APPENDIX F. DATA VALIDATION REPORTS

LABORATORY DATA CONSULTANTS, INC.
7750 El Camino Real, Suite 2L Carlsbad, CA 92009 Phone: 760/634-0437 Fax: 760/634-0439

Windward Environmental, LLC
200 West Mercer Street, Suite 401
Seattle, WA 98119
ATTN: Ms. Marina Mitchell

October 17, 2007

SUBJECT: Lower Duwamish Waterway Group, Data Validation

Dear Ms. Mitchell,

Enclosed are the final validation reports for the fractions listed below. This SDG was received on October 1, 2007. Attachment 1 is a summary of the samples that were reviewed for each analysis.

LDC Project # 17546:

SDG #	Fraction
WIN004	Total Arsenic & Inorganic Arsenic, %Solids

The data validation was performed under EPA Level III and Level IV guidelines. The analyses were validated using the following documents, as applicable to each method:

- Lower Duwamish Waterway Group Final Fish, Crab, and Clam Tissue Collection and Chemical Analyses Quality Assurance Project Plan, August 2007
- USEPA, Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, October 2004
- EPA SW 846, Third Edition, Test Methods for Evaluating Solid Waste, update 1, July 1992; update IIA, August 1993; update II, September 1994; update IIB, January 1995; update III, December 1996; update IIIA, April 1998

Please feel free to contact us if you have any questions.

Sincerely,

Stella Cuenco

Stella S. Cuenco
Project Manager/Senior Chemist

Attachment 1

EDD	LDC #17546 (Windward Environmental, LLC - Seattle WA / Lower Duwamish Waterway Group)																																	
LDC	SDG#	DATE REC'D	(3) DATE DUE	Total As (1638)		Ino. As (1632)		% Solids (160.3)																										
Matrix: Tissue/Sediment				T	S	T	S	T	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	WIN004	10/01/07	10/22/07	24	13	24	0	24	13																									
A	WIN004	10/01/07	10/22/07	6	3	6	0	6	3																									
Total	B/SC			6	16	30	0	30	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	98

Shaded cells indicate Level IV validation (all other cells are Level II validation). These sample counts do not include MS/MSD, and DUPs

Lower Duwamish Waterway Group
Data Validation Reports
LDC# 17546

Arsenic

LDC

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Lower Duwamish Waterway Group

Collection Date: August 24 through August 28, 2007

LDC Report Date: October 16, 2007

Matrix: Sediment/Tissue

Parameters: Total Arsenic & Inorganic Arsenic

Validation Level: EPA Level III & IV

Laboratory: Brooks Rand

Sample Delivery Group (SDG): WIN004

Sample Identification

LDW-07-C1-Comp
LDW-07-C1-Comp-dep
LDW-07-C2-1-Comp**
LDW-07-C2-1-Comp-dep**
LDW-07-C2-2-Comp**
LDW-07-C2-2-Comp-dep**
LDW-07-C3-1-Comp**
LDW-07-C3-1-Comp-dep**
LDW-07-C3-2-Comp
LDW-07-C3-2-Comp-dep
LDW-07-C4-Comp
LDW-07-C4-Comp-dep
LDW-07-C5-Comp
LDW-07-C6-Comp
LDW-07-C6-Comp-dep
LDW-07-C7-Comp
LDW-07-C9-Comp
LDW-07-C9-Comp-dep
LDW-07-C10-2-Comp
LDW-07-C1-S
LDW-07-C2-1-S
LDW-07-C2-2-S**
LDW-07-C3-1-S
LDW-07-C3-2-S**
LDW-07-C4-S
LDW-07-C5-S**
LDW-07-C6-S
LDW-07-C7-S
LDW-07-C9-S
LDW-07-C10-2-S
LDW-07-C10-2-S-FD
LDW-07-C8-S
LDW-07-C11-S
LDW-07-C10-1-S
LDW-07-C5-Comp-dep
LDW-07-C7-Comp-dep
LDW-07-C8-Comp-dep
LDW-07-C10-2-Comp-dep
LDW-07-C8-Comp
LDW-07-C11-Comp
LDW-07-C10-1-Comp
LDW-07-C10-1-Comp-dep
LDW-07-C11-Comp-dep
LDW-07-C12-Comp
LDW-07-C12-Comp-dep
LDW-07-C12-S
LDW-07-C1-CompMS
LDW-07-C1-CompMSD
LDW-07-C1-CompMSDRE
LDW-07-C1-CompDUP
LDW-07-C4-CompMS
LDW-07-C4-CompMSD
LDW-07-C4-CompDUP
LDW-07-C1-SMS
LDW-07-C1-SMSD
LDW-07-C1-SDUP
LDW-07-C10-2-SMS
LDW-07-C10-2-SMSD
LDW-07-C10-2-SDUP
LDW-07-C7-Comp-depMS
LDW-07-C7-Comp-depMSD
LDW-07-C7-Comp-depDUP
LDW-07-C8-Comp-depMS
LDW-07-C8-Comp-depMSD
LDW-07-C8-Comp-depDUP
LDW-07-C10-1-Comp-depMS
LDW-07-C10-1-Comp-depMSD
LDW-07-C10-1-Comp-depDUP

**Indicates sample underwent EPA Level IV review

Introduction

This data review covers 22 sediment samples and 46 tissue samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Method 1638 and EPA Method 1632 for Inorganic Arsenic.

This review follows the Lower Duwamish Waterway Group Final Fish, Crab, and Clam Tissue Collection and Chemical Analyses Quality Assurance Project Plan (August 23, 2007) and the National Functional Guidelines for Inorganic Data Review (October 2004).

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blanks are summarized in Section III.

Field duplicates are summarized in Section XIII.

Samples indicated by a double asterisk on the front cover underwent a EPA Level IV review. A EPA Level III review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Calibration

An initial calibration was performed.

The frequency and analysis criteria of the initial calibration verification (ICV) and continuing calibration verification (CCV) were met with the following exceptions:

Date	Lab. Reference/ID	Analyte	%R (Limits)	Associated Samples	Flag	A or P
9/7/07	CCV9	Total arsenic	133 (75-125)	LDW-07-C1-S LDW-07-C2-1-S LDW-07-C2-2-S** LDW-07-C3-1-S LDW-07-C3-2-S** LDW-07-C1-SMS LDW-07-C1-SMSD LDW-07-C1-SDUP PB	J+ (all detects)	P

III. Blanks

Method blanks were reviewed for each matrix as applicable. No contaminant concentrations were found in the initial, continuing and preparation blanks.

IV. ICP Interference Check Sample (ICS) Analysis

The frequency of analysis was met.

The criteria for analysis were met.

V. Matrix Spike Analysis

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	%R (Limits)	Flag	A or P
LDW-07-C4-CompMS (LDW-07-C4-Comp)	Inorganic arsenic	63 (65-135)	J- (all detects) UJ (all non-detects)	A

VI. Duplicate Sample Analysis

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable. Results were within QC limits.

VII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

Standard reference material was performed at the required frequencies.

VIII. Internal Standards

All internal standard percent recoveries (%R) were within QC limits for samples on which a EPA Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

IX. Furnace Atomic Absorption QC

All graphite furnace atomic absorption QC were within validation criteria for samples on which a EPA Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

X. ICP Serial Dilution

ICP serial dilution was not required by the method.

XI. Sample Result Verification

All sample result verifications were acceptable for samples on which a EPA Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XII. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

XIII. Field Duplicate

Samples LDW-07-C10-2-S and LDW-07-C10-2-S-FD were identified as field duplicates. No total arsenic or inorganic arsenic were detected in any of the samples with the following exceptions:

Analyte	Concentration (mg/Kg)		RPD
	LDW-07-C10-2-S	LDW-07-C10-2-S-FD	
Total arsenic	8.101	7.219	12

XIV. Field Blanks

No field blanks were identified in this SDG.

Lower Duwamish Waterway Group
Total Arsenic & Inorganic Arsenic - Data Qualification Summary - SDG WIN004

SDG	Sample	Analyte	Flag	A or P	Reason
WIN004	LDW-07-C1-S LDW-07-C2-1-S LDW-07-C2-2-S** LDW-07-C3-1-S LDW-07-C3-2-S** LDW-07-C1-SDUP	Total arsenic	J+ (all detects)	P	Calibration (%R)
WIN004	LDW-07-C4-Comp	Inorganic arsenic	J- (all detects) UJ (all non-detects)	A	Matrix spike analysis (%R)

Lower Duwamish Waterway Group
Total Arsenic & Inorganic Arsenic - Laboratory Blank Data Qualification Summary - SDG WIN004

No Sample Data Qualified in this SDG

LDC #: 17546A4
SDG #: WIN004
Laboratory: Brooks Rand

VALIDATION COMPLETENESS WORKSHEET
Level III/IV

Date: 10/8/07
Page: 1 of 2
Reviewer: SW
2nd Reviewer: N

METHOD: Total Arsenic (EPA Method 1638), Inorganic Arsenic (EPA Method 1632)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 8/24/07 – 8/28/07
II.	Calibration	SW	
III.	Blanks	A	
IV.	ICP Interference Check Sample (ICS) Analysis	N	Mt required.
V.	Matrix Spike Analysis	SW	3 MS/MSD/Dup
VI.	Duplicate Sample Analysis	A	
VII.	Laboratory Control Samples (LCS)	A	LCS, SRM.
VIII.	Internal Standard (ICP-MS)	A	
IX.	Furnace Atomic Absorption QC	N	
X.	ICP Serial Dilution	N	Mt required
XI.	Sample Result Verification	A	Not reviewed for Level III validation.
XII.	Overall Assessment of Data	A	
XIII.	Field Duplicates	SW	(30, 31)
XIV.	Field Blanks	N	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = No compounds detected; R = Rinsate; FB = Field blank; D = Duplicate; TB = Trip blank; EB = Equipment blank

Validated Samples: ** Indicates sample underwent Level IV validation

1	LDW-07-C1-Comp Tissue	11	LDW-07-C4-Comp Tissue	21	LDW-07-C2-1-S Sediment	31	LDW-07-C10-2-S-FD Sediment
2	LDW-07-C1-Comp-dep	12	LDW-07-C4-Comp-dep	22	LDW-07-C2-2-S**	32	LDW-07-C8-S
3	LDW-07-C2-1-Comp**	13	LDW-07-C5-Comp	23	LDW-07-C3-1-S	33	LDW-07-C11-S
4	LDW-07-C2-1-Comp-dep**	14	LDW-07-C6-Comp	24	LDW-07-C3-2-S**	34	LDW-07-C10-1-S
5	LDW-07-C2-2-Comp**	15	LDW-07-C6-Comp-dep	25	LDW-07-C4-S	35	LDW-07-C5-Comp-dep Tissue
6	LDW-07-C2-2-Comnp-dep**	16	LDW-07-C7-Comp	26	LDW-07-C5-S**	36	LDW-07-C7-Comp-dep
7	LDW-07-C3-1-Comp**	17	LDW-07-C9-Comp	27	LDW-07-C6-S	37	LDW-07-C8-Comp-dep
8	LDW-07-C3-1-Comp-dep**	18	LDW-07-C9-Comp-dep	28	LDW-07-C7-S	38	LDW-07-C10-2-Comp-dep
9	LDW-07-C3-2-Comp	19	LDW-07-C10-2-Comp	29	LDW-07-C9-S	39	LDW-07-C8-Comp
10	LDW-07-C3-2-Comp-dep	20	LDW-07-C1-S Sediment	30	LDW-07-C10-2-S	40	LDW-07-C11-Comp

Notes: _____

LDC #: 17546A4
SDG #: WIN004
Laboratory: Brooks Rand

VALIDATION COMPLETENESS WORKSHEET
Level III/IV

Date: 10/8/07
Page: 1 of 2
Reviewer: MM
2nd Reviewer: K

METHOD: Total Arsenic (EPA Method 1638), Inorganic Arsenic (EPA Method 1632)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times		Sampling dates:
II.	Calibration		
III.	Blanks		
IV.	ICP Interference Check Sample (ICS) Analysis		
V.	Matrix Spike Analysis		
VI.	Duplicate Sample Analysis		
VII.	Laboratory Control Samples (LCS)		See page 1
VIII.	Internal Standard (ICP-MS)		
IX.	Furnace Atomic Absorption QC		
X.	ICP Serial Dilution		
XI.	Sample Result Verification		Not reviewed for Level III validation.
XII.	Overall Assessment of Data		
XIII.	Field Duplicates		
XIV.	Field Blanks		

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = No compounds detected; R = Rinsate; FB = Field blank; D = Duplicate; TB = Trip blank; EB = Equipment blank

Validated Samples: ** Indicates sample underwent Level IV validation

41	LDW-07-C10-1-Comp Tissue	51	~~LDW-07-C1-Comp-depDUP~~ Tissue	61	~~LDW-07-C8-SDUP~~ Sediment	71	
42	LDW-07-C10-1-Comp-dep	52	LDW-07-C4-CompMS	62	LDW-07-C7-Comp-depMS Tissue	72	
43	LDW-07-C11-Comp-dep	53	LDW-07-C4-CompMSD	63	LDW-07-C7-Comp-depMSD	73	
44	LDW-07-C12-Comp	54	LDW-07-C4-CompDUP	64	LDW-07-C7-Comp-depDUP	74	
45	LDW-07-C12-Comp-dep	55	LDW-07-C1-SMS Sediment	65	LDW-07-C8-Comp-depMS	75	
46	LDW-07-C12-S Sediment	56	LDW-07-C1-SMSD	66	LDW-07-C8-Comp-depMSD	76	
47	LDW-07-C1-CompMS Tissue	57	LDW-07-C1-SDUP	67	LDW-07-C8-Comp-depDUP	77	
48	LDW-07-C1-CompMSD	58	LDW-07-C10-2-SMS	68	LDW-07-C10-1-Comp-depMS	78	
49	LDW-07-C1-CompMSDRE	59	LDW-07-C10-2-SMSD	69	LDW-07-C10-1-Comp-depMSD	79	
50	LDW-07-C1-CompDUP	60	LDW-07-C10-2-SDUP	70	LDW-07-C10-1-Comp-depDUP	80	

Notes:

LDC #: 17546 A4
SDG #: W2N07

VALIDATION FINDINGS CHECKLIST

Page: 1 of 2
Reviewer: MM
2nd Reviewer: A

Method: Metals (EPA SW 846 Method 6010/7000/6020)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	✓			
Cooler temperature criteria was met.	✓			
II. Calibration				
Were all instruments calibrated daily, each set-up time?	✓			
Were the proper number of standards used?	✓			
Were all initial and continuing calibration verification %Rs within the ~~90-110%~~ (80-120% for mercury and 85-115% for cyanide) QC limits?		✓		
Were all initial calibration correlation coefficients > 0.995? (Level IV only)	✓			
III. Blanks				
Was a method blank associated with every sample in this SDG?	✓			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.		✓		
IV. ICP Interference Check Sample (ICS) Analysis				
Were ICP interference check samples performed daily?			✓	
Were the AB solution percent recoveries (%R) with the 80-120% QC limits?			✓	
V. Matrix spike/Matrix spike duplicates				
Were a matrix spike (MS) and duplicate (DUP) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD or MS/DUP. Soil / Water.	✓			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the 75-125 QC limits? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.		✓		
Were the MS/MSD or duplicate relative percent differences (RPD) ≤ 20% for waters and ≤ 35% for soil samples? A control limit of +/- RL(+/-2X RL for soil) was used for samples that were ≤ 5X the RL, including when only one of the duplicate sample values were < 5X the RL.	✓			
VI. Laboratory control samples				
Was an LCS anaylzed for this SDG?	✓			
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 80-120% QC limits for water samples and laboratory established QC limits for soils?	✓			
VII. Furnace Atomic Absorption QC				
If MSA was performed, was the correlation coefficients > 0.995?			✓	
Do all applicable analysies have duplicate injections? (Level IV only)			✓	
For sample concentrations > RL, are applicable duplicate injection RSD values < 20%? (Level IV only)			✓	
Were analytical spike recoveries within the 85-115% QC limits?			✓	

LDC #: 19546A4
SDG #: W2N604

VALIDATION FINDINGS CHECKLIST

Reviewer: MM
2nd Reviewer: [illegible]

Validation Area	Yes	No	NA	Findings/Comments
VII. ICP Serial Dilution				
Was an ICP serial dilution analyzed if analyte concentrations were > 50X the IDL?			✓	
Were all percent differences (%Ds) < 10%?			✓	
Was there evidence of negative interference? If yes, professional judgement will be used to qualify the data.			✓	
VIII. Internal Standards (ICP-MS Methods Only)				
Were all the percent recoveries (%R) within the 30-120% of the intensity of the internal standard in the associated initial calibration?	✓			
If the %Rs were outside the criteria, was a reanalysis performed?			✓	
IX. Target Analyte Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?			✓	
Were the performance evaluation (PE) samples within the acceptance limits?			✓	
X. Sample Result Verification				
Were RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XI. Overall Assessment of Data				
Overall assessment of data was found to be acceptable.	✓			
XII. Field Duplicates				
Field duplicate pairs were identified in this SDG.	✓			
Target analytes were detected in the field duplicates.	✓			
XIII. Field Blanks				
Field blanks were identified in this SDG.		✓		
Target analytes were detected in the field blanks.			✓	

LDC #: 17546A4
SDG #: W3N004

VALIDATION FINDINGS WORKSHEET
Sample Specific Element Reference

Page: 1 of 1
Reviewer: MH
2nd reviewer: [illegible]

All circled elements are applicable to each sample.

on

Sample ID	Matrix	Target Analyte List (TAL)
1-19, 35-45	Tissue	Al, Sb, [✓ As], Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, [✓ Inorganic As] ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
20-34, 46	Sediment	Al, Sb, [✓ As], Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
47, 48, 50, 52-54	Tissue	Al, Sb, [✓ As], Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, [✓ As], Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
62-64, 68-70	Tissue	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
55-57, 58-60	Sediment	Al, Sb, [✓ As], Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
47-50, 52-54	Tissue	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, [✓ Inorganic As] ___
65-67	✓	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ✓ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
Analysis Method		
ICP		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
ICP Trace		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
ICP-MS		Al, Sb, [✓ As], Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
GFAA		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, [✓ Inorganic As] ___

Comments: Mercury by CVAA if performed

LDC #: 17546A4
SDG #: W1N004

VALIDATION FINDINGS WORKSHEET
Calibration

Page: 1 of 1
Reviewer: MH
2nd Reviewer: M

METHOD: Trace Metals (EPA SW 846 Method 6010/7000)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Were all instruments calibrated daily, each set-up time, and were the proper number of standards used?

Y N N/A Were all initial and continuing calibration verification percent recoveries (%R) within the control limits of 90-110% for all analytes except mercury (80-120%) and cyanide (85-115%)?

LEVEL IV ONLY:

Y N N/A Was a midrange cyanide standard distilled?

Y N N/A Are all correlation coefficients ≥0.995?

Y N N/A Were recalculated results acceptable? See Level IV Initial and Continuing Calibration Recalculation Worksheet for recalculations.

#	Date	Calibration ID	Analyte	%R	Associated Samples	Qualification of Data
1	9/7/07	ccv9	As	133 (75-125)	20-24, 55-57, PB	J+ (+)/P

Comments:

LDC #: 17546A4
SDG #: W7N004

VALIDATION FINDINGS WORKSHEET
Matrix Spike Analysis

Page: 1 of 1
Reviewer: W
2nd Reviewer: W

METHOD: Trace Metals (EPA SW 846 Method 6010/7000)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

(Y) N N/A Was a matrix spike analyzed for each matrix in this SDG?

Y (N) N/A Were matrix spike percent recoveries (%R) within the control limits of ~~75-125~~? 65-135 If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.

(Y) N N/A Was a post digestion spike analyzed for ICP elements that did not meet the required criteria for matrix spike recovery?

LEVEL IV ONLY:

(Y) N N/A Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations.

#	Matrix Spike ID	Matrix	Analyte	%R	Associated Samples	Qualifications
1	48	Tissue	Inorganic As	63	1	N; qual (reruns of P3 were within limits)
2	52	Tissue	Inorganic As	63	11	J-/UJ/A (# were within limits)

Comments:

MS.4S2

LDC#: 17000A4
SDG#: See Cover

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer:
2nd Reviewer:

METHOD: Metals (EPA Method 1638)

(Y) N NA Were field duplicate pairs identified in this SDG?
(Y) N NA Were target analytes detected in the field duplicate pairs?

Compound	Concentration (mg/kg)		RPD	
	30	31		
Arsenic	8.101	7.219	12	

V:\FIELD DUPLICATES\FD_inorganic\FDUP.wpd

LDC #: 19546A4
SDG #: W7H084

VALIDATION FINDINGS WORKSHEET
Initial and Continuing Calibration Calculation Verification

Page: 1 of 1
Reviewer: MS
2nd Reviewer: [illegible]

METHOD: Trace Metals (EPA SW 846 Method.6010/7000)

An initial and continuing calibration verification percent recovery (%R) was recalculated for each type of analysis using the following formula:

%R = Found x 100 / True

Where, Found = concentration (in ug/L) of each analyte measured in the analysis of the ICV or CCV solution
True = concentration (in ug/L) of each analyte in the ICV or CCV source

Standard ID	Type of Analysis	Element	Found (ug/L)	True (ug/L)	Recalculated %R	Reported %R	Acceptable (Y/N)
ICV	ICP (Initial calibration)	Ag	50.84	50	102	102	Y
↓	GFAA (Initial calibration) Hybrid	Ag	5.11 mg	5 mg	102	102 *	Y
	CVAA (Initial calibration)						
CCV	ICP (Continuing calibration)	Ag	5.452	5.0	109	109	Y
↓	GFAA (Continuing calibration) Hybrid	Ag	5.38 mg	5 mg	108	108 *	↓
	CVAA (Continuing calibration)						
	Cyanide (Initial calibration)						
	Cyanide (Continuing calibation)						

Comments: Refer to Calibration Verification findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results. * from raw data.

CALCLC.4SW

LDC #: 19546 A4
SDG #: W2004

VALIDATION FINDINGS WORKSHEET
Level IV Recalculation Worksheet

Reviewer: MR
2nd Reviewer: [illegible]

METHOD: Trace Metals (EPA SW 846 Method 6010/7000)

Percent recoveries (%R) for an ICP interference check sample, a laboratory control sample and a matrix spike sample were recaluculated using the following formula:

$$\%R = \frac{Found}{True} \times 100$$

Where, Found = Concentration of each analyte measured in the analysis of the sample. For the matrix spike calculation, Found = SSR (spiked sample result) - SR (sample result).
True = Concentration of each analyte in the source.

A sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

$$RPD = \frac{|S-D|}{(S+D)/2} \times 100$$

Where, S = Original sample concentration
D = Duplicate sample concentration

An ICP serial dilution percent difference (%D) was recalculated using the following formula:

$$\%D = \frac{|I-SDR|}{I} \times 100$$

Where, I = Initial Sample Result (mg/L)
SDR = Serial Dilution Result (mg/L) (Instrument Reading x 5)

Sample ID	Type of Analysis	Element	Found / S / I (units)	True / D / SDR (units)	Recalculated %R / RPD / %D	Reported %R / RPD / %D	Acceptable (Y/N)
MB	ICP interferance check						
LCS	Laboratory control sample	Inorganic Ag	0.926	1.00	93	94	Y
47	Matrix spike	Ag	(SSR-SR) 4.126	4.91	84	84	|
54	Duplicate	Inorganic Ag	6.657	6.457	3	3	|
	ICP serial dilution						

Comments: Refer to appropriate worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 19546A4
SDG #: MN004

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: 1 of 1
Reviewer: MW
2nd reviewer: W

METHOD: Trace Metals (EPA SW 846 Method 6010/7000)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Have results been reported and calculated correctly?
Y N N/A Are results within the calibrated range of the instruments and within the linear range of the ICP?
Y N N/A Are all detection limits below the CRDL?

Detected analyte results for 3, 22 were recalculated and verified using the following equation:

Concentration = $\frac{(RD)(FV)(Dil)}{(In.\ Vol.)(\%S)}$

Recalculation:

#2 Ag = $\frac{26.93\ \mu g/L \times 0.05\ L}{0.519\ g \times 0.7285} = 3.625\ mg/kg$

RD = Raw data concentration
FV = Final volume (ml)
In. Vol. = Initial volume (ml) or weight (G)
Dil = Dilution factor
%S = Decimal percent solids

Sample ID	Analyte	Reported Concentration (mg/kg)	Calculated Concentration (mg/kg)	Acceptable (Y/N)
3	Ag	4.97	4.97	Y
	Thorium Ag	2.750	2.707	↓
22	Ag	3.569	3.625	Y

Lower Duwamish Waterway Group
Data Validation Reports
LDC# 17546

%Solids

LDC

LDC Report# 17546A6

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name:	Lower Duwamish Waterway Group
Collection Date:	August 24 through August 28, 2007
LDC Report Date:	October 9, 2007
Matrix:	Tissue/Sediment
Parameters:	% Solids
Validation Level:	EPA Level III & IV
Laboratory:	Brooks Rand
Sample Delivery Groups (SDG):	WIN004

Sample Identification

LDW-07-C1-Comp	LDW-07-C2-1-S	LDW-07-C10-1-Comp
LDW-07-C1-Comp-dep	LDW-07-C2-2-S**	LDW-07-C10-1-Comp-dep
LDW-07-C2-1-Comp**	LDW-07-C3-1-S	LDW-07-C11-Comp-dep
LDW-07-C2-1-Comp-dep**	LDW-07-C3-2-S**	LDW-07-C12-Comp
LDW-07-C2-2-Comp**	LDW-07-C4-S	LDW-07-C12-Comp-dep
LDW-07-C2-2-Comnp-dep**	LDW-07-C5-S**	LDW-07-C12-S
LDW-07-C3-1-Comp**	LDW-07-C6-S	LDW-07-C1-Comp-depDUP
LDW-07-C3-1-Comp-dep**	LDW-07-C7-S	LDW-07-C4-CompDUP
LDW-07-C3-2-Comp	LDW-07-C9-S	LDW-07-C1-SDUP
LDW-07-C3-2-Comp-dep	LDW-07-C10-2-S	LDW-07-C8-SDUP
LDW-07-C4-Comp	LDW-07-C10-2-S-FD	LDW-07-C8-Comp-depDUP
LDW-07-C4-Comp-dep	LDW-07-C8-S	
LDW-07-C5-Comp	LDW-07-C11-S	
LDW-07-C6-Comp	LDW-07-C10-1-S	
LDW-07-C6-Comp-dep	LDW-07-C5-Comp-dep	
LDW-07-C7-Comp	LDW-07-C7-Comp-dep	
LDW-07-C9-Comp	LDW-07-C8-Comp-dep	
LDW-07-C9-Comp-dep	LDW-07-C10-2-Comp-dep	
LDW-07-C10-2-Comp	LDW-07-C8-Comp	
LDW-07-C1-S	LDW-07-C11-Comp	

**Indicates sample underwent EPA Level IV review

Introduction

This data review covers 18 sediment samples and 33 tissue samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Method 160.3 for Percent Solids.

This review follows the Lower Duwamish Waterway Group Final Fish, Crab, and Clam Tissue Collection and Chemical Analyses Quality Assurance Project Plan (August 23, 2007) and the National Functional Guidelines for Inorganic Data Review (October 2004).

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section III.

Field duplicates are summarized in Section IX.

Samples indicated by a double asterisk on the front cover underwent a EPA Level IV review. A EPA Level III review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Calibration

a. Initial Calibration

All criteria for the initial calibration of each method were met.

b. Calibration Verification

Calibration verification frequency and analysis criteria were met for each method when applicable.

III. Blanks

Method blanks were reviewed for each matrix as applicable. No contaminant concentrations were found in the initial, continuing and preparation blanks.

IV. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) analyses were not required by the method.

V. Duplicates

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable. Results were within QC limits.

VI. Laboratory Control Samples

Laboratory control samples (LCS) analyses were not required by the method.

VII. Sample Result Verification

All sample result verifications were acceptable for samples on which a EPA Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

VIII. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

IX. Field Duplicates

Samples LDW-07-C10-2-S and LDW-07-C10-2-S-FD were identified as field duplicates. No percent solids were detected in any of the samples with the following exceptions:

Analyte	Concentration (mg/L)		RPD
	LDW-07-C10-2-S	LDW-07-C10-2-S-FD	
% Solids	72.830	70.650	3

X. Field Blanks

No field blanks were identified in this SDG.

