-47-3	Chromium	16.2	T
7440-50-8	Copper	380	T
7439-92-1	Lead	13400	T
7439-97-6	Mercury	65.2	T
7440-02-0	Nickel	17.7	JT
7782-49-2	Selenium	0.14	T
7440-22-4	Silver	0.4	JT
7440-66-6	Zinc	1090	T
PAHs (ug/Kg)			
91-57-6	2-Methylnaphthalene	54	
83-32-9	Acenaphthene	16	
208-96-8	Acenaphthylene	21	
120-12-7	Anthracene	27	
56-55-3	Benzo(a)anthracene	200	
50-32-8	Benzo(a)pyrene	140	
205-99-2	Benzo(b)fluoranthene	400	
191-24-2	Benzo(g,h,i)perylene	260	
207-08-9	Benzo(k)fluoranthene	120	
218-01-9	Chrysene	370	
53-70-3	Dibenzo(a,h)anthracene	54	
206-44-0	Fluoranthene	670	
86-73-7	Fluorene	28	
HPAH	High Molecular Weight PAH	3300	T
193-39-5	Indeno(1,2,3-cd)pyrene	240	
LPAH	Low Molecular Weight PAH	420	T
91-20-3	Naphthalene	68	
85-01-8	Phenanthrene	210	
129-00-0	Pyrene	890	
130498-29-2	Total PAHs	3800	T
PCB Aroclors (ug/Kg)			
12674-11-2	Aroclor 1016	2.4	U
11104-28-2	Aroclor 1221	2.4	U
11141-16-5	Aroclor 1232	2.4	U
53469-21-9	Aroclor 1242	2.4	U
12672-29-6	Aroclor 1248	2.4	U
11097-69-1	Aroclor 1254	2.4	U
11096-82-5	Aroclor 1260	2.4	U
37324-23-5	Aroclor 1262	2.4	U
11100-14-4	Aroclor 1268	2.4	U
12767-79-2	Aroclors	2.4	UT

Table 4-1. Results for Round 3 Willamette Cove Sample.

CAS No.	Analyte	Concentration	
PCB Congeners (pg/g)			
TEQ_PCB.0	Dioxin-like PCB congener TCDD toxicity equivalent (ND = 0)	0.00702	JT
2051-60-7	PCB001	11.6	UT
2051-61-8	PCB002	11.6	UT
2051-62-9	PCB003	11.6	UT
PCB004_010	PCB004 & 010	23.3	UT
PCB005_008	PCB005 & 008	23.3	UT
25569-80-6	PCB006	23.3	UT
PCB007_009	PCB007 & 009	23.3	UT
2050-67-1	PCB011	23.3	UT
PCB012_013	PCB012 & 013	23.3	UT
34883-41-5	PCB014	23.3	UT
2050-68-2	PCB015	23.3	UT
PCB016_032	PCB016 & 032	11.6	UT
37680-66-3	PCB017	11.6	UT
37680-65-2	PCB018	11.6	UT
38444-73-4	PCB019	51.4	T
PCB020_021_033	PCB020 & 021 & 033	11.6	UT
38444-85-8	PCB022	11.6	UT
55720-44-0	PCB023	11.6	UT
PCB024_027	PCB024 & 027	11.6	UT
55712-37-3	PCB025	11.6	UT
38444-81-4	PCB026	11.6	UT
7012-37-5	PCB028	11.6	UT
15862-07-4	PCB029	11.6	UT
35693-92-6	PCB030	11.6	UT
16606-02-3	PCB031	11.6	UT
37680-68-5	PCB034	11.6	UT
37680-69-6	PCB035	11.6	UT
38444-87-0	PCB036	11.6	UT
38444-90-5	PCB037	11.6	UT
53555-66-1	PCB038	11.6	UT
38444-88-1	PCB039	11.6	UT
38444-93-8	PCB040	11.6	UT
PCB041_064_071_	PCB041 & 064 & 071 & 072	11.6	UT
PCB042_059	PCB042 & 059	11.6	UT
PCB043_049	PCB043 & 049	25.3	T
41464-39-5	PCB044	11.6	UT
70362-45-7	PCB045	11.6	UT
41464-47-5	PCB046	11.6	UT
2437-79-8	PCB047	67.6	T
PCB048_075	PCB048 & 075	11.6	UT
62796-65-0	PCB050	11.6	UT
68194-04-7	PCB051	27.8	T
PCB052_069	PCB052 & 069	26.4	T
41464-41-9	PCB053	23.3	T
15968-05-5	PCB054	12.8	T
74338-24-2	PCB055	11.6	UT

Table 4-1. Results for Round 3 Willamette Cove Sample.

CAS No.	Analyte	Concentration	
PCB056_060	PCB056 & 060	11.6	UT
70424-67-8	PCB057	11.6	UT
41464-49-7	PCB058	11.6	UT
PCB061_070	PCB061 & 070	11.6	UT
54230-22-7	PCB062	11.6	UT
74472-34-7	PCB063	11.6	UT
33284-54-7	PCB065	11.6	UT
PCB066_076	PCB066 & 076	11.6	UT
73575-53-8	PCB067	11.6	UT
73575-52-7	PCB068	11.6	UT
74338-23-1	PCB073	11.6	UT
32690-93-0	PCB074	11.6	UT
32598-13-3	PCB077	4.8	UT
70362-49-1	PCB078	11.6	UT
41464-48-6	PCB079	11.6	UT
33284-52-5	PCB080	11.6	UT
70362-50-4	PCB081	4.34	UT
52663-62-4	PCB082	11.6	UT
60145-20-2	PCB083	11.6	UT
PCB084_092	PCB084 & 092	30.8	T
PCB085_116	PCB085 & 116	11.6	UT
55312-69-1	PCB086	11.6	UT
PCB087_117_125	PCB087 & 117 & 125	11.6	UT
PCB088_091	PCB088 & 091	15	T
73575-57-2	PCB089	11.6	UT
PCB090_101	PCB090 & 101	60.2	T
73575-56-1	PCB093	11.6	UT
73575-55-0	PCB094	11.6	UT
PCB095_098_102	PCB095 & 098 & 102	58.3	T
73575-54-9	PCB096	11.6	UT
41464-51-1	PCB097	11.6	UT
38380-01-7	PCB099	32.3	T
39485-83-1	PCB100	17.7	T
60145-21-3	PCB103	11.6	UT
56558-16-8	PCB104	11.6	UT
32598-14-4	PCB105	10.1	UT
PCB106_118	PCB106 & 118	20.7	T
PCB107_109	PCB107 & 109	11.6	UT
PCB108_112	PCB108 & 112	11.6	UT
38380-03-9	PCB110	33.6	T
PCB111_115	PCB111 & 115	11.6	UT
68194-10-5	PCB113	11.6	UT
74472-37-0	PCB114	10.6	UT
56558-17-9	PCB119	11.6	UT
68194-12-7	PCB120	11.6	UT
56558-18-0	PCB121	11.6	UT
76842-07-4	PCB122	11.6	UT
65510-44-3	PCB123	7.74	UT

Table 4-1. Results for Round 3 Willamette Cove Sample.

CAS No.	Analyte	Concentration	
70424-70-3	PCB124	11.6	UT
57465-28-8	PCB126	9.16	UT
39635-33-1	PCB127	11.6	UT
PCB128_162	PCB128 & 162	11.6	UT
55215-18-4	PCB129	11.6	UT
52663-66-8	PCB130	11.6	UT
61798-70-7	PCB131	11.6	UT
PCB132_161	PCB132 & 161	31.6	T
PCB133_142	PCB133 & 142	11.6	UT
PCB134_143	PCB134 & 143	11.6	UT
52744-13-5	PCB135	28.8	T
38411-22-2	PCB136	28.3	T
35694-06-5	PCB137	11.6	UT
PCB138_163_164	PCB138 & 163 & 164	144	T
PCB139_149	PCB139 & 149	130	T
59291-64-4	PCB140	11.6	UT
52712-04-6	PCB141	42	T
68194-14-9	PCB144	11.6	UT
74472-40-5	PCB145	11.6	UT
PCB146_165	PCB146 & 165	26.3	T
68194-13-8	PCB147	11.6	UT
74472-41-6	PCB148	11.6	UT
68194-08-1	PCB150	11.6	UT
52663-63-5	PCB151	64.3	T
68194-09-2	PCB152	11.6	UT
35065-27-1	PCB153	199	T
60145-22-4	PCB154	11.6	UT
33979-03-2	PCB155	11.6	UT
38380-08-4	PCB156	8.89	JT
69782-90-7	PCB157	5.95	UT
PCB158_160	PCB158 & 160	11.6	UT
39635-35-3	PCB159	11.6	UT
41411-63-6	PCB166	11.6	UT
52663-72-6	PCB167	5.28	UT
59291-65-5	PCB168	11.6	UT
32774-16-6	PCB169	6.71	UT
35065-30-6	PCB170	88.6	T
52663-71-5	PCB171	23.6	T
52663-74-8	PCB172	13.8	T
68194-16-1	PCB173	11.6	UT
38411-25-5	PCB174	98.7	T
40186-70-7	PCB175	11.6	UT
52663-65-7	PCB176	14.5	T
52663-70-4	PCB177	58.9	T
52663-67-9	PCB178	23.1	T
52663-64-6	PCB179	48.4	T
35065-29-3	PCB180	229	T
74472-47-2	PCB181	11.6	UT

Table 4-1. Results for Round 3 Willamette Cove Sample.

CAS No.	Analyte	Concentration	
PCB182_187	PCB182 & 187	138	T
52663-69-1	PCB183	66.4	T
74472-48-3	PCB184	11.6	UT
52712-05-7	PCB185	11.6	UT
74472-49-4	PCB186	11.6	UT
74487-85-7	PCB188	11.6	UT
39635-31-9	PCB189	5.06	JT
41411-64-7	PCB190	17.8	T
74472-50-7	PCB191	11.6	UT
74472-51-8	PCB192	11.6	UT
69782-91-8	PCB193	11.6	UT
35694-08-7	PCB194	46.5	T
52663-78-2	PCB195	21.6	UJT
PCB196_203	PCB196 & 203	46.9	T
33091-17-7	PCB197	11.6	UT
68194-17-2	PCB198	11.6	UT
52663-75-9	PCB199	51.7	T
52663-73-7	PCB200	11.6	UT
40186-71-8	PCB201	11.6	UT
2136-99-4	PCB202	11.6	UT
74472-52-9	PCB204	11.6	UT
74472-53-0	PCB205	11.6	UT
40186-72-9	PCB206	11.6	UT
52663-79-3	PCB207	11.6	UT
52663-77-1	PCB208	11.6	UT
2051-24-3	PCB209	11.6	UT
1336-36-3	Total PCB Congeners	2180	T
Pesticides (ug/Kg)			
53-19-0	2,4'-DDD	0.3	U
3424-82-6	2,4'-DDE	0.33	U
789-02-6	2,4'-DDT	0.2	U
72-54-8	4,4'-DDD	0.28	U
72-55-9	4,4'-DDE	0.17	U
50-29-3	4,4'-DDT	0.16	U
309-00-2	Aldrin	0.27	U
959-98-8	alpha-Endosulfan	0.24	U
319-84-6	alpha-Hexachlorocyclohexane	0.37	U
33213-65-9	beta-Endosulfan	0.27	U
319-85-7	beta-Hexachlorocyclohexane	0.46	U
5103-71-9	cis-Chlordane	0.33	U
5103-73-1	cis-Nonachlor	0.35	U
319-86-8	delta-Hexachlorocyclohexane	0.35	U
60-57-1	Dieldrin	0.41	U
1031-07-8	Endosulfan sulfate	0.12	U
72-20-8	Endrin	0.28	U
7421-93-4	Endrin aldehyde	0.33	U
53494-70-5	Endrin ketone	0.12	U
58-89-9	gamma-Hexachlorocyclohexane	0.21	U

Table 4-1. Results for Round 3 Willamette Cove Sample.

CAS No.	Analyte	Concentration	
76-44-8	Heptachlor	0.16	U
1024-57-3	Heptachlor epoxide	0.19	U
72-43-5	Methoxychlor	0.9	U
2385-85-5	Mirex	0.13	U
27304-13-8	Oxychlordane	0.082	U
TOTCHLDANE	Total Chlordanes	0.35	UT
TOTENDOSLFN	Total Endosulfan	0.27	UT
E17075011	Total of 2,4' and 4,4'-DDD	0.3	UT
E966176	Total of 2,4' and 4,4'-DDD, -DDE, -DDT	0.33	UT
E17075029	Total of 2,4' and 4,4'-DDE	0.33	UT
E17075037	Total of 2,4' and 4,4'-DDT	0.2	UT
8001-35-2	Toxaphene	25	U
5103-74-2	trans-Chlordane	0.09	U
39765-80-5	trans-Nonachlor	0.35	U
Petroleum (mg/Kg)			
DRH	Diesel Range Hydrocarbons	1300	JT
GRH	Gasoline Range Hydrocarbons	5.9	U
RRH	Residual Range Hydrocarbons	2000	JT
TPH	Total Petroleum Hydrocarbons	3300	JT
Phenols (ug/Kg)			
4901-51-3	2,3,4,5-Tetrachlorophenol	0.87	U
935-95-5	2,3,5,6-Tetrachlorophenol	0.42	U
95-95-4	2,4,5-Trichlorophenol	0.76	U
88-06-2	2,4,6-Trichlorophenol	0.55	U
120-83-2	2,4-Dichlorophenol	50	U
105-67-9	2,4-Dimethylphenol	280	U
51-28-5	2,4-Dinitrophenol	850	U
95-57-8	2-Chlorophenol	100	U
95-48-7	2-Methylphenol	75	U
88-75-5	2-Nitrophenol	75	U
534-52-1	4,6-Dinitro-2-methylphenol	70	U
59-50-7	4-Chloro-3-methylphenol	70	U
106-44-5	4-Methylphenol	75	U
100-02-7	4-Nitrophenol	900	U
87-86-5	Pentachlorophenol	0.2	U
108-95-2	Phenol	100	U
Phthalates (ug/Kg)			
117-81-7	Bis(2-ethylhexyl) phthalate	350	U
85-68-7	Butylbenzyl phthalate	160	U
84-74-2	Dibutyl phthalate	400	U
84-66-2	Diethyl phthalate	65	U
131-11-3	Dimethyl phthalate	50	U
117-84-0	Di-n-octyl phthalate	85	U
SVOCs (ug/Kg)			
120-82-1	1,2,4-Trichlorobenzene	130	U
95-50-1	1,2-Dichlorobenzene	150	U
541-73-1	1,3-Dichlorobenzene	150	U
106-46-7	1,4-Dichlorobenzene	0.14	U

Table 4-1. Results for Round 3 Willamette Cove Sample.

