PORTLAND HARBOR RI/FS

ROUND 3B FISH AND INVERTEBRATE TISSUE AND COLLOCATED SEDIMENT DATA REPORT

ADDENDUM 1: LEAD AND ANTIMONY RESULTS FOR SMALLMOUTH BASS SAMPLE LW3-SB010E-C00B

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.

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Prepared for
The Lower Willamette Group

Prepared by
Integral Consulting Inc.

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RECOMMENDED FOR INCLUSION IN ADMINISTRATIVE RECORD

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LIST OF ACRONYMS

CAS	Columbia Analytical Services, Inc.
CLP	Contract Laboratory Program
EPA	U.S. Environmental Protection Agency
QC	quality control
QAPP	quality assurance project plan
RI/FS	remedial investigation and feasibility study
SCRA	site characterization and risk assessment

1.0 INTRODUCTION

Laboratory results for the Round 3B fish tissue samples included anomalously high lead and antimony levels in one smallmouth bass body sample (i.e. the body remaining after removal of the fillets; includes gut and gut contents). The individual bass for this composite sample were collected from the east side of the Willamette River between river miles 9.5 and 10.5. The concentrations of lead and antimony in this sample were greater than 200 times those found in the other smallmouth bass samples from the Portland Harbor study area. However, the results for the corresponding fillet sample were comparable to other Portland Harbor smallmouth bass fillet samples. The body sample, LW3-SB010E-C00B, was reanalyzed to confirm the high lead and antimony concentrations in this sample. Reanalysis procedures and results are presented in this document.

2.0 LABORATORY ANALYSES

The original analyses for metals in smallmouth bass sample LW3-SB010E-C00B and the reanalyses for lead and antimony were all completed by Columbia Analytical Services (CAS), located in Kelso, Washington. The composite tissue sample was archived frozen at -20°C from the time of collection until reanalysis, except during subsampling for the original analyses, in compliance with quality assurance project plan (QAPP) requirements. The holding time of one year and sample storage requirements were met for the reanalyses.

The sample was thawed, thoroughly mixed, and three subsamples (coded A, B, and C) were collected from three different areas of the sample jar. Each of the subsamples was freeze-dried separately and rehomogenized. The subsamples were digested and analyzed in duplicate (coded A1, A2, B1, etc.). A laboratory duplicate was also prepared from subsample A (coded A1D). Subsample A was therefore analyzed in triplicate and subsamples B and C were analyzed in duplicate, for a total of seven reanalyses.

One laboratory deviation from QAPP Addendum 9 (Integral 2007) was noted. The sample reanalyses were performed by EPA method 6020. The analytical method for lead provided in QAPP Addendum 9 is EPA method 6010B, and this method was used for the original lead analysis. However, EPA method 6020 is commonly used for lead analyses and laboratory quality control (QC) results were acceptable. The use of method 6020 rather than 6010B for lead does not affect the quality or comparability of the lead data in any way.

3.0 DATA VALIDATION AND DATA QUALITY

The reanalysis data were validated by Integral Consulting Inc. in accordance with guidance provided in *U.S. Environmental Protection Agency [EPA] Contract Laboratory Program [CLP] National Functional Guidelines for Inorganic Data Review* (EPA 2004) and *Guidance on Environmental Data Verification and Validation* (EPA 2002), as specified in the Round 2 QAPP.

The results were subjected to full data validation, including the evaluation and assessment of the sample results and applicable quality control results reported by the laboratory and recalculations of laboratory results. Data validation results are summarized as follows:

- Instrument operating conditions were correct and the instrument was properly calibrated.
- Laboratory accuracy was acceptable as demonstrated by the matrix spike recovery for antimony and certified reference material recovery for lead.
- Precision for the various replicates was greater than the control limit of 30%, with 41 relative percent difference reported for the laboratory duplicate for both antimony and lead and relative standard deviations greater than 40% for all replicates for both metals.

All reanalysis data were qualified as estimated based on the variability of the replicate results. The data are usable for all intended purposes, with the knowledge that they may be less precise than unqualified data.

4.0 REANALYSIS RESULTS

The data for the reanalyses confirm the original results (Table 4-1). For lead, the original result was 2230 mg/kg, and the reanalysis results ranged from 908 to 2590 mg/kg wet weight. For antimony, the original result was 10.9 mg/kg and the reanalysis results ranged from 4.9 to 13.4 mg/kg wet weight.

The anomalous result for this single bass body composite will be evaluated in the draft RI report in the context of lead and antimony concentrations found for other media in this location and throughout the site. A preliminary review of the other data types (e.g., other biota tissues, surface sediments) from the RM 10 east vicinity do not show elevated lead or antimony levels.