Lower Duwamish Waterway Group
% Solids - Data Qualification Summary - SDG WIN004

No Sample Data Qualified in this SDG

Lower Duwamish Waterway Group
% Solids - Laboratory Blank Data Qualification Summary - SDG WIN004

No Sample Data Qualified in this SDG

LDC #: 17546A6
SDG #: WIN004
Laboratory: Brooks Rand

VALIDATION COMPLETENESS WORKSHEET
Level III/IV

Date: 10/8/07
Page: 1 of 2
Reviewer: W
2nd Reviewer: W

METHOD: % Solids (EPA Method 160.3)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 8/24/07 - 8/28/07
IIa.	Initial calibration	A	
IIb.	Calibration verification	A	
III.	Blanks	A	
IV	Matrix Spike/Matrix Spike Duplicates	N	Not required
V	Duplicates	A	
VI.	Laboratory control samples	N	Not required
VII.	Sample result verification	A	Not reviewed for Level III validation.
VIII.	Overall assessment of data	A	
IX.	Field duplicates	SW	(30, 31)
X	Field blanks	N	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = No compounds detected; R = Rinsate; FB = Field blank; D = Duplicate; TB = Trip blank; EB = Equipment blank

Validated Samples: ** Indicates sample underwent Level IV validation

1	LDW-07-C1-Comp Tissue	11	LDW-07-C4-Comp Tissue	21	LDW-07-C2-1-S Sediment	31	LDW-07-C10-2-S-FD Sediment
2	LDW-07-C1-Comp-dep	12	LDW-07-C4-Comp-dep	22	LDW-07-C2-2-S**	32	LDW-07-C8-S
3	LDW-07-C2-1-Comp**	13	LDW-07-C5-Comp	23	LDW-07-C3-1-S	33	LDW-07-C11-S
4	LDW-07-C2-1-Comp-dep**	14	LDW-07-C6-Comp	24	LDW-07-C3-2-S**	34	LDW-07-C10-1-S
5	LDW-07-C2-2-Comp**	15	LDW-07-C6-Comp-dep	25	LDW-07-C4-S	35	LDW-07-C5-Comp-dep Tissue
6	LDW-07-C2-2-Comnp-dep**	16	LDW-07-C7-Comp	26	LDW-07-C5-S**	36	LDW-07-C7-Comp-dep
7	LDW-07-C3-1-Comp**	17	LDW-07-C9-Comp	27	LDW-07-C6-S	37	LDW-07-C8-Comp-dep
8	LDW-07-C3-1-Comp-dep**	18	LDW-07-C9-Comp-dep	28	LDW-07-C7-S	38	LDW-07-C10-2-Comp-dep
9	LDW-07-C3-2-Comp	19	LDW-07-C10-2-Comp	29	LDW-07-C9-S	39	LDW-07-C8-Comp
10	LDW-07-C3-2-Comp-dep	20	LDW-07-C1-S Sediment	30	LDW-07-C10-2-S	40	LDW-07-C11-Comp

Notes:

LDC #: 17546A6
SDG #: WIN004
Laboratory: Brooks Rand

VALIDATION COMPLETENESS WORKSHEET
Level III/IV

Date: 6/8/07
Page: 1 of 2
Reviewer: W
2nd Reviewer: R

METHOD: % Solids (EPA Method 160.3)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times		Sampling dates:
IIa.	Initial calibration		
IIb.	Calibration verification		
III.	Blanks		
IV	Matrix Spike/Matrix Spike Duplicates		
V	Duplicates		See page 1
VI.	Laboratory control samples		
VII.	Sample result verification		Not reviewed for Level III validation.
VIII.	Overall assessment of data		
IX.	Field duplicates		
X	Field blanks		

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = No compounds detected; R = Rinsate; FB = Field blank; D = Duplicate; TB = Trip blank; EB = Equipment blank

Validated Samples: ** Indicates sample underwent Level IV validation

41	LDW-07-C10-1-Comp	51	LDW-07-C8-Comp-depDUP	61		71	
42	LDW-07-C10-1-Comp-dep	52		62		72	
43	LDW-07-C11-Comp-dep	53		63		73	
44	LDW-07-C12-Comp	54		64		74	
45	LDW-07-C12-Comp-dep	55		65		75	
46	LDW-07-C12-S	56		66		76	
47	LDW-07-C1-Comp-depDUP	57		67		77	
48	LDW-07-C4-CompDUP	58		68		78	
49	LDW-07-C1-SDUP	59		69		79	
50	LDW-07-C8-SDUP	60		70		80	

Notes:

LDC #: 19546A6
SDG #: 472004

VALIDATION FINDINGS CHECKLIST

Page: 1 of 2
Reviewer: MM
2nd Reviewer:

Method: Inorganics (EPA Method 160.3)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	✓			
Cooler temperature criteria was met.	✓			
II. Calibration				
Were all instruments calibrated daily, each set-up time?			✓	
Were the proper number of standards used?			✓	
Were all initial calibration correlation coefficients ≥ 0.995?			✓	
Were all initial and continuing calibration verification %Rs within the 90-110% QC limits?			✓	
Were titrant checks performed as required? (Level IV only)			✓	
Were balance checks performed as required? (Level IV only)	✓			
III. Blanks				
Was a method blank associated with every sample in this SDG?	✓			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.		✓		
IV. Matrix spike/Matrix spike duplicates and Duplicates				
Were a matrix spike (MS) and duplicate (DUP) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD or MS/DUP. Soil / Water.	✓			Dup only
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the 75-125 QC limits? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.			✓	
Were the MS/MSD or duplicate relative percent differences (RPD) ≤ 20% for waters and ≤ 35% for soil samples? A control limit of ≤ CRDL(≤ 2X CRDL for soil) was used for samples that were ≤ 5X the CRDL, including when only one of the duplicate sample values were ≤ 5X the CRDL.	✓			
V. Laboratory control samples				
Was an LCS anaylzed for this SDG?			✓	
Was an LCS analyzed per extraction batch?			✓	
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 80-120% (85-115% for Method 300.0) QC limits?			✓	
VI. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?			✓	
Were the performance evaluation (PE) samples within the acceptance limits?			✓	

LDC #: 19546A6
SDG #: W7N04

VALIDATION FINDINGS CHECKLIST

Reviewer: MM
2nd Reviewer: A

Validation Area	Yes	No	NA	Findings/Comments
VII. Sample Result Verification				
Were RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
Were detection limits < RL?	✓			
VIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			
IX. Field duplicates				
Field duplicate pairs were identified in this SDG.	✓			
Target analytes were detected in the field duplicates.	✓			
X. Field blanks				
Field blanks were identified in this SDG.		✓		
Target analytes were detected in the field blanks.			✓	

LDC#: 17546A6
SDG#: WIN004

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: [signature]
2nd Reviewer: [signature]

Inorganics, Method EPA 160.3

(Y) N NA Were field duplicate pairs identified in this SDG?
(Y) N NA Were target analytes detected in the field duplicate pairs?

Analyte	Concentration (mg/L)		RPD (≤20)	
	30	31		
% Solids	72.830	70.650	3	

V:\FIELD DUPLICATES\FD_inorganic\17546A6.wpd

LDC #: 19546A6
SDG #: W2N604

VALIDATION FINDINGS WORKSHEET
Level IV Recalculation Worksheet

Reviewer: MM
2nd Reviewer: [illegible]

METHOD: Inorganics, Method 16.3

Percent recoveries (%R) for a laboratory control sample and a matrix spike sample were recalculated using the following formula:

$$\%R = \frac{Found}{True} \times 100$$ Where,

Found = concentration of each analyte measured in the analysis of the sample. For the matrix spike calculation, Found = SSR (spiked sample result) - SR (sample result).

True = concentration of each analyte in the source.

A sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

$$RPD = \frac{|S-D|}{(S+D)/2} \times 100$$ Where,

S = Original sample concentration

D = Duplicate sample concentration

Sample ID	Type of Analysis	Element	Found / S (units)	True / D (units)	Recalculated %R / RPD	Reported %R / RPD	Acceptable (Y/N)
	Laboratory control sample						
	Matrix spike sample		(SSR-SR)				
49	Duplicate sample	% S	7260	99.85	3	3	Y

Comments: Refer to appropriate worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 19546A6
SDG #: W1N004

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: 1 of 1
Reviewer: MH
2nd reviewer:

METHOD: Inorganics, Method 1663

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

(Y) N N/A Have results been reported and calculated correctly?
(Y) N N/A Are results within the calibrated range of the instruments?
(Y) N N/A Are all detection limits below the CRQL?

Compound (analyte) results for 3, 22 reported with a positive detect were recalculated and verified using the following equation:

#3 Concentration = Recalculation:

$$\% \text{ Solids} = \frac{(\text{Grow dry wt.} - \text{Tare wt}) \times 100\%}{(\text{Grow wet wt} - \text{Tare wt})}$$

$$\% \text{ Solid} = \frac{(1.922 - 1.038) \times 100\ \%}{5.550 - 1.038}$$

$$= 19.5922\ \%$$

#	Sample ID	Analyte	Reported Concentration (%)	Calculated Concentration (%)	Acceptable (Y/N)
1	3	~~TOT~~ % Solids	19.590	19.590	Y
2	22	% Solids	72.850	72.85	Y

Note:

LABORATORY DATA CONSULTANTS, INC.
7750 El Camino Real, Suite 2L Carlsbad, CA 92009 Phone: 760/634-0437 Fax: 760/634-0439

Windward Environmental, LLC
200 West Mercer Street, Suite 401
Seattle, WA 98119
ATTN: Ms. Marina Mitchell

November 8, 2007

SUBJECT: Lower Duwamish Waterway Group, Data Validation

Dear Ms. Mitchell,

Enclosed are the final validation reports for the fractions listed below. This SDG was received on October 19, 2007. Attachment 1 is a summary of the samples that were reviewed for each analysis.

LDC Project # 17648:

SDG #	Fraction
LO74	Polychlorinated Biphenyls, % Lipids

The data validation was performed under EPA Level III and Level IV guidelines. The analyses were validated using the following documents, as applicable to each method:

- Lower Duwamish Waterway Group Final Fish, Crab, and Clam Tissue Collection and Chemical Analyses Quality Assurance Project Plan, August 2007
- USEPA, Contract Laboratory Program National Functional Guidelines for Organic Data Review, October 1999
- USEPA, Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, October 2004
- EPA SW 846, Third Edition, Test Methods for Evaluating Solid Waste, update 1, July 1992; update IIA, August 1993; update II, September 1994; update IIB, January 1995; update III, December 1996; update IIIA, April 1998

Please feel free to contact us if you have any questions.

Sincerely,

Stella S. Cuenco
Project Manager/Senior Chemist

V:\LOGIN\Windward\Duwamish\17648COV.wpd

Attachment 1

EDD

LDC #17648 (Windward Environmental, LLC - Seattle WA / Lower Duwamish Waterway Group)

LDC	SDG#	DATE REC'D	(3) DATE DUE	PCBs (8082)		% Lipids (D/B)																											
Matrix: Water/Tissue				W	T	W	T	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	LO74	10/19/07	11/09/07	0	12	-	-																										
A	LO74	10/19/07	11/09/07	-	-	0	12																										
Total	B/SC			0	12	0	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	24

Shaded cells indicate Level IV validation (all other cells are Level III validation). These sample counts do not include MS/MSD, and DUPs

Lower Duwamish Waterway Group
Data Validation Reports
LDC# 17648

PCBs

LDC

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Lower Duwamish Waterway Group

Collection Date: August 24 through August 27, 2007

LDC Report Date: November 5, 2007

Matrix: Tissue

Parameters: Polychlorinated Biphenyls

Validation Level: EPA Level III

Laboratory: Analytical Resources, Inc.

Sample Delivery Group (SDG): LO74

LDW-07-C2-1-comp
LDW-07-C2-1-comp-dep
LDW-07-C6-comp
LDW-07-C6-comp-dep
LDW-07-C7-comp
LDW-07-C7-comp-dep
LDW-07-C8-comp
LDW-07-C8-comp-dep
LDW-07-C9-comp
LDW-07-C9-comp-dep
LDW-07-C10-1-comp
LDW-07-C10-1-comp-dep
LDW-07-C9-compMS
LDW-07-C9-compMSD
LDW-07-C8-compDL

Introduction

This data review covers 15 tissue samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8082 for Polychlorinated Biphenyls.

This review follows the Lower Duwamish Waterway Group Final Fish, Crab, and Clam Tissue Collection and Chemical Analyses Quality Assurance Project Plan (August 23, 2007) and the National Functional Guidelines for Organic Data Review (October 1999).

Blank results are summarized in Section V.

Field duplicates are summarized in Section XIV.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/ECD Instrument Performance Check

Instrument performance was acceptable unless noted otherwise under initial calibration and continuing calibration sections.

III. Initial Calibration

Initial calibration of multicomponent compounds was performed for the primary (quantitation) column as required by the method.

The percent relative standard deviations (%RSD) were less than or equal to 20.0% for all compounds.

IV. Continuing Calibration

Continuing calibration was performed at required frequencies.

The percent differences (%D) of calibration factors in continuing standard mixtures were within the 15.0% QC limits.

The percent difference (%D) of the second source calibration standard were less than or equal to 15.0% for all compounds.

V. Blanks

Method blanks were reviewed for each matrix as applicable. No polychlorinated biphenyl contaminants were found in the method blanks.

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits.

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Pesticide Cleanup Checks

a. Florisil Cartridge Check

Although sulfuric acid cleanup was not required by the method, sulfuric acid cleanup was performed by the laboratory for several samples in this SDG.

Florisil cleanup was not required and therefore not performed in this SDG.

b. GPC Calibration

GPC cleanup was not required and therefore not performed in this SDG.

XI. Target Compound Identification

Raw data were not reviewed for this SDG.

XII. Compound Quantitation and Reported CRQLs

All compound quantitation and CRQLs were within validation criteria with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
LDW-07-C8-comp	Aroclor-1254	Sample result exceeded calibration range.	Reported result should be within calibration range.	NA	-

N/A = Not applicable

For the results above flagged "Not applicable", the affected compound results in the associated samples were deemed unusable and did not warrant qualification of the data.

Raw data were not reviewed for this SDG.

XIII. Overall Assessment of Data

The overall assessment of data was acceptable. In the case where more than one result was reported for an individual sample, the least technically acceptable results were rejected as follows:

Sample	Compound	Flag	A or P
LDW-07-C8-comp	Aroclor-1254	R	A
LDW-07-C8-compDL	All TCL compounds except Aroclor-1254	R	A

Data flags are summarized at the end of this report if data has been qualified.

XIV. Field Replicates

No field replicates were identified in this SDG.

XV. Field Blanks

No field blanks were identified in this SDG.

Lower Duwamish Waterway Group
Polychlorinated Biphenyls - Data Qualification Summary - SDG LO74

SDG	Sample	Compound	Flag	A or P	Reason
LO74	LDW-07-C8-comp	Aroclor-1254	R	A	Overall assessment of data
LO74	LDW-07-C8-compDL	All TCL compounds except Aroclor-1254	R	A	Overall assessment of data

Lower Duwamish Waterway Group
Polychlorinated Biphenyls - Laboratory Blank Data Qualification Summary - SDG LO74

No Sample Data Qualified in this SDG

LDC #: 17648A3b

SDG #: LO74

Laboratory: Analytical Resources, Inc.

VALIDATION COMPLETENESS WORKSHEET

Level III

Date: 11/2/07

Page: 1 of 1

Reviewer: [illegible]

2nd Reviewer: [illegible]

METHOD: GC Polychlorinated Biphenyls (EPA SW 846 Method 8082)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 8/24 → 8/27/07
II.	GC/ECD Instrument Performance Check	NA	
III.	Initial calibration	A	
IV.	Continuing calibration	A	ICV ≤ 15
V.	Blanks	A	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	A	
VIII.	Laboratory control samples	A	LCS
IX.	Regional quality assurance and quality control	N	
Xa.	Florisil cartridge check	N	# 4, 5, 7 → 9 sulfur clean up performed
Xb.	GPC Calibration	N	
XI.	Target compound identification	N	
XII.	Compound quantitation and reported CRQLs	SW	
XIII.	Overall assessment of data	SW	
XIV.	Field duplicates	N	
XV.	Field blanks	N	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = No compounds detected; R = Rinsate; FB = Field blank; D = Duplicate; TB = Trip blank; EB = Equipment blank

Validated Samples:

Tissue

1	LDW-07-C2-1-comp	11	LDW-07-C10-1-comp	21	LO74MBST	31	
2	LDW-07-C2-1-comp-dep	12	LDW-07-C10-1-comp-dep	22	MB-092507	32	
3	LDW-07-C6-comp	13	LDW-07-C9-compMS	23		33	
4	LDW-07-C6-comp-dep ✓	14	LDW-07-C9-compMSD	24		34	
5	LDW-07-C7-comp ✓	15	LDW-07-C8-comp	25	DL	35	
6	LDW-07-C7-comp-dep	16		26		36	
7	LDW-07-C8-comp ✓	17		27		37	
8	LDW-07-C8-comp-dep ✓	18		28		38	
9	LDW-07-C9-comp ✓	19		29		39	
10	LDW-07-C9-comp-dep	20		30		40	

VALIDATION FINDINGS WORKSHEET

METHOD: Pesticide/PCBs (EPASW 846 Method 8081/8082)

A. alpha-BHC	I. Dieldrin	Q. Endrin ketone	Y. Aroclor-1242	GG.
B. beta-BHC	J. 4,4'-DDE	R. Endrin aldehyde	Z. Aroclor-1248	HH.
C. delta-BHC	K. Endrin	S. alpha-Chlordane	AA. Aroclor-1254	II.
D. gamma-BHC	L. Endosulfan II	T. gamma-Chlordane	BB. Aroclor-1260	JJ.
E. Heptachlor	M. 4,4'-DDD	U. Toxaphene	CC. DB 608	KK.
F. Aldrin	N. Endosulfan sulfate	V. Aroclor-1016	DD. DB 1701	LL.
G. Heptachlor epoxide	O. 4,4'-DDT	W. Aroclor-1221	EE.	MM.
H. Endosulfan I	P. Methoxychlor	X. Aroclor-1232	FF.	NN.

Notes: _____

LDC #: 17648136
SDG #: all covered

VALIDATION FINDINGS WORKSHEET
Compound Quantitation and Reported CRQLs

Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: ___ GC ___ HPLC

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Level IV/D Only

Y N N/A Were CRQLs adjusted for sample dilutions, dry weight factors, etc.?
Y N N/A Did the reported results for detected target compounds agree within 10.0% of the recalculated results?

#	Compound Name	Finding	Associated Samples	Qualifications
	AA	exceeded cal Range	[illegible] 7	NA

Comments: See sample calculation verification worksheet for recalculations

LDC #: 17648A36
SDG #: per cover

VALIDATION FINDINGS WORKSHEET
Overall Assessment of Data

Page: 1 of 1
Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: __ GC __ HPLC

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

All available information pertaining to the data were reviewed using professional judgement to compliment the determination of the overall quality of the data.

Y N N/A Was the overall quality and usability of the data acceptable?

#	Compound Name	Finding	Associated Samples	Qualifications
	AA	exceeded cal Range	7	R/A
	All except AA	diluted	15	R/A

Comments: _____

Lower Duwamish Waterway Group
Data Validation Reports
LDC# 17648

% Lipids

LDC

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name:	Lower Duwamish Waterway Group
Collection Date:	August 24 through August 27, 2007
LDC Report Date:	November 6, 2007
Matrix:	Tissue
Parameters:	% Lipids
Validation Level:	EPA Level IV
Laboratory:	Analytical Resources, Inc.
Sample Delivery Groups (SDG):	LO74

Sample Identification

LDW-07-C2-1-comp
LDW-07-C2-1-comp-dep
LDW-07-C6-comp
LDW-07-C6-comp-dep
LDW-07-C7-comp
LDW-07-C7-comp-dep
LDW-07-C8-comp
LDW-07-C8-comp-dep
LDW-07-C9-comp
LDW-07-C9-comp-dep
LDW-07-C10-1-comp
LDW-07-C10-1-comp-dep
LDW-07-C9-compDUP
LDW-07-C9-compTRP

Introduction

This data review covers 14 tissue samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per the Bligh & Dyer Method for Percent Lipids.

This review follows the Lower Duwamish Waterway Group Final Fish, Crab, and Clam Tissue Collection and Chemical Analyses Quality Assurance Project Plan (August 23, 2007) and the National Functional Guidelines for Inorganic Data Review (October 2004).

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section III.

Field duplicates are summarized in Section IX.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Calibration

a. Initial Calibration

Initial calibration data were not provided and therefore not reviewed.

b. Calibration Verification

Continuing calibration data were not provided and therefore not reviewed.

III. Blanks

Method blanks were reviewed for each matrix as applicable. No contaminant concentrations were found in the initial, continuing and preparation blanks.

IV. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) analyses were not required by the method.

V. Duplicates

Duplicate (DUP) and triplicate (TRP) sample analyses were reviewed for each matrix as applicable. Results were within QC limits.

VI. Laboratory Control Samples

Laboratory control samples (LCS) analyses were not required by the method.

VII. Sample Result Verification

All sample result verifications were acceptable.

VIII. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

IX. Field Duplicates

No field duplicates were identified in this SDG.

X. Field Blanks

No field blanks were identified in this SDG.

Lower Duwamish Waterway Group
% Lipids - Data Qualification Summary - SDG LO74

No Sample Data Qualified in this SDG

Lower Duwamish Waterway Group
% Lipids - Laboratory Blank Data Qualification Summary - SDG LO74

No Sample Data Qualified in this SDG

LDC #: 17648A6 **VALIDATION COMPLETENESS WORKSHEET** Date: 10/1/07
SDG #: LO74 Level IV Page: 1 of 1
Laboratory: Analytical Resources, Inc. Reviewer: MY
2nd Reviewer: MY

METHOD: Percent Lipids (Bligh & Dyer)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 8/24-27/07
IIa.	Initial calibration	A	Balance check NP/NR
IIb.	Calibration verification	N	
III.	Blanks	A	
IV	Matrix Spike/Matrix Spike Duplicates	A	~~Triplicate~~ MS not applicable
V	Duplicates	A	Triplicate
VI.	Laboratory control samples	N	
VII.	Sample result verification	A	
VIII.	Overall assessment of data	A	
IX.	Field duplicates	N	
X.	Field blanks	N	

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank

Validated Samples: tissues

1	LDW-07-C2-1-comp	11	LDW-07-C10-1-comp	21		31	
2	LDW-07-C2-1-comp-dep	12	LDW-07-C10-1-comp-dep	22		32	
3	LDW-07-C6-comp	13	LDW-07-C9-compDUP	23		33	
4	LDW-07-C6-comp-dep	14	LDW-07-C9-compTRP	24		34	
5	LDW-07-C7-comp	15	MB	25		35	
6	LDW-07-C7-comp-dep	16		26		36	
7	LDW-07-C8-comp	17		27		37	
8	LDW-07-C8-comp-dep	18		28		38	
9	LDW-07-C9-comp	19		29		39	
10	LDW-07-C9-comp-dep	20		30		40	

Notes:

LDC #: 17648A6
SDG #: L074

VALIDATION FINDINGS CHECKLIST

Reviewer: MB
2nd Reviewer: MF

Method: Inorganics (EPA Method 2 Liquids)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	✓			Samples kept frozen until the day before extraction 9/25/17
Cooler temperature criteria was met.	✓			
II. Calibration				
Were all instruments calibrated daily, each set-up time?			✓	
Were the proper number of standards used?			✓	
Were all initial calibration correlation coefficients ≥ 0.995?			✓	
Were all initial and continuing calibration verification %Rs within the 90-110% QC limits?			✓	
Were titrant checks performed as required? (Level IV only)			✓	
Were balance checks performed as required? (Level IV only)			✓	not provided
III. Blanks				
Was a method blank associated with every sample in this SDG?	✓			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.		✓		
IV. Matrix spike/Matrix spike duplicates and Duplicates				
Were a matrix spike (MS) and duplicate (DUP) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD or MS/DUP. Soil / Water.		✓		
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the 75-125 QC limits? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.			✓	
Were the MS/MSD or duplicate relative percent differences (RPD) ≤ 20% for waters and ≤ 35% for soil samples? A control limit of ≤ CRDL(≤ 2X CRDL for soil) was used for samples that were ≤ 5X the CRDL, including when only one of the duplicate sample values were < 5X the CRDL.	✓			triplicate
V. Laboratory control samples				
Was an LCS anaylzed for this SDG?		✓		
Was an LCS analyzed per extraction batch?		✓		
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 80-120% (85-115% for Method 300.0) QC limits?			✓	
VI. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?		✓		
Were the performance evaluation (PE) samples within the acceptance limits?			✓	

LDC #: 17648A6
SDG #: L074

VALIDATION FINDINGS CHECKLIST

Reviewer: VV
2nd Reviewer: 3rd

Validation Area	Yes	No	NA	Findings/Comments
VII. Sample Result Verification				
Were RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
Were detection limits < RL?	✓			
VIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			
IX. Field duplicates				
Field duplicate pairs were identified in this SDG.		✓		
Target analytes were detected in the field duplicates.			✓	
X. Field blanks				
Field blanks were identified in this SDG.		✓		
Target analytes were detected in the field blanks.			✓	

LDC #: 17648A6
SDG #: L074

VALIDATION FINDINGS WORKSHEET
Level IV Recalculation Worksheet

Reviewer: MY
2nd Reviewer: [illegible]

METHOD: Inorganics, Method 2 Lipids

Percent recoveries (%R) for a laboratory control sample and a matrix spike sample were recalculated using the following formula:

$$\%R = \frac{Found}{True} \times 100$$ Where,

Found = concentration of each analyte measured in the analysis of the sample. For the matrix spike calculation, Found = SSR (spiked sample result) - SR (sample result).

True = concentration of each analyte in the source.

A sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

$$RPD = \frac{|S-D|}{(S+D)/2} \times 100$$ Where,

S = Original sample concentration

D = Duplicate sample concentration

Sample ID	Type of Analysis	Element	Found / S (units)	True / D (units)	Recalculated %R / RPD	Reported %R / RPD	Acceptable (Y/N)
	Laboratory control sample	N/A					
	Matrix spike sample		(SSR-SR)				
13	Duplicate sample	Lipids	0.994%	1.08%	8.3	8.3	Y

Comments: Refer to appropriate worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 17648A6
SDG #: L074

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Reviewer: MT
2nd reviewer: MT

METHOD: Inorganics, Method Lipids

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Have results been reported and calculated correctly?
Y N N/A Are results within the calibrated range of the instruments?
Y N N/A Are all detection limits below the CRQL?

Compound (analyte) results for Lipids reported with a positive detect were recalculated and verified using the following equation:

Concentration = Recalculation:

$$\%\ \text{Lipids} = \frac{\text{Jar+spl. wt.} - \text{Jar weight}}{\text{original sample wt.}} \times 100 = \frac{1.1574 - 1.1153}{5.03\text{g}} \times 100 = .837\ \%$$

#	Sample ID	Analyte	Reported Concentration (%)	Calculated Concentration (%)	Acceptable (Y/N)
1	2	% Lipids	0.835	0.837	Y

Note:

LABORATORY DATA CONSULTANTS, INC.
7750 El Camino Real, Suite 2L Carlsbad, CA 92009 Phone: 760/634-0437 Fax: 760/634-0439

Windward Environmental, LLC
200 West Mercer Street, Suite 401
Seattle, WA 98119
ATTN: Ms. Marina Mitchell

November 8, 2007

SUBJECT: Lower Duwamish Waterway Group, Data Validation

Dear Ms. Mitchell,

Enclosed is the final validation report for the fraction listed below. This SDG was received on October 23, 2007. Attachment 1 is a summary of the samples that were reviewed for each analysis.

LDC Project # 17652:

SDG #	Fraction
LO75	% Lipids

The data validation was performed under EPA Level III and Level IV guidelines. The analyses were validated using the following documents, as applicable to each method:

- Lower Duwamish Waterway Group Final Fish, Crab, and Clam Tissue Collection and Chemical Analyses Quality Assurance Project Plan, August 2007
- USEPA, Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, October 2004
- EPA SW 846, Third Edition, Test Methods for Evaluating Solid Waste, update 1, July 1992; update IIA, August 1993; update II, September 1994; update IIB, January 1995; update III, December 1996; update IIIA, April 1998

Please feel free to contact us if you have any questions.

Sincerely,

Stella S. Cuenco
Project Manager/Senior Chemist

Attachment 1

LDC #17652 (Windward Environmental, LLC - Seattle WA / Lower Duwamish Waterway Group)

EDD

LDC	SDG#	DATE REC'D	(3) DATE DUE	% Lipids (D/B)																													
Matrix:	Water/Tissue			W	T	W	T	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	LO75	10/23/07	11/13/07	0	10																												
A	LO75	10/23/07	11/13/07	0	8																												
Total	B/SC			0	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18

Shaded cells indicate Level IV validation (all other cells are Level III validation). These sample counts do not include MS/MSD, and DUPs

Lower Duwamish Waterway Group
Data Validation Reports
LDC# 17652

% Lipids

LDC

LDC Report# 17652A6

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name:	Lower Duwamish Waterway Group
Collection Date:	August 24 through August 28, 2007
LDC Report Date:	November 6, 2007
Matrix:	Tissue
Parameters:	% Lipids
Validation Level:	EPA Level III & IV
Laboratory:	Analytical Resources, Inc.
Sample Delivery Groups (SDG):	LO75

Sample Identification

LDW-07-C1-comp**
LDW-07-C1-comp-dep**
LDW-07-C2-2-comp**
LDW-07-C2-2-comp-dep**
LDW-07-C3-1-comp
LDW-07-C3-1-comp-dep
LDW-07-C3-2-comp
LDW-07-C3-2-comp-dep
LDW-07-C4-comp
LDW-07-C4-comp-dep
LDW-07-C5-comp**
LDW-07-C5-comp-dep**
LDW-07-C10-2-comp**
LDW-07-C10-2-comp-dep**
LDW-07-C11-comp
LDW-07-C11-comp-dep
LDW-07-C12-comp
LDW-07-C12-comp-dep
LDW-07-C1-compDUP

**Indicates sample underwent EPA Level IV review

Introduction

This data review covers 19 tissue samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per the Bligh & Dyer Method for Percent Lipids.

This review follows the Lower Duwamish Waterway Group Final Fish, Crab, and Clam Tissue Collection and Chemical Analyses Quality Assurance Project Plan (August 23, 2007) and the National Functional Guidelines for Inorganic Data Review (October 2004).

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section III.

Field duplicates are summarized in Section IX.

Samples indicated by a double asterisk on the front cover underwent a EPA Level IV review. A EPA Level III review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Calibration

a. Initial Calibration

Initial calibration data were not provided and therefore not reviewed.

b. Calibration Verification

Continuing calibration data were not provided and therefore not reviewed.

III. Blanks

Method blanks were reviewed for each matrix as applicable. No contaminant concentrations were found in the initial, continuing and preparation blanks.

IV. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) analyses were not required by the method.

V. Duplicates

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable. Results were within QC limits.

VI. Laboratory Control Samples

Laboratory control samples (LCS) analyses were not required by the method.

VII. Sample Result Verification

All sample result verifications were acceptable for samples on which a EPA Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

VIII. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

IX. Field Duplicates

No field duplicates were identified in this SDG.

X. Field Blanks

No field blanks were identified in this SDG.