CAS No.	Analyte	Concentration	
121-14-2	2,4-Dinitrotoluene	75	U
606-20-2	2,6-Dinitrotoluene	100	U
91-58-7	2-Chloronaphthalene	80	U
88-74-4	2-Nitroaniline	160	U
91-94-1	3,3'-Dichlorobenzidine	190	U
99-09-2	3-Nitroaniline	130	U
101-55-3	4-Bromophenyl phenyl ether	80	U
106-47-8	4-Chloroaniline	95	U
7005-72-3	4-Chlorophenyl phenyl ether	70	U
100-01-6	4-Nitroaniline	90	U
62-53-3	Aniline	75	U
103-33-3	Azobenzene	55	U
65-85-0	Benzoic acid		R
100-51-6	Benzyl alcohol	110	U
111-91-1	Bis(2-chloroethoxy) methane	75	U
111-44-4	Bis(2-chloroethyl) ether	95	U
39638-32-9	Bis(2-chloroisopropyl) ether	130	U
86-74-8	Carbazole	65	U
132-64-9	Dibenzofuran	13	
118-74-1	Hexachlorobenzene	0.12	U
87-68-3	Hexachlorobutadiene	0.19	U
77-47-4	Hexachlorocyclopentadiene	1500	U
67-72-1	Hexachloroethane	0.21	U
78-59-1	Isophorone	50	U
98-95-3	Nitrobenzene	110	U
62-75-9	N-Nitrosodimethylamine	310	U
86-30-6	N-Nitrosodiphenylamine	80	U
621-64-7	N-Nitrosodipropylamine	120	U
VOCs (ug/Kg)			
630-20-6	1,1,1,2-Tetrachloroethane	0.11	U
71-55-6	1,1,1-Trichloroethane	0.093	U
79-34-5	1,1,2,2-Tetrachloroethane	0.16	U
79-00-5	1,1,2-Trichloroethane	0.16	U
75-34-3	1,1-Dichloroethane	0.095	U
75-35-4	1,1-Dichloroethene	0.08	U
96-18-4	1,2,3-Trichloropropane	0.41	U
107-06-2	1,2-Dichloroethane	0.08	U
78-87-5	1,2-Dichloropropane	0.14	U
110-57-6	1,4-Dichloro-trans-2-butene	0.58	U
110-75-8	2-Chloroethyl vinyl ether	0.44	U
67-64-1	Acetone	9.2	UJ
107-02-8	Acrolein		R
107-13-1	Acrylonitrile	0.65	U
71-43-2	Benzene	0.12	U
74-97-5	Bromochloromethane	0.26	U
75-27-4	Bromodichloromethane	0.16	U
75-25-2	Bromoform	0.27	U
74-83-9	Bromomethane	0.72	U

Table 4-1. Results for Round 3 Willamette Cove Sample.

CAS No.	Analyte	Concentration	
BTEX	BTEX	0.21	UT
75-15-0	Carbon disulfide	0.11	J
56-23-5	Carbon tetrachloride	0.11	U
108-90-7	Chlorobenzene	0.072	U
124-48-1	Chlorodibromomethane	0.14	U
75-00-3	Chloroethane	0.34	U
67-66-3	Chloroform	0.088	U
74-87-3	Chloromethane	0.16	U
156-59-2	cis-1,2-Dichloroethene	0.14	U
10061-01-5	cis-1,3-Dichloropropene	0.079	U
75-71-8	Dichlorodifluoromethane	0.093	U
100-41-4	Ethylbenzene	0.091	U
106-93-4	Ethylene dibromide	0.13	U
98-82-8	Isopropylbenzene	0.07	U
179601-23-1	m,p-Xylene	0.21	U
74-88-4	Methyl iodide	3.1	U
108-10-1	Methyl isobutyl ketone	0.31	U
591-78-6	Methyl n-butyl ketone	0.83	U
1634-04-4	Methyl tert-butyl ether	0.09	U
74-95-3	Methylene bromide	0.21	U
75-09-2	Methylene chloride	1.4	U
78-93-3	Methylethyl ketone		R
95-47-6	o-Xylene	0.08	U
100-42-5	Styrene	0.094	U
127-18-4	Tetrachloroethene	0.11	U
108-88-3	Toluene	0.19	U
156-60-5	trans-1,2-Dichloroethene	0.12	U
10061-02-6	trans-1,3-Dichloropropene	0.13	U
79-01-6	Trichloroethene	0.098	U
75-69-4	Trichlorofluoromethane	0.16	U
108-05-4	Vinyl acetate		R
75-01-4	Vinyl chloride	0.14	U
1330-20-7	Xylene	0.21	UT

PORTLAND HARBOR RI/FS

WILLAMETTE COVE SEDIMENT DATA REPORT

APPENDIX A

EPA-LWG COMMUNICATIONS

DRAFT

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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.

March 14, 2008

Prepared for
The Lower Willamette Group

Prepared by
Integral Consulting Inc.

EPA was notified about the collection of the sample in the October 4, 2007 Monthly Progress Report (IC07-0029).

PORTLAND HARBOR RI/FS

WILLAMETTE COVE SEDIMENT DATA REPORT

APPENDIX B

INTEGRAL FIELD NOTEBOOK & DEQ INSPECTION

DRAFT

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J. Moore — WILLAMETTE COVE — 9/21/07

0900 MOB TO PBNS LAB TO LOAD UP FOR SINGLE SURFACE SEDIMENT SAMPLE AT WILLAMETTE COVE.

0930 MEET KEVIN PARRETT AT WILLAMETTE COVE (DEQ SITE MANAGER)

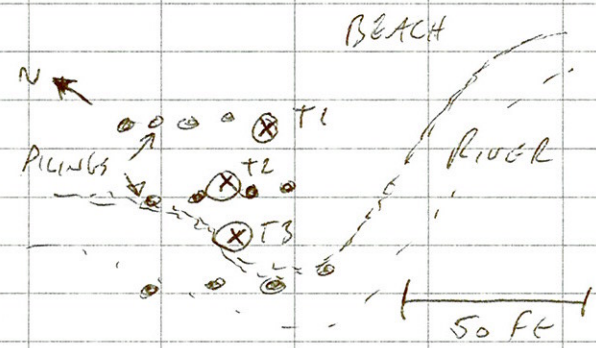
* PERSONNEL: J. MOORE / A. BONIN - WTEGRA
K. PARRETT - DEQ

* SCOPE: TO COLLECT FULL PORTLAND HARBOR SUITE of COCs SAMPLE FROM SURFACE SEDIMENT ALONG BEACH AT WILLAMETTE COVE - AS PART OF CONTAMINANT TESTING FOR RECENTLY DISCOVERED LOW WATER LINE NAPL IN DEQ TEST PIT.

- CONDUCT COMPLETE SITE WALK OF TEST PIT AREA.

1035: KEVIN PARRETT ONSITE.
DIG A SERIES OF SMALL TEST PITS 0-30cm DEEP FROM HIGH WATER LINE TO LOW WATER LINE.

J. Moore — WILLAMETTE COVE — 9/21/07



3 TESTPITS:

(T1) - RIP RAP SURFACE, CLEAN BROWN MED GRAIN SAND.

2cm - ORANGE OXIDIZED SAND WITH SILT 2cm THICK

4-6 - GREY U. FINE SAND AND SILT 50/50

6-10 - ORANGE OXIDIZED SAND

10-30 - GREY SILT, HIGH PLASTICITY - MODERATE LOW RANGE TPH ODOR
- NO SHEEN
- NO WATER IN HOLE
30 NO BUBBLES/SHEEN

* LED PAINT CHIPS IN ORANGE LAYERS.

(T2) - SURFACE RIP RAP, MED GRAIN CLEAN BROWN SAND.
2cm - 30, GREY SAND W SILT
SLIGHT ODOR · HEAVY TPH, MODERATE SHEEN, WATER IN HOLE TO 15cm DEPTH
- SHEEN RELATED TO WATER - NOT SEEN IN SEDIMENT UNTIL SATURATED

(T3) - SURFACE RIP RAP, MED GRAIN CLEAN BROWN SAND.
2cm-30cm GREY SAND W SILT
MODERATE TPH LOW RANGE ODOR, STRONG SHEEN AND FREE PRODUCT BLEBS.
- RIVER WATER FILLED HOLE DURING DIGGING

- THE ORIGINAL DEQ TEST PIT WAS AT LOCATION (T1) - BUT THE WATER LINE IS MUCH LOWER DUE TO LOW TIDE - SO THIS LOCATION IS NOW DRY - DECIDE TO SAMPLE AT (T3)

FOR FULL COC SUITE OF ANALYTES AS THIS SEEMS THE MOST IMPACTED AND COULD GIVE THE STRONGEST SIGNATURE FOR CONTAMINANTS.
- GPS COORDS FOR (T3):
45° 34' 50.552" N
122° 44' 45.540" W

1100: COLLECT SAMPLES - 0-30cm HOMOGENIZED ACCORDING TO R3/R2 SEDIMENT SAMPLING PROTOCOL WITH PRE-DECONED EQUIPMENT - 4 x 2 oz VOC CONTAINERS COLLECTED PRIOR TO MAIN HOMOGENIZED SAMPLE.

1115: INTERIM OFFSITE - MOB TO LUB FIELDLAB

1135: ARRIVE AT FIELDLAB. NAME SAMPLE LW3-GWC1 ANALYZE FOR: SVOCS, PCB AROCLORS, PESTICIDES, METALS, DIOXINS, TBT, SEND ARCHIVES TO CAS ALSO - HOLD PCB CONTENT FOR VISTA IN FIELDLAB.
- WRITE HOLD UNTIL 9/25/07 ON

J. MOORE WILLAMETTE COVE 9/21/07

CHAIN of CUSTODY.
HOLD VOCS in FIELDLAB WAITING
FOR LUG DECISION.

1220 : CAS COURIER AT FIELDLAB -
RELINQUISH SAMPLES

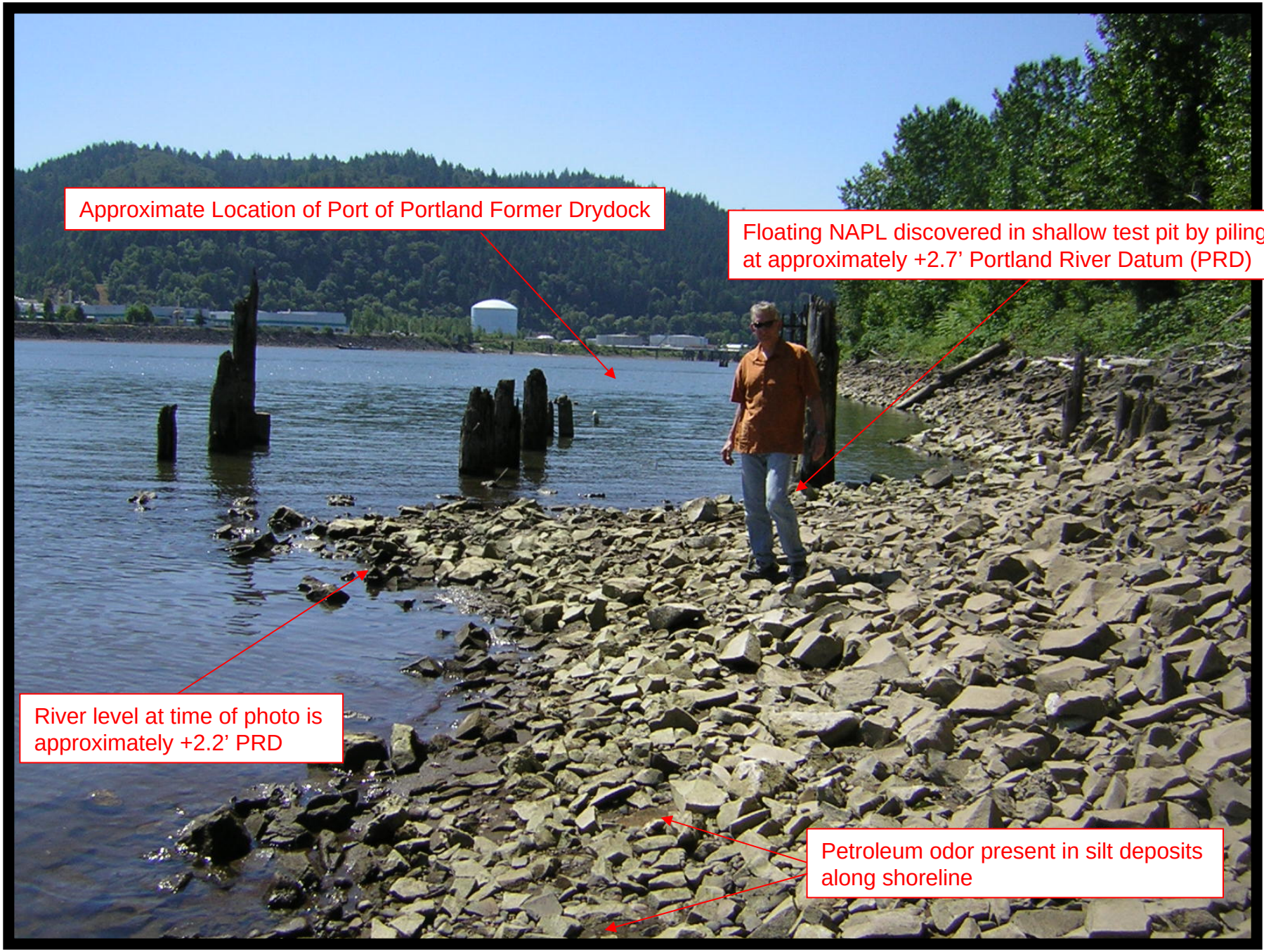
1230 : J. MOORE A. BONAN LEAVE FIELDLAB.