Alloys of lead and antimony are widely used in a variety of industrial and recreational equipment. Recreational uses for antimonial lead include fishing gear such as sinkers, lures, and jigs, and shotgun pellets.

The total mass of lead in sample LW3- SB010E-C00B was approximately 2.8 grams[1], or about 0.1 ounce. This quantity is consistent with a small fishing sinker. It seems likely that a fish could have ingested an antimonial lead sinker from a baited fishing lure or jig.

The individual results for the original analysis and all reanalyses were averaged according to rules described in *Portland Harbor Remedial Investigation/Feasibility Study (RI/FS) Technical Memorandum: Guidelines for Data Averaging and Treatment of Non-detected Values for the Round 1 Database* (Kennedy/Jenks et al. 2004) and the averaged values were incorporated into the site characterization and risk assessment (SCRA) database. The final values are 1640 and 8.41 mg/kg for lead and antimony, somewhat lower than the original concentrations, but still much higher than other bass body samples from the Study Area (Table 4-2). Individual and final averaged concentrations are shown in Table 4-1. The final values in the SCRA database, including revised calculated whole body concentrations, are provided in Table 4-3. The updated SCRA database is available on the Portland Harbor Collaboration Portal.

[1] The product of the lead concentration in the fish body sample, 1640 mg/kg wet weight and the combined weight of the individual fish bodies included in the sample, 1725 g, divided by 1,000,000 to convert to grams.

5.0 REFERENCES

EPA. 2002. Guidance on Environmental Data Verification and Validation. EPA AQ/G-8. U.S. Environmental Protection Agency, Office of Environmental Information, Washington, DC.

EPA. 2004. USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review. EPA 540-R-04-004. Office of Emergency and Remedial Response, U.S. Environmental Protection Agency, Washington, DC.

Integral. 2007. Portland Harbor RI/FS Round 2 Quality Assurance Project Plan Addendum 9: Fish and Invertebrate Tissue and Collocated Sediment for Round 3B. Final. IC07-0020. Prepared for the Lower Willamette Group, Portland, OR. Integral Consulting Inc., Mercer Island, WA.

Kennedy/Jenks, Integral, and Windward. 2004. Portland Harbor RI/FS Technical Memorandum: Guidelines for Data Reporting, Data Averaging, and Treatment of Non-Detected Values for the Round 1 Database. Kennedy/Jenks Consultants, Portland, OR; Integral Consulting Inc., Bellevue, WA; Windward Environmental LLC, Seattle, WA. June 24, 2004.

Table 4-1. Results for Reanalysis of Smallmouth Bass Sample LW3-SB010E-C00B for Lead and Antimony

Sample ID	Lead (mg/kg wet weight)	Antimony (mg/kg wet weight)
Original analysis		
LW3-SB010E-C00B	2230	10.9
Reanalysis[a]		
LW3-SB010E-C00B-A1	2350	12.7
LW3-SB010E-C00B-A1D[b]	1550	8.4
LW3-SB010E-C00B-A2	2590	13.4
LW3-SB010E-C00B-B1	958	5.2
LW3-SB010E-C00B-B2	908	4.9
LW3-SB010E-C00B-C1	1150	5.3
LW3-SB010E-C00B-C2	1320	7.1
Average, values included in database[c]	1640	8.41

Notes:

[a] Three subsamples of the fish homogenate were individually freeze-dried. Subsamples B and C were analyzed in duplicate and subsample A was analyzed in triplicate (see footnote b).

[b] This lab duplicate is an additional aliquot from freeze-dried subsample A and constitues a third analysis of freeze-dried subsample A (i.e., in addition to samples LW3-SB010E-C00B-A1 and -A2).

[c] The average was calculated by first averaging each replicate and then averaging these averaged values. These values are included in the SCRA database.