Lower Duwamish Waterway Group
% Lipids - Data Qualification Summary - SDG LO75

No Sample Data Qualified in this SDG

Lower Duwamish Waterway Group
% Lipids - Laboratory Blank Data Qualification Summary - SDG LO75

No Sample Data Qualified in this SDG

LDC #: 17652A6 **VALIDATION COMPLETENESS WORKSHEET** Date: 11/1/07
SDG #: LO75 Level IV Page: 1 of 1
Laboratory: Analytical Resources, Inc. Reviewer: VM
2nd Reviewer: GM

METHOD: Percent Lipids (Bligh & Dyer)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 8/24 - 28/07
IIa.	Initial calibration	N	NP/NR (Balance check)
IIb.	Calibration verification	N	
III.	Blanks	A	
IV	Matrix Spike/Matrix Spike Duplicates	N	
V	Duplicates	A	
VI.	Laboratory control samples	N	
VII.	Sample result verification	A	
VIII.	Overall assessment of data	A	
IX.	Field duplicates	N	
X	Field blanks	N	

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank

Validated Samples: tissues

1	LDW-07-C1-comp **	11	LDW-07-C5-comp **	21		31	
2	LDW-07-C1-comp-dep	12	LDW-07-C5-comp-dep	22		32	
3	LDW-07-C2-2-comp	13	LDW-07-C10-2-comp	23		33	
4	LDW-07-C2-2-comp-dep	14	LDW-07-C10-2-comp-dep	24		34	
5	LDW-07-C3-1-comp	15	LDW-07-C11-comp	25		35	
6	LDW-07-C3-1-comp-dep	16	LDW-07-C11-comp-dep	26		36	
7	LDW-07-C3-2-comp	17	LDW-07-C12-comp	27		37	
8	LDW-07-C3-2-comp-dep	18	LDW-07-C12-comp-dep	28		38	
9	LDW-07-C4-comp	19	LDW-07-C1-compDUP	29		39	
10	LDW-07-C4-comp-dep	20	NMB	30		40	

Notes: _____

LDC #: 17652A6
SDG #: L075

VALIDATION FINDINGS CHECKLIST

Reviewer: MF
2nd Reviewer: amf

Method: Inorganics (EPA Method 1o Lipids

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	✓			Samples frozen until analysis
Cooler temperature criteria was met.	✓			
II. Calibration				
Were all instruments calibrated daily, each set-up time?			✓	
Were the proper number of standards used?			✓	
Were all initial calibration correlation coefficients ≥ 0.995?			✓	
Were all initial and continuing calibration verification %Rs within the 90-110% QC limits?			✓	
Were titrant checks performed as required? (Level IV only)			✓	
Were balance checks performed as required? (Level IV only)			✓	not provided
III. Blanks				
Was a method blank associated with every sample in this SDG?	✓			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.		✓		
IV. Matrix spike/Matrix spike duplicates and Duplicates				
Were a matrix spike (MS) and duplicate (DUP) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD or MS/DUP. Soil / Water.			✓	
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the 75-125 QC limits? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.			✓	
Were the MS/MSD or duplicate relative percent differences (RPD) ≤ 20% for waters and ≤ 35% for soil samples? A control limit of ≤ CRDL(≤ 2X CRDL for soil) was used for samples that were ≤ 5X the CRDL, including when only one of the duplicate sample values were < 5X the CRDL.	✓			
V. Laboratory control samples				
Was an LCS anaylzed for this SDG?		✓		
Was an LCS analyzed per extraction batch?		✓		
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 80-120% (85-115% for Method 300.0) QC limits?			✓	
VI. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?		✓		
Were the performance evaluation (PE) samples within the acceptance limits?			✓	

LDC #: 17652A6
SDG #: L075

VALIDATION FINDINGS CHECKLIST

Reviewer: MT
2nd Reviewer: MTG

Validation Area	Yes	No	NA	Findings/Comments
VII. Sample Result Verification				
Were RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
Were detection limits < RL?	✓			
VIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			
IX. Field duplicates				
Field duplicate pairs were identified in this SDG.		✓		
Target analytes were detected in the field duplicates.			✓	
X. Field blanks				
Field blanks were identified in this SDG.		✓		
Target analytes were detected in the field blanks.			✓	

LDC #: 17652A6
SDG #: L075

VALIDATION FINDINGS WORKSHEET
Level IV Recalculation Worksheet

Reviewer: VV
2nd Reviewer: GW

METHOD: Inorganics, Method See Cover

Percent recoveries (%R) for a laboratory control sample and a matrix spike sample were recalculated using the following formula:

$\%R = \frac{Found}{True} \times 100$ Where, Found = concentration of each analyte measured in the analysis of the sample. For the matrix spike calculation, Found = SSR (spiked sample result) - SR (sample result).
True = concentration of each analyte in the source.

A sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

$RPD = \frac{|S-D|}{(S+D)/2} \times 100$ Where, S = Original sample concentration
D = Duplicate sample concentration

Sample ID	Type of Analysis	Element	Found / S (units)	True / D (units)	Recalculated %R / RPD	Reported %R / RPD	Acceptable (Y/N)
	Laboratory control sample	N/A					
	Matrix spike sample		(SSR-SR)				
19	Duplicate sample	% Lipids	0.689%	0.680%	1.3	1.3	Y

Comments: Refer to appropriate worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 17652A6
SDG #: L075

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: 1 of 1
Reviewer: MY
2nd reviewer: MY

METHOD: Inorganics, Method % Lipids

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

(Y) N N/A Have results been reported and calculated correctly?
(Y) N N/A Are results within the calibrated range of the instruments?
(Y) N N/A Are all detection limits below the CRQL?

Compound (analyte) results for % Lipids reported with a positive detect were recalculated and verified using the following equation:

Concentration = Recalculation:

$$\frac{\text{Jar + Sample} - \text{Jar}}{\text{Spl. wt.}} \times 100 = \frac{1.2271 - 1.1248}{10} \times 100 = 1.023$$

#	Sample ID	Analyte	Reported Concentration (%)	Calculated Concentration (%)	Acceptable (Y/N)
1	14	% Lipids	1.02	1.02	Y

Note:

LABORATORY DATA CONSULTANTS, INC.
7750 El Camino Real, Suite 2L Carlsbad, CA 92009 Phone: 760/634-0437 Fax: 760/634-0439

Windward Environmental, LLC
200 West Mercer Street, Suite 401
Seattle, WA 98119
ATTN: Ms. Marina Mitchell

February 26, 2008

SUBJECT: Lower Duwamish Waterway Group, Data Validation

Dear Ms. Mitchell,

Enclosed is the revised data validation report for the fraction listed below. Please replace the previously submitted report with the enclosed revised report.

SDG#	LDC#	Fraction
LT29	18015A3b	Polychlorinated Biphenyls
LT32	18015D3b	Polychlorinated Biphenyls
LT33	18015E3b	Polychlorinated Biphenyls

Please feel free to contact us if you have any questions.

Sincerely,

Stella S. Cuenco
Project Manager/Senior Chemist

LABORATORY DATA CONSULTANTS, INC.
7750 El Camino Real, Suite 2L Carlsbad, CA 92009 Phone: 760/634-0437 Fax: 760/634-0439

Windward Environmental, LLC
200 West Mercer Street, Suite 401
Seattle, WA 98119
ATTN: Ms. Marina Mitchell

January 14, 2008

SUBJECT: Lower Duwamish Waterway Group, Data Validation

Dear Ms. Mitchell,

Enclosed are the final validation reports for the fractions listed below. These SDGs were received on December 24, 2007. Attachment 1 is a summary of the samples that were reviewed for each analysis.

LDC Project # 18015:

SDG #	Fraction
LT29, LT30, LT31, LT32, LT33, LT34	Polychlorinated Biphenyls, % Lipids & Total Solids

The data validation was performed under EPA Level III and Level IV guidelines. The analyses were validated using the following documents, as applicable to each method:

- Lower Duwamish Waterway Group Final Fish, Crab, and Clam Tissue Collection and Chemical Analyses Quality Assurance Project Plan, August 2007
- USEPA, Contract Laboratory Program National Functional Guidelines for Organic Data Review, October 1999
- USEPA, Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, October 2004
- EPA SW 846, Third Edition, Test Methods for Evaluating Solid Waste, update 1, July 1992; update IIA, August 1993; update II, September 1994; update IIB, January 1995; update III, December 1996; update IIIA, April 1998

Please feel free to contact us if you have any questions.

Sincerely,

Stella S. Cuenco
Project Manager/Senior Chemist

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Attachment 1

EDD **LDC #18015 (Windward Environmental, LLC - Seattle WA / Lower Duwamish Waterway Group)**

LDC	SDG#	DATE REC'D	(3) DATE DUE	PCBs (8082)		% Lipids (D/B)		Total Solids (160.3)																									
Matrix: Water/Tissue				W	T	W	T	W	T	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	LT29	12/24/07	01/16/08	0	20	0	20	0	20																								
B	LT30	12/24/07	01/16/08	0	9	0	9	0	9																								
C	LT31	12/24/07	01/16/08	0	12	0	12	0	12																								
D	LT32	12/24/07	01/16/08	0	11	0	11	0	11																								
E	LT33	12/24/07	01/16/08	0	18	0	18	0	18																								
F	LT34	12/24/07	01/16/08	0	4	0	4	0	4																								
Total	T/SC			0	74	0	74	0	74	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	222

Shaded cells indicate Level IV validation (all other cells are Level II validation). These sample counts do not include DL, RE, RX, MS/MSD, and DUPs

Lower Duwamish Waterway Group
Data Validation Reports
LDC# 18015

PCBs

LDC

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Lower Duwamish Waterway Group

Collection Date: September 4 through September 7, 2007

LDC Report Date: September 25, 2008

Matrix: Tissue

Parameters: Polychlorinated Biphenyls

Validation Level: EPA Level IV

Laboratory: Analytical Resources, Inc.

Sample Delivery Group (SDG): LT29

***Sample Identification**

LDW-07-T1-M-DC-EM-comp1
LDW-07-T3-M-DC-EM-comp1
LDW-07-T3-M-DC -EM-comp2
LDW-07-T3-M-DC-EM-comp3
LDW-07-T1-M-SC-EM-comp1
LDW-07-T1-M-SC-EM-comp2
LDW-07-T1-M-SC-EM-comp3
LDW-07-T2-M-SC-EM-comp1
LDW-07-T2-M-SC-EM-comp2
LDW-07-T2-M-SC-EM-comp3
LDW-07-T1-M-DC-HP-comp1
LDW-07-T3-M-DC-HP-comp1
LDW-07-T3-M-DC-HP-comp2
LDW-07-T3-M-DC-HP-comp3
LDW-07-T1-M-SC-HP-comp1
LDW-07-T1-M-SC-HP-comp2
LDW-07-T1-M-SC-HP-comp3
LDW-07-T2-M-SC-HP-comp1
LDW-07-T2-M-SC-HP-comp2
LDW-07-T2-M-SC-HP-comp3
LDW-07-T3-M-DC-EM-comp3MS
LDW-07-T3-M-DC-EM-comp3MSD
LDW-07-T3-M-DC-HP-comp3MS
LDW-07-T3-M-DC-HP-comp3MSD
LDW-07-T3-M-DC-HP-comp3RE

*Removed several samples from above sample list.

Introduction

This data review covers *25 tissue samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8082 for Polychlorinated Biphenyls.

*This review follows the Lower Duwamish Waterway Group Final Fish, Crab, and Clam Tissue Collection and Chemical Analyses Quality Assurance Project Plan (August 23, 2007) and the National Functional Guidelines for *Organic Data Review (October 1999).

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section III.

Field duplicates are summarized in Section IX.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/ECD Instrument Performance Check

Instrument performance was acceptable unless noted otherwise under initial calibration and continuing calibration sections.

III. Initial Calibration

Initial calibration of multicomponent compounds was performed for the primary (quantitation) column as required by the method.

The percent relative standard deviations (%RSD) were less than or equal to 20.0% for all compounds.

Retention time windows were evaluated and considered technically acceptable.

IV. Continuing Calibration

Continuing calibration was performed at required frequencies.

The percent differences (%D) of calibration factors in continuing standard mixtures were within the 15.0% QC limits.

The percent difference (%D) of the second source calibration standard were less than or equal to 15.0% for all compounds.

Retention times (RT) of all compounds in the calibration standards were within QC limits.

V. Blanks

Method blanks were reviewed for each matrix as applicable. No polychlorinated biphenyl contaminants were found in the method blanks.

*VI. Surrogate Spikes and Internal Standards

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits with the following exceptions:

Sample	Surrogate	%R (Limits)	Compound	Flag	A or P
LDW-07-T1-M-DC-EM-comp1	Tetrachloro-m-xylene	25.5 (33-121)	All TCL compounds	NA	-
LDW-07-T1-M-SC-EM-comp1	Tetrachloro-m-xylene	29.7 (33-121)	All TCL compounds	NA	-
LDW-07-T2-M-SC-EM-comp2	Tetrachloro-m-xylene	27.3 (33-121)	All TCL compounds	NA	-

*Removed several samples from above findings table.

For the results above flagged "Not applicable", only Tetrachloro-m-xylene percent recoveries (%R) were outside the QC limits. Using professional judgement, these findings did not warrant the qualification of the data.

All internal standard areas and retention times were within QC limits with the following exceptions:

Sample	Column	Internal Standards	Area (Limits)	Compound	Flag	A or P
MB-110807-2	ZB-5	Hexabromobiphenyl	25102480 (5419634-21678536)	Aroclor-1260	J (all detects) UJ (all non-detects)	P
MB-110807-2	ZB-35	Hexabromobiphenyl	17782520 (3781362-15125446)	Aroclor-1260	J (all detects) UJ (all non-detects)	P

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Compound	MS (%R) (Limits)	MSD (%R) (Limits)	RPD (Limits)	Affected Compounds	Flag	A or P
LDW-07-T3-M-DC-EM-comp3MS/MSD (LDW-07-T3-M-DC-EM-comp3)	Aroclor-1260	16.0 (38-150)	15.0 (38-150)	-	Aroclor-1242 Aroclor-1248 Aroclor-1254 Aroclor-1260	J (all detects) UJ (all non-detects)	A
*LDW-07-T3-M-ES-WB-comp5REMS/MSD (No associated samples in this SDG)	Aroclor-1260	350 (38-150)	335 (38-150)	-	Aroclor-1242 Aroclor-1248 Aroclor-1254 Aroclor-1260	N/A	-

For the above %Ds flagged "NA", there were no associated samples for the compounds associated with LDW-07-T3-ES-WB-comp5MS/MSD, this finding did not warrant the qualification of the data.

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Pesticide Cleanup Checks

a. Florisil Cartridge Check

Florisil cleanup was not required and therefore not performed in this SDG.

*b. GPC Calibration

GPC and silica gel was performed by the laboratory.

XI. Target Compound Identification

All target compound identifications were within validation criteria.

XII. Compound Quantitation and CRQLs

All compound quantitation and CRQLs were within validation criteria.

The sample results for detected compounds from the two columns were within 40.0% relative percent differences (RPD) with the following exceptions:

Sample	Compound	%RPD	Flag	A or P
LDW-07-T1-M-SC-EM-comp3	Aroclor-1254	46	J (all detects)	A
LDW-07-T2-M-SC-EM-comp3	Aroclor-1248	44	J (all detects)	A

*XIII. Overall Assessment of Data

The overall assessment of data was acceptable. In the case where more than one result was reported for an individual sample, the least technically acceptable results were rejected as follows:

Sample	Compound	Flag	A or P
LDW-07-T3-M-DC-HP-comp3	Aroclor-1254 Aroclor-1260	R R	A
LDW-07-T3-M-DC-HP-comp3RE	All TCL compounds except Aroclor-1254 Aroclor-1260	R	A

*Removed Overall assessment of data finding for several samples in above table.

Data flags are summarized at the end of this report if data has been qualified.

XIV. Field Duplicates

No field duplicates were identified in this SDG.

XV. Field Blanks

No field blanks were identified in this SDG.

*Lower Duwamish Waterway Group
Polychlorinated Biphenyls - Data Qualification Summary - SDG LT29

SDG	Sample	Compound	Flag	A or P	Reason
LT29	LDW-07-T3-M-DC-EM-comp3	Aroclor-1242 Aroclor-1248 Aroclor-1254 Aroclor-1260	J (all detects) UJ (all non-detects)	A	Matrix spike/Matrix spike duplicates (%R)
LT29	LDW-07-T1-M-SC-EM-comp3	Aroclor-1254	J (all detects)	A	Compound quantitation and CRQLs (RPD)
LT29	LDW-07-T2-M-SC-EM-comp3	Aroclor-1248	J (all detects)	A	Compound quantitation and CRQLs (RPD)
LT29	LDW-07-T3-M-DC-HP-comp3	Aroclor-1254 Aroclor-1260	R R	A	Overall assessment of data
LT29	LDW-07-T3-M-DC-HP-comp3RE	All TCL compounds except Aroclor-1254 Aroclor-1260	R	A	Overall assessment of data

*Removed Surrogate recovery (%R) and Overall assessment of data findings from above table.

Lower Duwamish Waterway Group
Polychlorinated Biphenyls - Laboratory Blank Data Qualification Summary - SDG LT29

No Sample Data Qualified in this SDG

LDC #: 18015A3b
SDG #: LT29
Laboratory: Analytical Resources, Inc.

VALIDATION COMPLETENESS WORKSHEET
Level IV

Date: 1/7/08
Page: 1 of 1
Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: GC Polychlorinated Biphenyls (EPA SW 846 Method 8082)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 9/4 → 9/7/07
II.	GC/ECD Instrument Performance Check	NA	
III.	Initial calibration	A	
IV.	Continuing calibration	A	ICV ≤ 15
V.	Blanks	A	
VI.	Surrogate spikes / Int Stds	SW	
VII.	Matrix spike/Matrix spike duplicates	SW	LDW-07-T3-M
VIII.	Laboratory control samples	A	LCS
IX.	~~Regional quality assurance and quality control~~ Internal Standards	~~SW~~ N	
Xa.	Florisil cartridge check	N	
Xb.	GPC Calibration	N	
XI.	Target compound identification	A	
XII.	Compound quantitation and reported CRQLs	SW	
XIII.	Overall assessment of data	A	
XIV.	Field duplicates	N	
XV.	Field blanks	N	

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank

Validated Samples:

Tissue

1	LDW-07-T1-M-DC-EM-comp1	11	LDW-07-T1-M-DC-HP-comp1	21	LDW-07-T3-M-DC-EM-comp3MS	31	MB-110807-1		
2	LDW-07-T3-M-DC-EM-comp1	12	LDW-07-T3-M-DC-HP-comp1	22	LDW-07-T3-M-DC-EM-comp3MSD	32	MB-110807-2		
3	LDW-07-T3-M-DC -EM-comp2	13	LDW-07-T3-M-DC-HP-comp2	23	LDW-07-T3-M-DC-HP-comp3MS	33	MB-012408		
4	LDW-07-T3-M-DC-EM-comp3	14	LDW-07-T3-M-DC-HP-comp3	24	LDW-07-T3-M-DC-HP-comp3MSD	34			
5	LDW-07-T1-M-SC-EM-comp1	15	LDW-07-T1-M-SC-HP-comp1 RE	25	# 14 RE	35			
6	LDW-07-T1-M-SC-EM-comp2	16	LDW-07-T1-M-SC-HP-comp2 RE	26	# 15 RE	36			
7	LDW-07-T1-M-SC-EM-comp3	17	LDW-07-T1-M-SC-HP-comp3 RE	27	# 16 RE	37			
8	LDW-07-T2-M-SC-EM-comp1	18	LDW-07-T2-M-SC-HP-comp1	28	~~# 17 RE~~	38			
9	LDW-07-T2-M-SC-EM-comp2	19	LDW-07-T2-M-SC-HP-comp2	29		39			
10	LDW-07-T2-M-SC-EM-comp3	20	LDW-07-T2-M-SC-HP-comp3	30		40			

LDC #: 18015A36
SDG #: see cover

VALIDATION FINDINGS CHECKLIST

Page: 1 of 2
Reviewer: JT
2nd Reviewer: AL

Method: ✓ GC _____ HPLC

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	✓			
Cooler temperature criteria was met.	✓			
II. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	✓			
Was a linear fit used for evaluation? If yes, were all percent relative standard deviations (%RSD) ≤ 20%?	✓			
Was a curve fit used for evaluation? If Yes, what was the acceptance criteria used?		✓		
Did the initial calibration meet the curve fit acceptance criteria?			✓	
Were the RT windows properly established?	✓			
IV. Continuing calibration				
What type of continuing calibration calculation was performed? ____%D or ____%R	✓			
Was a continuing calibration analyzed daily?	✓			
Were all percent differences (%D) ≤ 15%.0 or percent recoveries 85-115%?	✓			
Were all the retention times within the acceptance windows?	✓			
V. Blanks				
Was a method blank associated with every sample in this SDG?	✓			
Was a method blank analyzed for each matrix and concentration?	✓			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.		✓		
VI. Surrogate Spikes				
Were all surrogate %R within the QC limits?		✓		
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?		✓		
If any %R was less than 10 percent, was a reanalysis performed to confirm %R?			✓	
VII. Matrix Spike/Matrix spike duplicates				
Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.	✓			
Was a MS/MSD analyzed every 20 samples of each matrix?	✓			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?		✓		
VIII. Laboratory control Samples				
Was an LCS analyzed for this SDG?	✓			
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	✓			

LDC #: 18015A36
SDG #: see cover

VALIDATION FINDINGS CHECKLIST

Reviewer: MJ
2nd Reviewer: AC

Validation Area	Yes	No	NA	Findings/Comments
IX. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?			✓	
Were the performance evaluation (PE) samples within the acceptance limits?			✓	
X. Target compound identification				
Were the retention times of reported detects within the RT windows?	✓			
XI. Compound quantitation/CRQLs				
Were compound quantitation and CRQLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XII. System performance				
System performance was found to be acceptable.	✓			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			
XIV. Field duplicates				
Field duplicate pairs were identified in this SDG.		✓		
Target compounds were detected in the field duplicates.			✓	
XV. Field blanks				
Field blanks were identified in this SDG.		✓		
Target compounds were detected in the field blanks.			✓	

VALIDATION FINDINGS WORKSHEET

METHOD: Pesticide/PCBs (EPASW 846 Method 8081/8082)

A. alpha-BHC	I. Dieldrin	Q. Endrin ketone	Y. Aroclor-1242	GG.
B. beta-BHC	J. 4,4'-DDE	R. Endrin aldehyde	Z. Aroclor-1248	HH.
C. delta-BHC	K. Endrin	S. alpha-Chlordane	AA. Aroclor-1254	II.
D. gamma-BHC	L. Endosulfan II	T. gamma-Chlordane	BB. Aroclor-1260	JJ.
E. Heptachlor	M. 4,4'-DDD	U. Toxaphene	CC. DB 608	KK.
F. Aldrin	N. Endosulfan sulfate	V. Aroclor-1016	DD. DB 1701	LL.
G. Heptachlor epoxide	O. 4,4'-DDT	W. Aroclor-1221	EE.	MM.
H. Endosulfan I	P. Methoxychlor	X. Aroclor-1232	FF.	NN.

Notes:

LDC #: 18015A3b
SDG #: pre cover

VALIDATION FINDINDS WORKSHEET
Surrogate Recovery

Page: 1 of 1
Reviewer: EJ
2nd Reviewer: M

METHOD: ~~GC~~ __ HPLC
Are surrogates required by the method? Yes____ or No____.
Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".
Y N N/A Were surrogates spiked into all samples and blanks?
Y N N/A Did all surrogate recoveries (%R) meet the QC limits?

#	Sample ID	Detector/ Column	Surrogate Compound	%R (Limits)	Qualifications
	1		TCMX	25.5 (33-121)	J/UJ/P N.A
	5		↓	29.7 (33-121)	↓
	9		↓	27.3 (33-121)	↓
	~~15~~		~~DCB~~	~~20.8~~ (~~32-155~~)	J/UJ/P
			TCMX	13.8 (33-121)	↓
	16		↓	20.4 (↓)	↓
				15.6 (↓)	
	~~17~~		↓	~~28.2~~ (↓)	↓
				22.3 (↓)	↓
	Use RES (JW		15-17		
	Since DCB %Rs were in, using professional judgment, data was not qualified				Ext

	Surrogate Compound		Surrogate Compound		Surrogate Compound		Surrogate Compound
A	Chlorobenzene (CBZ)	G	Octacosane	M	Benzo(e)Pyrene	S	1-Chloro-3-Nitrobenzene
B	4-Bromofluorobenzene (BFB)	H	Ortho-Terphenyl	N	Terphenyl-D14	T	3,4-Dinitrotoluene
C	a,a,a-Trifluorotoluene	I	Fluorobenzene (FBZ)	O	Decafluorobiphenyl (DCB)	U	Tripentyltin
D	Bromochlorobenene	J	n-Triacontane	P	1-methylnaphthalene	V	Tri-n-propyltin
E	1,4-Dichlorobutane	K	Hexacosane	Q	Dichlorophenyl Acetic Acid (DCAA)	W	Tributyl Phosphate
F	1,4-Difluorobenzene (DFB)	L	Bromobenzene	R	4-Nitrophenol	X	Triphenyl Phosphate

LDC #: 18015A36
SDG #: see cover

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

Page: 1 of 1
Reviewer: R
2nd Reviewer:

METHOD: ___ GC ___ HPLC

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

[✓ Y] N N/A Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG?
[✓ Y] N N/A Was an MS/MSD analyzed every 20 samples for each matrix or whenever a sample extraction was performed?
Y [✓ N] N/A Were the MS/MSD percent recoveries (%R) and relative percent differences (RPD) within QC limits?

#	MS/MSD ID	Compound	MS %R (Limits)	MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
1	21 + 22	BB	16.0 (38-150)	15.0 (38-150)	( )	4	J/UJ/A
			( )	( )	( )		QUAL Y, Z, AA,
			( )	( )	( )		BB
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
2	LDW-07-T3-		( )	( )	( )		
	M-ES-WB-compSITE	BB	350 (38-150)	335 (38-150)	( )	NON	NO QUAL
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		

LDC #: 18015A36
SDG #: pre cover

VALIDATION FINDINGS WORKSHEET
Internal Standards

Page: 1 of 1
Reviewer: E
2nd Reviewer: d

METHOD: ~~GC/MS VOA (EPA SW 846 Method 8260B)~~ EPA 8082

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Were all internal standard area counts within -50 to +100% of the associated calibration standard?

Y N N/A Were the retention times of the internal standards within +/- 30 seconds of the retention times of the associated calibration standard?

#	Column / ~~Date~~	Sample ID	Internal Standard	Area (Limits)	RT (Limits)	Qualifications
	ZB-5	MB-110807-2	Hexabromobiphenyl	25102480 (5419634-21678536)		J/UJ/P QUAL BB
	ZB-35	↓	↓	17782520 (3781362-15125446)		J/UJ/P QUAL BB

(BCM) = Bromochloromethane
(DFB) = 1,4-Difluorobenzene
(CBZ) = Chlorobenzene-d5
(PFB) = Pentafluorobenzene
(4DCB) = 1,4-Dichlorobenzene-d4
(2DCB) = 1,2-Dichlorobenzene-d4
(FBZ) = Fluorobenzene

LDC #: 18015A36
SDG #: per cover

VALIDATION FINDINGS WORKSHEET
Compound Quantitation and Reported CRQLs

Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: GC ___ HPLC

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Level IV/D Only

Y N N/A Were CRQLs adjusted for sample dilutions, dry weight factors, etc.?
Y N N/A Did the reported results for detected target compounds agree within 10.0% of the recalculated results?

#	Compound Name	% RPD Bet 2 column Finding	Associated Samples	Qualifications
	~~AA~~	~~40.26~~	6	~~J/A dt~~
	AA	~~45.65~~ 46	7	J/A dt
	Z	~~43.74~~ 44	10	↓

Comments: See sample calculation verification worksheet for recalculations note # 6 40.26 rounded to 40

LDC #: 15015A3b
SDG #: per conv

VALIDATION FINDINGS WORKSHEET
Overall Assessment of Data

Page: 1 of 1
Reviewer: EJ
2nd Reviewer: M

METHOD: ✓ GC __ HPLC

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

All available information pertaining to the data were reviewed using professional judgement to compliment the determination of the overall quality of the data.

Y N N/A Was the overall quality and usability of the data acceptable?

#	Compound Name	Finding	Associated Samples	Qualifications
	AA, BB	lower Result	14	R/A
	All except above	higher RL	25	R/A
	~~All~~	low surrogate	15, 16, 17	~~R/A~~ q

Comments: _____

OVRNew.wpd

LDC #: 18015A3b
SDG #: see cover

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Page: 1 of 1
Reviewer:
2nd Reviewer:

METHOD: GC ✓ HPLC ____

The calibration Factor (CF), average CF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following calculations:

CF = A/C
average CF = sum of the CF/number of standards
%RSD = 100 * (S/X)

A = Area of compound,
C = Concentration of compound,
S = Standard deviation of the CF
X = Mean of the CFs

#	Standard ID	Calibration Date	Compound	Reported CF (250 std)	Recalculated CF (250 std)	Reported Average CF (initial)	Recalculated Average CF (initial)	Reported %RSD	Recalculated %RSD
1	ICAL	11/12/07	1260-1 ZB-5	0.12498	0.12498	0.13116	0.13116	11.768	11.768
		ZB-5	1260-1 ZB-35	0.10230	0.10230	0.10438	0.10438	8.525	8.525
2									
3									
4									

Comments: Refer to Initial Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 18015A36
SDG #: see cover

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Page: 1 of 1
Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: GC ✓ HPLC ____

The percent difference (%D) of the initial calibration average Calibration Factors (CF) and the continuing calibration CF were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. CF - CF)/ave. CF
CF = A/C

Where: ave. CF = initial calibration average CF
CF = continuing calibration CF
A = Area of compound
C = Concentration of compound

#	Standard ID	Calibration Date	Compound	Average CF(ical)/ CCV Conc.	Reported CF/Conc. CCV	Recalculated CF/Conc. CCV	Reported %D	Recalculated %D
1	CCV @	11/15/07	1260-1 ZB-5	250.0	225.8	225.8	9.7	9.7
	1529		1260-1 ZB-35	↓	240.2	240.2	3.9	3.9
2	CCV @	11/20/07	↓	↓	244.8	244.8	2.1	2.1
	0941				252.7	252.7	1.1	1.1
3								
4								

Comments: Refer to Continuing Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

CONCLC.1S

LDC #: 18015A3b
SDG #: pet cover

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

Reviewer:
2nd reviewer:

METHOD: GC ___ HPLC

The percent recoveries (%R) of surrogates were recalculated for the compounds identified below using the following calculation:

% Recovery: SF/SS * 100

Where: SF = Surrogate Found
SS = Surrogate Spiked

Sample ID: # 1 2x

Surrogate	Column/Detector	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
				Reported	Recalculated	
DCB	ZB-5	40	8.7	43.4	43.4	0
TCMX	↓	40	5.1	25.5	25.5	0

Sample ID:

Surrogate	Column/Detector	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
				Reported	Recalculated	

Sample ID:

Surrogate	Column/Detector	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
				Reported	Recalculated	

LDC #: 18015A36
SDG #: see cover

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates Results Verification

Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: ___ GC __HPLC

The percent recoveries (%R) and relative percent differences (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * (SSC - SC)/SA Where SSC = Spiked sample concentration SC = Sample concentration
SA = Spike added
RPD =(({SSCMS - SSCMSD} * 2) / (SSCMS + SSCMSD))*100 MS = Matrix spike MSD = Matrix spike duplicate

MS/MSD samples: 21 + 22

Compound	Spike Added (ug/kg)		Sample Conc. (ug/kg)	Spike Sample Concentration (ug/kg)		Matrix spike Percent Recovery		Matrix Spike Duplicate Percent Recovery		MS/MSD RPD	
	MS	MSD	—	MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Gasoline (8015)											
Diesel (8015)											
Benzene (8021B)											
Methane (RSK-175)											
2,4-D (8151)											
Dinoseb (8151)											
Naphthalene (8310)											
Anthracene (8310)											
HMX (8330)											
2,4,6-Trinitrotoluene (8330)											
Aroclor 1260	10	10	16.8	18.4	18.3	~~18.3~~ 16.0	16.0	15.0	15.0	0.5	0.5

Comments: Refer to Matrix Spike/Matrix Spike Duplicates findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 18015A36
SDG #: pw cover

VALIDATION FINDINGS WORKSHEET
Laboratory Control Sample/Laboratory Control Sample Duplicates Results Verification

Page: 1 of 1
Reviewer: MT
2nd Reviewer:

METHOD: GC HPLC

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control sample duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * (SSC - SC)/SA Where SSC = Spiked concentration, SA = Spike added, SC = Sample concentration

RPD =(({SSCLCS - SSCLCSD} * 2) / (SSCLCS + SSCLCSD))*100 LCS = Laboratory Control Sample percent recovery LCSD = Laboratory Control Sample duplicate percent recovery

LCS/LCSD samples: LCS-110807

Compound	Spike Added (ug/kg)		Sample Conc. (ug/kg)	Spike Sample Concentration (ug/kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	--	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Gasoline (8015)											
Diesel (8015)											
Benzene (8021B)											
Methane (RSK-175)											
2,4-D (8151)											
Dinoseb (8151)											
Naphthalene (8310)											
Anthracene (8310)											
HMX (8330)											
2,4,6-Trinitrotoluene (8330)											
Aroclor 1260	10.0	NA	0	5.0	NA	50.0	50.0				

Comments: Refer to Laboratory Control Sample/Laboratory Control Sample Duplicate findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 18015A3b
SDG #: see cover

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: 1 of 1
Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: ___ GC ___ HPLC

Y N N/A Were all reported results recalculated and verified for all level IV samples?
Y N N/A Were all recalculated results for detected target compounds within 10% of the reported results?