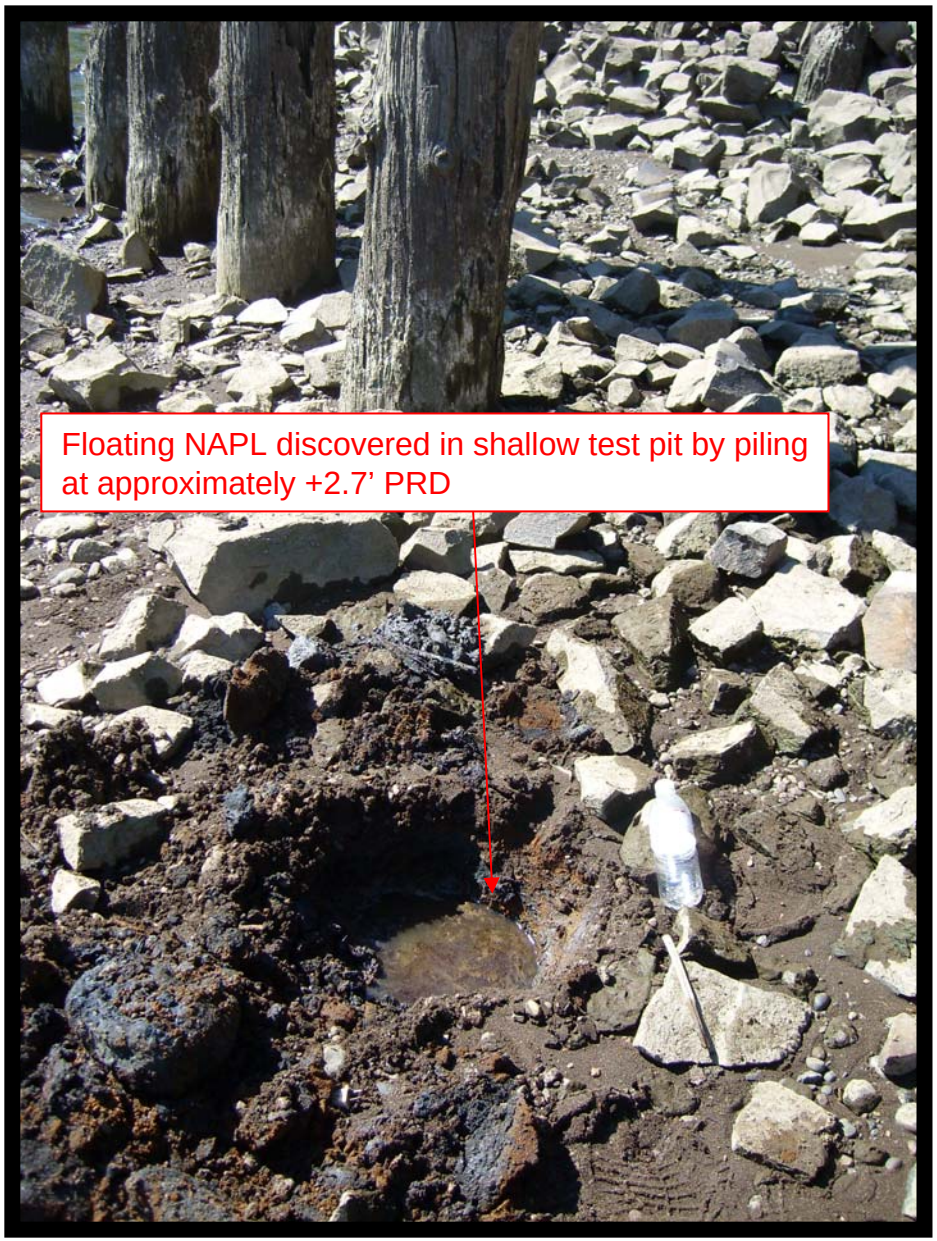
JM 9/21/07 1230.

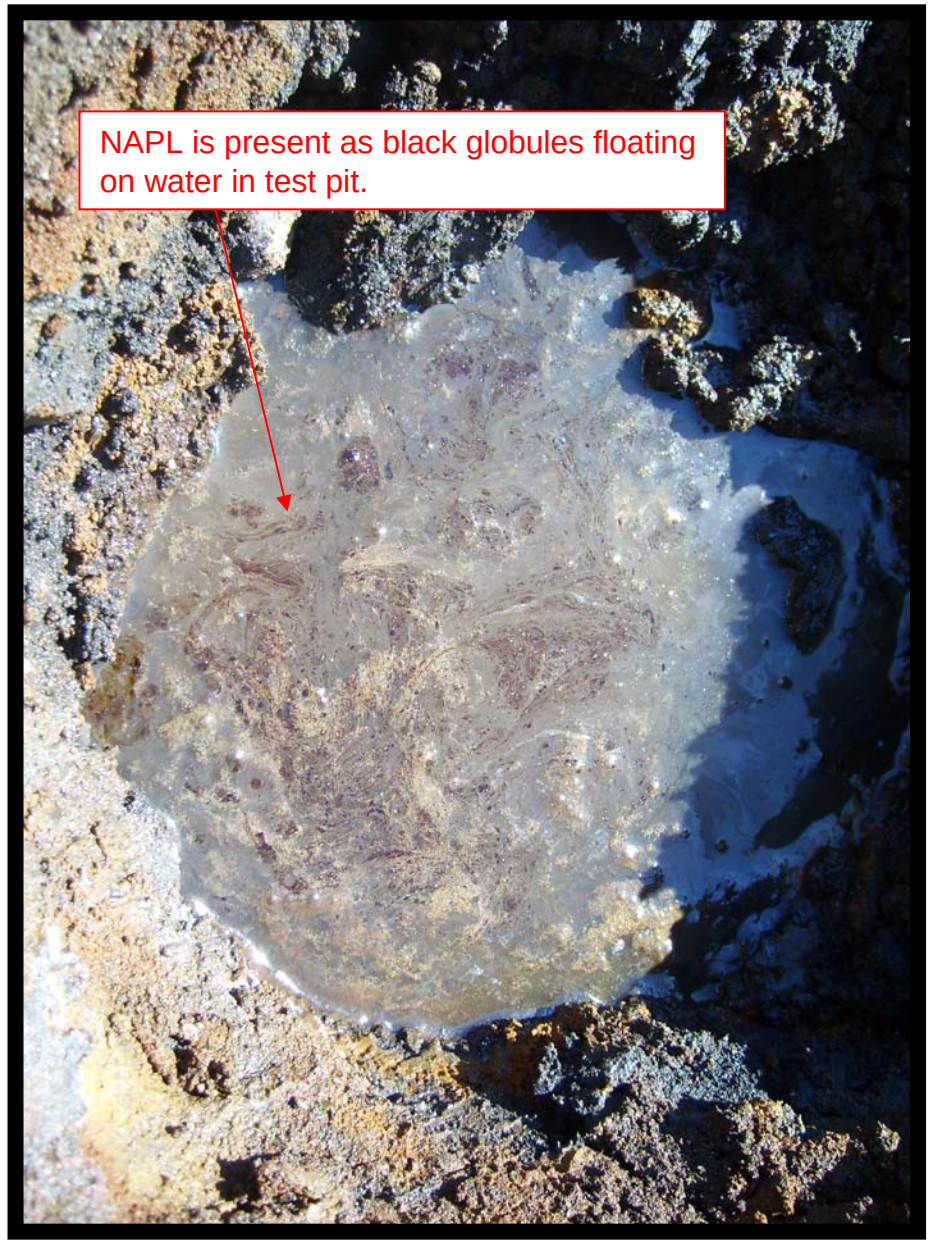
Willamette Cove Field Inspection of Petroleum Contaminated Beach Sediment

Attendees: Kevin Parrett (DEQ), Amanda Spencer (Ash Creak Associates) and Sara Moore (Port of Portland)

Site visit conducted from 2pm to 3pm on August 28, 2007


Approximate Location of Port of Portland Former Drydock
Floating NAPL discovered in shallow test pit by piling at approximately +2.7' Portland River Datum (PRD)
River level at time of photo is approximately +2.2' PRD
Petroleum odor present in silt deposits along shoreline


Floating NAPL discovered in shallow test pit by piling at approximately +2.7' PRD


NAPL is present as black globules floating on water in test pit.

Approximate Location of Port of Portland Former Drydock
Approximate location of August 28, 2007, test pit by piling
Aerial photo taken on October 2, 2006 at 11:45 AM

PORTLAND HARBOR RI/FS

WILLAMETTE COVE SEDIMENT DATA REPORT

APPENDIX C

DATA VALIDATION REPORT

DRAFT

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March 14, 2008

Prepared for
The Lower Willamette Group

Prepared by
Integral Consulting Inc.

EcoChem, INC.
Environmental Data Quality

DATA QUALITY EVALUATION

PORTLAND HARBOR

WILLAMETTE COVE SEDIMENT SAMPLING - SEPTEMBER 2007

Volatile Organic Compounds (VOC) - Method SW8260B
Semivolatile Organic Compounds (SVOC) - Method SW8270C
Polycyclic Aromatic Hydrocarbons (PAH) - Method SW8270-SIM
Chlorinated Phenols - Method SW8151A
Chlorinated Pesticides - Method SW8081A
Polychlorinated Biphenyls (PCB) – Method SW8082
Organotins - Krone Method
Fuels – NWTPH-Gx and NWTPH-Dx Methods
Dioxin/Furan Compounds – Method E1613B
Herbicides – Method SW8151
Polychlorinated Biphenyl (PCB) Congeners – Method E1668A
Metals - Methods SW6010/6020, SW7470/7471A, & SW7742
Total Organic Carbon – PSEP Method
Percent Solids

Prepared for:

Integral Consulting
7900 SE 28th Street, Suite 300
Mercer Island, Washington 98040

Integral Project: B01-01-69

Prepared by:

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

EcoChem Project: C22122-1
February 22, 2008

Approved for Release:

Linda Williams for
Eric Strout
Project Manager/Technical Director
EcoChem, Inc.

DATA QUALITY EVALUATION

BASIS OF DATA EVALUATION

The data were validated using guidance and quality control (QC) criteria documented in the analytical methods; *Guidance on Environmental Data Verification and Validation* (EPA 2002c); *Portland Harbor RI/FS, Round 2, Quality Assurance Project Plan* (QAPP) (Integral 2004);and *National Functional Guidelines for Organic and/or Inorganic Data Review* (USEPA 1994, 1999 & 2002). Additional guidance for polychlorinated biphenyl (PCB) congener data validation was from the *EPA Region 10 SOP for the Validation of Method 1668 Toxic, Dioxin-like PCB Data* (USEPA 1995) and for the dioxin/furan data, *EPA Region 10 SOP for the Validation of Polychlorinated Dibenzodioxin (PCDD) and Polychlorinated Dibenzofuran (PCDF) Data* (EPA 1996).

Data qualifier definitions, reason codes, and validation criteria are included as **Appendix A**. Data validation reports, which discuss individual findings for each QC element [by sample delivery group (SDG)], are provided in **Appendix B**. Data validation worksheets and communication records are organized by SDG and will be kept on file at EcoChem.

PROCESS FOR DATA VALIDATION

All electronic data deliverable files (EDD) were verified by comparing 100% of the field sample results and 10% of the QC sample results to the hardcopy data package.

All of the data received a Level IV (full) validation, which included evaluation (as appropriate for each method) of:

- Package completeness
- Sample chain-of-custody and sample preservation
- Analytical holding times
- Blank contamination
- Precision (replicate analyses)
- Accuracy (compound recovery)
- Chromatogram review (pesticide, PCB, and fuel fractions)
- Detection limits
- Instrument performance (initial calibration, continuing calibration, tuning, sensitivity and degradation)
- Compound Identification
- Transcription and calculation checks

A dual-tier system of primary and secondary reviewers is utilized to ensure technical correctness and QC of the validation process; and all data validation is documented using standardized and controlled validation worksheets and spreadsheets. These worksheets are completed for each SDG, documenting all deficiencies, outliers and subsequent qualifiers.

After qualifiers are entered into the EcoChem database, a second party verifies 100% of the qualifier entry. Interpretive qualifiers are then applied to the field samples and qualified data is exported to the project database (Integral).

SUMMARY OF DATA VALIDATION

One sediment sample was collected and submitted for analysis to Columbia Analytical Services, Kelso, Washington (all tests except dioxin/furan and PCB congeners); Columbia Analytical Services, Houston (dioxin/furans); and Vista Analytical Laboratory, El Dorado Hills, California (PCB congeners). To monitor the field collection and sample transport process, a trip blank was included with the sample containers for volatile organic compounds (VOC) and gasoline range organics (GRO).

The data were generally acceptable. A total of four data points (1.0% of all sediment results) were of unacceptable quality and were rejected. A total of seven data points (1.8% of all sediment results) were estimated because control limits were exceeded in one or more laboratory QC samples or procedures. Qualified data points may have a larger associated bias or may be less precise than unqualified data, but are usable for the intended purpose.

The laboratory data were evaluated in terms of completeness, holding times, instrument performance, bias, and precision. The results of the QC procedures used during the analyses are discussed below.

Completeness of Data Set

Completeness is defined as the total number of usable results (results that were not rejected during data validation) divided by the total results reported by the laboratory. Four data points (three VOC and one SVOC reporting limits) were rejected. The results reported by the laboratory were 99% complete for the sediment analyses.

The table below summarizes the sediment results that were rejected during data validation and the associated QC item. Note that most data points were rejected for more than one QC violation.

Number of Rejected Results	Reason for Rejection
3	Initial Calibration
3	Continuing Calibration
1	LCS/LCSD %Recovery

Holding Times and Sample Preservation

The initial sample preservation requirement (cooler temperature of 4°C ±2°) was not met for all samples. The majority of the sample coolers were received at the laboratory with temperatures less than the advisory lower control limit of 2°C, with a low of –0.6ºC. These temperature outliers did not impact data quality and no action was taken.

The cooler was received at Vista Analytical Laboratory with a temperature of 10.9°C. A reserve aliquot of the sample was shipped to the laboratory and analyzed within the holding time limit. No action was required.

Instrument Performance

Initial and continuing calibrations were completed for all target analytes and met the criteria for frequency of analysis. The initial calibrations met the linearity (percent relative standard deviation or correlation coefficient) control limits.

For the VOC fraction, the relative response factor (RRF) values were less than the 0.05 minimum acceptance limit for several compounds (acetone, 2-butanone, acrolein, and vinyl acetate) in the initial and continuing calibration analyses. Due to the potential significant low bias, the validation guidelines require that the associated positive results are estimated (J) and the reporting limits are rejected (R). Acetone was detected in Sample LW3-GWC1, but was qualified as not detected based on trip blank contamination. As the qualifier is essentially an elevation of the reporting limit, the acetone non-detect was estimated (UJ) rather than rejected based on the RRF outlier. The reporting limits for 2-butanone, acrolein, and vinyl acetate were rejected (R) in the sediment sample. This constitutes the majority of rejected data points for the sediment sample.

One continuing calibration percent difference (%D) value was outside the acceptance limit. However, the compound (acrolein) was also associated with a low RRF value. As the acrolein result in the sample was rejected based on the RRF value outlier, no further action was necessary.

All other calibrations were acceptable for all other analytical fractions.

Method Blank Analyses

To assess the impact of each blank contaminant on the reported sample results, an action level is established at five times (5x) the concentration detected in the blank for most compounds and ten times (10x) for common laboratory contaminates. If a contaminant is detected in an associated field sample and the concentration is less than the action level, the result is qualified as not detected (U). If the result is also less than the reporting limit, then the result is elevated to the reporting limit. No action is taken if the sample result is greater than the action level, or for non-detected results.

Various target analytes were detected in the method blanks. A total of three results (0.8% of all sediment results) were qualified as not detected (U) based on method blank contamination. The qualifiers were issued to methylene chloride, methyl iodide, and GRO.

Accuracy

Surrogate Compound Recovery

Surrogate compounds were added to all samples (when appropriate for the analytical fraction). The surrogate recoveries reported by the laboratory met the criteria for acceptable performance for the sediment sample.

Labeled Compound Recovery – Dioxin/Furan and PCB Congeners only

Labeled compounds were added to all field and QC samples. The recovery values reported by the laboratory met the criteria for acceptable performance.

Matrix Spike Recovery

Matrix and duplicate matrix spike (MS/MSD) analyses were not performed for the dioxin/furan and PCB congener analyses. Accuracy was assessed using the labeled compound and ongoing precision and recovery (OPR) analyses.

For other compounds, MS/MSD analyses met the criteria for frequency of analysis. Several of the recovery values reported by the laboratory for MS/MSD analyses did not meet the criteria for acceptable performance, with most outliers indicating a potential low bias. However, for the sediment sample only the metals data were affected by MS/MSD recovery outliers. Two sediment metals results (0.5% of all sediment results) were estimated (J) during the quality assurance review because the control limits for MS/MSD recovery were not met. The antimony and silver results were estimated with a potential low bias.