Table 4-2. Lead and Antimony Values for Round 3B Bass Samples

				Fillet data				Remainder data			
Species	**Location**	**CAS_Rn**	**Analyte**	**Fillet Sample**	**Detect flag**	**Result**	**Units**	**Remainder Sample**	**Detect flag**	**Result**	**Units**
smallmouth bass	SB02E	7439-92-1	Lead	LW3-SB02E-C00F	Y	0.011	mg/kg	LW3-SB02E-C00B	N	0.019 U	mg/kg
smallmouth bass	SB03E	7439-92-1	Lead	LW3-SB03E-C00F	Y	0.518	mg/kg	LW3-SB03E-C00B	Y	2.28	mg/kg
smallmouth bass	SB03W	7439-92-1	Lead	LW3-SB03W-C00F	Y	0.045	mg/kg	LW3-SB03W-C00B	N	0.013 U	mg/kg
smallmouth bass	SB04E	7439-92-1	Lead	LW3-SB04E-C01F	Y	0.056 T	mg/kg	LW3-SB04E-C01B	Y	0.0315 T	mg/kg
smallmouth bass	SB04W	7439-92-1	Lead	LW3-SB04W-C00F	Y	0.046	mg/kg	LW3-SB04W-C00B	Y	0.056	mg/kg
smallmouth bass	SB05W	7439-92-1	Lead	LW3-SB05W-C00F	Y	0.022	mg/kg	LW3-SB05W-C00B	N	0.016 U	mg/kg
smallmouth bass	SB06E	7439-92-1	Lead	LW3-SB06E-C00F	Y	0.043	mg/kg	LW3-SB06E-C00B	N	0.018 U	mg/kg
smallmouth bass	SB06W	7439-92-1	Lead	LW3-SB06W-C00F	Y	0.025	mg/kg	LW3-SB06W-C00B	N	0.015 U	mg/kg
smallmouth bass	SB07E	7439-92-1	Lead	LW3-SB07E-C00F	Y	0.009	mg/kg	LW3-SB07E-C00B	Y	0.034	mg/kg
smallmouth bass	SB07W	7439-92-1	Lead	LW3-SB07W-C00F	Y	0.01	mg/kg	LW3-SB07W-C00B	Y	0.023	mg/kg
smallmouth bass	SB08E	7439-92-1	Lead	LW3-SB08E-C00F	Y	0.007	mg/kg	LW3-SB08E-C00B	N	0.019 U	mg/kg
smallmouth bass	SB08W	7439-92-1	Lead	LW3-SB08W-C00F	Y	0.007	mg/kg	LW3-SB08W-C00B	N	0.019 U	mg/kg
smallmouth bass	SB09E	7439-92-1	Lead	LW3-SB09E-C00F	Y	0.007 T	mg/kg	LW3-SB09E-C00B	N	0.017 UT	mg/kg
smallmouth bass	SB09W	7439-92-1	Lead	LW3-SB09W-C00F	Y	0.009	mg/kg	LW3-SB09W-C00B	Y	0.045	mg/kg
smallmouth bass	**SB010E**	**7439-92-1**	**Lead**	**LW3-SB010E-C00F**	**Y**	**0.022**	**mg/kg**	**LW3-SB010E-C00B**	**Y**	**1640 JT**	**mg/kg**
smallmouth bass	SB010W	7439-92-1	Lead	LW3-SB010W-C00F	Y	0.011	mg/kg	LW3-SB010W-C00B	Y	9.8	mg/kg
smallmouth bass	SB011E	7439-92-1	Lead	LW3-SB011E-C00F	Y	0.013	mg/kg	LW3-SB011E-C00B	Y	0.165	mg/kg
smallmouth bass	SB011W	7439-92-1	Lead	LW3-SB011W-C00F	Y	0.023	mg/kg	LW3-SB011W-C00B	Y	0.144	mg/kg
smallmouth bass	SB02E	7440-36-0	Antimony	LW3-SB02E-C00F	N	0.005 UJ	mg/kg	LW3-SB02E-C00B	N	0.006 UJ	mg/kg
smallmouth bass	SB03E	7440-36-0	Antimony	LW3-SB03E-C00F	N	0.005 UJ	mg/kg	LW3-SB03E-C00B	N	0.006 UJ	mg/kg
smallmouth bass	SB03W	7440-36-0	Antimony	LW3-SB03W-C00F	N	0.005 UJ	mg/kg	LW3-SB03W-C00B	N	0.006 UJ	mg/kg
smallmouth bass	SB04E	7440-36-0	Antimony	LW3-SB04E-C01F	N	0.005 UJT	mg/kg	LW3-SB04E-C01B	N	0.005 UJT	mg/kg
smallmouth bass	SB04W	7440-36-0	Antimony	LW3-SB04W-C00F	N	0.005 UJ	mg/kg	LW3-SB04W-C00B	N	0.006 UJ	mg/kg
smallmouth bass	SB05W	7440-36-0	Antimony	LW3-SB05W-C00F	N	0.005 UJ	mg/kg	LW3-SB05W-C00B	N	0.006 UJ	mg/kg
smallmouth bass	SB06E	7440-36-0	Antimony	LW3-SB06E-C00F	N	0.005 UJ	mg/kg	LW3-SB06E-C00B	N	0.006 UJ	mg/kg
smallmouth bass	SB06W	7440-36-0	Antimony	LW3-SB06W-C00F	N	0.005 UJ	mg/kg	LW3-SB06W-C00B	N	0.005 UJ	mg/kg
smallmouth bass	SB07E	7440-36-0	Antimony	LW3-SB07E-C00F	N	0.005 UJ	mg/kg	LW3-SB07E-C00B	N	0.006 U	mg/kg
smallmouth bass	SB07W	7440-36-0	Antimony	LW3-SB07W-C00F	N	0.005 UJ	mg/kg	LW3-SB07W-C00B	N	0.006 U	mg/kg
smallmouth bass	SB08E	7440-36-0	Antimony	LW3-SB08E-C00F	N	0.005 UJ	mg/kg	LW3-SB08E-C00B	N	0.006 U	mg/kg
smallmouth bass	SB08W	7440-36-0	Antimony	LW3-SB08W-C00F	N	0.005 UJ	mg/kg	LW3-SB08W-C00B	N	0.018 U	mg/kg
smallmouth bass	SB09E	7440-36-0	Antimony	LW3-SB09E-C00F	Y	0.005 JT	mg/kg	LW3-SB09E-C00B	Y	0.006 JT	mg/kg
smallmouth bass	SB09W	7440-36-0	Antimony	LW3-SB09W-C00F	N	0.004 UJ	mg/kg	LW3-SB09W-C00B	N	0.005 U	mg/kg
smallmouth bass	**SB010E**	**7440-36-0**	**Antimony**	**LW3-SB010E-C00F**	**N**	**0.005 UJ**	**mg/kg**	**LW3-SB010E-C00B**	**Y**	**8.41 JT**	**mg/kg**
smallmouth bass	SB010W	7440-36-0	Antimony	LW3-SB010W-C00F	N	0.005 UJ	mg/kg	LW3-SB010W-C00B	Y	0.052	mg/kg
smallmouth bass	SB011E	7440-36-0	Antimony	LW3-SB011E-C00F	N	0.005 UJ	mg/kg	LW3-SB011E-C00B	N	0.006 U	mg/kg
smallmouth bass	SB011W	7440-36-0	Antimony	LW3-SB011W-C00F	N	0.005 UJ	mg/kg	LW3-SB011W-C00B	N	0.005 U	mg/kg