Concentration= $\frac{(A)(Fv)(Df)}{(RF)(Vs \text{ or } Ws)(\%S/100)}$

A= Area or height of the compound to be measured
Fv= Final Volume of extract
Df= Dilution Factor
RF= Average response factor of the compound in the initial calibration
Vs= Initial volume of the sample
Ws= Initial weight of the sample
%S= Percent Solid

Example:

Sample ID. #1 Compound Name Aroclor 1260

Concentration = $\frac{117.29 \quad (2)}{(50)}$

= 4.69 ug/kg

#	Sample ID	Compound	Reported Concentrations	Recalculated Results Concentrations	Qualifications
	Aroclor 1260 -2 =	1066050 (80	= 169.95	1260-2=	169.95
		(858398) (0.05845)		3 =	115.1
				4 =	91.1
				5-	93.0
					117.29

Comments: _____

SAMPCALew.wpd

LDC Report# 18015B3b

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Lower Duwamish Waterway Group

Collection Date: September 4 through September 6, 2007

LDC Report Date: January 9, 2008

Matrix: Tissue

Parameters: Polychlorinated Biphenyls

Validation Level: EPA Level III

Laboratory: Analytical Resources, Inc.

Sample Delivery Group (SDG): LT30

Sample Identification

LDW-07-T1-M-ES-FL-comp1
LDW-07-T1-M-ES-FL-comp2
LDW-07-T1-M-ES-FL-comp3
LDW-07-T2-A-ES-FL-comp1
LDW-07-T2-A-ES-FL-comp2
LDW-07-T2-A-ES-FL-comp3
LDW-07-T3-M-ES-FL-comp1
LDW-07-T3-M-ES-FL-comp2
LDW-07-T3-M-ES-FL-comp3
LDW-07-T3-M-ES-FL-comp2MS
LDW-07-T3-M-ES-FL-comp2MSD

Introduction

This data review covers 11 tissue samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8082 for Polychlorinated Biphenyls.

*This review follows the Lower Duwamish Waterway Group Final Fish, Crab, and Clam Tissue Collection and Chemical Analyses Quality Assurance Project Plan (August 23, 2007) and the National Functional Guidelines for *Organic Data Review (October 1999).

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section III.

Field duplicates are summarized in Section IX.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/ECD Instrument Performance Check

Instrument performance was acceptable unless noted otherwise under initial calibration and continuing calibration sections.

III. Initial Calibration

Initial calibration of multicomponent compounds was performed for the primary (quantitation) column as required by the method.

The percent relative standard deviations (%RSD) were less than or equal to 20.0% for all compounds.

IV. Continuing Calibration

Continuing calibration was performed at required frequencies.

The percent differences (%D) of calibration factors in continuing standard mixtures were within the 15.0% QC limits.

The percent difference (%D) of the second source calibration standard were less than or equal to 15.0% for all compounds.

V. Blanks

Method blanks were reviewed for each matrix as applicable. No polychlorinated biphenyl contaminants were found in the method blanks.

VI. Surrogate Spikes and Internal Standards

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits.

All internal standard areas and retention times were within QC limits.

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Pesticide Cleanup Checks

a. Florisil Cartridge Check

Florisil cleanup was not required and therefore not performed in this SDG.

b. GPC Calibration

GPC and silica gel was performed by the laboratory.

XI. Target Compound Identification

Raw data were not reviewed for this SDG.

XII. Compound Quantitation and CRQLs

Raw data were not reviewed for this SDG.

XIII. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

XIV. Field Duplicates

No field duplicates were identified in this SDG.

XV. Field Blanks

No field blanks were identified in this SDG.

Lower Duwamish Waterway Group
Polychlorinated Biphenyls - Data Qualification Summary - SDG LT30

No Sample Data Qualified in this SDG

Lower Duwamish Waterway Group
Polychlorinated Biphenyls - Laboratory Blank Data Qualification Summary - SDG LT30

No Sample Data Qualified in this SDG

LDC #: 18015B3b

VALIDATION COMPLETENESS WORKSHEET

SDG #: LT30

Level III

Laboratory: Analytical Resources, Inc.

Date: 1/4/08

Page: 1 of 1

Reviewer: [illegible]

2nd Reviewer: [illegible]

METHOD: GC Polychlorinated Biphenyls (EPA SW 846 Method 8082)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 9/4/07 – 9/6/07
II.	GC/ECD Instrument Performance Check	NA	
III.	Initial calibration	A	
IV.	Continuing calibration	A	ICV ≤ 15
V.	Blanks	A	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	~~SW~~ A	
VIII.	Laboratory control samples	A	LCS
IX.	Regional quality assurance and quality control	N	Internal standards Acceptable
Xa.	Florisil cartridge check	N	
Xb.	GPC Calibration	N	GPC, clean-up performed (All) → silica Gel
XI.	Target compound identification	N	
XII.	Compound quantitation and reported CRQLs	N	
XIII.	Overall assessment of data	A	
XIV.	Field duplicates	N	
XV.	Field blanks	N	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = No compounds detected; R = Rinsate; FB = Field blank; D = Duplicate; TB = Trip blank; EB = Equipment blank

Validated Samples:

Tissue

1	LDW-07-T1-M-ES-FL-comp1	11	LDW-07-T3-M-ES-FL-comp2MSD	21	MB-111407	31	
2	LDW-07-T1-M-ES-FL-comp2	12		22		32	
3	LDW-07-T1-M-ES-FL-comp3	13		23		33	
4	LDW-07-T2-A-ES-FL-comp1	14		24		34	
5	LDW-07-T2-A-ES-FL-comp2	15		25		35	
6	LDW-07-T2-A-ES-FL-comp3	16		26		36	
7	LDW-07-T3-M-ES-FL-comp1	17		27		37	
8	LDW-07-T3-M-ES-FL-comp2	18		28		38	
9	LDW-07-T3-M-ES-FL-comp3	19		29		39	
10	LDW-07-T3-M-ES-FL-comp2MS	20		30		40	

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Lower Duwamish Waterway Group

Collection Date: September 4 through September 6, 2007

LDC Report Date: September 25, 2008

Matrix: Tissue

Parameters: Polychlorinated Biphenyls

Validation Level: EPA Level III

Laboratory: Analytical Resources, Inc.

Sample Delivery Group (SDG): LT31

Sample Identification

LDW-07-T1-M-ES-WB-comp1
LDW-07-T1-M-ES-WB-comp2
LDW-07-T1-M-ES-WB-comp3
LDW-07-T1-M-ES-WB-comp4
LDW-07-T1-M-ES-WB-comp5
LDW-07-T1-M-ES-WB-comp6
LDW-07-T2-A-ES-WB-comp1
LDW-07-T2-A-ES-WB-comp2
LDW-07-T2-A-ES-WB-comp3
LDW-07-T2-A-ES-WB-comp4
LDW-07-T2-A-ES-WB-comp5
LDW-07-T2-A-ES-WB-comp6
LDW-07-T2-A-ES-WB-comp2MS
LDW-07-T2-A-ES-WB-comp2MSD

Introduction

This data review covers 14 tissue samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8082 for Polychlorinated Biphenyls.

*This review follows the Lower Duwamish Waterway Group Final Fish, Crab, and Clam Tissue Collection and Chemical Analyses Quality Assurance Project Plan (August 23, 2007) and the National Functional Guidelines for *Organic Data Review (October 1999).

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section III.

Field duplicates are summarized in Section IX.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/ECD Instrument Performance Check

Instrument performance was acceptable unless noted otherwise under initial calibration and continuing calibration sections.

III. Initial Calibration

Initial calibration of multicomponent compounds was performed for the primary (quantitation) column as required by the method.

The percent relative standard deviations (%RSD) were less than or equal to 20.0% for all compounds.

IV. Continuing Calibration

Continuing calibration was performed at required frequencies.

The percent differences (%D) of calibration factors in continuing standard mixtures were within the 15.0% QC limits.

The percent difference (%D) of the second source calibration standard were less than or equal to 15.0% for all compounds with the following exceptions:

Date	Standard	Column	Compound	%D	Associated Samples	Affected Compound	Flag	A or P
12/3/07	ICV	ZB-35	Aroclor-1260	16.76	LDW-07-T2-A-ES-WB-comp2MS LDW-07-T2-A-ES-WB-comp2MSD MB-111707	Aroclor-1242 Aroclor-1248 Aroclor-1254 Aroclor-1260	J (all detects) UJ (all non-detects)	A

V. Blanks

Method blanks were reviewed for each matrix as applicable. No polychlorinated biphenyl contaminants were found in the method blanks.

VI. Surrogate Spikes and Internal Standards

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits.

All internal standard areas and retention times were within QC limits.

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Compound	MS (%R) (Limits)	MSD (%R) (Limits)	RPD (Limits)	Affected Compounds	Flag	A or P
LDW-07-T2-A-ES-WB-comp2MS/MSD (LDW-07-T2-A-ES-WB-comp2)	Aroclor-1260	13 (38-150)	-	-	Aroclor-1242 Aroclor-1248 Aroclor-1254 Aroclor-1260	J (all detects) UJ (all non-detects)	A

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Pesticide Cleanup Checks

a. Florisil Cartridge Check

Florisil cleanup was not required and therefore not performed in this SDG.

b. GPC Calibration

GPC and silica gel was performed by the laboratory.

XI. Target Compound Identification

Raw data were not reviewed for this SDG.

XII. Compound Quantitation and CRQLs

Raw data were not reviewed for this SDG.

XIII. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

XIV. Field Duplicates

No field duplicates were identified in this SDG.

XV. Field Blanks

No field blanks were identified in this SDG.

Lower Duwamish Waterway Group
Polychlorinated Biphenyls - Data Qualification Summary - SDG LT31

SDG	Sample	Compound	Flag	A or P	Reason
LT31	LDW-07-T2-A-ES-WB-comp2	Aroclor-1242 Aroclor-1248 Aroclor-1254 Aroclor-1260	J (all detects) UJ (all non-detects)	A	Matrix spike/Matrix spike duplicates (%R)

Lower Duwamish Waterway Group
Polychlorinated Biphenyls - Laboratory Blank Data Qualification Summary - SDG LT31

No Sample Data Qualified in this SDG

LDC #: 18015C3b

SDG #: LT31

Laboratory: Analytical Resources, Inc.

VALIDATION COMPLETENESS WORKSHEET

Level III

Date: 1/4/08

Page: 1 of 1

Reviewer: PT

2nd Reviewer: M

METHOD: GC Polychlorinated Biphenyls (EPA SW 846 Method 8082)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 9/4 – 9/6/07
II.	GC/ECD Instrument Performance Check	NA	
III.	Initial calibration	A	
IV.	Continuing calibration	SW	ICV ≤ 15
V.	Blanks	A	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	SW	
VIII.	Laboratory control samples	A	LCS
IX.	Regional quality assurance and quality control	N	
Xa.	Florisil cartridge check	N	
Xb.	GPC Calibration	N	GPC clean-up performed (All) + silica Gel
XI.	Target compound identification	N	
XII.	Compound quantitation and reported CRQLs	N	
XIII.	Overall assessment of data	A	
XIV.	Field duplicates	N	
XV.	Field blanks	N	

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank

Validated Samples: Tissue

1	LDW-07-T1-M-ES-WB-comp1	11	LDW-07-T2-A-ES-WB-comp5	21	MB-111707	31	
2	LDW-07-T1-M-ES-WB-comp2	12	LDW-07-T2-A-ES-WB-comp6	22		32	
3	LDW-07-T1-M-ES-WB-comp3	13	LDW-07-T2-A-ES-WB-comp2MS	23		33	
4	LDW-07-T1-M-ES-WB-comp4	14	LDW-07-T2-A-ES-WB-comp2MSD	24		34	
5	LDW-07-T1-M-ES-WB-comp5	15		25		35	
6	LDW-07-T1-M-ES-WB-comp6	16		26		36	
7	LDW-07-T2-A-ES-WB-comp1	17		27		37	
8	LDW-07-T2-A-ES-WB-comp2	18		28		38	
9	LDW-07-T2-A-ES-WB-comp3	19		29		39	
10	LDW-07-T2-A-ES-WB-comp4	20		30		40	

VALIDATION FINDINGS WORKSHEET

METHOD: Pesticide/PCBs (EPASW 846 Method 8081/8082)

A. alpha-BHC	I. Dieldrin	Q. Endrin ketone	Y. Aroclor-1242	GG.
B. beta-BHC	J. 4,4'-DDE	R. Endrin aldehyde	Z. Aroclor-1248	HH.
C. delta-BHC	K. Endrin	S. alpha-Chlordane	AA. Aroclor-1254	II.
D. gamma-BHC	L. Endosulfan II	T. gamma-Chlordane	BB. Aroclor-1260	JJ.
E. Heptachlor	M. 4,4'-DDD	U. Toxaphene	CC. DB 608	KK.
F. Aldrin	N. Endosulfan sulfate	V. Aroclor-1016	DD. DB 1701	LL.
G. Heptachlor epoxide	O. 4,4'-DDT	W. Aroclor-1221	EE.	MM.
H. Endosulfan I	P. Methoxychlor	X. Aroclor-1232	FF.	NN.

lotes:

LDC #: 18015C3b
SDG #: per cover

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Page: 1 of 1
Reviewer: FZ
2nd Reviewer:

METHOD: ✓ GC ___ HPLC

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".
What type of continuing calibration calculation was performed? ___%D or ___RPD
[✓ Y] N N/A Were continuing calibration standards analyzed at the required frequencies?
Y [✓ N] N/A Did the continuing calibration standards meet the %D / RPD validation criteria of ≤15.0%?
Level IV ~~Only~~
Y N [✓ N/A] Were the retention times for all calibrated compounds within their respective acceptance windows?

#	Date	Standard ID	Detector/ Column	Compound	%D / RPD (Limit ≤ 15.0)	RT (limit)	Associated Samples	Qualifications
	12/3/07	ICV	ZB-35	BB	16.76	( )	MB-111707,	J/UJ/A
						( )	13, 14	QUAL BB ~~only~~
						( )		Y, Z + AA
						( )		
						( )		
						( )		
						( )		
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LDC #: 18015C2b
SDG #: LT 31

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

Page: 1 of 1
Reviewer: FT
2nd Reviewer: A

METHOD: ✓ GC ___ HPLC

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

[✓ Y] N N/A Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG?
[✓ Y] N N/A Was an MS/MSD analyzed every 20 samples for each matrix or whenever a sample extraction was performed?
Y [✓ N] N/A Were the MS/MSD percent recoveries (%R) and relative percent differences (RPD) within QC limits?

#	MS/MSD ID	Compound	MS %R (Limits)	MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
	13 + 14	BB	13 (~~50-150~~)	~~40~~ ~~(50-150)~~	( )	8	J/UJ/A
			(38-150)	( )	( )		QUAL Y, Z, AA,
			( )	( )	( )		BB
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
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			( )	( )	( )		
			( )	( )	( )		

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Lower Duwamish Waterway Group

Collection Date: September 5 through September 12, 2007

LDC Report Date: September 25, 2008

Matrix: Tissue

Parameters: Polychlorinated Biphenyls

Validation Level: EPA Level III

Laboratory: Analytical Resources, Inc.

Sample Delivery Group (SDG): LT32

***Sample Identification**

LDW-07-T3-M-ES-WB-comp1
LDW-07-T3-M-ES-WB-comp1DL
LDW-07-T3-M-ES-WB-comp2
LDW-07-T3-M-ES-WB-comp2DL
LDW-07-T3-M-ES-WB-comp3
LDW-07-T3-M-ES-WB-comp3DL
LDW-07-T3-M-ES-WB-comp4
LDW-07-T3-M-ES-WB-comp4DL
LDW-07-T3-M-ES-WB-comp5
LDW-07-T3-M-ES-WB-comp6
LDW-07-T4-M-ES-WB-comp1
LDW-07-T4-M-SF-FL-comp1
LDW-07-T4-M-SF-WB-comp1
LDW-07-T4-M-SF-WB-comp2
LDW-07-T4-M-SF-WB-comp3
LDW-07-T3-M-ES-WB-comp3MS
LDW-07-T3-M-ES-WB-comp3MSD
LDW-07-T3-M-ES-WB-comp5MS
LDW-07-T3-M-ES-WB-comp5MSD

Introduction

This data review covers *19 tissue samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8082 for Polychlorinated Biphenyls.

*This review follows the Lower Duwamish Waterway Group Final Fish, Crab, and Clam Tissue Collection and Chemical Analyses Quality Assurance Project Plan (August 23, 2007) and the National Functional Guidelines for *Organic Data Review (October 1999).

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section III.

Field duplicates are summarized in Section IX.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/ECD Instrument Performance Check

Instrument performance was acceptable unless noted otherwise under initial calibration and continuing calibration sections.

III. Initial Calibration

Initial calibration of multicomponent compounds was performed for the primary (quantitation) column as required by the method.

The percent relative standard deviations (%RSD) were less than or equal to 20.0% for all compounds.

IV. Continuing Calibration

Continuing calibration was performed at required frequencies.

The percent differences (%D) of calibration factors in continuing standard mixtures were within the 15.0% QC limits.

The percent difference (%D) of the second source calibration standard were less than or equal to 15.0% for all compounds with the following exceptions:

Date	Standard	Column	Compound	%D	Associated Samples	Affected Compound	Flag	A or P
12/3/07	ICV	ZB-35	Aroclor-1260	16.76	LDW-07-T3-M-ES-WB-comp1DL LDW-07-T3-M-ES-WB-comp2DL LDW-07-T3-M-ES-WB-comp3DL LDW-07-T3-M-ES-WB-comp4DL	Aroclor-1242 Aroclor-1248 Aroclor-1254 Aroclor-1260	J (all detects) UJ (all non-detects)	A

V. Blanks

Method blanks were reviewed for each matrix as applicable. No polychlorinated biphenyl contaminants were found in the method blanks.

*VI. Surrogate Spikes and Internal Standards

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits.

All internal standard areas and retention times were within QC limits.

*VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Compound	MS (%R) (Limits)	MSD (%R) (Limits)	RPD (Limits)	Affected Compounds	Flag	A or P
*LDW-07-T3-M-ES-WB-comp5MS/MSD (*LDW-07-T3-M-ES-WB-comp5)	Aroclor-1260	350 (38-150)	335 (38-150)	-	Aroclor-1242 Aroclor-1248 Aroclor-1254 Aroclor-1260	J (all detects) J (all detects) J (all detects) J (all detects)	A

*Corrected samples in above Matrix spike/Matrix spike duplicates (%R) finding.

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Pesticide Cleanup Checks

a. Florisil Cartridge Check

Florisil cleanup was not required and therefore not performed in this SDG.

b. GPC Calibration

GPC and silica gel was performed by the laboratory.

XI. Target Compound Identification

Raw data were not reviewed for this SDG.

XII. Compound Quantitation and CRQLs

All compound quantitation and CRQLs were within validation criteria with the following exceptions:

Sample	Compound	Finding	Criteria	Flag
LDW-07-T3-M-ES-WB-comp1 LDW-07-T3-M-ES-WB-comp2 LDW-07-T3-M-ES-WB-comp3	Aroclor-1254	Sample result exceeded calibration range.	Reported result should be within calibration range.	N/A
LDW-07-T3-M-ES-WB-comp4	Aroclor-1254 Aroclor-1260	Sample result exceeded calibration range.	Reported result should be within calibration range.	N/A

N/A = Not applicable

For the results above flagged "Not applicable", the affected compound results in the associated samples were deemed unusable and did not warrant qualification of the data.

Raw data were not reviewed for this SDG.

*XIII. Overall Assessment of Data

The overall assessment of data was acceptable. In the case where more than one result was reported for an individual sample, the least technically acceptable results were rejected as follows:

Sample	Compound	Flag	A or P
LDW-07-T3-M-ES-WB-comp1 LDW-07-T3-M-ES-WB-comp2 LDW-07-T3-M-ES-WB-comp3	Aroclor-1254	R	A
LDW-07-T3-M-ES-WB-comp1DL LDW-07-T3-M-ES-WB-comp2DL LDW-07-T3-M-ES-WB-comp3DL	All TCL compounds except Aroclor-1254	R	A
LDW-07-T3-M-ES-WB-comp4	Aroclor-1254 Aroclor-1260	R R	A
LDW-07-T3-M-ES-WB-comp4DL	All TCL compounds except Aroclor-1254 Aroclor-1260	R	A

*Removed Overall assessment of data finding for LDW-07-T3-M-ES-WB-comp5.

Data flags are summarized at the end of this report if data has been qualified.

XIV. Field Duplicates

No field duplicates were identified in this SDG.

XV. Field Blanks

No field blanks were identified in this SDG.

*Lower Duwamish Waterway Group
Polychlorinated Biphenyls - Data Qualification Summary - SDG LT32

SDG	Sample	Compound	Flag	A or P	Reason
LT32	LDW-07-T3-M-ES-WB-comp1DL LDW-07-T3-M-ES-WB-comp2DL LDW-07-T3-M-ES-WB-comp3DL LDW-07-T3-M-ES-WB-comp4DL	Aroclor-1242 Aroclor-1248 Aroclor-1254 Aroclor-1260	J (all detects) UJ (all non-detects)	A	Continuing calibration (ICV %D)
LT32	LDW-07-T3-M-ES-WB-comp5RE	Aroclor-1242 Aroclor-1248 Aroclor-1254 Aroclor-1260	J (all detects) J (all detects) J (all detects) J (all detects)	A	Matrix spike/Matrix spike duplicates (%R)
LT32	LDW-07-T3-M-ES-WB-comp1 LDW-07-T3-M-ES-WB-comp2 LDW-07-T3-M-ES-WB-comp3	Aroclor-1254	R	A	Overall assessment of data
LT32	LDW-07-T3-M-ES-WB-comp1DL LDW-07-T3-M-ES-WB-comp2DL LDW-07-T3-M-ES-WB-comp3DL	All TCL compounds except Aroclor-1254	R	A	Overall assessment of data
LT32	LDW-07-T3-M-ES-WB-comp4	Aroclor-1254 Aroclor-1260	R R	A	Overall assessment of data
LT32	LDW-07-T3-M-ES-WB-comp4DL	All TCL compounds except Aroclor-1254 Aroclor-1260	R	A	Overall assessment of data

*Removed Surrogate recovery (%R) and Overall assessment of data findings from above table.

Lower Duwamish Waterway Group
Polychlorinated Biphenyls - Laboratory Blank Data Qualification Summary - SDG LT32

No Sample Data Qualified in this SDG

LDC #: 18015D3b
SDG #: LT32
Laboratory: Analytical Resources, Inc.

VALIDATION COMPLETENESS WORKSHEET
Level III

Date: 1/4/08
Page: 1 of 1
Reviewer: EJ
2nd Reviewer: AC

METHOD: GC Polychlorinated Biphenyls (EPA SW 846 Method 8082)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 9/5 → 9/12/07
II.	GC/ECD Instrument Performance Check	NA	
III.	Initial calibration	A	
IV.	Continuing calibration	SW	ICV ≤ 15
V.	Blanks	A	
VI.	Surrogate spikes / Int Stds	SW	
VII.	Matrix spike/Matrix spike duplicates	SW	
VIII.	Laboratory control samples	A	LCS
IX.	Regional quality assurance and quality control	N	
Xa.	Florisil cartridge check	N	
Xb.	GPC Calibration	N	GPC clean-up performed all & Silica Gel
XI.	Target compound identification	N	
XII.	Compound quantitation and reported CRQLs	SW	
XIII.	Overall assessment of data	SW	
XIV.	Field duplicates	N	
XV.	Field blanks	N	

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank

Validated Samples:

Tissue

1	LDW-07-T3-M-ES-WB-comp1	11	LDW-07-T4-M-ES-WB-comp1	21	MB-112607	31	
2	LDW-07-T3-M-ES-WB-comp1DL	12	LDW-07-T4-M-SF-FL-comp1	22	MB-012408	32	
3	LDW-07-T3-M-ES-WB-comp2	13	LDW-07-T4-M-SF-WB-comp1	23		33	
4	LDW-07-T3-M-ES-WB-comp2DL	14	LDW-07-T4-M-SF-WB-comp2	24		34	
5	LDW-07-T3-M-ES-WB-comp3	15	LDW-07-T4-M-SF-WB-comp3	25		35	
6	LDW-07-T3-M-ES-WB-comp3DL	16	LDW-07-T3-M-ES-WB-comp3MS	26		36	
7	LDW-07-T3-M-ES-WB-comp4 AA,BB	17	LDW-07-T3-M-ES-WB-comp3MSD	27		37	
8	LDW-07-T3-M-ES-WB-comp4DL	18	~~#9RE~~	28		38	
9	LDW-07-T3-M-ES-WB-comp5 BB	19	#9RE MS	29		39	
10	LDW-07-T3-M-ES-WB-comp6	20	#9RE MSD	30		40	

VALIDATION FINDINGS WORKSHEET

METHOD: Pesticide/PCBs (EPASW 846 Method 8081/8082)

A. alpha-BHC	I. Dieldrin	Q. Endrin ketone	Y. Aroclor-1242	GG.
B. beta-BHC	J. 4,4'-DDE	R. Endrin aldehyde	Z. Aroclor-1248	HH.
C. delta-BHC	K. Endrin	S. alpha-Chlordane	AA. Aroclor-1254	II.
D. gamma-BHC	L. Endosulfan II	T. gamma-Chlordane	BB. Aroclor-1260	JJ.
E. Heptachlor	M. 4,4'-DDD	U. Toxaphene	CC. DB 608	KK.
F. Aldrin	N. Endosulfan sulfate	V. Aroclor-1016	DD. DB 1701	LL.
G. Heptachlor epoxide	O. 4,4'-DDT	W. Aroclor-1221	EE.	MM.
H. Endosulfan I	P. Methoxychlor	X. Aroclor-1232	FF.	NN.

Notes:

LDC #: 18015D3b
SDG #: see cover

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Page: 1 of 1
Reviewer: FT
2nd Reviewer: [illegible]

METHOD: ✓ GC ___ HPLC

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".
What type of continuing calibration calculation was performed? ___%D or ___RPD
[✓ Y] ~~N~~ N/A Were continuing calibration standards analyzed at the required frequencies?
Y [✓ N] N/A Did the continuing calibration standards meet the %D / RPD validation criteria of ≤15.0%?
Level IV Only
Y N [✓ N/A] Were the retention times for all calibrated compounds within their respective acceptance windows?

#	Date	Standard ID	Detector/ Column	Compound	%D / RPD (Limit ≤ 15.0)	RT (limit)	Associated Samples	Qualifications
	12/3/07	ICV	ZB-35	BB	16.76	( )	2, 4, 6, 8	J/UJ/A
						( )		QUAL BB only
						( )		Y, Z + AA
						( )		
						( )		
						( )		
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LDC #: 14015D3b
SDG #: see cover

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

Page: 1 of 1
Reviewer:
2nd Reviewer:

METHOD: ___ GC ___ HPLC

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y [✓ N] N/A Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG?

[✓ Y] N N/A Was an MS/MSD analyzed every 20 samples for each matrix or whenever a sample extraction was performed?

Y N N/A Were the MS/MSD percent recoveries (%R) and relative percent differences (RPD) within QC limits?

#	MS/MSD ID	Compound	MS %R (Limits)	MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
	19+20 (3X)	BB	350 (38-150)	335 (38-150)	( )	18	J/A det
			( )	( )	( )		QUAL Y, Z, AA,
			( )	( )	( )		BB
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
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LDC #: 18015D3b
SDG #: see cover

VALIDATION FINDINGS WORKSHEET
Compound Quantitation and Reported CRQLs

Page: 1 of 1
Reviewer: B
2nd Reviewer: A

METHOD: ~~GC~~ HPLC

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Level IV/D Only

Y N N/A Were CRQLs adjusted for sample dilutions, dry weight factors, etc.?
Y N N/A Did the reported results for detected target compounds agree within 10.0% of the recalculated results?