Laboratory Control Sample Recovery

Laboratory control sample/laboratory control sample duplicate (LCS/LCSD) analyses (or OPR analyses for the dioxin/furan and PCB congener analyses) were performed at the proper frequency. The benzoic acid recovery was less than the lower control limit and less than 10%. Benzoic acid was not detected in the associated sample; the reporting limit was rejected (R). All other LCS (or OPR) recoveries were acceptable.

Contract Required Detection Limit Standard Analyses – Metals Only

CRDL standards were analyzed at the beginning of each analytical sequence. For recoveries greater than the 130% upper control limit, the associated positive results less than two times the CRDL are estimated (J) to indicate a potential high bias. For recovery values less than the 70% lower control limit, positive results less than twice the CRDL and non-detects are estimated (J/UJ) to indicate a potential low bias. The recovery for aluminum (66%) was less than the lower control limit of 70%. The field sample result was greater than twice the CRDL; therefore no qualification of data was necessary.

Interference Check Samples – Metals Only

ICP interference check samples were analyzed at the beginning of each analytical sequence. All ICP interference check sample results were within the acceptance criteria.

Serial Dilution Analyses – Metals Only

Serial dilution analyses were performed at the proper frequency. Serial dilution %D values greater than 10% for sample results greater than 50 times the MDL may indicate the presence of matrix interference, resulting in potential bias. For serial dilution outliers, all associated sample results were qualified. The nickel serial dilution result (21%) was greater than the 10% control limit. The nickel result in the sediment sample was estimated (J).

Precision

MS/MSD and LCS/LCSD (or OPR/OPRD) analyses, or (where appropriate) laboratory duplicate analyses, were evaluated for laboratory precision. The antimony relative percent difference (RPD) value for the laboratory duplicate analyses did not meet the criteria for acceptable performance. The antimony result was estimated (J) in the sediment sample.

Compound Identification and Quantitation

Fuels: Several different flags were used by the laboratory to provide information about the reported results. These flags indicated that the pattern in the sample did not match the calibration standard. During validation, the data were estimated (J) to indicate that the reported result may not accurately reflect the concentration of fuels present in the sample. A total of two data points (the diesel range and residual range organics) were estimated.

Dioxins/Furans: Flags were used by the laboratory to provide information about the reported results. A "K" flag indicates that a peak was detected at the correct retention time for the target analyte; however, the ion abundance ratio criteria were not met. The reported result is an EMPC (estimated maximum possible concentration) value, which is essentially an elevated detection limit. Data flagged "K" by the laboratory were qualified as not detected (U) to make this relationship clear to the data user. Two data points were qualified as not detected because the ion abundance ratio criteria were not met.

PCB Congeners: The laboratory noted chemical interferences for the PCB 195 result in the sample spectra. The affected result was flagged ("I") by the laboratory, and the result was estimated (UJ).

Method Detection Limits and Method Reporting Limits

See the individual validation reports (**Appendix B**).

Field Quality Control Samples

Field QC samples collected for the Willamette Cove sediment sampling event included two trip blanks. The results for the field QC samples are discussed in the following sections.

Trip Blanks

VOC: Positive results for acetone, chloromethane, and 2-butanone were reported in the trip blank, LW3-WC-TB. The acetone result was qualified as not detected (U) in Sample LW3-GWC1.

GRO: Gasoline range organics were detected in the trip blank, LW3-WC-TB. No qualifiers were required as the result in the associated sediment sample was already qualified as not detected based on method blank contamination.

EcoChem, INC.
Environmental Data Quality

APPENDIX A

DATA QUALIFIER DEFINITIONS, REASON CODES, AND CRITERIA TABLES

DATA VALIDATION QUALIFIER CODES
National Functional Guidelines

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

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

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

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

DATA QUALIFIER REASON CODES

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

Integral - Portland Harbor Site
Volatile Compounds by GC/MS (Based on Organic NFG 1999)

VALIDATION QC ELEMENT	ACCEPTANCE CRITERIA	ACTION	REASON CODE
Cooler/Storage Temperature and Preservation	Aqueous/Soil/Sediment <4°C Tissues <-10°C Water: HCl to pH < 2	J(+)/UJ(-) if greater than 6 deg. C (EcoChem PJ)	1
Hold Time	Waters: 14 days preserved 7 Days: unpreserved (for aromatics) Solids: 14 Days	J(+)/UJ(-) if hold times exceeded If exceeded by > 3X HT: J(+)/R(-) (EcoChem PJ)	1
Tuning	BFB Beginning of each 12 hour period Method acceptance criteria	R(+/-) all analytes in all samples associated with the tune	5A
Initial Calibration (Minimum 5 stds.)	RRF > 0.05	J(+)/R(-) if RRF < 0.05	5A
	%RSD < 30%	(EcoChem PJ, see TM-06) J(+) if %RSD > 30%	5A
Continuing Calibration (Prior to each 12 hr. shift)	RRF > 0.05	(EcoChem PJ, see TM-06) If MDL= reporting limit: J(+)/R(-) if RRF < 0.05 If reporting limit > MDL: note in worksheet if RRF <0.05	5B
	%D <25%	(EcoChem PJ, see TM-06) If > +/-90%: J+/R- If -90% to -26%: J+ (high bias) If 26% to 90%: J+/UJ- (low bias)	5B
Method Blank	One per matrix per batch No results > QL	U(+) if sample (+) result is less than QL and less than appropriate 5X or 10X rule (raise sample value to QL)	7
		U(+) if sample (+) result is greater than or equal to QL and less than appropriate 5X and 10X rule (at reported sample value)	7
	No TICs present	R(+) TICs using 10X rule	7
Storage Blank	One per SDG <QL	U(+) the specific analyte(s) results in all assoc.samples using the 5x or 10x rule	7
Trip Blank	Frequency as per project QAPP	Same as method blank for positive results remaining in trip blank after method blank qualifiers are assigned	18
Field Blanks	No results > QL	Apply 5X/10X rule; U(+) < action level	6
MS/MSD (recovery)	One per matrix per batch Use method acceptance criteria	Qualify parent only unless other QC indicates systematic problems: J(+) if both %R > UCL J(+)/UJ(-) if both %R < LCL J(+)/R(-) if both %R < 10% PJ if only one %R outlier	8
MS/MSD (RPD)	One per matrix per batch Use method acceptance criteria	J(+) if RPD > CL	9

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Integral - Portland Harbor Site
Volatile Compounds by GC/MS (Based on Organic NFG 1999)

VALIDATION QC ELEMENT	ACCEPTANCE CRITERIA	ACTION	REASON CODE
Lab Duplicate	Results >5X reporting limit (RL): RPD criteria: use QAPP limits, all matrices Results <5X RL: Solid: Absolute difference < 2X RL Aqueous: Absolute difference < 1X RL	J(+)/UJ(-) if outside limits	9
LCS *low conc. H2O VOA*	One per lab batch Within method control limits	J(+) assoc. cmpd if > UCL J(+)/R(-) assoc. cmpd if < LCL J(+)/R(-) all cmpds if half are < LCL	10
LCS *regular VOA (H2O & solid)*	One per lab batch Lab or method control limits	J(+) if %R > UCL J(+)/UJ(-) if %R <LCL J(+)/R(-) if %R < 10% (EcoChem PJ)	10
LCS/LCSD *(if required)*	One set per matrix and batch of 20 samples RPD < 35%	J(+) assoc. cmpd. in all samples	9
Surrogates	Added to all samples Within method control limits	J(+) if %R >UCL J(+)/UJ(-) if %R <LCL but >10% (see PJ1) J(+)/R(-) if <10%	13
Internal Standards	Added to all samples Acceptable Range: IS area 50% to 200% of CCAL area RT within 30 seconds of CC RT	J(+) if > 200% J(+)/UJ(-) if < 50% J(+)/R(-) if < 25% R T>30 seconds, narrate and Notify PM	19
Field Duplicates	Results >5X reporting limit (RL): RPD < 50% (all matrices, QAPP specified) Results <5X RL: Solid: Absolute difference < 2X RL Aqueous: Absolute difference < 1X RL	Narrate; do not qualify	na
TICs	Major ions (>10%) in reference must be present in sample; intensities agree within 20%; check identification	R(+) common laboratory contaminants R(+) target compouds from other fractions See Technical Director for ID issues	14
Quantitation/ Identification	RRT within 0.06 of standard RRT Ion relative intensity within 20% of standard All ions in std. at > 10% intensity must be present in sample	See Technical Director if outliers	14 21 (false +)

PJ1 No action if there are 4+ surrogates and only 1 outlier.

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Semivolatile Compounds by GC/MS (Based on Organic NFG 1999)

VALIDATION QC ELEMENT	ACCEPTANCE CRITERIA	ACTION	REASON CODE
Cooler/Storage Temperature	Aqueous/Soil/Sediment <4°C Tissues <-10°C	J(+)/UJ(-) if greater than 6 deg. C (EcoChem PJ)	1
Holding Time	Water: 7 days from collection Soil: 14 days from collection Analysis: 40 days from extraction	Water: J(+)/UJ(-) if ext. > 7 and < 21 days J(+)/R(-) if ext > 21 days (EcoChem PJ) Solids/Wastes: J(+)/UJ(-) if ext. > 14 and < 42 days J(+)/R(-) if ext. > 42 days (EcoChem PJ) J(+)/UJ(-) if analysis >40 days	1
Tuning	DFTPP Beginning of each 12 hour period Method acceptance criteria	R(+/-) all analytes in all samples associated with the tune	5A
Initial Calibration (Minimum 5 stds.)	RRF > 0.05	(EcoChem PJ, see TM-06) If MDL= reporting limit: J(+)/R(-) if RRF < 0.05 If reporting limit > MDL: note in worksheet if RRF <0.05	5A
	%RSD < 30%	(EcoChem PJ, see TM-06) J(+) if %RSD > 30%	5A
Continuing Calibration (Prior to each 12 hr. shift)	RRF > 0.05	(EcoChem PJ, see TM-06) If MDL= reporting limit: J(+)/R(-) if RRF < 0.05 If reporting limit > MDL: note in worksheet if RRF <0.05	5B
	%D <25%	(EcoChem PJ, see TM-06) If > +/-90%: J+/R- If -90% to -26%: J+ (high bias) If 26% to 90%: J+/UJ- (low bias)	5B
Method Blank	One per matrix per batch No results > QL	U(+) if sample (+) result is less than QL and less than appropriate 5X or 10X rule (raise sample value to QL)	7
		U(+) if sample (+) result is greater than or equal to QL and less than appropriate 5X and 10X rule (at reported sample value)	7
	No TICs present	R(+) TICs using 10X rule	7
Field Blanks	No results > QL	Apply 5X/10X rule; U(+) < action level	6

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Semivolatile Compounds by GC/MS (Based on Organic NFG 1999)

VALIDATION QC ELEMENT	ACCEPTANCE CRITERIA	ACTION	REASON CODE
MS/MSD (recovery)	One per matrix per batch Use method acceptance criteria	Qualify parent only unless other QC indicates systematic problems: J(+) if both %R > UCL J(+)/UJ(-) if both %R < LCL J(+)/R(-) if both %R < 10% PJ if only one %R outlier	8
MS/MSD (RPD)	One per matrix per batch Use method acceptance criteria	J(+) if RPD > CL	9
Lab Duplicate	Results >5X reporting limit (RL): RPD criteria: use QAPP limits, all matrices Results <5X RL: Solid: Absolute difference < 2X RL Aqueous: Absolute difference < 1X RL	J(+)/UJ(-) if outside limits	9
LCS low conc. H2O SVOA	One per lab batch Within method control limits	J(+) assoc. cmpd if > UCL J(+)/R(-) assoc. cmpd if < LCL J(+)/R(-) all cmpds if half are < LCL	10
LCS regular SVOA (H2O & solid)	One per lab batch Lab or method control limits	J(+) if %R > UCL J(+)/UJ(-) if %R <LCL J(+)/R(-) if %R < 10% (EcoChem PJ)	10
LCS/LCSD *(if required)*	One set per matrix and batch of 20 samples RPD < 35%	J(+) assoc. cmpd. in all samples	9
Surrogates	Minimum of 3 acid and 3 base/neutral compounds Use method acceptance criteria	Do not qualify if only 1 acid and/or 1 B/N surrogate is out unless <10% J(+) if %R > UCL J(+)/UJ(-) if %R < LCL J(+)/R(-) if %R < 10%	13
Internal Standards	Added to all samples Acceptable Range: IS area 50% to 200% of CCAL area RT within 30 seconds of CC RT	J(+) if > 200% J(+)/UJ(-) if < 50% J(+)/R(-) if < 25% R T>30 seconds, narrate and Notify PM	19
Field Duplicates	Results >5X reporting limit (RL): RPD < 50% (all matrices, QAPP specified) Results <5X RL: Solid: Absolute difference < 2X RL Aqueous: Absolute difference < 1X RL	Narrate; do not qualify	na
TICs	Major ions (>10%) in reference must be present in sample; intensities agree within 20%; check identification	R(+) common laboratory contaminants R(+) target compouds from other fractions See Technical Director for ID issues	4
Quantitation/ Identification	RRT within 0.06 of standard RRT Ion relative intensity within 20% of standard All ions in std. at > 10% intensity must be present in sample	See Technical Director if outliers	14 21 (false +)

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Butyltins by GC/FPD

VALIDATION QC ELEMENT	ACCEPTANCE CRITERIA	ACTION	REASON CODE
Cooler/Storage Temperature	Aqueous/Soil/Sediment <4°C Tissues <-10°C	J(+)/UJ(-) if greater than 6 deg. C (EcoChem PJ)	1
Holding Time	Water: 7 days from collection Soil: 14 days from collection Analysis: 40 days from extraction	J(+)/UJ(-) if ext/analyzed > HT J(+)/R(-) if ext/analyzed > 3X HT (EcoChem PJ)	1
Initial Calibration	%RSD<30% or correlation co-efficient >0.99	J(high bias), J/UJ(low bias)	5A
Continuing Calibration	%D < 25%	J(high bias), J/UJ(low bias)	5B
Method Blank	One per matrix per batch	U(+) if sample result is < QL and < 5X rule (raise sample value to QL)	7
		U(+) if sample result is > or equal to QL and < 5X rule (at reported sample value)	7
Instrument Blanks	Analyzed at the beginning of every 12 hour sequence No analyte > MRL	Same as Method Blank	7
Field Blanks	No results > QL	Apply 5X rule; U(+) < action level	6
MS/MSD (recovery)	One set per matrix per batch Method Acceptance Criteria	Qualify parent only unless other QC indicates systematic problems: J(+) if both %R > UCL J(+)/UJ(-) if both %R < LCL J(+)/R(-) if both %R < 10% PJ if only one %R outlier	8
MS/MSD (RPD)	One set per matrix per batch Method Acceptance Criteria	J(+) if RPD > CL	9
Lab Duplicate	Results >5X reporting limit (RL): RPD criteria: use QAPP limits, all matrices Results <5X RL: Solid: Absolute difference < 2X RL Aqueous: Absolute difference < 1X RL	J(+)/UJ(-) if outside limits	9
LCS	One per SDG Method Acceptance Criteria	J(+) if %R > UCL J(+)/UJ(-) if %R < LCL J(+)/R(-) using PJ if %R <<LCL (< 10%)	10