Notes:

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.

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 3 data.

Table 4-3. Revised Lead and Antimony Values for Sample LW3-SB010E-C00B in SCRA Database

LocationID	LocationName	X	Y	Z	RiverMile	Task	SampleDate	SampleTime	Species	Tissue	Matrix	LabMatrix	SampleID	ParentSample	SampleType
LW3-SB010E-C00	SB010E	7639790.56	694692.56		9.5 - 10.5	B01-01-67B_Biota	9/6/2007	12:06	smallmouth bass	body without fillet	tissue	tissue	LW3-SB010E-C00B		normal
LW3-SB010E-C00	SB010E	7639790.56	694692.56		9.5 - 10.5	B01-01-67B_Biota	9/6/2007	12:06	smallmouth bass	body without fillet	tissue	tissue	LW3-SB010E-C00B		normal
LW3-SB010E-C00	SB010E	7639790.56	694692.56		9.5 - 10.5	B01-01-67B_Biota	9/6/2007	12:06	smallmouth bass	combined fillet and body w/o fillet fractions	tissue	tissue	LW3-SB010E-C00W		normal
LW3-SB010E-C00	SB010E	7639790.56	694692.56		9.5 - 10.5	B01-01-67B_Biota	9/6/2007	12:06	smallmouth bass	combined fillet and body w/o fillet fractions	tissue	tissue	LW3-SB010E-C00W		normal

Table 4-3. Revised Lead and Antimony Values for Sample LW3-SB010E-C00B in SCRA Database

LocationID	Method	AnalysisDate	AnalysisTime	AnalyteGroup	cas_rn	Analyte	total_or_dissolved	detect_flag	VALUE	Qualifiers	Units	Basis	DVCategory	Notes
LW3-SB010E-C00	SW6020	2/5/2008	11:34	Metals	7440-36-0	Antimony	total	Y	8.41	JT	mg/kg	Wet	QA2Cat1	
LW3-SB010E-C00	SW6010B	2/5/2008	10:28	Metals	7439-92-1	Lead	total	Y	1640	JT	mg/kg	Wet	QA2Cat1	
LW3-SB010E-C00	SW6020	1/22/2008	14:13	Metals	7439-92-1	Lead	total	Y	1100	JT	mg/kg	Wet	QA2Cat1	
LW3-SB010E-C00	SW6020	1/22/2008	15:42	Metals	7440-36-0	Antimony	total	Y	5.9	JT	mg/kg	Wet	QA2Cat1	