#	Compound Name	Finding	Associated Samples	Qualifications
	AA	exceeded cal range	1, 3, 5	NA
	AA, BB	↓	7	NA

Comments: See sample calculation verification worksheet for recalculations

LDC #: 18015P3b
SDG #: pre cover

VALIDATION FINDINGS WORKSHEET
Overall Assessment of Data

Page: 1 of 1
Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: ✓ GC ___ HPLC

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

All available information pertaining to the data were reviewed using professional judgement to compliment the determination of the overall quality of the data.

Y N N/A Was the overall quality and usability of the data acceptable?

#	Compound Name	Finding	Associated Samples	Qualifications
1	AA	exceeded cal range	1, 3, 5	R/A
2	all except AA	diluted	2, 4, 6	R/A
3	AA, BB	exceeded cal range	7	R/A
4	All except above	diluted	8	R/A
5	~~All~~	~~low surrog~~	~~9~~	~~R/A~~
	use the	RE		

Comments: _____

OVRNew.wpd

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Lower Duwamish Waterway Group

Collection Date: September 4 through September 7, 2007

LDC Report Date: September 25, 2008

Matrix: Tissue

Parameters: Polychlorinated Biphenyls

Validation Level: EPA Level III

Laboratory: Analytical Resources, Inc.

Sample Delivery Group (SDG): LT33

***Sample Identification**

LDW-07-T1-A-SS-WB-comp1
LDW-07-T1-B-SS-WB-comp1
LDW-07-T1-C-SS-WB-comp1
LDW-07-T1-D-SS-WB-comp1
LDW-07-T1-E-SS-WB-comp1
LDW-07-T1-F-SS-WB-comp1
LDW-07-T2-A-SS-WB-comp1
LDW-07-T2-B-SS-WB-comp1
LDW-07-T2-C-SS-WB-comp1
LDW-07-T2-D-SS-WB-comp1
LDW-07-T2-E-SS-WB-comp1
LDW-07-T2-F-SS-WB-comp1
LDW-07-T3-A-SS-WB-comp1
LDW-07-T3-B-SS-WB-comp1
LDW-07-T3-C-SS-WB-comp1
LDW-07-T3-D-SS-WB-comp1
LDW-07-T3-E-SS-WB-comp1
LDW-07-T3-F-SS-WB-comp1
LDW-07-T3-F-SS-WB-comp1DL
LDW-07-T3-D-SS-WB-comp1MS
LDW-07-T3-D-SS-WB-comp1MSD

*Removed sample LDW-07-T1-D-SS-WB-comp1RE from above sample list.

Introduction

This data review covers *21 tissue samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8082 for Polychlorinated Biphenyls.

*This review follows the Lower Duwamish Waterway Group Final Fish, Crab, and Clam Tissue Collection and Chemical Analyses Quality Assurance Project Plan (August 23, 2007) and the National Functional Guidelines for *Organic Data Review (October 1999).

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section III.

Field duplicates are summarized in Section IX.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/ECD Instrument Performance Check

Instrument performance was acceptable unless noted otherwise under initial calibration and continuing calibration sections.

III. Initial Calibration

Initial calibration of multicomponent compounds was performed for the primary (quantitation) column as required by the method.

The percent relative standard deviations (%RSD) were less than or equal to 20.0% for all compounds.

*IV. Continuing Calibration

Continuing calibration was performed at required frequencies.

The percent differences (%D) of calibration factors in continuing standard mixtures were within the 15.0% QC limits.

The percent difference (%D) of the second source calibration standard were less than or equal to 15.0% for all compounds with the following exceptions:

Date	Standard	Column	Compound	%D	*Associated Samples	Affected Compound	Flag	A or P
12/5/07	ICV	ZB-5	Aroclor-1260	18.20	All samples in SDG LT33 except LDW-07-T1-D-SS-WB-comp1	Aroclor-1242 Aroclor-1248 Aroclor-1254 Aroclor-1260	J (all detects) UJ (all non-detects)	A
12/5/07	ICV	ZB-35	Aroclor-1260	17.36	All samples in SDG LT33 except LDW-07-T1-D-SS-WB-comp1	Aroclor-1242 Aroclor-1248 Aroclor-1254 Aroclor-1260	J (all detects) UJ (all non-detects)	A

*Corrected samples associated with above finding.

V. Blanks

Method blanks were reviewed for each matrix as applicable. No polychlorinated biphenyl contaminants were found in the method blanks.

*VI. Surrogate Spikes and Internal Standards

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits.

All internal standard areas and retention times were within QC limits.

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Compound	MS (%R) (Limits)	MSD (%R) (Limits)	RPD (Limits)	Affected Compounds	Flag	A or P
LDW-07-T3-M-ES-WB-comp5REMS/MSD (No associated samples in this SDG)	Aroclor-1260	350 (38-150)	335 (38-150)	-	Aroclor-1242 Aroclor-1248 Aroclor-1254 Aroclor-1260	N/A	-

For the above %Ds flagged "NA", there were no associated samples for the compounds associated with LDW-07-T3-ES-WB-comp5MS/MSD, this finding did not warrant the qualification of the data.

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Pesticide Cleanup Checks

a. Florisil Cartridge Check

Florisil cleanup was not required and therefore not performed in this SDG.

b. GPC Calibration

GPC and silica gel was performed by the laboratory.

XI. Target Compound Identification

Raw data were not reviewed for this SDG.

XII. Compound Quantitation and CRQLs

All compound quantitation and CRQLs were within validation criteria with the following exceptions:

Sample	Compound	Finding	Criteria	Flag
LDW-07-T3-F-SS-WB-comp1	Aroclor-1260	Sample result exceeded calibration range.	Reported result should be within calibration range.	N/A

N/A = Not applicable

For the results above flagged "Not applicable", the affected compound results in the associated samples were deemed unusable and did not warrant qualification of the data.

Raw data were not reviewed for this SDG.

*XIII. Overall Assessment of Data

The overall assessment of data was acceptable. In the case where more than one result was reported for an individual sample, the least technically acceptable results were rejected as follows:

Sample	Compound	Flag	A or P
LDW-07-T3-F-SS-WB-comp1	Aroclor-1260	R	A
LDW-07-T3-F-SS-WB-comp1DL	All TCL compounds except Aroclor-1260	R	A

*Removed Overall assessment of data finding for sample LDW-07-T1-D-SS-WB-comp1 in above table.

Data flags are summarized at the end of this report if data has been qualified.

XIV. Field Duplicates

No field duplicates were identified in this SDG.

XV. Field Blanks

No field blanks were identified in this SDG.

*Lower Duwamish Waterway Group
Polychlorinated Biphenyls - Data Qualification Summary - SDG LT33

SDG	Sample	Compound	Flag	A or P	Reason
*LT33	LDW-07-T1-A-SS-WB-comp1 LDW-07-T1-B-SS-WB-comp1 LDW-07-T1-C-SS-WB-comp1 LDW-07-T1-E-SS-WB-comp1 LDW-07-T1-F-SS-WB-comp1 LDW-07-T2-A-SS-WB-comp1 LDW-07-T2-B-SS-WB-comp1 LDW-07-T2-C-SS-WB-comp1 LDW-07-T2-D-SS-WB-comp1 LDW-07-T2-E-SS-WB-comp1 LDW-07-T2-F-SS-WB-comp1 LDW-07-T3-A-SS-WB-comp1 LDW-07-T3-B-SS-WB-comp1 LDW-07-T3-C-SS-WB-comp1 LDW-07-T3-D-SS-WB-comp1 LDW-07-T3-E-SS-WB-comp1 LDW-07-T3-F-SS-WB-comp1 LDW-07-T3-F-SS-WB-comp1DL	Aroclor-1242 Aroclor-1248 Aroclor-1254 Aroclor-1260	J (all detects) UJ (all non-detects)	A	Continuing calibration (ICV %D)
LT33	LDW-07-T3-F-SS-WB-comp1	Aroclor-1260	R	A	Overall assessment of data
LT33	LDW-07-T3-F-SS-WB-comp1DL	All TCL compounds except Aroclor-1260	R	A	Overall assessment of data

Lower Duwamish Waterway Group
Polychlorinated Biphenyls - Laboratory Blank Data Qualification Summary - SDG LT33

No Sample Data Qualified in this SDG

LDC #: 18015E3b
SDG #: LT33
Laboratory: Analytical Resources, Inc.

VALIDATION COMPLETENESS WORKSHEET
Level III

Date: 1/4/08
Page: 1 of 7
Reviewer:
2nd Reviewer:

METHOD: GC Polychlorinated Biphenyls (EPA SW 846 Method 8082)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 9/4 - 9/7/07
II.	GC/ECD Instrument Performance Check	NA	
III.	Initial calibration	A	
IV.	Continuing calibration	SW	ICV ≤ 15
V.	Blanks	A	
VI.	Surrogate spikes /mat std	SW	
VII.	Matrix spike/Matrix spike duplicates	SW	
VIII.	Laboratory control samples	A	LCS
IX.	Regional quality assurance and quality control	N	
Xa.	Florisil cartridge check	N	
Xb.	GPC Calibration	N	GPC clean up performed (All & Silica Gel)
XI.	Target compound identification	N	
XII.	Compound quantitation and reported CRQLs	SW	
XIII.	Overall assessment of data	SW	
XIV.	Field duplicates	N	
XV.	Field blanks	N	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = No compounds detected; R = Rinsate; FB = Field blank; D = Duplicate; TB = Trip blank; EB = Equipment blank

Validated Samples:

Tissue

1	LDW-07-T1-A-SS-WB-comp1	11	LDW-07-T2-E-SS-WB-comp1	21	LDW-07-T3-D-SS-WB-comp1MSD	31	
2	LDW-07-T1-B-SS-WB-comp1	12	LDW-07-T2-F-SS-WB-comp1	22	MB-113007	32	
3	LDW-07-T1-C-SS-WB-comp1	13	LDW-07-T3-A-SS-WB-comp1	23	MB-012408	33	
4	LDW-07-T1-D-SS-WB-comp1	14	LDW-07-T3-B-SS-WB-comp1	24	~~#4 RE~~	34	
5	LDW-07-T1-E-SS-WB-comp1	15	LDW-07-T3-C-SS-WB-comp1	25		35	
6	LDW-07-T1-F-SS-WB-comp1	16	LDW-07-T3-D-SS-WB-comp1	26		36	
7	LDW-07-T2-A-SS-WB-comp1	17	LDW-07-T3-E-SS-WB-comp1	27		37	
8	LDW-07-T2-B-SS-WB-comp1	18	LDW-07-T3-F-SS-WB-comp1	28		38	
9	LDW-07-T2-C-SS-WB-comp1	19	LDW-07-T3-F-SS-WB-comp1DL	29		39	
10	LDW-07-T2-D-SS-WB-comp1	20	LDW-07-T3-D-SS-WB-comp1MS	30		40	

VALIDATION FINDINGS WORKSHEET

METHOD: Pesticide/PCBs (EPASW 846 Method 8081/8082)

A. alpha-BHC	I. Dieldrin	Q. Endrin ketone	Y. Aroclor-1242	GG.
B. beta-BHC	J. 4,4'-DDE	R. Endrin aldehyde	Z. Aroclor-1248	HH.
C. delta-BHC	K. Endrin	S. alpha-Chlordane	AA. Aroclor-1254	II.
D. gamma-BHC	L. Endosulfan II	T. gamma-Chlordane	BB. Aroclor-1260	JJ.
E. Heptachlor	M. 4,4'-DDD	U. Toxaphene	CC. DB 608	KK.
F. Aldrin	N. Endosulfan sulfate	V. Aroclor-1016	DD. DB 1701	LL.
G. Heptachlor epoxide	O. 4,4'-DDT	W. Aroclor-1221	EE.	MM.
H. Endosulfan I	P. Methoxychlor	X. Aroclor-1232	FF.	NN.

Notes:

LDC #: 18015E3b
SDG #: see cover

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Page: 1 of 1
Reviewer: FT
2nd Reviewer: R

METHOD: ✓ GC __ HPLC

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".
What type of continuing calibration calculation was performed? __%D or __RPD
[✓ Y] N N/A Were continuing calibration standards analyzed at the required frequencies?
Y [✓ N] N/A Did the continuing calibration standards meet the %D / RPD validation criteria of ≤15.0%?
Level IV Only
Y N [✓ N/A] Were the retention times for all calibrated compounds within their respective acceptance windows?

#	Date	Standard ID	Detector/ Column	Compound	%D / RPD (Limit ≤ 15.0)	RT (limit)	Associated Samples	Qualifications
	12/5/07	ICV	ZB-5	BB	18.20	( )	All + Blk except #4	J/UJ/A
			ZB-35	BB	17.36	( )	↓	↓
						( )		QUAL Y, Z, BB,
						( )		AA
						( )		
						( )		
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LDC #: 18015E3b
SDG #: see cover

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

Page: 1 of 1
Reviewer:
2nd Reviewer:

METHOD: ✓ GC ___ HPLC

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

[✓ Y] N N/A Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG?
[✓ Y] N N/A Was an MS/MSD analyzed every 20 samples for each matrix or whenever a sample extraction was performed?
Y [✓ N] N/A Were the MS/MSD percent recoveries (%R) and relative percent differences (RPD) within QC limits?

#	MS/MSD ID	Compound	MS %R (Limits)	MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
①	20021 (3X)	BB	0 (38-150)	0 (38-150)	( )	16	no QUAL
			( )	( )	( )		parent > 4X
			( )	( )	( )		spike Amt
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
②	LDW-07-T3-M	BB	350 (↓)	335 (↓)	( )	none	no QUAL
	-ES-WB-comp5RE		( )	( )	( )		
	MS/D		( )	( )	( )		
	(3X)		( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
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			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		

LDC #: 18015F3b
SDG #: see cover

VALIDATION FINDINGS WORKSHEET
Compound Quantitation and Reported CRQLs

Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: ✓ GC ___ HPLC

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Level IV/D Only

Y N N/A Were CRQLs adjusted for sample dilutions, dry weight factors, etc.?
Y N N/A Did the reported results for detected target compounds agree within 10.0% of the recalculated results?

#	Compound Name	Finding	Associated Samples	Qualifications
	BB	exceeded cal Range	18	NA

Comments: See sample calculation verification worksheet for recalculations

LDC #: 18015E36
SDG #: see cover

VALIDATION FINDINGS WORKSHEET
Overall Assessment of Data

Page: 1 of 1
Reviewer: D
2nd Reviewer: L

METHOD: ✓ GC ___ HPLC

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

All available information pertaining to the data were reviewed using professional judgement to compliment the determination of the overall quality of the data.

Y N N/A Was the overall quality and usability of the data acceptable?

#	Compound Name	Finding	Associated Samples	Qualifications
1	BB	exceeded cal range	18	R/A
2	all except BB	diluted	19	R/A
3	All	low surrogate	4	R/A
	use RE.			

Comments: _____

OVRNew.wpd

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Lower Duwamish Waterway Group

Collection Date: September 5, 2007

LDC Report Date: September 25, 2008

Matrix: Tissue

Parameters: Polychlorinated Biphenyls

Validation Level: EPA Level III

Laboratory: Analytical Resources, Inc.

Sample Delivery Group (SDG): LT34

Sample Identification

LDW-07-T4-A-SS-WB-comp1
LDW-07-T4-B-SS-WB-comp1
LDW-07-T4-C-SS-WB-comp1
LDW-07-T4-D-SS-WB-comp1
LDW-07-T4-B-SS-WB-comp1MS
LDW-07-T4-B-SS-WB-comp1MSD

Introduction

This data review covers 6 tissue samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8082 for Polychlorinated Biphenyls.

*This review follows the Lower Duwamish Waterway Group Final Fish, Crab, and Clam Tissue Collection and Chemical Analyses Quality Assurance Project Plan (August 23, 2007) and the National Functional Guidelines for *Organic Data Review (October 1999).

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section III.

Field duplicates are summarized in Section IX.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/ECD Instrument Performance Check

Instrument performance was acceptable unless noted otherwise under initial calibration and continuing calibration sections.

III. Initial Calibration

Initial calibration of multicomponent compounds was performed for the primary (quantitation) column as required by the method.

The percent relative standard deviations (%RSD) were less than or equal to 20.0% for all compounds.

IV. Continuing Calibration

Continuing calibration was performed at required frequencies.

The percent differences (%D) of calibration factors in continuing standard mixtures were within the 15.0% QC limits.

The percent difference (%D) of the second source calibration standard were less than or equal to 15.0% for all compounds with the following exceptions:

Date	Standard	Column	Compound	%D	Associated Samples	Affected Compound	Flag	A or P
12/5/07	ICV	ZB-5	Aroclor-1260	18.20	All samples in SDG LT34	Aroclor-1242 Aroclor-1248 Aroclor-1254 Aroclor-1260	J (all detects) UJ (all non-detects)	A
12/5/07	ICV	ZB-35	Aroclor-1260	17.36	All samples in SDG LT34	Aroclor-1242 Aroclor-1248 Aroclor-1254 Aroclor-1260	J (all detects) UJ (all non-detects)	A

V. Blanks

Method blanks were reviewed for each matrix as applicable. No polychlorinated biphenyl contaminants were found in the method blanks.

VI. Surrogate Spikes and Internal Standards

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits.

All internal standard areas and retention times were within QC limits.

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Compound	MS (%R) (Limits)	MSD (%R) (Limits)	RPD (Limits)	Affected Compounds	Flag	A or P
LDW-07-T4-B-SS-WB-comp1MS/MSD (LDW-07-T4-B-SS-WB-comp1)	Aroclor-1260	-	34.6 (38-150)	-	Aroclor-1242 Aroclor-1248 Aroclor-1254 Aroclor-1260	J (all detects) UJ (all non-detects)	A

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Pesticide Cleanup Checks

a. Florisil Cartridge Check

Florisil cleanup was not required and therefore not performed in this SDG.

b. GPC Calibration

GPC and silica gel was performed by the laboratory.

XI. Target Compound Identification

Raw data were not reviewed for this SDG.

XII. Compound Quantitation and CRQLs

Raw data were not reviewed for this SDG.

XIII. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

XIV. Field Duplicates

No field duplicates were identified in this SDG.

XV. Field Blanks

No field blanks were identified in this SDG.

Lower Duwamish Waterway Group
Polychlorinated Biphenyls - Data Qualification Summary - SDG LT34

SDG	Sample	Compound	Flag	A or P	Reason
LT34	LDW-07-T4-A-SS-WB-comp1 LDW-07-T4-B-SS-WB-comp1 LDW-07-T4-C-SS-WB-comp1 LDW-07-T4-D-SS-WB-comp1	Aroclor-1242 Aroclor-1248 Aroclor-1254 Aroclor-1260	J (all detects) UJ (all non-detects)	A	Continuing calibration (ICV %D)
LT34	LDW-07-T4-B-SS-WB-comp1	Aroclor-1242 Aroclor-1248 Aroclor-1254 Aroclor-1260	J (all detects) UJ (all non-detects)	A	Matrix spike/Matrix spike duplicates (%R)

Lower Duwamish Waterway Group
Polychlorinated Biphenyls - Laboratory Blank Data Qualification Summary - SDG LT34

No Sample Data Qualified in this SDG

LDC #: 18015F3b
SDG #: LT34
Laboratory: Analytical Resources, Inc.

VALIDATION COMPLETENESS WORKSHEET
Level III

Date: 1/4/08
Page: 1 of 1
Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: GC Polychlorinated Biphenyls (EPA SW 846 Method 8082)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 9/5/07
II.	GC/ECD Instrument Performance Check	NA	
III.	Initial calibration	A	
IV.	Continuing calibration	SW	ICV ≤ 15
V.	Blanks	A	
VI.	Surrogate spikes /hd stds	A	
VII.	Matrix spike/Matrix spike duplicates	SW	
VIII.	Laboratory control samples	A	LCS
IX.	Regional quality assurance and quality control	N	
Xa.	Florisil cartridge check	N	
Xb.	GPC Calibration	N	GPC + Silica Gel clean up performed (All
XI.	Target compound identification	N	
XII.	Compound quantitation and reported CRQLs	N	
XIII.	Overall assessment of data	A	
XIV.	Field duplicates	N	
XV.	Field blanks	N	

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank

Validated Samples:
Tissue

1	LDW-07-T4-A-SS-WB-comp1	11	MB-120407	21		31	
2	LDW-07-T4-B-SS-WB-comp1	12		22		32	
3	LDW-07-T4-C-SS-WB-comp1	13		23		33	
4	LDW-07-T4-D-SS-WB-comp1	14		24		34	
5	LDW-07-T4-B-SS-WB-comp1MS	15		25		35	
6	LDW-07-T4-B-SS-WB-comp1MSD	16		26		36	
7		17		27		37	
8		18		28		38	
9		19		29		39	
10		20		30		40	

VALIDATION FINDINGS WORKSHEET

METHOD: Pesticide/PCBs (EPASW 846 Method 8081/8082)

A. alpha-BHC	I. Dieldrin	Q. Endrin ketone	Y. Aroclor-1242	GG.
B. beta-BHC	J. 4,4'-DDE	R. Endrin aldehyde	Z. Aroclor-1248	HH.
C. delta-BHC	K. Endrin	S. alpha-Chlordane	AA. Aroclor-1254	II.
D. gamma-BHC	L. Endosulfan II	T. gamma-Chlordane	BB. Aroclor-1260	JJ.
E. Heptachlor	M. 4,4'-DDD	U. Toxaphene	CC. DB 608	KK.
F. Aldrin	N. Endosulfan sulfate	V. Aroclor-1016	DD. DB 1701	LL.
G. Heptachlor epoxide	O. 4,4'-DDT	W. Aroclor-1221	EE.	MM.
H. Endosulfan I	P. Methoxychlor	X. Aroclor-1232	FF.	NN.

Notes:

LDC #: 18015F3b
SDG #: see cover

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Page: 1 of 1
Reviewer: FZ
2nd Reviewer:

METHOD: ✓ GC __ HPLC

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".
What type of continuing calibration calculation was performed? __%D or __RPD

[✓ Y] N N/A Were continuing calibration standards analyzed at the required frequencies?

Y [✓ N] N/A Did the continuing calibration standards meet the %D / RPD validation criteria of ≤15.0%?

Level IV Only

Y N [✓ N/A] Were the retention times for all calibrated compounds within their respective acceptance windows?

#	Date	Standard ID	Detector/ Column	Compound	%D / RPD (Limit ≤ 15.0)	RT (limit)	Associated Samples	Qualifications
	12/5/07	ICV	ZB-5	BB	18.20	( )	All + BLK	J/UJ/A
			ZB-35	BB	17.36	( )	↓	↓
						( )		QUAL Y, Z, AA,
						( )		BB
						( )		
						( )		
						( )		
						( )		
						( )		
						( )		
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						( )		
						( )		
						( )		
						( )		

LDC #: 18D15F3b
SDG #: see cover

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

Page: 1 of 1
Reviewer: FT
2nd Reviewer: R

METHOD: [✓ GC] __ HPLC

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

[✓ Y] N N/A Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG?

~~Y~~ N N/A Was an MS/MSD analyzed every 20 samples for each matrix or whenever a sample extraction was performed?

Y [✓ N] N/A Were the MS/MSD percent recoveries (%R) and relative percent differences (RPD) within QC limits?

#	MS/MSD ID	Compound	MS %R (Limits)	MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
	5+6 (3X)	BB	( )	34.6 (38-154)	( )	2	J/UJ/A
			( )	( )	( )		QUAL Y, Z, AA, BB
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
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			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		

Lower Duwamish Waterway Group
Data Validation Reports
LDC# 18015

% Lipids & Total Solids

LDC

LDC Report# 18015A6

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name:	Lower Duwamish Waterway Group
Collection Date:	September 4 through September 7, 2007
LDC Report Date:	January 3, 2008
Matrix:	Tissue
Parameters:	% Lipids & Total Solids
Validation Level:	EPA Level IV
Laboratory:	Analytical Resources, Inc.
Sample Delivery Groups (SDG):	LT29

Sample Identification

LDW-07-T1-M-DC-EM-comp1
LDW-07-T3-M-DC-EM-comp1
LDW-07-T3-M-DC -EM-comp2
LDW-07-T3-M-DC-EM-comp3
LDW-07-T1-M-SC-EM-comp1
LDW-07-T1-M-SC-EM-comp2
LDW-07-T1-M-SC-EM-comp3
LDW-07-T2-M-SC-EM-comp1
LDW-07-T2-M-SC-EM-comp2
LDW-07-T2-M-SC-EM-comp3
LDW-07-T1-M-DC-HP-comp1
LDW-07-T3-M-DC-HP-comp1
LDW-07-T3-M-DC-HP-comp2
LDW-07-T3-M-DC-HP-comp3
LDW-07-T1-M-SC-HP-comp1
LDW-07-T1-M-SC-HP-comp2
LDW-07-T1-M-SC-HP-comp3
LDW-07-T2-M-SC-HP-comp1
LDW-07-T2-M-SC-HP-comp2
LDW-07-T2-M-SC-HP-comp3
LDW-07-T3-M-DC-EM-comp3DUP
LDW-07-T3-M-DC-EM-comp3TRP
LDW-07-T3-M-DC-HP-comp3DUP
LDW-07-T3-M-DC-HP-comp3TRP

Introduction

This data review covers 24 tissue samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per the EPA Method 160.3 for Total Solids and Bligh & Dyer Method for Percent Lipids.

This review follows the Lower Duwamish Waterway Group Final Fish, Crab, and Clam Tissue Collection and Chemical Analyses Quality Assurance Project Plan (August 23, 2007) and the National Functional Guidelines for Inorganic Data Review (October 2004).

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section III.

Field duplicates are summarized in Section IX.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Calibration

a. Initial Calibration

All criteria for the initial calibration of each method were met.

b. Calibration Verification

Calibration verification frequency and analysis criteria were met for each method when applicable.

III. Blanks

Method blanks were reviewed for each matrix as applicable. No contaminant concentrations were found in the initial, continuing and preparation blanks with the following exceptions:

Method Blank ID	Analyte	Concentration	Associated Samples
PB	% Lipids	0.0040 %	LDW-07-T1-M-DC-EM-comp1 LDW-07-T3-M-DC-EM-comp1 LDW-07-T3-M-DC -EM-comp2 LDW-07-T3-M-DC-EM-comp3 LDW-07-T1-M-SC-EM-comp1 LDW-07-T1-M-SC-EM-comp2 LDW-07-T1-M-SC-EM-comp3 LDW-07-T2-M-SC-EM-comp1 LDW-07-T2-M-SC-EM-comp2 LDW-07-T2-M-SC-EM-comp3 LDW-07-T3-M-DC-EM-comp3DUP LDW-07-T3-M-DC-EM-comp3TRP
PB	% Lipids	0.0080 %	LDW-07-T1-M-DC-HP-comp1 LDW-07-T3-M-DC-HP-comp1 LDW-07-T3-M-DC-HP-comp2 LDW-07-T3-M-DC-HP-comp3 LDW-07-T1-M-SC-HP-comp1 LDW-07-T1-M-SC-HP-comp2 LDW-07-T1-M-SC-HP-comp3 LDW-07-T2-M-SC-HP-comp1 LDW-07-T2-M-SC-HP-comp2 LDW-07-T2-M-SC-HP-comp3 LDW-07-T3-M-DC-HP-comp3DUP LDW-07-T3-M-DC-HP-comp3TRP

Sample concentrations were compared to concentrations detected in the method blanks. The sample concentrations were either not detected or were significantly greater (>5X blank contaminants) than the concentrations found in the associated method blanks.

IV. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) analyses were not required by the method.

V. Duplicates

Duplicate (DUP) and triplicate (TRP) sample analyses were reviewed for each matrix as applicable. Results were within QC limits.

VI. Laboratory Control Samples

Laboratory control samples (LCS) analyses were not required by the method.

VII. Sample Result Verification

All sample result verifications were acceptable.

VIII. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

IX. Field Duplicates

No field duplicates were identified in this SDG.

X. Field Blanks

No field blanks were identified in this SDG.

Lower Duwamish Waterway Group
% Lipids & Total Solids - Data Qualification Summary - SDG LT29

No Sample Data Qualified in this SDG

Lower Duwamish Waterway Group
% Lipids & Total Solids - Laboratory Blank Data Qualification Summary - SDG LT29

No Sample Data Qualified in this SDG

LDC #: 18015A6
SDG #: LT29
Laboratory: Analytical Resources, Inc.