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Integral - Portland Harbor Site
Butyltins by GC/FPD

VALIDATION QC ELEMENT	ACCEPTANCE CRITERIA	ACTION	REASON CODE
LCS/LCSD *(if required)*	One set per matrix and batch of 20 samples RPD < 35%	J(+) assoc. cmpd. in all samples	9
Surrogates	tri-n-propyltin added to every sample %R = Laboratory control limits	J(+)/UJ(-) if both %R = 10 - 60% J(+) if both >150% J(+)/R(-) if any %R <10%	13
Quantitation/ Identification	Analyte within RTW on both columns Quantitated using ICAL CF Higher value from either column reported RPD between columns (40%)	J(+) if RPD = 40 - 60% NJ(+) if RPD >60% (EcoChem PJ)	3
Two analyses for one sample	Report only one result per analyte	"DNR" results that should not be used to avoid reporting two results for one sample	11
Field Duplicates	Results >5X reporting limit (RL): RPD < 50% (all matrices, QAPP specified) Results <5X RL: Solid: Absolute difference < 2X RL Aqueous: Absolute difference < 1X RL	Narrate; do not qualify	na

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Integral - Portland Harbor Site
Compounds Analyzed By HRMS (Methods 1613B or SW846 - 8290)
Polycyclic Aromatic Hydrocarbons (PAH), PCB Congeners and Dioxins/Furans

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

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Integral - Portland Harbor Site
Compounds Analyzed By HRMS (Methods 1613B or SW846 - 8290)
Polycyclic Aromatic Hydrocarbons (PAH), PCB Congeners and Dioxins/Furans

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

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Integral - Portland Harbor Site
Compounds Analyzed By HRMS (Methods 1613B or SW846 - 8290)
Polycyclic Aromatic Hydrocarbons (PAH), PCB Congeners and Dioxins/Furans

VALIDATION QC ELEMENT	ACCEPTANCE CRITERIA	ACTION	REASON CODE
MS/MSD (RPD)	May not analyze MS/MSD RPD < 20%	J(+) if RPD > CL	9
Lab Duplicate	RPD <25% if present.	J(+) if outside limts	9
Labeled Compounds / Internal Standards	*Method 8290:* %R = 40% - 135% in all samples	J(+)/UJ(-) if %R = 10% to LCL J(+) if %R > UCL J(+)/R(-) if %R < 10%	13
	Method 1613B: %R must meet limits specified inTable 7		
Quantitation/ Identification	Ions for analyte, IS, and rec. std. must max w/in 2 sec. S/N >2.5 IA ratios meet limits in Table 9 of 1613B or Table 8 of 8290 RRTs w/in limits in table 2 of 1613B	If RT criteria not met, use PJ (see TM-05) If S/N criteria not met, J(+). if unlabelled ion abundance not met, change to EMPC If labelled ion abundance not met, J(+).	21
EMPC (estimated maximum possible concentration)	If quantitation identification criteria are not met, laboratory should report an EMPC value.	If laboratory correctly reported an EMPC value, qualify with U to indicate that the value is a detection limit.	14
Interferences	PCDF interferences from PCDPE	If both detected, change PCDF result to EMPC	14
Second Column Confirmation	All 2378-TCDF hits must be confirmed on a DB-225 column (or equiv). All QC specs in this table must be met for the confirmation analysis.	Report lower of the two values. If not performed use PJ (see TM-05).	3
Field Duplicates	QAPP specified RPD < 50% (all matrices)	Narrate; do not qualify	na
Two analyses for one sample	Report only one result per analyte	"DNR" results that should not be used	11

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Integral - Portland Harbor Site
Metals by ICP (Based on Inorganic NFG 1994 & 2002)

VALIDATION QC ELEMENT	ACCEPTANCE CRITERIA	ACTION	REASON CODE
Cooler/Storage Temperature and Preservation	Aqueous/Soil/Sediment <4°C Tissues <-10°C Water Only: Nitric Acid to pH < 2 For Dissolved metals, 0.45 um filter preserve after filtration	EcoChem PJ J(+)/UJ(-) if preservation requirements are not met	1
Holding Time	180 days	EcoChem PJ J(+)/UJ(-)	1
Initial Calibration	Blank + minimum 1 standard once every 24 hours if more than 1 standard r>0.995	EcoChem PJ J(+)/UJ(-) if r<0.995 (multi point cal)	5A
Initial Calibration Verification (ICV)	Independent source analyzed immed. after cal. %R within +/- 10% of true value	EcoChem PJ J(+)/UJ(-) if %R 75%-89% J(+) if %R = 111-125% R(+) if %R > 125% R(+/-) if %R < 75%	5A
Continuing Cal Verification (CCV)	Every ten samples, immed. Before samples+ and end of run %R within +/- 10% of true value	EcoChem PJ J(+)/UJ(-) if %R = 75%-89% J(+) if %R 111-125% R(+) if %R > 125% R(+/-) if %R < 75%	5B
CRI Standard (to check RL)	2X RL (or 2X IDL if greater) analyzed beginning and end of run (at least 8 hrs) Not required for Al, Ba, Ca, Fe, Mg, Na, K %R = 70%-130% (50%-150% Sb, Pb, Tl)	EcoChem PJ R(-),(+)<2XRL if %R <50% (< 30% Sb, Pb, Tl) J(+)<2XRL, UJ(-) if %R 50-69% (30%-49% Sb, Pb,Tl) J(+) <2X RL if %R 130%-180% (150%-200%Sb, Pb, Tl) R(+)<2X RL if %R>180%(200% Sb, Pb, Tl)	14

Initial and Continuing Cal Blanks (ICB/CCB)	after each ICV and CCV
	every ten samples and end of run
	blank < +/- IDL
		Action level is 5x abs. value of blk conc.
		For (+) blk value, U(+) values < action level
		For (-) blk value, J(+)/UJ(-) values < action level
			7

Prep Blank	One per matrix per batch
	(not to exceed 20 samples)
		Action level is 5x abs. value of blk conc.
		For (+) blk value, U(+) values < action level
		For (-) blk value, J(+)/UJ(-) values < action level
			7

Interference Check Samples ICSA/ICSAB	Beginning and end of each run or every eight hours ICSAB +/- 20% ICSA < +/- IDL	For samp with Al,Ca,Fe,Mg > ICS levels R(+/-) if %R<50% J(+) if %R >120% J(+)/UJ(-) if %R= 50% to 79% EcoChem PJ ICSA	17
Post Digestion Spike	If ICP Matrix Spike is outside 75-125%, spike at twice the sample conc.	No Quals assigned based on this element	

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Metals by ICP (Based on Inorganic NFG 1994 & 2002)

VALIDATION QC ELEMENT	ACCEPTANCE CRITERIA	ACTION	REASON CODE
Matrix Spike	One per matrix per batch 75-125% for samples less than 4 x spike level	J(+) if %R>125% J(+)/UJ(-) if %R <75% J(+)/R(-) if %R<30%	8
Laboratory Duplicate	One per matrix per batch RPD <20% for samples > 5x RL Diff <RL for samples >RL and <5 x RL (may use RPD < 35%, Diff < 2X RL for solids)	J(+)/UJ(-) if RPD > 20% or diff > RL	9
Serial Dilution	5x dilution one per matrix %D <10% for values > 50x IDL	J(+)/UJ(-) if %D >10%	16
Laboratory Control Sample	Waters: One per matrix per batch %R (80-120%)	R(+/-) if %R < 50% J(+)/UJ(-) if %R = 50-79% J(+) if %R >120%	10
	Soils: One per matrix per batch Result within manufacturer's certified acceptance range	J(+)/UJ(-) if < LCL, J(+) if > UCL	10
Field Blanks	No results > QL	Apply 5X rule; U(+) < action level	6
Field Duplicates	QAPP specified RPD < 50% (all matrices)	Narrate; do not qualify	na
Instrument Detection Limit	determined every 3 months	EcoChem PJ	14
Linear Range	determined yearly samples diluted to fall within range	J(+) values over range	20

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Metals by ICP-MS (Based on Inorganic NFG 1994 & 2002)

VALIDATION QC ELEMENT	ACCEPTANCE CRITERIA	ACTION	REASON CODE
Cooler/Storage Temperature and Preservation	Aqueous/Soil/Sediment <4°C Tissues <-10°C Water Only: Nitric Acid to pH < 2 For Dissolved metals, 0.45 um filter preserve after filtration	EcoChem PJ J(+)/UJ(-) if preservation requirements are not met	1
Holding Time	180 days	EcoChem PJ J(+)/UJ(-) if holding time exceeded J(+)/R(-) if HT exceeded by 3x	1
Tune	Prior to ICAL Analyzed 5 times wih Std Dev. ≤ 5% mass calibration <0.1 amu from True Value Resolution < 0.9 AMU @ 10% peak height or <0.75 amu @ 5% peak height	EcoChem PJ No Tune - R all results criteria not met - J(+)/UJ(-)	5A
Initial Calibration	Mininum Blank+1 Standard every 24 hours	EcoChem PJ J(+)/UJ(-) >24 hours J(+)/UJ(-) if r<0.995 (for multi point cal)	5A
Initial Calibration Verification (ICV)	Independent source; analyzed post ICAL and prior to samples +/-10% of the True value	EcoChem PJ J(+)/UJ(-) if %R 75%-89% J(+) if %R = 111-125% R(+) if %R > 125% R(+/-) if %R < 75%	5A
Continuing Cal Verification (CCV)	Every 10 samples,post ICV/ICB and end of run +/- 10% of True value	EcoChem PJ J(+)/UJ(-) if %R 75%-89% J(+) if %R = 111-125% R(+) if %R > 125% R(+/-) if %R < 75%	5B
RL Standard (CRI)	2X RL (or 2X IDL if greater) analyzed beginning and end of run (at least 8 hrs) Not required for Al, Ba, Ca, Fe, Mg, Na, K %R = 70%-130% (50%-150% Co,Mn, Zn)	EcoChem PJ R(-),(+)<2XRL if %R <50% (< 30% Co,Mn, Zn) J(+)<2XRL, UJ(-) if %R 50-69% (30%-49% Co,Mn, Zn) J(+) <2X RL if %R 130%-180% (150%-200% Co,Mn, Zn) R(+)<2X RL if %R>180%(200% Co,Mn, Zn)	14

Initial and Continuing Cal Blanks (ICB/CCB)	after each ICV and CCV every ten samples and end of run blank < +/- IDL	Action level is 5x abs. value of blk conc.
		For (+) blk value, U(+) values < AL
		For (-) blk value, J(+)/UJ(-) values < AL
			7

Prep Blank	One per matrix per batch (not to exceed 20 samples)	Action level is 5x abs. value of blk conc.
		For (+) blk value, U(+) values < AL
		For (-) blk value, J(+)/UJ(-) values < AL
			7

Field Blanks	No results > QL	Apply 5X rule; U(+) < action level	6

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Metals by ICP-MS (Based on Inorganic NFG 1994 & 2002)

VALIDATION QC ELEMENT	ACCEPTANCE CRITERIA	ACTION	REASON CODE
Interference Check Samples ICSA/ICSAB	ICSAB +/- 20% of true value ICSA < +/- IDL	Where Al,Ca,Fe,Mg = ICS levels J(+) if %R >120% J(+)/UJ(-) if %R = 50% to 79% R(+/-) if %R<50% EcoChem PJ for ICSA > +/- IDL	17
Post Digestion Spike	If ICP Matrix Spike is outside 75-125% Spike parent sample at 2X the sample conc.	EcoChem PJ - usually no action	14
Matrix Spike	One per matrix, batch and SDG 75-125% for samples where results do not exceed 4x spike level	J (+) if %R > 125% J(+)/UJ(-) if %R < 75% J(+)/R(-) if %R < 30% UJ(-) if %R = 30-74%	8
Laboratory Duplicate	One per matrix per batch RPD <20% for samples > 5x RL Diff<RL for samples >RL and <5 x RL (may use RPD < 35%, Diff < 2X RL for solids)	J(+)/UJ(-) associated samples if RPD > 20% or diff > RL	9
Laboratory Control Sample	Waters: One per matrix per batch %R (80-120%)	R(+/-) if %R < 50% J(+)/UJ(-) if %R = 50-79% J(+) if %R >120%	10
	Soils: One per matrix per batch result within manufaturer's certified acceptance range	J(+)/UJ(-) if < LCL, J(+) if > UCL	10
Serial Dilution	5x dilution one per matrix (or SDG) %D <10% of the undiluted value for values > 50x IDL	J(+)/UJ(-) if %D >10%	16
Field Duplicates	QAPP specified RPD < 50% (all matrices)	Narrate; do not qualify	na
Internal Standards	Every Sample 60%-125% of ICAL IS	J (+)/UJ (-) analytes associated with IS outlier	19
Instrument Detection Limit	Determined every 3 months	EcoChem PJ	14
Linear Range	determined yearly samples diluted to fall within range	J(+) values over range	20

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Mercury by CVAA (Based on Inorganic NFG 1994 & 2002)

VALIDATION QC ELEMENT	ACCEPTANCE CRITERIA	ACTION	REASON CODE
Cooler/Storage Temperature and Preservation	Aqueous/Soil/Sediment <4°C Tissues <-10°C Water Only: Nitric Acid to pH < 2 For Dissolved metals, 0.45 um filter preserve after filtration	EcoChem PJ J(+)/UJ(-) if preservation requirements are not met	1
Holding Time	28 days from date sampled	EcoChem PJ J(+)/UJ(-) if holding time exceeded	1
Initial Calibration	Blank + 4 standards r > 0.995 once every 24 hours	EcoChem PJ J(+)/UJ(-) if r<0.995	5A
Initial Calibration Verification (ICV)	Independent source analyzed immediately after cal. %R within +/- 20% of true value	EcoChem PJ R(+/-) if %R < 65% R(+) if %R > 135% J(+)/UJ(-) if %R = 65%-79% J(+) if %R = 121-135%	5A
Continuing Cal Verification (CCV)	Every ten samples, immed. following ICV/ICB and end of run %R within +/- 20% of true value	R(+/-) if %R < 65% R(+) if %R > 135% J(+)/UJ(-) if %R = 65%-79% J(+) if %R = 121-135%	5B
RL Standard (CRA)	Beginning of run after ICV/ICB CCV/CCB Conc = RL 70% - 130%	EcoChem PJ R(-),(+)<2XRL if %R <50% J(+)<2XRL, UJ(-) if %R 50-69% J(+) <2X RL if %R 130%-180% R(+)<2X RL if %R>180%	14

Initial and Continuing Cal Blanks (ICB/CCB)	After each ICV and CCV every ten samples and end of run
	blank < +/- IDL
		Action level is 5x abs. value of blk conc.
		For (+) blk value, U(+) sample values < AL
		For (-) blk value, J(+)/UJ(-) sample values < AL
			7

Prep Blank	One per matrix per batch
	(not to exceed 20 samples)
		Action level is 5x abs. value of blk conc.
		For (+) blk value, U(+) sample values < AL
		For (-) blk value, J(+)/UJ(-) sample values < AL
			7