VALIDATION COMPLETENESS WORKSHEET
Level IV

Date: 1/31/07
Page: 1 of 1
Reviewer: ak
2nd Reviewer: ✓

METHOD: Percent Lipids (Bligh & Dyer), Total Solids (EPA Method 160.3)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 9/4 → 9/7/07
IIa.	Initial calibration	A	
IIb.	Calibration verification	A	
III.	Blanks	SW	
IV	Matrix Spike/Matrix Spike Duplicates	N	~~D~~ / TRP
V	Duplicates	~~SW~~ A*	
VI.	Laboratory control samples	N	
VII.	Sample result verification	A	
VIII.	Overall assessment of data	A	
IX.	Field duplicates	N	
X	Field blanks	N	

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank

Validated Samples: All Tissue

1	LDW-07-T1-M-DC-EM-comp1	11	LDW-07-T1-M-DC-HP-comp1	21	LDW-07-T3-M-DC-EM-comp3DUP	31	
2	LDW-07-T3-M-DC-EM-comp1	12	LDW-07-T3-M-DC-HP-comp1	22	LDW-07-T3-M-DC-EM-comp3TRP	32	
3	LDW-07-T3-M-DC -EM-comp2	13	LDW-07-T3-M-DC-HP-comp2	23	LDW-07-T3-M-DC-HP-comp3DUP	33	
4	LDW-07-T3-M-DC-EM-comp3	14	LDW-07-T3-M-DC-HP-comp3	24	LDW-07-T3-M-DC-HP-comp3TRP	34	
5	LDW-07-T1-M-SC-EM-comp1	15	LDW-07-T1-M-SC-HP-comp1	25	PB	35	
6	LDW-07-T1-M-SC-EM-comp2	16	LDW-07-T1-M-SC-HP-comp2	26		36	
7	LDW-07-T1-M-SC-EM-comp3	17	LDW-07-T1-M-SC-HP-comp3	27		37	
8	LDW-07-T2-M-SC-EM-comp1	18	LDW-07-T2-M-SC-HP-comp1	28		38	
9	LDW-07-T2-M-SC-EM-comp2	19	LDW-07-T2-M-SC-HP-comp2	29		39	
10	LDW-07-T2-M-SC-EM-comp3	20	LDW-07-T2-M-SC-HP-comp3	30		40	

Notes: * % RSD w/in Limits (Triplicates)

LDC #: 18015A6
SDG #: LT29

VALIDATION FINDINGS CHECKLIST

Reviewer: CL
2nd Reviewer: [illegible]

Method: Inorganics (EPA Method In Cover)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	✓			
Coolor temperature criteria was met.	✓			
II. Calibration				
Were all instruments calibrated daily, each set-up time?	✓			
Were the proper number of standards used?	✓			
Were all initial calibration correlation coefficients ≥ 0.995?	✓			
Were all initial and continuing calibration verification %Rs within the 90-110% QC limits?	✓			
Were titrant checks performed as required? (Level IV only)			✓	
Were balance checks performed as required? (Level IV only)			✓	
III. Blanks				
Was a method blank associated with every sample in this SDG?	✓			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.	✓			
IV. Matrix spike/Matrix spike duplicates and Duplicates				
Were a matrix spike (MS) and duplicate (DUP) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD or MS/DUP. Soil / Water.			✓	
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the 75-125 QC limits? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.			✓	
Were the MS/MSD or duplicate relative percent differences (RPD) ≤ 20% for waters and ≤ 35% for soil samples? A control limit of ≤ CRDL(≤ 2X CRDL for soil) was used for samples that were ≤ 5X the CRDL, including when only one of the duplicate sample values were ≤ 5X the CRDL.			✓	
V. Laboratory control samples				
Was an LCS anaylzed for this SDG?			✓	
Was an LCS analyzed per extraction batch?			✓	
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 80-120% (85-115% for Method 300.0) QC limits?			✓	
VI. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?		✓		
Were the performance evaluation (PE) samples within the acceptance limits?			✓	

LDC #: 18915A6
SDG #: LT29

VALIDATION FINDINGS CHECKLIST

Reviewer: CA
2nd Reviewer: LC

Validation Area	Yes	No	NA	Findings/Comments
VII. Sample Result Verification				
Were RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
Were detection limits < RL?	✓			
VIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			
IX. Field duplicates				
Field duplicate pairs were identified in this SDG.		✓		
Target analytes were detected in the field duplicates.			✓	
X. Field blanks				
Field blanks were identified in this SDG.		✓		
Target analytes were detected in the field blanks.			✓	

LDC #: 18015A6
SDG #: LT29

VALIDATION FINDINGS WORKSHEET
Sample Specific Analysis Reference

Page: 1 of 1
Reviewer: AA
2nd reviewer: ✓

All circled methods are applicable to each sample.

Sample ID	Parameter
1 - 20	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} (Tot. Solids) (% Lipids)
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
QC Samples 21 - 24	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} (% Lipids) ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}

Comments: ____________________

LDC #: 18015A6
SDG #: LT29

VALIDATION FINDINGS WORKSHEET
Blanks

Reviewer: AL
2nd Reviewer:

METHOD: Inorganics, Method Sm Conv

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".
Ⓨ N N/A Were all samples associated with a given method blank?
Ⓨ N N/A Were any inorganic contaminants detected above the reporting limit in the method blanks? If yes, please see qualifications below.

Conc. units: % **Associated Samples:** 1-10, 21, 22 (x5x)

Analyte	Blank ID	Maximum ICB/CCB	Blank Action Limit	Sample Identification								
	PB											
% Lipids	0.0040		0.02									

CIRCLED RESULTS WERE NOT QUALIFIED. ALL RESULTS NOT CIRCLED WERE QUALIFIED BY THE FOLLOWING STATEMENT:
All contaminants within five times the method blank concentration were qualified as not detected, "U".

LDC #: 18015A6
SDG #: LT29

VALIDATION FINDINGS WORKSHEET
Blanks

Reviewer: AL
2nd Reviewer: L

METHOD: Inorganics, Method Sr Conv

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".
(Y) N N/A Were all samples associated with a given method blank?
(N) N N/A Were any inorganic contaminants detected above the reporting limit in the method blanks? If yes, please see qualifications below.

Conc. units: % Associated Samples: 11-20 23, 24 (>5x)

Analyte	Blank ID	Maximum ICB/CCB	Blank Action Limit	Sample Identification								
	PB											
% Lipids	0.0080		0.04									

CIRCLED RESULTS WERE NOT QUALIFIED. ALL RESULTS NOT CIRCLED WERE QUALIFIED BY THE FOLLOWING STATEMENT:
All contaminants within five times the method blank concentration were qualified as not detected, "U".

LDC #: 19015A6
SDG #: LT29

VALIDATION FINDINGS WORKSHEET
Level IV Recalculation Worksheet

Reviewer: AI
2nd Reviewer: [illegible]

METHOD: Inorganics, Method Sm Conv

Percent recoveries (%R) for a laboratory control sample and a matrix spike sample were recalculated using the following formula:

%R = Found / True x 100 Where, Found = concentration of each analyte measured in the analysis of the sample. For the matrix spike calculation, Found = SSR (spiked sample result) - SR (sample result).
True = concentration of each analyte in the source.

A sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

RPD = |S-D| / (S+D)/2 x 100 Where, S = Original sample concentration
D = Duplicate sample concentration

Sample ID	Type of Analysis	Element	Found / S (units)	True / D (units)	Recalculated %R / RPD	Reported %R / RPD	Acceptable (Y/N)
	Laboratory control sample						
	Matrix spike sample		(SSR-SR)				
LT29NDUP	Duplicate sample	% Lipids	6.10	7.52	20.9	20.9	Y

Comments: Refer to appropriate worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 18015A6
SDG #: LT29

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: 1 of 1
Reviewer: CA
2nd reviewer: LA

METHOD: Inorganics, Method Sm Com

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

(Y) N N/A Have results been reported and calculated correctly?
(Y) N N/A Are results within the calibrated range of the instruments?
(Y) N N/A Are all detection limits below the CRQL?

Compound (analyte) results for _____ reported with a positive detect were recalculated and verified using the following equation:

Concentration = Recalculation:

$$\%\ Lipid^{(1)} = \frac{(1.2301 - 1.1197)}{50} \times 2 \times 100 = 0.4416$$

#	Sample ID	Analyte	Reported Concentration (%)	Calculated Concentration (%)	Acceptable (Y/N)
	1	Tot. Solids	15.80	15.80	Y
		% Lipids	0.440	0.4416	Y
	11	Tot. Solids	15.42	15.42	Y
		% Lipids	3.72	3.727	Y

Note: _____

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name:	Lower Duwamish Waterway Group
Collection Date:	September 4 through September 6, 2007
LDC Report Date:	January 3, 2008
Matrix:	Tissue
Parameters:	% Lipids & Total Solids
Validation Level:	EPA Level III
Laboratory:	Analytical Resources, Inc.
Sample Delivery Groups (SDG):	LT30

Sample Identification

LDW-07-T1-M-ES-FL-comp1
LDW-07-T1-M-ES-FL-comp2
LDW-07-T1-M-ES-FL-comp3
LDW-07-T2-A-ES-FL-comp1
LDW-07-T2-A-ES-FL-comp2
LDW-07-T2-A-ES-FL-comp3
LDW-07-T3-M-ES-FL-comp1
LDW-07-T3-M-ES-FL-comp2
LDW-07-T3-M-ES-FL-comp3
LDW-07-T3-M-ES-FL-comp2DUP
LDW-07-T3-M-ES-FL-comp2TRP

Introduction

This data review covers 11 tissue samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per the EPA Method 160.3 for Total Solids and Bligh & Dyer Method for Percent Lipids.

This review follows the Lower Duwamish Waterway Group Final Fish, Crab, and Clam Tissue Collection and Chemical Analyses Quality Assurance Project Plan (August 23, 2007) and the National Functional Guidelines for Inorganic Data Review (October 2004).

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section III.

Field duplicates are summarized in Section IX.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Calibration

a. Initial Calibration

All criteria for the initial calibration of each method were met.

b. Calibration Verification

Calibration verification frequency and analysis criteria were met for each method when applicable.

III. Blanks

Method blanks were reviewed for each matrix as applicable. No contaminant concentrations were found in the initial, continuing and preparation blanks with the following exceptions:

Method Blank ID	Analyte	Concentration	Associated Samples
PB	% Lipids	0.0080 %	All samples in SDG LT30

Sample concentrations were compared to concentrations detected in the method blanks. The sample concentrations were either not detected or were significantly greater (>5X blank contaminants) than the concentrations found in the associated method blanks.

IV. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) analyses were not required by the method.

V. Duplicates

Duplicate (DUP) and triplicate (TRP) sample analyses were reviewed for each matrix as applicable. Results were within QC limits.

VI. Laboratory Control Samples

Laboratory control samples (LCS) analyses were not required by the method.

VII. Sample Result Verification

Raw data were not reviewed for this SDG.

VIII. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

IX. Field Duplicates

No field duplicates were identified in this SDG.

X. Field Blanks

No field blanks were identified in this SDG.

Lower Duwamish Waterway Group
% Lipids & Total Solids - Data Qualification Summary - SDG LT30

No Sample Data Qualified in this SDG

Lower Duwamish Waterway Group
% Lipids & Total Solids - Laboratory Blank Data Qualification Summary - SDG LT30

No Sample Data Qualified in this SDG

LDC #: 18015B6

SDG #: LT30

Laboratory: Analytical Resources, Inc.

VALIDATION COMPLETENESS WORKSHEET

Level III

Date: 1/2/08

Page: 1 of 1

Reviewer: ek

2nd Reviewer:

METHOD: Percent Lipids (Bligh & Dyer), Total Solids (EPA Method 160.3)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 9/4 → 9/6/07
IIa.	Initial calibration	A	
IIb.	Calibration verification	A	
III.	Blanks	SW	
IV	Matrix Spike/Matrix Spike Duplicates	N	~~DUP~~ / TRP
V	Duplicates	A	
VI.	Laboratory control samples	N	
VII.	Sample result verification	N	
VIII.	Overall assessment of data	A	
IX.	Field duplicates	N	
X	Field blanks	N	

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank

Validated Samples:

All Tissue

1	LDW-07-T1-M-ES-FL-comp1	11	LDW-07-T3-M-ES-FL-comp2TRP	21		31	
2	LDW-07-T1-M-ES-FL-comp2	12	PB	22		32	
3	LDW-07-T1-M-ES-FL-comp3	13		23		33	
4	LDW-07-T2-A-ES-FL-comp1	14		24		34	
5	LDW-07-T2-A-ES-FL-comp2	15		25		35	
6	LDW-07-T2-A-ES-FL-comp3	16		26		36	
7	LDW-07-T3-M-ES-FL-comp1	17		27		37	
8	LDW-07-T3-M-ES-FL-comp2	18		28		38	
9	LDW-07-T3-M-ES-FL-comp3	19		29		39	
10	LDW-07-T3-M-ES-FL-comp2DUP	20		30		40	

Notes:

LDC #: 1801586
SDG #: LT30

VALIDATION FINDINGS WORKSHEET
Sample Specific Analysis Reference

Page: 1 of 1
Reviewer: Al
2nd reviewer:

All circled methods are applicable to each sample.

Sample ID	Parameter
1-9	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} (Tot. Solids) (% Lipids)
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
QC sample 10-11	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} (% Lipids)
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}

Comments:

LDC #: 18015B6
SDG #: LT30

VALIDATION FINDINGS WORKSHEET
Blanks

Page: 1 of 1
Reviewer: AL
2nd Reviewer: L

METHOD: Inorganics, Method Sw Conv

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".
(Y) N N/A Were all samples associated with a given method blank?
(Y) N N/A Were any inorganic contaminants detected above the reporting limit in the method blanks? If yes, please see qualifications below.

Conc. units: ug/L

Associated Samples: All (>5x)

Analyte	Blank ID	Maximum ICB/CCB	Blank Action Limit	Sample Identification								
	PB											
ug/L Lipid	0.0080	~~0.0~~	0.040									

CIRCLED RESULTS WERE NOT QUALIFIED. ALL RESULTS NOT CIRCLED WERE QUALIFIED BY THE FOLLOWING STATEMENT:
All contaminants within five times the method blank concentration were qualified as not detected, "U".

LDC Report# 18015C6

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name:	Lower Duwamish Waterway Group
Collection Date:	September 4 through September 6, 2007
LDC Report Date:	January 3, 2008
Matrix:	Tissue
Parameters:	% Lipids & Total Solids
Validation Level:	EPA Level III
Laboratory:	Analytical Resources, Inc.
Sample Delivery Groups (SDG):	LT31

Sample Identification

LDW-07-T1-M-ES-WB-comp1
LDW-07-T1-M-ES-WB-comp2
LDW-07-T1-M-ES-WB-comp3
LDW-07-T1-M-ES-WB-comp4
LDW-07-T1-M-ES-WB-comp5
LDW-07-T1-M-ES-WB-comp6
LDW-07-T2-A-ES-WB-comp1
LDW-07-T2-A-ES-WB-comp2
LDW-07-T2-A-ES-WB-comp3
LDW-07-T2-A-ES-WB-comp4
LDW-07-T2-A-ES-WB-comp5
LDW-07-T2-A-ES-WB-comp6
LDW-07-T2-A-ES-WB-comp2DUP
LDW-07-T2-A-ES-WB-comp2TRP

Introduction

This data review covers 14 tissue samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per the EPA Method 160.3 for Total Solids and Bligh & Dyer Method for Percent Lipids.

This review follows the Lower Duwamish Waterway Group Final Fish, Crab, and Clam Tissue Collection and Chemical Analyses Quality Assurance Project Plan (August 23, 2007) and the National Functional Guidelines for Inorganic Data Review (October 2004).

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section III.

Field duplicates are summarized in Section IX.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Calibration

a. Initial Calibration

All criteria for the initial calibration of each method were met.

b. Calibration Verification

Calibration verification frequency and analysis criteria were met for each method when applicable.

III. Blanks

Method blanks were reviewed for each matrix as applicable. No contaminant concentrations were found in the initial, continuing and preparation blanks with the following exceptions:

Method Blank ID	Analyte	Concentration	Associated Samples
PB	% Lipids	0.0080 %	All samples in SDG LT31

Sample concentrations were compared to concentrations detected in the method blanks. The sample concentrations were either not detected or were significantly greater (>5X blank contaminants) than the concentrations found in the associated method blanks.

IV. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) analyses were not required by the method.

V. Duplicates

Duplicate (DUP) and triplicate (TRP) sample analyses were reviewed for each matrix as applicable. Results were within QC limits.

VI. Laboratory Control Samples

Laboratory control samples (LCS) analyses were not required by the method.

VII. Sample Result Verification

Raw data were not reviewed for this SDG.

VIII. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

IX. Field Duplicates

No field duplicates were identified in this SDG.

X. Field Blanks

No field blanks were identified in this SDG.

Lower Duwamish Waterway Group
% Lipids & Total Solids - Data Qualification Summary - SDG LT31

No Sample Data Qualified in this SDG

Lower Duwamish Waterway Group
% Lipids & Total Solids - Laboratory Blank Data Qualification Summary - SDG LT31

No Sample Data Qualified in this SDG

LDC #: 18015C6
SDG #: LT31
Laboratory: Analytical Resources, Inc.

VALIDATION COMPLETENESS WORKSHEET
Level ~~IV~~ III

Date: 11/2/08
Page: 1 of 1
Reviewer: ak
2nd Reviewer:

METHOD: Percent Lipids (Bligh & Dyer), Total Solids (EPA Method 160.3)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 7/4 → 9/6/07
IIa.	Initial calibration	A	
IIb.	Calibration verification	A	
III.	Blanks	SW	
IV	Matrix Spike/Matrix Spike Duplicates	N	~~D~~/TRP
V	Duplicates	A	
VI.	Laboratory control samples	N	
VII.	Sample result verification	N	
VIII.	Overall assessment of data	A	
IX.	Field duplicates	N	
X	Field blanks	N	

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank

Validated Samples:

All Tissue

1	LDW-07-T1-M-ES-WB-comp1	11	LDW-07-T2-A-ES-WB-comp5	21		31	
2	LDW-07-T1-M-ES-WB-comp2	12	LDW-07-T2-A-ES-WB-comp6	22		32	
3	LDW-07-T1-M-ES-WB-comp3	13	LDW-07-T2-A-ES-WB-comp2DUP	23		33	
4	LDW-07-T1-M-ES-WB-comp4	14	LDW-07-T2-A-ES-WB-comp2TRP	24		34	
5	LDW-07-T1-M-ES-WB-comp5	15	PB	25		35	
6	LDW-07-T1-M-ES-WB-comp6	16		26		36	
7	LDW-07-T2-A-ES-WB-comp1	17		27		37	
8	LDW-07-T2-A-ES-WB-comp2	18		28		38	
9	LDW-07-T2-A-ES-WB-comp3	19		29		39	
10	LDW-07-T2-A-ES-WB-comp4	20		30		40	

Notes:

LDC #: 18015C6
SDG #: LT31

VALIDATION FINDINGS WORKSHEET
Sample Specific Analysis Reference

Page: 1 of 1
Reviewer: [illegible]
2nd reviewer: [illegible]

All circled methods are applicable to each sample.

Sample ID	Parameter
1-12	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} (Tot. Solid) (% Lipid)
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
QC Sample 13-14	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} (% Lipid) ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}

Comments: ____

LDC #: 18015C6
SDG #: LT31

VALIDATION FINDINGS WORKSHEET
Blanks

Reviewer: AL
2nd Reviewer: [illegible]

METHOD: Inorganics, Method Sr Cor

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".
(Y) N N/A Were all samples associated with a given method blank?
(Y) N N/A Were any inorganic contaminants detected above the reporting limit in the method blanks? If yes, please see qualifications below.

Conc. units: % **Associated Samples:** All (>5x)

Analyte	Blank ID	Maximum ICB/CCB	Blank Action Limit	Sample Identification								
	PB											
% Lipids	0.0050		0.050									

CIRCLED RESULTS WERE NOT QUALIFIED. ALL RESULTS NOT CIRCLED WERE QUALIFIED BY THE FOLLOWING STATEMENT:
All contaminants within five times the method blank concentration were qualified as not detected, "U".

LDC Report# 18015D6

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name:	Lower Duwamish Waterway Group
Collection Date:	September 5 through September 12, 2007
LDC Report Date:	January 3, 2008
Matrix:	Tissue
Parameters:	% Lipids & Total Solids
Validation Level:	EPA Level III
Laboratory:	Analytical Resources, Inc.
Sample Delivery Groups (SDG):	LT32

Sample Identification

LDW-07-T3-M-ES-WB-comp1
LDW-07-T3-M-ES-WB-comp2
LDW-07-T3-M-ES-WB-comp3
LDW-07-T3-M-ES-WB-comp4
LDW-07-T3-M-ES-WB-comp5
LDW-07-T3-M-ES-WB-comp6
LDW-07-T4-M-ES-WB-comp1
LDW-07-T4-M-SF-FL-comp1
LDW-07-T4-M-SF-WB-comp1
LDW-07-T4-M-SF-WB-comp2
LDW-07-T4-M-SF-WB-comp3
LDW-07-T3-M-ES-WB-comp3DUP
LDW-07-T3-M-ES-WB-comp3TRP

Introduction

This data review covers 13 tissue samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per the EPA Method 160.3 for Total Solids and Bligh & Dyer Method for Percent Lipids.

This review follows the Lower Duwamish Waterway Group Final Fish, Crab, and Clam Tissue Collection and Chemical Analyses Quality Assurance Project Plan (August 23, 2007) and the National Functional Guidelines for Inorganic Data Review (October 2004).

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section III.

Field duplicates are summarized in Section IX.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Calibration

a. Initial Calibration

All criteria for the initial calibration of each method were met.

b. Calibration Verification

Calibration verification frequency and analysis criteria were met for each method when applicable.

III. Blanks

Method blanks were reviewed for each matrix as applicable. No contaminant concentrations were found in the initial, continuing and preparation blanks.

IV. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) analyses were not required by the method.

V. Duplicates

Duplicate (DUP) and triplicate (TRP) sample analyses were reviewed for each matrix as applicable. Results were within QC limits.

VI. Laboratory Control Samples

Laboratory control samples (LCS) analyses were not required by the method.

VII. Sample Result Verification

Raw data were not reviewed for this SDG.

VIII. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

IX. Field Duplicates

No field duplicates were identified in this SDG.

X. Field Blanks

No field blanks were identified in this SDG.

Lower Duwamish Waterway Group
% Lipids & Total Solids - Data Qualification Summary - SDG LT32

No Sample Data Qualified in this SDG

Lower Duwamish Waterway Group
% Lipids & Total Solids - Laboratory Blank Data Qualification Summary - SDG LT32

No Sample Data Qualified in this SDG

LDC #: 18015D6

SDG #: LT32

Laboratory: Analytical Resources, Inc.

VALIDATION COMPLETENESS WORKSHEET

Level III

Date: 1/8/07

Page: 1 of 1

Reviewer: ak

2nd Reviewer:

METHOD: Percent Lipids (Bligh & Dyer), Total Solids (EPA Method 160.3)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 9/5 → 9/14/07
IIa.	Initial calibration	A	
IIb.	Calibration verification	A	
III.	Blanks	A	
IV	Matrix Spike/Matrix Spike Duplicates	N	~~D~~/TRP
V	Duplicates	A	
VI.	Laboratory control samples	N	
VII.	Sample result verification	N	
VIII.	Overall assessment of data	A	
IX.	Field duplicates	N	
X	Field blanks	N	

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet

ND = No compounds detected
R = Rinsate
FB = Field blank

D = Duplicate
TB = Trip blank
EB = Equipment blank

Validated Samples:

All Tissue

1	LDW-07-T3-M-ES-WB-comp1	11	LDW-07-T4-M-SF-WB-comp3	21		31	
2	LDW-07-T3-M-ES-WB-comp2	12	LDW-07-T3-M-ES-WB-comp3DUP	22		32	
3	LDW-07-T3-M-ES-WB-comp3	13	LDW-07-T3-M-ES-WB-comp3TRP	23		33	
4	LDW-07-T3-M-ES-WB-comp4	14	PB	24		34	
5	LDW-07-T3-M-ES-WB-comp5	15		25		35	
6	LDW-07-T3-M-ES-WB-comp6	16		26		36	
7	LDW-07-T4-M-ES-WB-comp1	17		27		37	
8	LDW-07-T4-M-SF-FL-comp1	18		28		38	
9	LDW-07-T4-M-SF-WB-comp1	19		29		39	
10	LDW-07-T4-M-SF-WB-comp2	20		30		40	

Notes:

LDC #: 18015D6
SDG #: LT32

VALIDATION FINDINGS WORKSHEET
Sample Specific Analysis Reference

Page: 1 of 1
Reviewer: ____
2nd reviewer: ____

All circled methods are applicable to each sample.

QC Sample

Sample ID	Parameter
1-11	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} [✓ Tot. Solids] ____ [✓ % Lipid]
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
12-13	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} [✓ % Lipid] ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}

Comments: ____

LDC Report# 18015E6

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name:	Lower Duwamish Waterway Group
Collection Date:	September 4 through September 7, 2007
LDC Report Date:	January 3, 2008
Matrix:	Tissue
Parameters:	% Lipids & Total Solids
Validation Level:	EPA Level III
Laboratory:	Analytical Resources, Inc.
Sample Delivery Groups (SDG):	LT33

Sample Identification

LDW-07-T1-A-SS-WB-comp1
LDW-07-T1-B-SS-WB-comp1
LDW-07-T1-C-SS-WB-comp1
LDW-07-T1-D-SS-WB-comp1
LDW-07-T1-E-SS-WB-comp1
LDW-07-T1-F-SS-WB-comp1
LDW-07-T2-A-SS-WB-comp1
LDW-07-T2-B-SS-WB-comp1
LDW-07-T2-C-SS-WB-comp1
LDW-07-T2-D-SS-WB-comp1
LDW-07-T2-E-SS-WB-comp1
LDW-07-T2-F-SS-WB-comp1
LDW-07-T3-A-SS-WB-comp1
LDW-07-T3-B-SS-WB-comp1
LDW-07-T3-C-SS-WB-comp1
LDW-07-T3-D-SS-WB-comp1
LDW-07-T3-E-SS-WB-comp1
LDW-07-T3-F-SS-WB-comp1
LDW-07-T3-D-SS-WB-comp1DUP
LDW-07-T3-D-SS-WB-comp1TRP

Introduction

This data review covers 20 tissue samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per the EPA Method 160.3 for Total Solids and Bligh & Dyer Method for Percent Lipids.

This review follows the Lower Duwamish Waterway Group Final Fish, Crab, and Clam Tissue Collection and Chemical Analyses Quality Assurance Project Plan (August 23, 2007) and the National Functional Guidelines for Inorganic Data Review (October 2004).

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section III.

Field duplicates are summarized in Section IX.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Calibration

a. Initial Calibration

All criteria for the initial calibration of each method were met.

b. Calibration Verification

Calibration verification frequency and analysis criteria were met for each method when applicable.

III. Blanks

Method blanks were reviewed for each matrix as applicable. No contaminant concentrations were found in the initial, continuing and preparation blanks.

IV. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) analyses were not required by the method.

V. Duplicates

Duplicate (DUP) and triplicate (TRP) sample analyses were reviewed for each matrix as applicable. Results were within QC limits.

VI. Laboratory Control Samples

Laboratory control samples (LCS) analyses were not required by the method.

VII. Sample Result Verification

Raw data were not reviewed for this SDG.

VIII. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

IX. Field Duplicates

No field duplicates were identified in this SDG.

X. Field Blanks

No field blanks were identified in this SDG.

Lower Duwamish Waterway Group
% Lipids & Total Solids - Data Qualification Summary - SDG LT33

No Sample Data Qualified in this SDG

Lower Duwamish Waterway Group
% Lipids & Total Solids - Laboratory Blank Data Qualification Summary - SDG LT33

No Sample Data Qualified in this SDG

LDC #: 18015E6

SDG #: LT33

Laboratory: Analytical Resources, Inc.

VALIDATION COMPLETENESS WORKSHEET

Level III

Date: 11/28

Page: 1 of 1

Reviewer: ak

2nd Reviewer:

METHOD: Percent Lipids (Bligh & Dyer), Total Solids (EPA Method 160.3)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 9/4 → 9/7/07
IIa.	Initial calibration	A	
IIb.	Calibration verification	A	
III.	Blanks	A	
IV	Matrix Spike/Matrix Spike Duplicates	N	} D~~R~~ / TRP
V	Duplicates	A	}
VI.	Laboratory control samples	N	
VII.	Sample result verification	N	
VIII.	Overall assessment of data	A	
IX.	Field duplicates	N	
X	Field blanks	N	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = No compounds detected; R = Rinsate; FB = Field blank; D = Duplicate; TB = Trip blank; EB = Equipment blank

Validated Samples:

All Tissue

1	LDW-07-T1-A-SS-WB-comp1	11	LDW-07-T2-E-SS-WB-comp1	21	PB	31	
2	LDW-07-T1-B-SS-WB-comp1	12	LDW-07-T2-F-SS-WB-comp1	22		32	
3	LDW-07-T1-C-SS-WB-comp1	13	LDW-07-T3-A-SS-WB-comp1	23		33	
4	LDW-07-T1-D-SS-WB-comp1	14	LDW-07-T3-B-SS-WB-comp1	24		34	
5	LDW-07-T1-E-SS-WB-comp1	15	LDW-07-T3-C-SS-WB-comp1	25		35	
6	LDW-07-T1-F-SS-WB-comp1	16	LDW-07-T3-D-SS-WB-comp1	26		36	
7	LDW-07-T2-A-SS-WB-comp1	17	LDW-07-T3-E-SS-WB-comp1	27		37	
8	LDW-07-T2-B-SS-WB-comp1	18	LDW-07-T3-F-SS-WB-comp1	28		38	
9	LDW-07-T2-C-SS-WB-comp1	19	LDW-07-T3-D-SS-WB-comp1DUP	29		39	
10	LDW-07-T2-D-SS-WB-comp1	20	LDW-07-T3-D-SS-WB-comp1TRP	30		40	

Notes:

LDC #: 18015E6
SDG #: LT33

VALIDATION FINDINGS WORKSHEET
Sample Specific Analysis Reference

Page: 1 of 1
Reviewer: cl
2nd reviewer: [signature]

All circled methods are applicable to each sample.

Sample ID	Parameter
1-18	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} (Tot. Solids) (% Lipid)
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
QC samples 19-20	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} (% Lipid)
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}

Comments:

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name:	Lower Duwamish Waterway Group
Collection Date:	September 5, 2007
LDC Report Date:	January 3, 2008
Matrix:	Tissue
Parameters:	% Lipids & Total Solids
Validation Level:	EPA Level III
Laboratory:	Analytical Resources, Inc.
Sample Delivery Groups (SDG):	LT34

Sample Identification

LDW-07-T4-A-SS-WB-comp1
LDW-07-T4-B-SS-WB-comp1
LDW-07-T4-C-SS-WB-comp1
LDW-07-T4-D-SS-WB-comp1
LDW-07-T4-B-SS-WB-comp1DUP
LDW-07-T4-B-SS-WB-comp1TRP

Introduction

This data review covers 6 tissue samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per the EPA Method 160.3 for Total Solids and Bligh & Dyer Method for Percent Lipids.

This review follows the Lower Duwamish Waterway Group Final Fish, Crab, and Clam Tissue Collection and Chemical Analyses Quality Assurance Project Plan (August 23, 2007) and the National Functional Guidelines for Inorganic Data Review (October 2004).

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section III.

Field duplicates are summarized in Section IX.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Calibration

a. Initial Calibration

All criteria for the initial calibration of each method were met.

b. Calibration Verification

Calibration verification frequency and analysis criteria were met for each method when applicable.

III. Blanks

Method blanks were reviewed for each matrix as applicable. No contaminant concentrations were found in the initial, continuing and preparation blanks.

IV. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) analyses were not required by the method.

V. Duplicates

Duplicate (DUP) and triplicate (TRP) sample analyses were reviewed for each matrix as applicable. Results were within QC limits.

VI. Laboratory Control Samples

Laboratory control samples (LCS) analyses were not required by the method.

VII. Sample Result Verification

Raw data were not reviewed for this SDG.

VIII. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

IX. Field Duplicates

No field duplicates were identified in this SDG.

X. Field Blanks

No field blanks were identified in this SDG.

Lower Duwamish Waterway Group
% Lipids & Total Solids - Data Qualification Summary - SDG LT34

No Sample Data Qualified in this SDG

Lower Duwamish Waterway Group
% Lipids & Total Solids - Laboratory Blank Data Qualification Summary - SDG LT34

No Sample Data Qualified in this SDG

LDC #: 18015F6

SDG #: LT34

Laboratory: Analytical Resources, Inc.

VALIDATION COMPLETENESS WORKSHEET

Level III

Date: 1/2/08

Page: 1 of 1

Reviewer: AA

2nd Reviewer: W

METHOD: Percent Lipids (Bligh & Dyer), Total Solids (EPA Method 160.3)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 9/5/07
IIa.	Initial calibration	A	
IIb.	Calibration verification	A	
III.	Blanks	A	
IV	Matrix Spike/Matrix Spike Duplicates	N	} ~~DUP~~ / TRP
V	Duplicates	A	
VI.	Laboratory control samples	N	
VII.	Sample result verification	N	
VIII.	Overall assessment of data	A	
IX.	Field duplicates	N	
X	Field blanks	N	

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet

ND = No compounds detected
R = Rinsate
FB = Field blank

D = Duplicate
TB = Trip blank
EB = Equipment blank

Validated Samples:

All Tissue

1	LDW-07-T4-A-SS-WB-comp1	11		21		31	
2	LDW-07-T4-B-SS-WB-comp1	12		22		32	
3	LDW-07-T4-C-SS-WB-comp1	13		23		33	
4	LDW-07-T4-D-SS-WB-comp1	14		24		34	
5	LDW-07-T4-B-SS-WB-comp1DUP	15		25		35	
6	LDW-07-T4-B-SS-WB-comp1TRP	16		26		36	
7	PB	17		27		37	
8		18		28		38	
9		19		29		39	
10		20		30		40	

Notes: _____

LDC #: 18015F6
SDG #: LT34

VALIDATION FINDINGS WORKSHEET
Sample Specific Analysis Reference

Page: 1 of 1
Reviewer: AL
2nd reviewer: L

All circled methods are applicable to each sample.

Sample ID	Parameter
1-4	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} (Tot. Solid) (% Lipid)
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
QC Sample 5-6	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} (% Lipid)
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}

Comments:

LABORATORY DATA CONSULTANTS, INC.
7750 El Camino Real, Suite 2L Carlsbad, CA 92009 Phone: 760/634-0437 Fax: 760/634-0439

Windward Environmental, LLC
200 West Mercer Street, Suite 401
Seattle, WA 98119
ATTN: Ms. Marina Mitchell

August 13, 2008

SUBJECT: Lower Duwamish Waterway Group, Data Validation

Dear Ms. Mitchell,

Enclosed is the revised validation report for the fraction listed below. This SDG was received on April 15, 2008. Attachment 1 is a summary of the samples that were reviewed for each analysis.

LDC Project # 18590:

SDG #	Fraction
DPWG25031/ WG24520	Polychlorinated Biphenyls as Congeners

The data validation was performed under EPA Level IV guidelines. The analyses were validated using the following documents, as applicable to each method:

- Lower Duwamish Waterway Group Final Fish, Crab, and Clam Tissue Collection and Chemical Analyses Quality Assurance Project Plan, August 2007
- EPA Region 10 SOP for the Validation of 1668 Toxic, Dioxin-like PCB Data, Revision 1.0, December 1995
- EPA Method and Guidance for the Analysis of Water, January 1996

Please feel free to contact us if you have any questions.

Sincerely,

Stella S. Cuenco
Project Manager/Senior Chemist

Revision 1

LDC Report# 18590A3

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Lower Duwamish Waterway Group

Collection Date: September 4 through September 7, 2007

LDC Report Date: August 12, 2008

Matrix: Tissue

Parameters: Polychlorinated Biphenyls as Congeners

Validation Level: EPA Level IV

Laboratory: AXYS Analytical Services

Sample Delivery Group (SDG): DPWG25031/WG24520

LDW-07-T1-M-DC-EM-COMP1
LDW-07-T3-M-DC-EM-COMP3
LDW-07-T2-M-SC-EM-COMP1
LDW-07-T1-M-DC-HP-COMP1
LDW-07-T1-M-ES-WB-COMP5
LDW-07-T2-A-ES-WB-COMP4
LDW-07-T3-M-ES-WB-COMP4
LDW-07-T1-B-SS-WB-COMP1
LDW-07-T2-E-SS-WB-COMP1
LDW-07-T3-F-SS-WB-COMP1
LDW-07-T2-M-SC-EM-COMP1DUP

Introduction

This data review covers 11 tissue samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Method 1668A for Polychlorinated Biphenyl as Congeners.

The QC guidelines used for data qualification are those specified in the EPA Region 10 SOP for the Validation of 1668 Toxic, Dioxin-like PCB Data (Revision 1.0, December 8, 1995) and Lower Duwamish Waterway Group Final Fish, Crab, and Clam Tissue Collection and Chemical Analyses Quality Assurance Project Plan (August 23, 2007).

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section V.

Field duplicates are summarized in Section XIV.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

- J1 Blank Contamination: Indicates possible high bias and/or false positives.
- J2 Calibration Range exceeded: Indicates possible low bias.
- J3 Holding times not met: Indicates low bias for most analytes.
- J4 Other QC parameters outside control limits: bias not readily determined.
- J5 Other QC parameters outside control limits. The reported results appear to be biased high. The actual value of target compound in the sample may be lower than the value reported by the laboratory.
- J6 Other QC parameters outside control limits. The reported results appear to be biased low. The actual value of target compound in the sample may be higher than the value reported by the laboratory.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

*II. HRGC/MS Instrument Performance Check

Instrument performance was checked at the required daily frequency.

Retention time windows were established for all congeners. The chromatographic resolution was less than or equal to 40% for congeners PCB-23 and PCB-34 and congeners PCB-182 and PCB-187.

The static resolving power was at least 10,000 (10% valley definition).

*III. Initial Calibration

A five point initial calibration was performed as required by the method.

The percent relative standard deviations (%RSD) were less than or equal to 20.0% for all compounds.

The ion abundance ratios for all PCBs were within validation criteria.

The minimum S/N ratio for each target compound was greater than or equal to 2.5 and greater than or equal to 10 for each recovery and internal standard compound.

*IV. Routine Calibration (Continuing)

Routine calibration was performed at the required frequencies.

All of the routine calibration percent differences (%D) between the initial calibration RRF and the routine calibration RRF were less than or equal to 30.0% for unlabeled compounds and less than or equal to 50.0% for labeled compounds.

The ion abundance ratios for all PCBs were within validation criteria.

V. Blanks

Method blanks were reviewed for each matrix as applicable. No polychlorinated biphenyl contaminants were found in the method blanks with the following exceptions:

*Changed text.

Method Blank ID	Extraction Date	Compound	Concentration	Associated Samples
WG24520-101	2/14/08	PCB-11	5.23 ng/Kg	All samples in SDG DPWG25031/WG24520
		PCB-18/30	4.29 ng/Kg	
		PCB-20/28	4.35 ng/Kg	
		PCB-31	2.67 ng/Kg	
		PCB-32	1.16 ng/Kg	
		PCB-37	2.95 ng/Kg	
		PCB-40	2.98 ng/Kg	
		PCB-44/47/65	5.81 ng/Kg	
		PCB-49/69	3.86 ng/Kg	
		PCB-52	8.46 ng/Kg	
		PCB-56	1.38 ng/Kg	
		PCB-64	1.49 ng/Kg	
		PCB-66	3.60 ng/Kg	
		PCB-85/116/117	1.72 ng/Kg	
		PCB-86/87/97/108/119/125	4.48 ng/Kg	
		PCB-105	1.91 ng/Kg	
		PCB-110/115	8.46 ng/Kg	
		PCB-112	0.691 ng/Kg	
		PCB-118	7.88 ng/Kg	
		PCB-129/138/160/163	1.51 ng/Kg	
		PCB-141	2.60 ng/Kg	
		PCB-146	1.82 ng/Kg	
		PCB-147/149	6.76 ng/Kg	
		PCB-153/168	13.0 ng/Kg	
		PCB-174	4.52 ng/Kg	
		PCB-177	3.37 ng/Kg	
		PCB-179	2.28 ng/Kg	
		PCB-183/185	3.87 ng/Kg	
		PCB-187	7.77 ng/Kg	
		PCB-198/199	5.94 ng/Kg	
		Total Di-CBs	5.23 ng/Kg	
		Total Tri-CBs	15.4 ng/Kg	
		Total Tetra-CBs	28.3 ng/Kg	
		Total Penta-CBs	25.7 ng/Kg	
		Total Hexa-CBs	39.7 ng/Kg	
		Total Hepta-CBs	21.8 ng/Kg	
		Total Octa-CBs	5.94 ng/Kg	
WG24520-101i	2/14/08	PCB-81	0.701 ng/Kg	LDW-07-T1-M-DC-HP-COMP1
		PCB-126	0.549 ng/Kg	LDW-07-T1-M-ES-WB-COMP5
		PCB-169	0.401 ng/Kg	LDW-07-T2-A-ES-WB-COMP4
				LDW-07-T3-M-ES-WB-COMP4
				LDW-07-T1-B-SS-WB-COMP1
				LDW-07-T2-E-SS-WB-COMP1
				LDW-07-T3-F-SS-WB-COMP1

*Changed concentration for Total Hexa-CBs for method blank WG24520-101 and added PCB-169 to method blank WG24520-101i.

Sample concentrations were compared to concentrations detected in the method blanks. The sample concentrations were either not detected or were significantly greater (>5X blank contaminants) than the concentrations found in the associated method blanks with the following exceptions:

Sample	Compound	Reported Concentration	Modified Final Concentration
LDW-07-T1-M-DC-EM-COMP1	PCB-11	6.25 ng/Kg	6.25U ng/Kg
LDW-07-T3-M-DC-EM-COMP3	PCB-11	9.53 ng/Kg	9.53U ng/Kg

*Indicates change as the result of report review.

Sample	Compound	Reported Concentration	Modified Final Concentration
LDW-07-T2-M-SC-EM-COMP1	PCB-11	3.66 ng/Kg	3.66U ng/Kg
LDW-07-T2-M-SC-EM-COMP1DUP	PCB-11	3.42 ng/Kg	3.42U ng/Kg
LDW-07-T1-M-DC-HP-COMP1	PCB-11	24.5 ng/Kg	24.5U ng/Kg

All method blank results flagged "K" by the laboratory were considered not detected.

No field blanks were identified in this SDG.

VI. Matrix Spike/Matrix Spike Duplicates

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable. Results were within QC limits.

VII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. The percent recoveries (%R) were within the QC limits.

VIII. Regional Quality Assurance and Quality Control

Not applicable.

IX. Internal Standards

All internal standard recoveries were within QC limits with the following exceptions:

Sample	Internal Standard	%R (Limits)	Compound	Flag	A or P
WG24520-101	^{13}C-PCB-1 ^{13}C-PCB-3 ^{13}C-PCB-4	14.1 (25-150) 17.3 (25-150) 21.4 (25-150)	PCB-1 PCB-2 PCB-3 PCB-4 PCB-5 PCB-6 PCB-7 PCB-8 PCB-9 PCB-10 PCB-11 PCB-12 PCB-13 PCB-14 Total mono-CBs Total di-CBs	J (all detects) UJ (all non-detects)	P
LDW-07-T1-M-DC-EM-COMP1	^{13}C-PCB-1 ^{13}C-PCB-3 ^{13}C-PCB-4 ^{13}C-PCB-19 ^{13}C-PCB-54	9.65 (25-150) 11.5 (25-150) 13.5 (25-150) 21.3 (25-150) 23.7 (25-150)	PCB-1 thru PCB-14 PCB-16 thru PCB-36 PCB-38 thru PCB-76 PCB-78 PCB-79 PCB-80 Total mono-CBs Total di-CBs Total tri-CBs Total tetra-CBs	J (all detects) UJ (all non-detects)	P
LDW-07-T3-M-DC-EM-COMP3	^{13}C-PCB-1 ^{13}C-PCB-3 ^{13}C-PCB-4 ^{13}C-PCB-15 ^{13}C-PCB-19 ^{13}C-PCB-54 ^{13}C-PCB-126	8.06 (25-150) 10.1 (25-150) 11.9 (25-150) 21.9 (25-150) 20.1 (25-150) 23.8 (25-150) 24.0 (25-150)	PCB-1 thru PCB-36 PCB-38 thru PCB-76 PCB-78 thru PCB-80 PCB-82 thru PCB-103 PCB-106 thru PCB-113 PCB-115 thru PCB-117 PCB-119 thru PCB-122 PCB-124 thru PCB-127 Total mono-CBs Total di-CBs Total tri-CBs Total tetra-CBs Total penta-CBs	J (all detects) UJ (all non-detects)	P
LDW-07-T2-M-SC-EM-COMP1	^{13}C-PCB-1 ^{13}C-PCB-3 ^{13}C-PCB-4	15.2 (25-150) 15.7 (25-150) 18.6 (25-150)	PCB-1 PCB-2 PCB-3 PCB-4 PCB-5 PCB-6 PCB-7 PCB-8 PCB-9 PCB-10 PCB-11 PCB-12 PCB-13 PCB-14 Total mono-CBs Total di-CBs	J (all detects) UJ (all non-detects)	P
LDW-07-T2-M-SC-EM-COMP1DUP	^{13}C-PCB-1 ^{13}C-PCB-3 ^{13}C-PCB-4 ^{13}C-PCB-15 ^{13}C-PCB-54	13.5 (25-150) 14.6 (25-150) 18.0 (25-150) 23.7 (25-150) 24.1 (25-150)	PCB-1 thru PCB-18 PCB-20 thru PCB-36 PCB-38 thru PCB-76 PCB-78 PCB-79 PCB-80 Total mono-CBs Total di-CBs Total tri-CBs Total tetra-CBs	J (all detects) UJ (all non-detects)	P

*Indicates change as the result of report review.

Sample	Internal Standard	%R (Limits)	Compound	Flag	A or P
LDW-07-T1-M-DC-HP-COMP1	^{13}C-PCB-15	23.9 (25-150)	PCB-5 PCB-6 PCB-7 PCB-8 PCB-9 PCB-10 PCB-11 PCB-12 PCB-13 PCB-14 PCB-15 Total di-CBs	J (all detects) UJ (all non-detects)	P
LDW-07-T1-M-ES-WB-COMP5	^{13}C-PCB-15	20.6 (25-150)	PCB-5 PCB-6 PCB-7 PCB-8 PCB-9 PCB-10 PCB-11 PCB-12 PCB-13 PCB-14 PCB-15 Total di-CBs	J (all detects) UJ (all non-detects)	P
LDW-07-T2-A-ES-WB-COMP4	^{13}C-PCB-15	22.9 (25-150)	PCB-5 PCB-6 PCB-7 PCB-8 PCB-9 PCB-10 PCB-11 PCB-12 PCB-13 PCB-14 PCB-15 Total di-CBs	J (all detects) UJ (all non-detects)	P
LDW-07-T3-M-ES-WB-COMP4	^{13}C-PCB-4 ^{13}C-PCB-15 ^{13}C-PCB-104	21.6 (25-150) 21.3 (25-150) 23.0 (25-150)	PCB-4 thru PCB-15 PCB-82 thru PCB-113 PCB-115 thru PCB-117 PCB-119 thru PCB-122 PCB-124 PCB-125 PCB-127 Total di-CBs Total penta-CBs	J (all detects) UJ (all non-detects)	P
LDW-07-T1-B-SS-WB-COMP1	^{13}C-PCB-15	23.5 (25-150)	PCB-5 PCB-6 PCB-7 PCB-8 PCB-9 PCB-10 PCB-11 PCB-12 PCB-13 PCB-14 PCB-15 Total di-CBs	J (all detects) UJ (all non-detects)	P

Sample	Internal Standard	%R (Limits)	Compound	Flag	A or P
LDW-07-T2-E-SS-WB-COMP1	^{13}C-PCB-4 ^{13}C-PCB-15 ^{13}C-PCB-19 ^{13}C-PCB-155	21.5 (25-150) 19.0 (25-150) 24.1 (25-150) 18.0 (25-150)	PCB-4 thru PCB-36 PCB-38 PCB-39 PCB-128 thru PCB-155 PCB-158 thru PCB-166 PCB-168 Total di-CBs Total tri-CBs Total hexa-CBs	J (all detects) UJ (all non-detects)	P
LDW-07-T3-F-SS-WB-COMP1	^{13}C-PCB-4 ^{13}C-PCB-15	21.4 (25-150) 18.3 (25-150)	PCB-1 PCB-2 PCB-3 PCB-4 PCB-5 PCB-6 PCB-7 PCB-8 PCB-9 PCB-10 PCB-11 PCB-12 PCB-13 PCB-14 PCB-15 Total di-CBs	J (all detects) UJ (all non-detects)	P

X. Target Compound Identifications

All target compound identifications were within validation criteria.

XI. Compound Quantitation and CRQLs

All compound quantitation and CRQLs were within validation criteria with the following exceptions:

Sample	Compound	Flag	A or P
All samples in SDG DPWG25031/WG24520	All TCL compounds flagged "K" by the laboratory as estimated maximum possible concentration (EMPC)	U	A

XII. System Performance

The system performance was acceptable.

XIII. Overall Assessment of Data

The overall assessment of data was acceptable with the following exceptions:

Sample	Compound	Finding
LDW-07-T1-M-DC-HP-COMP1	All TCL compounds	There was a leakage from the sample.
LDW-07-T1-M-DC-EM-COMP1	All TCL compounds	Sample extract went dry during concentration after alumina column clean-up procedure.
LDW-07-T3-M-DC-EM-COMP3	All TCL compounds	Sample extract went dry during concentration after biobead column and before acid/base silica clean-up procedures.
LDW-07-T3-F-SS-WB-COMP1	All TCL compounds	Approximately 2 drops of sample spilled.

Data flags are summarized at the end of this report if data has been qualified.

XIV. Field Replicates

No field replicates were identified in this SDG.

Lower Duwamish Waterway Group
Polychlorinated Biphenyls - Data Qualification Summary - SDG DPWG25031/WG24520

SDG	Sample	Compound	Flag	A or P	Reason
DPWG25031/ WG24520	LDW-07-T1-M-DC-EM-COMP1	PCB-1 thru PCB-14 PCB-16 thru PCB-36 PCB-38 thru PCB-76 PCB-78 PCB-79 PCB-80 Total mono-CBs Total di-CBs Total tri-CBs Total tetra-CBs	J (all detects) UJ (all non-detects)	P	Internal standards (%R)
DPWG25031/ WG24520	LDW-07-T3-M-DC-EM-COMP3	PCB-1 thru PCB-36 PCB-38 thru PCB-76 PCB-78 thru PCB-80 PCB-82 thru PCB-103 PCB-106 thru PCB-113 PCB-115 thru PCB-117 PCB-119 thru PCB-122 PCB-124 thru PCB-127 Total mono-CBs Total di-CBs Total tri-CBs Total tetra-CBs Total penta-CBs	J (all detects) UJ (all non-detects)	P	Internal standards (%R)
DPWG25031/ WG24520	LDW-07-T2-M-SC-EM-COMP1	PCB-1 PCB-2 PCB-3 PCB-4 PCB-5 PCB-6 PCB-7 PCB-8 PCB-9 PCB-10 PCB-11 PCB-12 PCB-13 PCB-14 Total mono-CBs Total di-CBs	J (all detects) UJ (all non-detects)	P	Internal standards (%R)
DPWG25031/ WG24520	LDW-07-T1-M-DC-HP-COMP1 LDW-07-T1-M-ES-WB-COMP5 LDW-07-T2-A-ES-WB-COMP4 LDW-07-T1-B-SS-WB-COMP1	PCB-5 PCB-6 PCB-7 PCB-8 PCB-9 PCB-10 PCB-11 PCB-12 PCB-13 PCB-14 PCB-15 Total di-CBs	J (all detects) UJ (all non-detects)	P	Internal standards (%R)

SDG	Sample	Compound	Flag	A or P	Reason
DPWG25031/ WG24520	LDW-07-T2-M-SC-EM-COMP1DUP	PCB-1 thru PCB-18 PCB-20 thru PCB-36 PCB-38 thru PCB-76 PCB-78 PCB-79 PCB-80 Total mono-CBs Total di-CBs Total tri-CBs Total tetra-CBs	J (all detects) UJ (all non-detects)	P	Internal standards (%R)
DPWG25031/ WG24520	LDW-07-T3-M-ES-WB-COMP4	PCB-4 thru PCB-15 PCB-82 thru PCB-113 PCB-115 thru PCB-117 PCB-119 thru PCB-122 PCB-124 PCB-125 PCB-127 Total di-CBs Total penta-CBs	J (all detects) UJ (all non-detects)	P	Internal standards (%R)
DPWG25031/ WG24520	LDW-07-T2-E-SS-WB-COMP1	PCB-4 thru PCB-36 PCB-38 PCB-39 PCB-128 thru PCB-155 PCB-158 thru PCB-166 PCB-168 Total di-CBs Total tri-CBs Total hexa-CBs	J (all detects) UJ (all non-detects)	P	Internal standards (%R)
DPWG25031/ WG24520	LDW-07-T3-F-SS-WB-COMP1	PCB-1 PCB-2 PCB-3 PCB-4 PCB-5 PCB-6 PCB-7 PCB-8 PCB-9 PCB-10 PCB-11 PCB-12 PCB-13 PCB-14 PCB-15 Total di-CBs	J (all detects) UJ (all non-detects)	P	Internal standards (%R)
DPWG25031/ WG24520	LDW-07-T1-M-DC-EM-COMP1 LDW-07-T3-M-DC-EM-COMP3 LDW-07-T2-M-SC-EM-COMP1 LDW-07-T1-M-DC-HP-COMP1 LDW-07-T1-M-ES-WB-COMP5 LDW-07-T2-A-ES-WB-COMP4 LDW-07-T3-M-ES-WB-COMP4 LDW-07-T1-B-SS-WB-COMP1 LDW-07-T2-E-SS-WB-COMP1 LDW-07-T3-F-SS-WB-COMP1 LDW-07-T2-M-SC-EM-COMP1DUP	All TCL compounds flagged "K" by the laboratory as estimated maximum possible concentration (EMPC).	U	A	Compound quantitation and CRQLs

Lower Duwamish Waterway Group
Polychlorinated Biphenyls - Laboratory Blank Data Qualification Summary - SDG DPWG25031/WG24520

*Indicates change as the result of report review.

SDG	Sample	Compound	Modified Final Concentration	A or P
DPWG25031/WG24520	LDW-07-T1-M-DC-EM-COMP1	PCB-11	6.25U ng/Kg	A
DPWG25031/WG24520	LDW-07-T3-M-DC-EM-COMP3	PCB-11	9.53U ng/Kg	A
DPWG25031/WG24520	LDW-07-T2-M-SC-EM-COMP1	PCB-11	3.66U ng/Kg	A
DPWG25031/WG24520	LDW-07-T2-M-SC-EM-COMP1DUP	PCB-11	3.42U ng/Kg	A
DPWG25031/WG24520	LDW-07-T1-M-DC-HP-COMP1	PCB-11	24.5U ng/Kg	A

LDC #: 18590A3 **VALIDATION COMPLETENESS WORKSHEET** Date: 4/22/08
SDG #: DPWG25031/WG24520 Level IV Page: 1 of 1
Laboratory: AXYS Analytical Services, Ltd. Reviewer: 9
2nd Reviewer: V

METHOD: HRGC/HRMS Polychlorinated Biphenyl Congeners (EPA Method 1668A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 9/4 - 7/07
II.	GC/MS Instrument performance check	A	
III.	Initial calibration	A	20%.
IV.	Routine calibration	A	30/50%. (unless)
V.	Blanks	SW	
VI.	Matrix spike/Matrix spike duplicates/DUP	N/A	
VII.	Laboratory control samples	A	OPR, CRM
VIII.	Regional quality assurance and quality control	N	
IX.	Internal standards	SW	
X.	Target compound identifications	A	
XI.	Compound quantitation and CRQLs	SW	
XII.	System performance	A	
XIII.	Overall assessment of data	SW	
XIV.	Field duplicates	N	
XV.	Field blanks	N	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = No compounds detected; R = Rinsate; FB = Field blank; D = Duplicate; TB = Trip blank; EB = Equipment blank

Validated Samples:
All Tissues

1	LDW-07-T1-M-DC-EM-COMP1	11	LDW-07-T2-M-SC-EM-COMP1DUP	21	WG24520-10	31	
2	LDW-07-T3-M-DC-EM-COMP3	12		22		32	
3	LDW-07-T2-M-SC-EM-COMP1	13		23		33	
4	LDW-07-T1-M-DC-HP-COMP1	14		24		34	
5	LDW-07-T1-M-ES-WB-COMP5	15		25		35	
6	LDW-07-T2-A-ES-WB-COMP4	16		26		36	
7	LDW-07-T3-M-ES-WB-COMP4	17		27		37	
8	LDW-07-T1-B-SS-WB-COMP1	18		28		38	
9	LDW-07-T2-E-SS-WB-COMP1	19		29		39	
10	LDW-07-T3-F-SS-WB-COMP1	20		30		40	

LDC #: 18596A3
SDG #: See Cover

VALIDATION FINDINGS CHECKLIST

Page: 1 of 2
Reviewer: 9
2nd Reviewer: W

Method: HRGC/HRMS Polychlorinated Biphenyls (EPA Method 1668)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	✓			
Cooler temperature criteria was met.	✓			
II. GC/MS instrument performance check				
Was PFK exact mass 380.9760 verified?	✓			
Were the retention time windows established for all homologues?	✓			
Is the static resolving power at least 10,000 (10% valley definition)?	✓			
Was the mass resolution adequately check with PFK?	✓			
III. Initial calibration				
Was the initial calibration performed at 5 concentration levels?	✓			
Were all percent relative standard deviations (%RSD) ≤ 25% (20%) for unlabeled standards and ~~< 30%~~ for labeled standards?	✓			
Did all calibration standards meet the Ion Abundance Ratio criteria?	✓			
Was the signal to noise ratio for each target compound ≥ 2.5 and for each recovery and internal standard > 10?	✓			
IV. Continuing calibration				
Was a routine calibration performed at the beginning of each 12 hour period?	✓			
Were all percent differences (%D) < 20% (30/50) for unlabeled and labeled standards?	✓			
Did all routine calibration standards meet the Ion Abundance Ratio criteria?	✓			
V. Blanks				
Was a method blank associated with every sample in this SDG?	✓			
Was a method blank performed for each matrix and concentration?	✓			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.	✓			
VI. Matrix spike/Matrix spike duplicates				
Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.		✓		DUP (>10x RL)
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			✓	
VII. Laboratory control samples				
Was an LCS analyzed for this SDG?	✓			
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	✓			

LDC #: 18590A3
SDG #: See cover

VALIDATION FINDINGS CHECKLIST

Reviewer: 1
2nd Reviewer: 1

Validation Area	Yes	No	NA	Findings/Comments
VIII. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?		✓		
Were the performance evaluation (PE) samples within the acceptance limits?			✓	
IX. Internal standards				
Were internal standard recoveries within the 25-150% criteria?		✓		
Was the minimum S/N ratio of all internal standard peaks > 10?	✓			
X. Target compound identification				
For polychlorinated biphenyl congeners with associated labeled standards, were the retention times of the two quantitation peaks within -1 to 3 sec. of the RT of the labeled standard?	✓			
For polychlorinated biphenyl congeners without associated labeled standards, were the relative retention times of the two quantitation peaks within 0.005 time units of the RRT measured in the routine calibration?	✓			
For other polychlorinated biphenyl congeners, were the retention times of the two quantitation peaks within RT established in the performance check solution?	✓			
Did compound spectra contain all characteristic ions listed in the table attached?	✓			
Was the Ion Abundance Ratio for the two quantitation ions within criteria?	✓			
Was the signal to noise ratio for each target compound and labeled standard > 2.5?	✓			
Does the maximum intensity of each specified characteristic ion coincide within ± 2 seconds (includes labeled standards)?	✓			
Was an acceptable lock mass recorded and monitored?	✓			
XI. Compound quantitation/CRQLs				
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the compound?	✓			
Were compound quantitation and CRQLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XII. System performance				
System performance was found to be acceptable.	✓			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			
XIV. Field duplicates				
Field duplicate pairs were identified in this SDG.		✓		
Target compounds were detected in the field duplicates.			✓	
XV. Field blanks				
Field blanks were identified in this SDG.		✓		
Target compounds were detected in the field blanks.			✓	

LDC #: 18590A3
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Blanks

Page: 1 of 1
Reviewer: 9
2nd Reviewer: [illegible]

METHOD: HRGC/HRMS Polychlorinated Biphenyls (EPA Method 1668)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Were all samples associated with a method blank?
Y N N/A Was a method blank performed for each matrix and whenever a sample extraction was performed?
Y N N/A Was method blank contamination less < CRQL for all target compounds?

Blank extraction date: 2/14/18 **Blank analysis date:** 3/28/18 **Associated samples:** all

Conc. units: ng/mL

Compound	Blank ID	Sample Identification								
MB	245201401	1	2	3	11	4	5			
PCB 11	5.23	6.25/U	9.53/U	3.66/U	3.42/U	24.5/U				
18/30	4.29	>5x	>5	>5	>5	>5				
20/28	4.35	+								
31	2.67	-								
32	1.16	-								
37	2.95	-								
40	2.98	-								
44/47/65	5.81	-								
49/69	3.86	-								
52	8.46	-								
56	1.38	-								
64	1.49	-								
66	3.60	-								
85/116/117	1.72									
86/87/97/108/119/125	4.48									
105	1.91									
110/115	8.46									
112	0.691	↓	↓	↓	↓	↓				

CIRCLED RESULTS WERE NOT QUALIFIED. ALL RESULTS NOT CIRCLED WERE QUALIFIED BY THE FOLLOWING STATEMENT:
All contaminants within five times the method blank concentration were qualified as not detected, "U".

LDC #: 18590A3
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Blanks

Page: 1 of 1
Reviewer: 9
2nd Reviewer: 1

METHOD: HRGC/HRMS Polychlorinated Biphenyls (EPA Method 1668)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Were all samples associated with a method blank?
Y N N/A Was a method blank performed for each matrix and whenever a sample extraction was performed?
Y N N/A Was method blank contamination less < CRQL for all target compounds?