Matrix Spike	One per matrix per batch 5% frequency 75-125% for samples less than 4x spike level	J(+) if %R > 125% J(+)/UJ(-) if %R < 75% J(+)/R(-) if %R < 30%	8
Laboratory Duplicate	One per matrix per batch RPD <20% for samples > 5x RL (+/-)RL for samples >RL and <5 x RL (may use RPD < 35%, Diff < 2X RL for solids)	J(+)/UJ(-) if RPD > 20% or diff > RL	9

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Mercury by CVAA (Based on Inorganic NFG 1994 & 2002)

VALIDATION QC ELEMENT	ACCEPTANCE CRITERIA	ACTION	REASON CODE
Laboratory Control Sample	Waters: One per matrix per batch %R (80-120%)	R(+/-) if %R < 50%; J(+) if %R >120% J(+)/UJ(-) if %R = 50-79%	10
	Soils: One per matrix per batch Result within manufacturer's certified acceptance range	J(+)/UJ(-) if < LCL, J(+) if > UCL	10
Field Duplicates	QAPP specified RPD < 50% (all matrices)	Narrate; do not qualify	na

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Metals by AA-Hydride (Based on Inorganic NFG 1994 & 2002)

VALIDATION QC ELEMENT	ACCEPTANCE CRITERIA	ACTION	REASON CODE
Cooler/Storage Temperature and Preservation	Aqueous/Soil/Sediment <4°C Tissues <-10°C Water Only: Nitric Acid to pH < 2 For Dissolved metals, 0.45 um filter preserve after filtration	J(+)/UJ(-) if preservation requirements are not met	1
Holding Time	180 Days from collection	J(+)/UJ(-) >180 Days	1
Initial Calibration	Blank + 3 standards (1 at RL) every 24 hours; r>0.995	R(+/-) if <5 standards or >24 hours J(+)/UJ(-) if r<0.995	5A
Initial Calibration Verification (ICV)	Independent source > CRA std. conc. Post ICAL & prior to samples +/-10% of the True value	J(+) if %R < 75% J(+)/UJ(-) if %R = 75%-89% J(+) if %R = 111-125% R(-) if %R<75% R(+) if %R>125%	5A
Continuing Cal Verification (CCV)	Every 10 samples,post ICV/ICB and end of run +/- 10% of True value	J(+) if %R < 75% J(+)/UJ(-) if %R 75%-89% J(+) if %R 111-125% R(-) if %R<75% R(+) if %R>125%	5B
RL Standard (CRA)	@ RL; analyzed beginning of run %R = 70%-130%	EcoChem PJ %R <50% - R(-),(+) <2X RL %R 50-69% - J(+) <2X RL, UJ(-) %R 130%-180% - J(+) <2X RL %R>180% - R(+)< 2X RL	14
Initial and Continuing Cal Blanks (ICB/CCB)	After each ICV and CCV - every ten samples (or 2 hours) and end of run blank < IDL and > -RL	Action level 5x(+)/5x(-) For positive blank hit, U(+) values < AL For negative blank hit, J(+)/UJ(-) < AL	7
Prep Blank	One per matrix per batch (Max 20 samples)	Action level 5x(+)/5x(-) For positive blank hit, U(+) values < AL For negative blank hit, J(+)/UJ(-) < AL	7
Field Blanks	No results > QL	Apply 5X rule; U(+) < action level	6
Matrix Spike	One per matrix, batch and SDG 75-125% for samples where results do not exceed 4x spike level	J (+) if %R > 125% J(+)/UJ(-), %R < 75% J(+)/R(-), %R < 30% UJ(-), %R 30-74%	8
Laboratory Duplicate	One per matrix per batch RPD <20% for samples > 5x RL (+/-)RL for samples >RL and <5 x RL (may use RPD < 35%, Diff < 2X RL for solids)	J(+)/UJ(-) associated samples if RPD > 20% or diff > RL	9

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Integral - Portland Harbor Site
Metals by AA-Hydride (Based on Inorganic NFG 1994 & 2002)

VALIDATION QC ELEMENT	ACCEPTANCE CRITERIA	ACTION	REASON CODE
Laboratory Control Sample	Waters: One per matrix per batch %R (80-120%)	R(+/-) if %R < 50% J(+)/UJ(-) if %R = 50-79% J(+) if %R >120%	10
	Soils: One per matrix per batch Result within manufacturer's certified acceptance range	J(+)/UJ(-) if < LCL, J(+) if > UCL	10
Field Duplicates	QAPP specified RPD < 50% (all matrices)	Narrate; do not qualify	na
Linear Range	Sample results must be less than 110% of high standard	J(+) values over range	20

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Environmental Data Quality

APPENDIX B
DATA VALIDATION REPORTS

DATA VALIDATION REPORT
Portland Harbor RI/FS
Willamette Cove Sediments
Volatile Organic Compounds – Method SW8260B
Columbia Analytical Services

This report documents the review of analytical data from the analyses of a sediment sample and the associated laboratory and field quality control samples. Columbia Analytical Services, Inc., Kelso, Washington, analyzed the samples.

SDG	Number of Samples	Validation Level
K0708876	1 Sediment & 1 Trip Blank	Full

I. DATA PACKAGE COMPLETENESS

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

II. EDD TO HARDCOPY VERIFICATION

A complete (100%) verification of the electronic data deliverable (EDD) results was performed by comparison to the hardcopy laboratory data package. Laboratory QC results were also verified (10%). No errors were found.

III. TECHNICAL DATA VALIDATION

The QC requirements that were reviewed are summarized in the table below.

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

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

Holding Times and Sample Receipt

The sample coolers were received by the laboratory at temperatures less than the lower control limit of 2°C, at -0.3 and -0.6°C. These outliers did not impact data quality and no qualifiers were required.

Initial Calibration

All percent relative standard deviation (%RSD) values were within the ±30% control limit. All relative response factor (RRF) values were greater than the 0.05 minimum control limit with the following exceptions:

The RRF values for acetone, acrylonitrile, 2-chloroethyl vinyl ether, 2-butanone, acrolein, and 4-methyl-2-pentanone from the ICAL analyzed on 10/10/07 (Instrument MS04) were below the minimum control limit. Except for acetone, these analytes were not detected in any sample. The acetone result in Sample LW3-WC-TB was estimated (J-5A). Reporting limits for the other analytes were rejected (R-5A).

The RRF values for acetone, vinyl acetate, 2-butanone, and acrolein from the ICAL analyzed on 9/20/07 (Instrument MS05) were below the minimum control limit. Acetone was detected in Sample LW3-GWC1, but was qualified as not detected based on trip blank contamination. As the qualifier is essentially an elevation of the reporting limit, the acetone non-detect was estimated (UJ-5A) rather than rejected based on the RRF outlier. The other analytes were not detected in the associated sample and the reporting limits were rejected (R-5A).

Continuing Calibration

All percent difference (%D) values for CCALs were within the ±25% control limit, with the exceptions noted below. The RRF values were greater than the 0.05 minimum for all analytes, with the exceptions noted below. Positive results and reporting limits in samples associated with %D outliers were qualified as estimated (J/UJ-5B). The %D outliers are documented in the data validation worksheets.

The RRF values for acetone, acrylonitrile, vinyl acetate, 2-butanone, 2-hexanone, acrolein, and 4-methyl-2-pentanone were less than the 0.05 minimum from the Instrument MS04 CCAL analyzed on 10/11/07. The acetone result in Sample LW3-WC-TB was estimated (J-5B). The reporting limits for the other analytes were rejected (R-5B).

The RRF values for acetone, vinyl acetate, 2-butanone, and acrolein were less than the 0.05 minimum from the Instrument MS05 CCAL analyzed on 10/4/07. The %D value for acrolein was greater than the ±25% control limit in the same CCAL. Acetone was detected in Sample LW3-GWC1, but was qualified as not detected based on trip blank contamination. As the qualifier is essentially an elevation of the reporting limit, the acetone non-detect was estimated (UJ-5B) rather than rejected based on the RRF outlier. The reporting limits for the other analytes were rejected (R-5B) in the associated sample.

Blanks (Method)

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

Method blanks are used to evaluate all associated samples, including trip blanks and field blanks. Any remaining positive results in the trip blanks are used to evaluate all associated samples, including field blanks. Any remaining positive results in the field blanks are used to evaluate all associated samples.

Method blanks were analyzed at the appropriate frequency. Positive results for iodomethane and methylene chloride were qualified as not detected (U-7) in Sample LW3-GWC1.

Blanks (Field)

After method blanks are used to evaluate all associated samples, including trip blanks and field blanks, any remaining positive results in the trip blanks are used to evaluate all associated samples, including field blanks. Finally, any remaining positive results in the field blanks are used to evaluate all associated samples. Any results designated as not detected because of field blank contamination were qualified (U-18 for trip blank contamination; U-6 for field blank contamination).

Positive results for acetone, chloromethane, and 2-butanone were reported in the trip blank, LW3-WC-TB. The acetone result was qualified as not detected (U-18) in Sample LW3-GWC1.

Matrix Spike/Matrix Spike Duplicates

A batched matrix spike/matrix spike duplicate (MS/MSD) set associated with the trip blank (LW3-WC-TB) was submitted. One target analyte (2-chloroethyl vinyl ether) was not recovered in this batched MS/MSD set. No action was taken, as the parent sample was not part of this project.

Field Replicates

No field replicates were submitted. Precision was assessed using the laboratory control sample/laboratory control sample duplicate (LCS/LCSD) set.

Calculation Verification

Calculation verifications were performed on this SDG. No calculation errors were found.

IV. OVERALL ASSESSMENT

As was determined by this evaluation, the laboratory followed the specified analytical method. Accuracy was acceptable, as demonstrated by the surrogate, MS/MSD, and LCS/LCSD percent recovery values, with the exceptions noted above. Precision was also acceptable as demonstrated by the MS/MSD and LCS/LCSD relative percent difference values.

Data were estimated based on initial and continuing calibration RRF outliers. Data were also qualified as not detected based on contamination in the associated laboratory and field blanks.

Data were rejected because of initial and continuing calibration RRF outliers. Data that have been rejected are not useable for any purpose.

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

DATA VALIDATION REPORT
Portland Harbor RI/FS
Willamette Cove Sediments
Semivolatile Organic Compounds - Method SW8270C
Columbia Analytical Services

This report documents the review of analytical data from the analyses of one sediment sample and the associated laboratory and field quality control (QC) samples. The sample was analyzed by Columbia Analytical Services, Inc., Kelso, Washington.

SDG	Number of. Samples	Validation Level
K0708876	1 Sediment	Full

I. DATA PACKAGE COMPLETENESS

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

II. EDD TO HARDCOPY VERIFICATION

A complete (100%) verification of the electronic data deliverable (EDD) results was performed by comparison to the hardcopy laboratory data package. Laboratory QC results were also verified (10%). No errors were found.

III. TECHNICAL DATA VALIDATION

The QC requirements that were reviewed are summarized in the table below.

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

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

Holding Times and Sample Receipt

The sample coolers were received by the laboratory at temperatures less than the lower control limit of 2°C, at -0.3 and -0.6°C. These outliers did not impact data quality and no qualifiers were required.

Laboratory Blanks

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

Method blanks were analyzed at the appropriate frequency. Bis(2-ethylhexyl)phthalate was detected at a low level. This analyte was not detected in the associated sample. No data were qualified based on method blank contamination.

Surrogates

The percent recovery (%R) values for the surrogates were within the specified control limits with the exceptions noted below. If the outliers indicated a potential high bias, only the associated positive results were estimated (J-13). If the outliers indicated a potential low bias, positive results and reporting limits were estimated (J/UJ-13).

The %R value for 2,4,6-tribromophenol was greater than the upper control limit in the batch QC matrix spike sample. No qualifiers were applied as this was a QC sample.

Matrix Spike/Matrix Spike Duplicates

Matrix spike/matrix spike duplicate (MS/MSD) analyses were performed at the required frequency. All MS/MSD recovery values were within the specified control limits, with the exceptions noted below. If the %R outlier was due to the presence of high levels of the target analyte present in the parent sample, no action was taken. If the outliers indicated a potential high bias, only the associated positive results were qualified as estimated (J-8). If the outliers indicated a potential low bias, results and reporting limits were estimated (J/UJ-8). If the recovery value was less than 10%, the reporting limits were rejected (R-8). A summary of outliers is provided in the data validation worksheets.

All MS/MSD relative percent difference (RPD) values were within the specified control limits.

In the MS/MSD performed using a batched QC sample, the %R values for n-nitrosodimethylamine were less than the lower control limit, the %R values for aniline were less than 10%, and 3,3'-dichlorobenzidine was not recovered. The MS %R value for n-nitrosodiphenylamine was greater than the upper control limit. No qualifiers were applied since the parent sample was not from this SDG.

Laboratory Control Sample/Laboratory Control Sample Duplicate

The %R values for benzoic acid were less than 10% in the laboratory control sample and laboratory control sample duplicate (LCS/LCSD). The reporting limit for this analyte was rejected (R-10) in the associated sample.

Field Replicates

No field replicates were submitted. Precision was assessed using the LCS/LCSD set.

Reporting Limits

Sample LW3-GWC1 was analyzed at dilution (50x) due to the presence of non-target background components. The reporting limits were elevated accordingly.

Calculation Verification

Calculation verifications were performed on this SDG. No calculation errors were found.

IV. OVERALL ASSESSMENT

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

Data were rejected because of poor LCS/LCSD recovery. Data that have been rejected are not useable for any purpose.

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

DATA VALIDATION REPORT
Portland Harbor RI/FS
Willamette Cove Sediments
Polyaromatic Hydrocarbons by SW8270C-SIM
Columbia Analytical Services

This report documents the review of analytical data from the analyses of one sediment sample and the associated laboratory and field quality control (QC) samples. The sample was analyzed by Columbia Analytical Services, Inc., Kelso, Washington.

SDG	Number of Samples	Validation Level
K0708876	1 Sediment	Full

I. DATA PACKAGE COMPLETENESS

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

II. EDD TO HARDCOPY VERIFICATION

A complete (100%) verification of the electronic data deliverable (EDD) results was performed by comparison to the hardcopy laboratory data package. Laboratory QC results were also verified (10%). No errors were found.

III. TECHNICAL DATA VALIDATION

The QC requirements that were reviewed are summarized in the table below.

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

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

Holding Times and Sample Receipt

The sample coolers were received by the laboratory at temperatures less than the lower control limit of 2°C, at -0.3 and -0.6°C. These outliers did not impact data quality and no qualifiers were required.

Laboratory Blanks

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

Method blanks were analyzed at the appropriate frequency. Naphthalene was detected at a low level. Naphthalene was present in the associated sample at a concentration significantly greater than the action level. No data were qualified based on method blank contamination.

Matrix Spike/Matrix Spike Duplicates

Matrix spike/matrix spike duplicate (MS/MSD) analyses were performed using a batched QC sample. Precision and accuracy were acceptable.

Field Replicates

No field replicates were submitted. Precision was assessed using the laboratory control sample/laboratory control sample duplicate (LCS/LCSD) set.

Calculation Verification

Calculation verifications were performed on this SDG. No calculation errors were found.

IV. OVERALL ASSESSMENT

As was determined by this evaluation, the laboratory followed the specified analytical method. Accuracy was acceptable, as demonstrated by the surrogate, LCS/LCSD and MS/MSD percent recovery values, with the above exception. Precision was also acceptable as demonstrated by the LCS/LCSD and MS/MSD RPD values.

All data, as reported, are acceptable for use.

DATA VALIDATION REPORT
Portland Harbor RI/FS
Willamette Cove Sediments
Chlorophenols - Method SW8151(Modified)
Columbia Analytical Services

This report documents the review of analytical data from the analyses of sediment samples and the associated laboratory and field quality control (QC) samples. Samples were analyzed by Columbia Analytical Services, Inc., Kelso, Washington.

SDG	Number of Samples	Validation Level
K0708876	1 Sediment	Full

I. DATA PACKAGE COMPLETENESS

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

No data for 2,4,5-trichlorophenol was reported in the original data package or EDD file, although this analyte was included in the instrument calibrations and spike mixtures. The laboratory was informed on 01/11/2008, and revised the data to include this analyte. The revised data package was received on 12/25/2008.

II. EDD TO HARDCOPY VERIFICATION

A complete (100%) verification of the electronic data deliverable (EDD) results was performed by comparison to the hardcopy laboratory data package. Laboratory QC results were also verified (10%). Other than the missing analyte (discussed above), no errors were found.

III. TECHNICAL DATA VALIDATION

The QC requirements that were reviewed are listed below.

1	Holding Times and Sample Receipt
	Instrument Performance Check
	Initial Calibration (ICAL)
	Continuing Calibration (CCAL)
	Laboratory Blanks
	Surrogate Compounds
1	Matrix Spikes/Matrix Spike Duplicates (MS/MSD)
	Laboratory Control Samples (LCS)
1	Field Replicates
	Reporting Limits
	Compound Identification
1	Calculation Verification (Full validation only)

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

Holding Times and Sample Receipt

The sample coolers were received by the laboratory at temperatures less than the lower control limit of 2°C, at -0.3 and -0.6°C. These outliers did not impact data quality and no qualifiers were required.

Matrix Spike/Matrix Spike Duplicates

Matrix spike/matrix spike duplicate (MS/MSD) analyses were performed at the required frequency. All MS/MSD relative percent difference (RPD) values were within the specified control limits. All MS/MSD recovery values were within the specified control limits, with the exceptions noted below. If the percent recovery (%R) outlier was due to the presence of high levels of the target analyte present in the parent sample, no action was taken. If the outliers indicated a potential high bias, only the associated positive results were qualified as estimated (J-8). If the outliers indicated a potential low bias, results and reporting limits were estimated (J/UJ-8). The MS/MSD outliers are documented in the data validation worksheets.

In the MS/MSD performed using Sample LW3-GWC1, the MSD %R value for 2,4,6-trichlorophenol was less than the lower control limit. No qualifiers were applied for this single outlier.

Field Replicates

No field replicates were submitted. Precision was assessed using the MS/MSD set.

Calculation Verification

Calculation verifications were performed on this SDG. No calculation errors were found.

IV. OVERALL ASSESSMENT

As was determined by this evaluation, the laboratory followed the specified analytical method. Accuracy was acceptable, as demonstrated by the surrogate, laboratory control sample, and MS/MSD %R values. Precision was also acceptable as demonstrated by the RPD values from the MS/MSD.

All data, as reported, are acceptable for use.

DATA VALIDATION REPORT
Portland Harbor RI/FS
Willamette Cove Sediments
Pesticides - Method SW8081A
Columbia Analytical Services

This report documents the review of analytical data from the analyses of a sediment sample and the associated laboratory and field quality control (QC) samples. The sample was analyzed by Columbia Analytical Services, Inc., Kelso, Washington.

SDG	Number of Samples	Validation Level
K0708876	1 Sediment	Full

I. DATA PACKAGE COMPLETENESS

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

II. EDD TO HARDCOPY VERIFICATION

A complete (100%) verification of the electronic data deliverable (EDD) results was performed by comparison to the hardcopy laboratory data package. Laboratory QC results were also verified (10%).

III. TECHNICAL DATA VALIDATION

The QC requirements that were reviewed are summarized in the table below.

1	Holding Times and Sample Receipt	1	Matrix Spikes/Matrix Spike Duplicates (MS/MSD)
	DDT/Endrin Breakdown		Laboratory Control Samples (LCS)
	Initial Calibration (ICAL)	1	Field Replicates
	Continuing Calibration (CCAL)	1	Reporting Limits
	Blanks (Method and Field)		Compound Identification
	Surrogate Compounds	1	Calculation Verification (full validation only)

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

Holding Times and Sample Receipt

As stated in validation guidance documents, sample shipping coolers should be within the advisory temperature range of 2° to 6°C upon receipt at the laboratory. The laboratory received the sample coolers with temperatures below the advisory control limits, at -0.3º and -0.6ºC. These outliers did not impact data quality and no qualifiers were required.

Matrix Spike/Matrix Spike Duplicate

Matrix spike/matrix spike duplicate (MS/MSD) analyses were performed at an acceptable frequency. All percent recovery (%R) values were within the control limits, with the exception noted below. All relative percent difference (RPD) values were acceptable. When outliers were present, only the associated compounds in the parent sample were qualified.

For LW3-GWC1 MS/MSD, the %R value for toxaphene (at 191%) was greater than the upper control limit of 184% in the MSD. No qualifiers were required for toxaphene as the MS %R value was within control limits.

Field Replicates

No field replicates were submitted. Precision was assessed using the MS/MSD set.

Reporting Limits

Method reporting limits (MRL) for most target analytes slightly exceeded the QAPP target method reporting limits (MRL) of 0.2 µg/kg.

Calculation Verification

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

IV. OVERALL ASSESSMENT

As was determined by this evaluation, the laboratory performed an appropriate analytical method. Accuracy was acceptable, as demonstrated by the surrogate, MS/MSD, and laboratory control sample %R values, with the exceptions noted above. Precision was acceptable as demonstrated by the RPD values for the MS/MSD analyses.

No data were qualified for any reason

All data, as reported, are acceptable for use.

DATA VALIDATION REPORT
Portland Harbor RI/FS
Willamette Cove Sediments
PCB Aroclors - Method SW8082
Columbia Analytical Services

This report documents the review of analytical data from the analyses of one sediment sample and the associated laboratory and field quality control (QC) samples. The sample was analyzed by Columbia Analytical Services, Inc., Kelso, Washington.

SDG	Number of Samples	Validation Level
K0708876	1 Sediment	Full

I. DATA PACKAGE COMPLETENESS

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

II. EDD TO HARDCOPY VERIFICATION

A complete (100%) verification of the electronic data deliverable (EDD) results was performed by comparison to the hardcopy laboratory data package. Laboratory QC results were also verified (10%). No errors were found.

III. TECHNICAL DATA VALIDATION

The QC requirements that were reviewed are listed below.

1	Holding Times and Sample Receipt		Matrix Spikes/Matrix Spike Duplicates (MS/MSD)
	Instrument Performance Check		Laboratory Control Samples (LCS)
	Initial Calibration (ICAL)	1	Field Replicates
	Continuing Calibration (CCAL)		Reporting Limits
	Laboratory Blanks		Compound Identification
	Surrogate Compounds	1	Calculation Verification (Full validation only)

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

Holding Times and Sample Receipt

The sample coolers were received by the laboratory at temperatures less than the lower control limit of 2°C, at -0.3 and -0.6°C. These outliers did not impact data quality and no qualifiers were required.

Field Replicates

No field replicates were submitted. Precision was assessed using the matrix spike/matrix spike duplicate (MS/MSD) set.

Calculation Verification

Calculation verifications were performed on this SDG. No calculation errors were found.

IV. OVERALL ASSESSMENT

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

All data, as reported, are acceptable for use.

DATA VALIDATION REPORT
Portland Harbor RI/FS
Willamette Cove Sediments
Organotins – Krone Method
Columbia Analytical Services

This report documents the review of analytical data from the analyses of one sediment sample and the associated laboratory and field quality control (QC) samples. The sample was analyzed by Columbia Analytical Services, Inc., Kelso, Washington.

SDG	Number of Samples	Validation Level
K0708876	1 Sediment	Full

I. DATA PACKAGE COMPLETENESS

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

II. EDD TO HARDCOPY VERIFICATION

A complete (100%) verification of the electronic data deliverable (EDD) results was performed by comparison to the hardcopy laboratory data package. Laboratory QC results were also verified (10%). No errors were found.

III. TECHNICAL DATA VALIDATION

The QC requirements that were reviewed are listed below.

1	Holding Times and Sample Receipt		Matrix Spikes/Matrix Spike Duplicates (MS/MSD)
	Instrument Performance Check		Laboratory Control Samples (LCS)
	Initial Calibration (ICAL)	1	Field Replicates
	Continuing Calibration (CCAL)		Reporting Limits
	Laboratory Blanks		Compound Identification
	Surrogate Compounds	1	Calculation Verification (Full validation only)

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

Holding Times and Sample Receipt

The validation guidance documents state that the cooler temperatures should be within an advisory temperature range of 2° to 6°C. The laboratory received some sample coolers with temperatures outside the advisory control limits. These temperature outliers did not impact data quality and no qualifiers were required.

Field Replicates

No field replicates were submitted. Precision was assessed using the matrix spike/matrix spike duplicate (MS/MSD) set.

Calculation Verification

Calculation verifications were performed on this SDG. No calculation errors were found.

IV. OVERALL ASSESSMENT

As was determined by this evaluation, the laboratory followed the specified analytical method. Accuracy was acceptable, as demonstrated by the surrogate, laboratory control sample, and MS/MSD percent recovery values. Precision was also acceptable as demonstrated by the relative percent difference values from the MS/MSD.

All data, as reported, are acceptable for use.

DATA VALIDATION REPORT
Portland Harbor RI/FS
Willamette Cove Sediments
Diesel and Residual Range Hydrocarbons – Method NWTPH-Dx
Columbia Analytical Services

This report documents the review of analytical data from the analyses of a sediment sample and the associated laboratory and field quality control (QC) samples. Samples were analyzed by Columbia Analytical Services, Inc., Kelso, Washington.

SDG	Number of Samples	Validation Level
K0708876	1 Sediment	Full

I. DATA PACKAGE COMPLETENESS

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

II. EDD TO HARDCOPY VERIFICATION

A complete (100%) verification of the electronic data deliverable (EDD) results was performed by comparison to the hardcopy laboratory data package. Laboratory QC results were also verified (10%). No errors were found.

III. TECHNICAL DATA VALIDATION

The QC requirements that were reviewed are summarized in the table below.

1	Holding Times & Sample Receipt		Laboratory Duplicates
	Initial Calibration (ICAL)	1	Field Replicates
	Continuing Calibration (CCAL)		Reporting Limits (MDL and MRL)
1	Blanks (Method and Field)	2	Compound Identification
	Surrogate Compounds	1	Calculation Verification (Full validation only)
	Laboratory Control Samples (LCS/LCSD)		

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

Holding Times and Sample Receipt

As stated in validation guidance documents, sample shipping coolers should be within the advisory temperature range of 2° to 6°C upon receipt at the laboratory. The laboratory received the sample coolers with temperatures below the advisory control limits, at -0.3º and -0.6ºC. These outliers did not impact data quality and no qualifiers were required.

Laboratory Blanks

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

Method blanks were analyzed at the appropriate frequency. For the analytical batches noted below, residual range hydrocarbons were reported in the method blank. A summary of contaminant levels, associated samples, and action levels are documented in the data validation worksheets.

One sediment method blank was reported. Positive results for residual range organics (RRO) and diesel range organics (DRO) were reported in the method blank. The RRO and DRO results in the associated sample were greater than the action levels and no qualifiers were required.

Field Replicates

No field replicates were submitted. Precision was assessed using the laboratory duplicate set.

Compound Identification

The chromatographic patterns for Sample LW3-GWC1 did not match that of the DRO or RRO standard used for calibration. The DRO or RRO results in this sample were flagged by the laboratory and are qualified as estimated (J-2).

Calculation Verification

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

IV. OVERALL ASSESSMENT

As was determined by this evaluation, the laboratory followed the specified analytical method. Accuracy was acceptable, as demonstrated by the surrogate and LCS percent recovery values. Precision was also acceptable as demonstrated by the laboratory duplicate relative percent difference values.

Data were qualified because of chromatographic pattern mismatches.

All data, as qualified, are acceptable for use.

DATA VALIDATION REPORT
Portland Harbor RI/FS
Willamette Cove Sediments
Gasoline Range Organics - Method NWTPH-Gx
Columbia Analytical Services

This report documents the review of analytical data from the analyses of a sediment sample and the associated laboratory and field quality control (QC) samples. Columbia Analytical Services, Inc., Kelso, Washington, analyzed the samples.

SDG	Number of Samples	Validation Level
K0708876	1 Sediment & 1 Trip Blank	Full

I. DATA PACKAGE COMPLETENESS

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

II. EDD TO HARDCOPY VERIFICATION

A complete (100%) verification of the electronic data deliverable (EDD) results was performed by comparison to the hardcopy laboratory data package. Laboratory QC results were also verified (10%). No errors were found, with the following exception:

III. TECHNICAL DATA VALIDATION

The QC requirements that were reviewed are summarized in the table below.

1	Holding Times and Sample Receipt		Laboratory Duplicates
	Instrument Performance Check		Laboratory Control Samples
	Initial Calibration (ICAL)	1	Field Replicates
	Continuing Calibration (CCAL)		Reporting Limits
2	Blanks (Method and Field)		Compound Identification
	Surrogate Compounds	1	Calculation Verification (full validation only)

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

Holding Times and Sample Receipt

As stated in validation guidance documents, sample shipping coolers should be within the advisory temperature range of 2° to 6°C upon receipt at the laboratory. The laboratory received the sample coolers with temperatures below the advisory control limits, at -0.3º and -0.6ºC. These outliers did not impact data quality and no qualifiers were required.

Method Blanks

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

Method blanks were analyzed at the appropriate frequency. For the analytical batches noted below, gasoline range organics were reported in the method blank. A summary of contaminant levels, associated samples, and action levels is provided in the data validation worksheets.

One water and one sediment method blank were reported. A positive result for gasoline range organics (GRO) was reported in the sediment method blank. The GRO result in the associated sample was less than the action level and was qualified as not detected (U-7).

Field Blanks

Method blanks are used to evaluate all associated field blanks. Any remaining positive results in the field blanks are used to evaluate all associated samples.

One trip blank was analyzed. GRO were detected in the trip blank, LW3-WC-TB. No qualifiers were required as the result in the associated sediment sample was already qualified as not detected based on method blank contamination.

Field Replicates

No field replicates were submitted. Precision was assessed using the batched matrix spike/matrix spike duplicate set.

Calculation Verification

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

IV. OVERALL ASSESSMENT

As was determined by this evaluation, the laboratory followed the specified analytical method. Accuracy was acceptable, as demonstrated by the surrogate and laboratory control sample percent recovery values. Precision was acceptable as demonstrated by the relative percent difference values for the laboratory duplicate analyses.

Data were qualified as not detected due to laboratory blank contamination.

All data, as qualified, are acceptable for use.

DATA VALIDATION REPORT
Portland Harbor RI/FS
Willamette Cove Sediments
Dioxin/Furan Compounds - EPA Method 1613B
Columbia Analytical Services

This report documents the review of analytical data from the analyses of a sediment sample and the associated laboratory and field quality control (QC) samples. Columbia Analytical Services, of Houston, Texas analyzed the sample.

SDG	Number of Samples	Validation Level
K0708876	1 Sediment	Full

I. DATA PACKAGE COMPLETENESS

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

II. EDD TO HARDCOPY VERIFICATION

A complete (100%) verification of the electronic data deliverable (EDD) results was performed by comparison to the hardcopy laboratory data package. Laboratory QC results were also verified (10%). No errors were found

III. TECHNICAL DATA VALIDATION

The QC requirements that were reviewed are summarized in the table below.

1	Holding Times and Sample Receipt
	Initial Calibration (ICAL)
	Continuing Calibration (CCAL)
	Laboratory Blanks
	Field Blanks
	Labeled Compounds
1	Matrix Spikes/Matrix Spike Duplicates (MS/MSD)
	Ongoing Precision and Recovery (OPR)
1	Field Replicates
	Laboratory Duplicates
2	Compound Identification
	Reporting Limits (MDL and MRL)
1	Calculation Verification (full validation only)

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

Holding Times and Sample Receipt

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

coolers with temperatures below the advisory control limits, at 1.0ºC. These outliers did not impact data quality and no qualifiers were required.

Matrix Spike/Matrix Spike Duplicate

No matrix spike/matrix spike duplicate (MS/MSD) sets were performed. Accuracy and precision were assessed using labeled compound recoveries, ongoing precision and recovery (OPR) samples, and OPR duplicate samples.

Field Replicates

No field replicates were submitted. Precision was assessed using the OPR/OPRD set.

Compound Identification

The laboratory assigned K-flags to numerous values when a peak was detected but did not meet ion-ratio quantitation criteria, therefore the reported values cannot be considered as positive identification for these analytes. These results were considered potential false positives or "estimated maximum possible concentrations" and were qualified as not detected (U-21) at the reported values. Laboratory blank values with K flags were considered as not detected.

All results for 2,3,7,8-TCDF were confirmed on a DB-225 column as required by the method. Although the 2,3,7,8-TCDF results from both columns were reported in the raw data, only the results from the DB-225 column were reported in the EDD. No action was necessary.

Calculation Verification

A full validation (Level IV) was performed on this SDG. No anomalies were identified.

IV. OVERALL ASSESSMENT

As was determined by this evaluation, the laboratory followed the specified analytical method. Accuracy was acceptable, as demonstrated by the labeled compound and OPR percent recovery values. Precision was acceptable as demonstrated by the relative percent difference values for the OPR and OPR duplicate analyses.

Data were qualified as not detected to indicate results that should be considered not detected.

All data, as qualified, are acceptable for use.

DATA VALIDATION REPORT
Portland Harbor RI/FS
Willamette Cove Sediments
Herbicides - Method SW8151
Columbia Analytical Services

This report documents the review of analytical data from the analyses of a sediment sample and the associated laboratory and field quality control (QC) samples. The sample was analyzed by Columbia Analytical Services, Inc., Kelso, Washington.

SDG	Number of Samples	Validation Level
K0708876	1 Sediment	Full

I. DATA PACKAGE COMPLETENESS

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

II. EDD TO HARDCOPY VERIFICATION

A complete (100%) verification of the electronic data deliverable (EDD) results was performed by comparison to the hardcopy laboratory data package. Laboratory QC results were also verified (10%). No errors were found.

III. TECHNICAL DATA VALIDATION

The QC requirements that were reviewed are listed below.

1	Holding Times and Sample Receipt		Laboratory Control Samples
	Initial Calibration (ICAL)	1	Field Replicates
	Continuing Calibration (CCAL)	1	Reporting Limits
	Blanks (Method and Field)		Compound Identification
	Surrogate Compounds	1	Calculation Verification (full validation only)
	Matrix Spikes/Matrix Spike Duplicates		

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

Holding Times and Sample Receipt

As stated in validation guidance documents, sample shipping coolers should be within the advisory temperature range of 2° to 6°C upon receipt at the laboratory. The laboratory received the sample coolers with temperatures below the advisory control limits, at -0.3º and -0.6ºC. These outliers did not impact data quality and no qualifiers were required.

Field Replicates

No field replicates were submitted. Precision was assessed using the matrix spike/matrix spike duplicate (MS/MSD) set.

Reporting Limits

Sample LW3-GWC1 was analyzed at a 10x dilution. The reporting limits were adjusted accordingly.

Calculation Verification

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

IV. OVERALL ASSESSMENT

As was determined by this evaluation, the laboratory followed the specified analytical method. Accuracy was acceptable, as demonstrated by the surrogate, laboratory control sample, and MS/MSD percent recovery values. Precision was acceptable as demonstrated by the relative percent difference values for the MS/MSD analyses.

No data were qualified for any reason.

All data, as reported, are acceptable for use.

DATA VALIDATION REPORT
Portland Harbor RI/FS
Willamette Cove Sediments
PCB Congeners - EPA Method 1668
Vista Analytical Laboratory

This report documents the review of analytical data from the analyses of one sediment sample and the associated laboratory quality control (QC) samples. The sample was analyzed by Vista Analytical Laboratory, Inc., El Dorado Hills, California.

SDG	Number of Samples	Validation Level
29650	1 Sediment	Full

I. DATA PACKAGE COMPLETENESS

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

II. EDD TO HARDCOPY VERIFICATION

A complete (100%) verification of the electronic data deliverable (EDD) results was performed by comparison to the hardcopy laboratory data package. Laboratory QC results were also verified (10%). No errors were found

III. TECHNICAL DATA VALIDATION

The QC requirements that were reviewed are summarized in the table below.

1	Holding Times and Sample Receipt		Labeled Compound Recovery
	GC/MS Tuning	1	Matrix Spikes/Matrix Spike Duplicates (MS/MSD)
	Initial Calibration (ICAL)		Ongoing Precision and Recovery (OPR)
	Calibration Verification (CVER)	1	Field Replicates
	Isomer Specificity		Compound Identification
1	Laboratory Blanks	2	Reporting Limits
	Field Blanks	1	Calculation Verification (Full validation only)

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

Holding Times and Sample Receipt

The validation guidance documents state that the cooler temperatures should be within an advisory temperature range of 2° to 6°C. The laboratory received the sample cooler with a temperature of 10.9°C. The client opted to furnish the laboratory with a backup portion of the sample, which was received by the laboratory within hold time limits. Both results were

analyzed and reported together. For validation purposes, the two sets of results were considered as field duplicates, and the results met all duplicate precision criteria.

Laboratory Blanks

In order to assess the impact of laboratory blank contamination on the reported sample results, action levels at five times the blank concentrations are established. If the concentrations in the associated field samples are less than the action levels, the results are qualified as not detected (U-7). If the result is also less than the reporting limit, the result is elevated to the reporting limit.

Positive results for PCB77, PCB81, and co-eluting PCB106/118 were detected in the sediment laboratory blank. The associated sample results were greater than the action level and no qualifiers were required.

Matrix Spike/Matrix Spike Duplicates

Matrix spike/matrix spike duplicates (MS/MSD) were not analyzed. Accuracy was evaluated using the labeled compound and on-going precision recovery (OPR) values.

Field Replicates

Note that the relative percent difference (RPD) value is used to assess precision only if both sample results are greater than five times the reporting limit for a given analyte; otherwise the absolute difference between the two results is used to evaluate precision. The RPD control limit is 50%. The absolute difference control limit is twice the reporting limit of the compound.

Sample LW3-GWC1 was submitted in duplicate. The RPD values between the two sets of results met quality control criteria.

Reporting Limits

For most samples, the laboratory reported specific toxic PCB congener (PCB77, PCB81, PCB105, PCB106/118, PCB114, PCB123, PCB126, PCB156, PCB157, PCB167, PCB169, and PCB189) results using sample-specific reporting limits determined by the sample signal-to-noise ratios. A laboratory flag (*) was applied to indicate this. All other PCB congener results were reported to the method reporting limit.

The laboratory noted chemical interferences for one or more PCB results in some sample spectra. The affected results were flagged ("I") by the laboratory, and these results were qualified as estimated (J/UJ-14).

Calculation Verification

A full validation (Level IV) was performed on this SDG. No anomalies were identified.

IV. OVERALL ASSESSMENT

As was determined by this evaluation, the laboratory followed the specified analytical method. Accuracy was acceptable, as demonstrated by the labeled compound and OPR percent recovery values. Precision was acceptable as demonstrated by the field duplicate RPD values, with the exceptions noted above.

Data were qualified as estimated due to spectral interferences.

All data, as qualified, are acceptable for use.

DATA VALIDATION REPORT
Portland Harbor RI/FS
Willamette Cove Sediments
Metals – Methods SW6010B/6020, SW7471A, and SW7742
Columbia Analytical Services

This report documents the review of analytical data from the analyses of one sediment sample and the associated laboratory and field quality control (QC) samples. Columbia Analytical Laboratories, Inc., Kelso, Washington, analyzed the sample.

SDG	Number of Samples	Validation Level
K0708876	1 Sediment	Full

I. DATA PACKAGE COMPLETENESS

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

II. EDD TO HARDCOPY VERIFICATION

A complete (100%) verification of the electronic data deliverable (EDD) results was performed by comparison to the hardcopy laboratory data package. Laboratory QC results were also verified (10%). No errors were found.

III. TECHNICAL DATA VALIDATION

The QC requirements that were reviewed are summarized in the table below.

1	Technical Holding Times and Sample Preservation	2	Laboratory Duplicates
	Initial Calibration (ICAL)		ICP Interference Check Samples
	Continuing Calibration Verification	2	Serial Dilutions
1	CRDL Standards		ICP-MS Internal Standards & Tunes
	Laboratory Blanks	1	Field Replicates
	Field Blanks	1	Reporting Limits
	Laboratory Control Samples	1	Reported Results
2	Matrix Spikes	1	Calculation Verification (Full validation only)

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

Technical Holding Times and Sample Preservation

The validation guidance documents state that the cooler temperatures should be within an advisory temperature range of 2° to 6°C. The majority of the coolers were received at the laboratory at temperatures outside of these limits, with temperatures ranging from -0.6° to -0.3°C. The

temperature outliers were judged to have no significant impact on the reported results; no further action was taken.

Contract-Required Detection Limit Standard

Contract required detection limit (CRDL) standards were analyzed at the beginning of each analytical sequence. The recovery for aluminum (66%) was less than the lower control limit of 70%. The field sample result was greater than twice the CRDL; therefore no qualification of data was necessary.

Matrix Spikes

A matrix spike (MS) sample was analyzed at the proper frequency of one per 20 samples. The percent recovery (%R) values were within the QAPP specified control limits of 70%-130%, with the following exceptions:

The %R values for antimony (31%) and silver (49%) were less than the lower control limit. These analytes were estimated (J-8) in the associated sample to indicate a potential low bias.

Laboratory Duplicates

Laboratory duplicate percent difference (RPD) values were used to evaluate precision. For sample results greater than five times the reporting limit (RL) the RPD the control limit is 30%. For results less than 5x the RL, the difference between results must be less than twice the RL. The RPD value for antimony (38%) was greater than the control limit; the associated results were estimated (J-9).

Serial Dilutions

A serial dilution was analyzed at the proper frequency of one per 20 samples. The percent difference (%D) values were less than the control limit of 10% for results greater than 50 times the MDL, with the exception of nickel (21%). The associated results were estimated (J-16).

Field Replicates

No field replicates were submitted. Precision was assessed using the laboratory duplicate set.

Reporting Limits

The QAPP specifies target method reporting limits (MRL) of 2.0 mg/kg for aluminum, 0.1 mg/kg for copper, 0.5 mg/kg for lead, and 0.5 mg/kg for zinc. The laboratory reports 5.0 mg/kg, 1.0 mg/kg, 10 mg/kg, and 1.0 mg/kg, respectively, for these analytes. No action was taken, other than to note the discrepancy.

Reported Results

The concentrations for aluminum, copper, lead, and zinc were high enough to necessitate quantification by EPA Method SW6010B (ICP) rather than EPA Method SW6020 (ICP-MS).

Selenium results were reported from EPA Method 7742 (hydride generation – atomic adsorption analysis) due to interference on the ICP-MS.

Calculation Verification

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

IV. OVERALL ASSESSMENT

As determined by this evaluation, the laboratory followed the specified analytical methods. The laboratory duplicate RPD values indicated acceptable precision, except as previously noted. Accuracy was also acceptable, as demonstrated by the MS and laboratory control sample %R values, except as noted above.

Data were estimated based on MS % R, laboratory duplicate RPD, and serial dilution %D outliers.

All data, as qualified, are acceptable for use.

DATA VALIDATION REPORT
Portland Harbor RI/FS
Willamette Cove Sediments
Conventional Parameter Analyses
Columbia Analytical Services

This report documents the review of analytical data from the analyses of sediment samples and the associated laboratory and field quality control (QC) samples. Analysis was performed by Columbia Analytical Services, Inc., Kelso, Washington.

SDG	Number of Samples	Validation Level
K0708876	1 Sediment	Full

The analytical tests that were performed are summarized below:

Parameter	Method
Total Solids	PSEP 1986
Total Organic Carbon (TOC)	PSEP 1986

I. DATA PACKAGE COMPLETENESS

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

II. EDD TO HARDCOPY VERIFICATION

A complete (100%) verification of the electronic data deliverable (EDD) results was performed by comparison to the hardcopy laboratory data package. Laboratory QC results were also verified (10%). No errors were found.

III. TECHNICAL DATA VALIDATION

The QC requirements that were reviewed are summarized in the table below.

1	Technical Holding Times and Sample Receipt		Matrix Spike/Matrix Spike Duplicates (MS/MSD)
	Initial Calibration		Laboratory Duplicates
	Calibration Verification	1	Field Replicates
	Laboratory Blanks		Reporting Limits
	Field Blanks	1	Calculation Verification (Full validation only)
	Laboratory Control Samples		

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

Technical Holding Times and Sample Receipt

The validation guidance documents state that the cooler temperatures should be within an advisory temperature range of 2° to 6°C. The majority of the coolers were received at the laboratory at temperatures outside of these limits, with temperatures ranging from -0.6° to -0.3°C. The temperature outliers were judged to have no significant impact on the reported results; no further action was taken.

Field Replicates

No field replicates were submitted. For total solids, precision was assessed using a laboratory duplicate. Precision was not assessed for total organic carbon.

Calculation Verification

This SDG received a full data review. Several results were verified by recalculation; no calculation or transcription errors were noted.

IV. OVERALL ASSESSMENT

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

All data, as reported, are acceptable for use.

PORTLAND HARBOR RI/FS

WILLAMETTE COVE SEDIMENT DATA REPORT

APPENDIX D

SCRA DATABASE, EXCEL® FLAT FILE FORMAT

FOUND ON ACCOMPANYING CD

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.

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Prepared for
The Lower Willamette Group

Prepared by
Integral Consulting Inc.