Blank extraction date: 2/14/08 **Blank analysis date:** 3/28/08

Conc. units: ~~ng/g~~ pg

Associated samples: ~~All~~ All (>5x)

Compound	Blank ID	Sample Identification								
MB	245201401									
Total Tetrachloro Biphenyls	5.97									

CIRCLED RESULTS WERE NOT QUALIFIED. ALL RESULTS NOT CIRCLED WERE QUALIFIED BY THE FOLLOWING STATEMENT:
All contaminants within five times the method blank concentration were qualified as not detected, "U".

LDC #: 18590A3
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Blanks

Page: 1 of 1
Reviewer: 9
2nd Reviewer: 6

METHOD: HRGC/HRMS Polychlorinated Biphenyls (EPA Method 1668)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Were all samples associated with a method blank?
Y N N/A Was a method blank performed for each matrix and whenever a sample extraction was performed?
Y N N/A Was method blank contamination less < CRQL for all target compounds?

Blank extraction date: 3/14/08 **Blank analysis date:** 3/28/08 **Associated samples:** All (>5x)

Conc. units: ~~ng/g~~

Compound	Blank ID	Sample Identification								
MB	245>0401	1								
PCB 118	7.88									
129/138/160/163	15.1									
141	2.60									
146	1.82									
147/149	6.76									
153/168	13.0									
174	4.52									
177	3.37									
179	2.28									
183/185	3.87									
187	7.77									
198/199	5.94									
Total DiChloro Biphenyls	5.33									
Trichloro Biphenyls	15.4									
Tetrachloro	28.3									
Pentachloro	25.7									
Hexachloro	39.3	39.7								
Heptachloro	2.8									

CIRCLED RESULTS WERE NOT QUALIFIED. ALL RESULTS NOT CIRCLED WERE QUALIFIED BY THE FOLLOWING STATEMENT:
All contaminants within five times the method blank concentration were qualified as not detected, "U".

qual + as U

LDC #: 18590A3
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Blanks

Page: 1 of 1
Reviewer: 9
2nd Reviewer: KA

METHOD: HRGC/HRMS Polychlorinated Biphenyls (EPA Method 1668)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Were all samples associated with a method blank?
Y N N/A Was a method blank performed for each matrix and whenever a sample extraction was performed?
Y N N/A Was method blank contamination less < CRQL for all target compounds?

Blank extraction date: 2/14/18 **Blank analysis date:** ~~3/28/18~~ 4/18/
Conc. units: ~~ng/L~~ pg
Associated samples: ~~NA~~ 4-10 (>5x)

Compound	Blank ID	Sample Identification								
MB	245040101									
PCB81	0.701									
↓ 126	0.519									
PCB169	0.401									

CIRCLED RESULTS WERE NOT QUALIFIED. ALL RESULTS NOT CIRCLED WERE QUALIFIED BY THE FOLLOWING STATEMENT:
All contaminants within five times the method blank concentration were qualified as not detected, "U".

LDC #: 18593A3
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Internal Standards

Page: 1 of 3
Reviewer: 9
2nd Reviewer:

METHOD: HRGC/HRMS Polychlorinated Biphenyls (EPA Method 1668)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y (N) N/A Are all internal standard recoveries were within the 25-150% criteria?

(Y) N N/A Was the S/N ratio all internal standard peaks ≥ 10?

#	Date	Lab ID/Reference	Internal Standard	% Recovery (Limit: 25-150%)		Qualifications
		WG24520-101	13C-PCB 1	14.1	(25-150)	√ NJ / P (PCB 1-14
			3	17.3	( )	Total Mono-CBs
			4	21.4	( )	& Di-CBs)
					( )	
		1	13C-PCB 1	9.65	( )	(PCB 1-14, 16-36
			3	11.5	( )	PCB 38-76, 78-80
			4	13.5	( )	Total Mono, Di,
			19	21.3	( )	Tri, Tetra-CBs)
			54	23.7	( )	
					( )	
		2	13C-PCB 1	8.06	( )	(PCB 1-36, 38-76
			3	10.1	( )	78-80, 82-103,
			4	11.9	( )	106-113, 115-117
			15	21.9	( )	119-122, 124-128, 127
			19	20.1	( )	Total Mono, Di,
			54	23.8	( )	Tri, Tetra and
			126	24.0	( )	Penta-CBs,)
					( )	
		B	13C-		( )	
					( )	

	Internal Standards	Check Standard Used		Internal Standards	Check Standard Used
A.	^{13}C-3,3',4,4'-TetraCB		K.	^{13}C-2,4,4'-TriCB	
B.	^{13}C-2,3',4,4',5-PentaCB		L.		
C.	^{13}C-3,3',4,4',5-PentaCB		M.		
D.	^{13}C-3,3',4,4',5,5'-HexaCB		N.		
E.	^{13}C-2,2',3,4,4',5,5'-HeptaCB		O.		
F.	^{13}C-2,2',3,3',4,4',5,5'-OCB		P.		
G.	^{13}C-DCB		Q.		
H.	^{13}C-4-CB		R.		
I.	^{13}C-4,4'-DCB		T.		

LDC #: 18590A3
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Internal Standards

Page: 2 of 2
Reviewer: 9
2nd Reviewer: 1

METHOD: HRGC/HRMS Polychlorinated Biphenyls (EPA Method 1668)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Are all internal standard recoveries were within the 25-150% criteria?

Y N N/A Was the S/N ratio all internal standard peaks ≥ 10?

#	Date	Lab ID/Reference	Internal Standard	% Recovery (Limit: 25-150%)	Qualifications
		3	13C-PCB 1	15.2 (25-150)	J/N/P (PCB 1-4,
			3	15.7 ( )	Total Mono-CBs
			4	18.6 ( )	Di-CBs)
				( )	
		11	13C-PCB 1	13.5 ( )	(PCB 1-18, 20-3
			3	14.6 ( )	PCB 38-76, 78-80
			4	18.0 ( )	Total Mono, Di
			15	23.7 ( )	Tri, Tetra-CBs)
			54	24.1 ( )	
				( )	
		4	13C-PCB 15	23.9 ( )	(PCB 5-15,
				( )	Total Di-CBs)
		5	13C-PCB 15	20.6 ( )	
				( )	
		6	13C-PCB 15	~~22~~ 20.9 ( )	
				( )	4
		7	13C-PCB 4	21.6 ( )	(PCB 5-15, 82-113
			15	21.3 ( )	PCB 106-113, 115-117
			104	23.0 ( )	PCB 119-122, 124-125
				( )	127, Total Di, Penta-CBs)

	Internal Standards	Check Standard Used
A.	^{13}C-3,3',4,4'-TetraCB	
B.	^{13}C-2,3',4,4',5-PentaCB	
C.	^{13}C-3,3',4,4',5-PentaCB	
D.	^{13}C-3,3',4,4',5,5'-HexaCB	
E.	^{13}C-2,2',3,4,4',5,5'-HeptaCB	
F.	^{13}C-2,2',3,3',4,4',5,5'-OCB	
G.	^{13}C-DCB	
H.	^{13}C-4-CB	
I.	^{13}C-4,4'-DCB	

	Internal Standards	Check Standard Used
K.	^{13}C-2,4,4'-TriCB	
L.		
M.		
N.		
O.		
P.		
Q.		
R.		
T.		

LDC #: 18590A3
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Internal Standards

Reviewer: 9
2nd Reviewer: W

METHOD: HRGC/HRMS Polychlorinated Biphenyls (EPA Method 1668)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

~~Y~~ N N/A Are all internal standard recoveries were within the 25-150% criteria?

(Y) N N/A Was the S/N ratio all internal standard peaks ≥ 10?

#	Date	Lab ID/Reference	Internal Standard	% Recovery (Limit: 25-150%)	Qualifications
		8	13C-PCB 15	23.5 (25-150)	Y/N/ P (PCB 5-15 Total Di-CBs)
				( )	
		9	13C-PCB 4	21.5 ( )	
			15	19.0 ( )	(PCB 4-36, 38-39, PCB 128-155, 158-166
			19	~~24.0~~ 24.1 ( )	
			155	18.0 ( )	PCB 168, Total Di, Tri, Hexa-CBs)
				( )	
		10	13C-PCB 4	21.4 ( )	(PCB 4-15 Total Di-CBs)
			15	18.3 ( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	

	Internal Standards	Check Standard Used		Internal Standards	Check Standard Used
A.	^{13}C-3,3',4,4'-TetraCB		K.	^{13}C-2,4,4'-TriCB	
B.	^{13}C-2,3',4,4',5-PentaCB		L.		
C.	^{13}C-3,3',4,4',5-PentaCB		M.		
D.	^{13}C-3,3',4,4',5,5'-HexaCB		N.		
E.	^{13}C-2,2',3,4,4',5,5'-HeptaCB		O.		
F.	^{13}C-2,2',3,3',4,4',5,5'-OCB		P.		
G.	^{13}C-DCB		Q.		
H.	^{13}C-4-CB -		R.		
I.	^{13}C-4,4'-DCB		T		

LDC #: 55902A3
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Compound Quantitation and Reported CRQLs

Reviewer: 9
2nd Reviewer: 1

METHOD: HRGC/HRMS Polychlorinated Biphenyls (EPA Method 1668)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Were the correct internal standard (IS), quantitation ions and relative response factors (RRF) used to quantitate the compound?
Y N N/A Compound quantitation and CRQLs were adjusted to reflect all sample dilutions and dry weight factors (if necessary).

#	Date	Sample ID	Finding	Associated Samples	Qualifications
		All	K flag	all	U

Comments: See sample calculation verification worksheet for recalculations

LDC #: 18590A3
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Overall Assessment of Data

Page: 1 of 1
Reviewer: T
2nd Reviewer: [illegible]

METHOD: HRGC/HRMS ~~Dioxins/Dibenzofurans~~ PCBs (EPA ~~SW 846~~ Method ~~8290~~ 1668)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

All available information pertaining to the data were reviewed using professional judgement to compliment the determination of the overall quality of the data.

(Y) N N/A Was the overall quality and usability of the data acceptable?

#	Date	Sample ID	Finding	Associated Samples	Qualifications
		There was a leakage from the sample		4	Text
		Sample extract went dry during concentration after alumina column clean-up procedure. ~~for sample~~		1	Text
		Sample extract went dry during concentration after biobead column befor ~~Acid~~/Base silica clean-up procedures.		2	✓
		Sample was spilled (approximately 2 drops)		10	

Comments: _____

LDC #: 18590A3
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Reviewer: 9
2nd Reviewer: [illegible]

METHOD: HRGC/HRMS Polychlorinated Biphenyls (EPA Method 1668)

The Relative Response Factor (RRF), average RRF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following calculations:

RRF = $(A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of compound, A_{is} = Area of associated internal standard
C_x = Concentration of compound, C_{is} = Concentration of internal standard
S = Standard deviation of the RRFs, X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Reported Average RRF (initial)	Recalculated Average RRF (initial)	Reported RRF (CS3 std)	Recalculated RRF (CS3 std)	Reported %RSD	Recalculated %RSD
1	ICAL	3/6/08	PCB-77 (^{13}C-PCB-77)	1.00	1.00	1.03	1.03	3.0	3.03
			PCB-105 (^{13}C-PCB-105)	0.94	0.94	0.97	0.97	3.76	3.77
			PCB-156 (^{13}C-PCB-156)	0.95	0.95	1.01	1.01	3.67	3.96
			PCB-180 (^{13}C-PCB-180)	0.91	0.91	0.96	0.90	2.85	2.98
2	ICAL	4/8/08	~~PCB-77 (^{13}C-PCB-77)~~ PCB8 (^{13}C-PCB8)	1.13	1.13	1.15	1.15	3.56	3.56
			PCB-105 (^{13}C-PCB-105) PCB126 (^{13}C-PCB126)	1.10	1.10	1.09	1.09	5.37	5.33
			PCB-156 (^{13}C-PCB-156) PCB169 (^{13}C-PCB169)	1.08	1.08	1.09	1.09	4.15	4.19
			~~PCB-180 (^{13}C-PCB-180)~~						
3			PCB-77 (^{13}C-PCB-77)						
			PCB-105 (^{13}C-PCB-105)						
			PCB-156 (^{13}C-PCB-156)						
			PCB-180 (^{13}C-PCB-180)						

Comments: Refer to Initial Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 18590A3
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Routine Calibration Results Verification

Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: HRGC/HRMS Polychlorinated Biphenyls (EPA Method 1668)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = $(A_x)(C_{is})/(A_{is})(C_x)$

Where: ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
A_x = Area of compound, A_{is} = Area of associated internal standard
C_x = Concentration of compound, C_{is} = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Average RRF (initial)	Reported RRF (CC)	Recalculated RRF (CC)	Reported %D	Recalculated %D
1	PB8C-136 S=1	3/28/08	PCB-77 (^{13}C-PCB-77)	1.00	48.1	48.1		
			PCB-105 (^{13}C-PCB-105)	0.94	52.2	52.2		
			PCB-156 (^{13}C-PCB-156)	0.95	105	105		
			PCB-169 (^{13}C-PCB-169)	0.91	47.9	47.9		
2	PB8C-137 S=1	3/29/08	PCB-77 (^{13}C-PCB-77)	1.00	47.7	47.5		
			PCB-105 (^{13}C-PCB-105)	0.94	51.6	51.7		
			PCB-156 (^{13}C-PCB-156)	0.95	106	106		
			PCB-169 (^{13}C-PCB-169)	0.91	48.1	48.0		
3	DTBB_08T S=1	4/9/08	~~PCB-77 (^{13}C-PCB-77)~~ PCB-81 (^{13}C-PCB-81)	1.13	49.3	49.5		
			PCB-105 (^{13}C-PCB-105) ~~PCB-126~~ (↓ PCB-126)	1.10	49.2	49.3		
			PCB-156 (^{13}C-PCB-156) ~~PCB-169~~ (↓ PCB-169)	1.08	49.2	49.2		
			~~PCB-180 (^{13}C-PCB-180)~~					

Comments: Refer to Routine Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 185903
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Routine Calibration Results Verification

Page: 2 of ___
Reviewer: 9
2nd Reviewer: 1A

METHOD: HRGC/HRMS Polychlorinated Biphenyls (EPA Method 1668)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = $(A_x)(C_{is})/(A_{is})(C_x)$

Where: ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
A_x = Area of compound, A_{is} = Area of associated internal standard
C_x = Concentration of compound, C_{is} = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Average RRF (Initial)	Reported RRF (CC)	Recalculated RRF (CC)	Reported %D	Recalculated %D
1	8B CL48 S=1	1/3/18	PCB-77 (^{13}C-PCB-77)	1.00	48.9	48.7		
			PCB-105 (^{13}C-PCB-105)	0.94	52.4	52.7		
			PCB-156 (^{13}C-PCB-156)	0.95	107	107		
			PCB-180 (^{13}C-PCB-180)	0.91	49.5	49.2		
2			PCB-77 (^{13}C-PCB-77)					
			PCB-105 (^{13}C-PCB-105)					
			PCB-156 (^{13}C-PCB-156)					
			PCB-180 (^{13}C-PCB-180)					
3			PCB-77 (^{13}C-PCB-77)					
			PCB-105 (^{13}C-PCB-105)					
			PCB-156 (^{13}C-PCB-156)					
			PCB-180 (^{13}C-PCB-180)					

Comments: Refer to Routine Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 18590A3
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Laboratory Control Sample Results Verification

Page: 1 of 1
Reviewer: 9
2nd Reviewer: [illegible]

METHOD: HRGC/HRMS Polychlorinated Biphenyls (EPA Method 1668)

The percent recoveries (%R) and Relative Percent Difference (RPD) of the laboratoy control sample and laboratory control sample duplicate (if applicable) were recalculated for the compounds identified below using the following calculation:

% Recovery = 100 * SSC/SA Where: SSC = Spiked sample concentration; SA = Spike added

RPD = I LCS - LCSD I * 2/(LCS + LCSD) LCS = Laboraotry control sample percent recovery LCSD = Laboratory control sample duplicate percent recovery

LCS ID: WG24520-1021

Compound	Spike Added (ng/mL)		Spiked Sample Concentration (ng/mL)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalculated
PCB-77	100	NA	96.6	NA	96.6	96.6				
PCB-81	↓		102		102	102				
PCB-105			106		106	106				
PCB-114			105		105	105				
PCB-118			105		105	105				
PCB-123			102		102	102				
PCB-126	↓		103		103	103				
PCB-156/157	200		219		110	110				
PCB-157										
PCB-167	100		105		105	105				
PCB-169	↓		108		108	108				
~~PCB-170~~										
~~PCB-180~~										
PCB-189	102		91.0		91.0	91.0				

Comments: Refer to Laboratory Control Sample findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

Ions Monitored for HRGC/HRMS Analysis of Polychlorinated Biphenyls

Descriptor	Accurate mass[a]	Ion ID	Analyte	Substance
1	289.9224	M	C12 H6 35Cl4	TCB
	291.9194	M+2	C12 H6 35Cl3 37Cl4	TCB
	301.9626	M	13C12 H6 35Cl4	PeCB
	303.9597	M+2	13C12 H6 35Cl3 37Cl	PeCB
	325.8804	M+2	C12 H5 35Cl4 37Cl	PeCB
	327.8775	M+4	C12 H5 35Cl3 37Cl2	PeCB
	[292.9825]	Lock	C7 F11	PFK
2	325.8804	M+2	C12 H5 35Cl4 37Cl	PeCB
	327.8775	M+4	C12 H5 35Cl3 37Cl2	PeCB
	337.9207	M+2	13C12 H5 35Cl4 37Cl	PeCB
	339.9178	M+4	13C12 H5 35Cl3 37Cl2	PeCB
	359.8415	M+2	C12 H4 35Cl5 37Cl	HxCB
	361.8385	M+4	C12 H4 35Cl4 37Cl2	HxCB
	371.8817	M+2	13C12 H4 35Cl5 37Cl	HxCB
	373.8788	M+4	13C12 H4 35Cl4 37Cl2	HxCB
	393.8025	M+2	C12 H3 35Cl6 37Cl	HpCB
	395.7996	M+4	C12 H3 35Cl5 37Cl2	HpCB
	405.8428	M+2	13C12 H3 35Cl6 37Cl	HpCB
	407.8398	M+4	13C12 H3 35Cl5 37Cl2	HpCB
	[354.9892[	Lock	C9F13	PFK
3	509.7229	M+4	13C12 35Cl10 37Cl2	DCB
	511.7199	M+6	13C12 35Cl9 37Cl3	
	513.7170	M+8	13C12 35Cl8 37Cl4	
	[442.9728]	Lock	C10 F17	PFK

S = internal/recovery standard

H = 1.007825
C = 12.000000
^{13}C = 13.003355
F = 18.9984

^{35}Cl = 34.968853
^{37}Cl = 36.965903

LDC #: 18590B3
SDG #: Sitcover

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Reviewer: C
2nd reviewer: [illegible]

METHOD: HRGC/HRMS Polychlorinated Biphenyls (EPA Method 1668)

Y N N/A Were all reported results recalculated and verified for all level IV samples?

Y N N/A Were all recalculated results for detected target compounds agree within 10.0% of the reported results?

Concentration = $\frac{(A_x)(I_s)(DF)}{(A_s)(RRF)(V_o)(\%S)}$

A_x = Area of the characteristic ion (EICP) for the compound to be measured

A_s = Area of the characteristic ion (EICP) for the specific internal standard

I_s = Amount of internal standard added in nanograms (ng)

RRF = Relative response factor of the calibration standard.

V_o = Volume or weight of sample pruged in milliliters (ml) or grams (g).

Df = Dilution factor.

%S = Percent solids, applicable to soils and solid matrices only.

Example:

Sample I.D. 1 . PCB 1:

Conc. = (2.67e+07)(2000)(1) / (1.91e+07)(1.06)(5.08)(1)

= 0.519 ng/kg

#	Sample ID	Compound	Reported Concentration ( )	Calculated Concentration ( )	Qualification

LABORATORY DATA CONSULTANTS, INC.
7750 El Camino Real, Suite 2L Carlsbad, CA 92009 Phone: 760/634-0437 Fax: 760/634-0439

Windward Environmental, LLC
200 West Mercer Street, Suite 401
Seattle, WA 98119
ATTN: Ms. Marina Mitchell

August 28, 2008

SUBJECT: Lower Duwamish Waterway Group, Data Validation

Dear Ms. Mitchell,

Enclosed is the final validation report for the fraction listed below. This SDG was received on August 11, 2008. Attachment 1 is a summary of the samples that were reviewed for each analysis.

LDC Project # 19259:

SDG #	Fraction
DPWG26063/WG25504	Polychlorinated Biphenyls as Congeners

The data validation was performed under EPA Level IV guidelines. The analyses were validated using the following documents, as applicable to each method:

- Lower Duwamish Waterway Group Final Fish, Crab, and Clam Tissue Collection and Chemical Analyses Quality Assurance Project Plan, August 2007
- EPA Region 10 SOP for the Validation of 1668 Toxic, Dioxin-like PCB Data, Revision 1.0, December 1995
- EPA Method and Guidance for the Analysis of Water, January 1996

Please feel free to contact us if you have any questions.

Sincerely,

Stella S. Cuenco
Project Manager/Senior Chemist

Attachment 1

EDD	LDC #19259 (Windward Environmental, LLC - Seattle WA / Lower Duwamish Waterway Group)																																		
LDC	SDG#	DATE REC'D	(3) DATE DUE	PCB Cong. (1668)																															
Matrix:	Water/Tissue			W	T	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	DPWG26063/WG25504	08/11/08	09/01/08	0	7																														
Total	T/SC			0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7

Shaded cells indicate Level IV validation (all other cells are Level II validation). These sample counts do not include MS/MSD, and DUPs

19259ST.wpd

Lower Duwamish Waterway Group
Data Validation Reports
LDC# 19259

Polychlorinated Biphenyls as Congeners

LDC

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Lower Duwamish Waterway Group

Collection Date: September 4 through September 7, 2007

LDC Report Date: August 21, 2008

Matrix: Tissue

Parameters: Polychlorinated Biphenyls as Congeners

Validation Level: EPA Level IV

Laboratory: AXYS Analytical Services

Sample Delivery Group (SDG): DPWG26063/WG25504

LDW-07-T1-C-SS-WB-comp1
LDW-07-T1-M-ES-WB-comp3
LDW-07-T1-M-SC-EM-comp2
LDW-07-T2-A-ES-WB-comp2
LDW-07-T2-B-SS-WB-comp1
LDW-07-T3-E-SS-WB-comp1
LDW-07-T3-M-ES-WB-comp6
LDW-07-T3-M-ES-WB-comp6DUP

Introduction

This data review covers 8 tissue samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Method 1668A for Polychlorinated Biphenyl as Congeners.

The QC guidelines used for data qualification are those specified in the EPA Region 10 SOP for the Validation of 1668 Toxic, Dioxin-like PCB Data (Revision 1.0, December 8, 1995) and Lower Duwamish Waterway Group Final Fish, Crab, and Clam Tissue Collection and Chemical Analyses Quality Assurance Project Plan (August 23, 2007).

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section V.

Field duplicates are summarized in Section XIV.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

- J1 Blank Contamination: Indicates possible high bias and/or false positives.
- J2 Calibration Range exceeded: Indicates possible low bias.
- J3 Holding times not met: Indicates low bias for most analytes.
- J4 Other QC parameters outside control limits: bias not readily determined.
- J5 Other QC parameters outside control limits. The reported results appear to be biased high. The actual value of target compound in the sample may be lower than the value reported by the laboratory.
- J6 Other QC parameters outside control limits. The reported results appear to be biased low. The actual value of target compound in the sample may be higher than the value reported by the laboratory.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. HRGC/MS Instrument Performance Check

Instrument performance was acceptable unless noted otherwise under initial calibration and continuing calibration sections.

Retention time windows were established for all congeners. The chromatographic resolution was less than or equal to 40% for congeners PCB-23 and PCB-34 and congeners PCB-182 and PCB-187.

The static resolving power was at least 10,000 (10% valley definition).

III. Initial Calibration

A five point initial calibration was performed as required by the method.

The percent relative standard deviations (%RSD) were less than or equal to 20.0% for all compounds.

The ion abundance ratios for all PCBs were within validation criteria.

The minimum S/N ratio for each target compound was greater than or equal to 2.5 and greater than or equal to 10 for each recovery and internal standard compound.

IV. Routine Calibration (Continuing)

Routine calibration was performed at the required frequencies.

All of the routine calibration percent differences (%D) between the initial calibration RRF and the routine calibration RRF were less than or equal to 30.0% for unlabeled compounds and less than or equal to 50.0% for labeled compounds.

The ion abundance ratios for all PCBs were within validation criteria.

V. Blanks

Method blanks were reviewed for each matrix as applicable. No polychlorinated biphenyl contaminants were found in the method blanks with the following exceptions:

Method Blank ID	Extraction Date	Compound	Concentration	Associated Samples
WG25504-101	6/9/08	PCB-44/47/65	18.5 ng/Kg	All samples in SDG DPWG26063/WG25504
		PCB-59/62/75	1.59 ng/Kg	
		PCB-83/99	4.65 ng/Kg	
		PCB-90/101/113	9.57 ng/Kg	
		PCB-129/138/160/163	8.68 ng/Kg	
		PCB-153/168	9.38 ng/Kg	
		PCB-180-193	3.85 ng/Kg	
		PCB-187	4.75 ng/Kg	
		Total Tetra-CBs	20.1 ng/Kg	
		Total Penta-CBs	14.2 ng/Kg	
		Total Hexa-CBs	18.1 ng/Kg	
		Total Hepta-CBs	8.60 ng/Kg	

Sample concentrations were compared to concentrations detected in the method blanks. The sample concentrations were either not detected or were significantly greater (>5X blank contaminants) than the concentrations found in the associated method blanks.

All method blank results flagged "K" by the laboratory were considered not detected.

No field blanks were identified in this SDG.

VI. Matrix Spike/Matrix Spike Duplicates

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable. Relative percent differences (RPD) were within QC limits with the following exceptions:

DUP ID (Associated Samples)	Compound	RPD (Limits)	Flag	A or P
LDW-07-T3-M-ES-WB-comp6DUP (LDW-07-T3-M-ES-WB-comp6 LDW-07-T3-M-ES-WB-comp6DUP)	PCB-24	50.8 (≤50)	J (all detects)	A

VII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. The percent recoveries (%R) were within the QC limits.

VIII. Regional Quality Assurance and Quality Control

Not applicable.

IX. Internal Standards

All internal standard recoveries were within QC limits.

X. Target Compound Identifications

All target compound identifications were within validation criteria.

XI. Compound Quantitation and CRQLs

All compound quantitation and CRQLs were within validation criteria with the following exceptions:

Sample	Compound	Flag	A or P
All samples in SDG DPWG26063/WG25504	All TCL compounds flagged "K" by the laboratory as estimated maximum possible concentration (EMPC)	U	A

XII. System Performance

The system performance was acceptable.

XIII. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

XIV. Field Replicates

No field replicates were identified in this SDG.

Lower Duwamish Waterway Group
Polychlorinated Biphenyls - Data Qualification Summary - SDG DPWG26063/WG25504

SDG	Sample	Compound	Flag	A or P	Reason
DPWG26063/ WG25504	LDW-07-T3-M-ES-WB-comp6 LDW-07-T3-M-ES-WB-comp6DUP	PCB-24	J (all detects)	A	Duplicate analysis (RPD)
DPWG26063/ WG25504	LDW-07-T1-C-SS-WB-comp1 LDW-07-T1-M-ES-WB-comp3 LDW-07-T1-M-SC-EM-comp2 LDW-07-T2-A-ES-WB-comp2 LDW-07-T2-B-SS-WB-comp1 LDW-07-T3-E-SS-WB-comp1 LDW-07-T3-M-ES-WB-comp6 LDW-07-T3-M-ES-WB-comp6DUP	All TCL compounds flagged "K" by the laboratory as estimated maximum possible concentration (EMPC).	U	A	Compound quantitation and CRQLs

Lower Duwamish Waterway Group
Polychlorinated Biphenyls - Laboratory Blank Data Qualification Summary - SDG DPWG26063/WG25504

No Sample Data Qualified in this SDG

LDC #: 19259A3 **VALIDATION COMPLETENESS WORKSHEET** Date: 8/19/08
SDG #: DPWG26063/WG25504 Level IV Page: 1 of 1
Laboratory: AXYS Analytical Services, Ltd. Reviewer: 1
2nd Reviewer: 2

METHOD: HRGC/HRMS Polychlorinated Biphenyl Congeners (EPA Method 1668A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 9/4 - 7/07
II.	GC/MS Instrument performance check	A	
III.	Initial calibration	A	20%
IV.	Routine calibration	A	30/50%
V.	Blanks	SW	
VI.	Matrix spike/Matrix spike duplicates / DUP	N/SW	client specified
VII.	Laboratory control samples	A	OPR. CRM
VIII.	Regional quality assurance and quality control	N	
IX.	Internal standards	A	
X.	Target compound identifications	A	
XI.	Compound quantitation and CRQLs	A	qual K as U
XII.	System performance	A	
XIII.	Overall assessment of data	A	
XIV.	Field duplicates	N	
XV.	Field blanks	N	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = No compounds detected; R = Rinsate; FB = Field blank; D = Duplicate; TB = Trip blank; EB = Equipment blank

Validated Samples:
All Tissues

1	LDW-07-T1-C-SS-WB-comp1	11	WG25504-101	21		31	
2	LDW-07-T1-M-ES-WB-comp3	12		22		32	
3	LDW-07-T1-M-SC-EM-comp2	13		23		33	
4	LDW-07-T2-A-ES-WB-comp2	14		24		34	
5	LDW-07-T2-B-SS-WB-comp1	15		25		35	
6	LDW-07-T3-E-SS-WB-comp1	16		26		36	
7	LDW-07-T3-M-ES-WB-comp6	17		27		37	
8	LDW-07-T3-M-ES-WB-comp6DUP	18		28		38	
9		19		29		39	
10		20		30		40	

LDC #: 19059A3
SDG #: See cover

VALIDATION FINDINGS CHECKLIST

Page: 1 of 2
Reviewer: 9
2nd Reviewer: M

Method: HRGC/HRMS Polychlorinated Biphenyls (EPA Method 1668)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	✓			
Cooler temperature criteria was met.	✓			
II. GC/MS instrument performance check				
Was PFK exact mass 380.9760 verified?	✓			
Were the retention time windows established for all homologues?	✓			
Is the static resolving power at least 10,000 (10% valley definition)?	✓			
Was the mass resolution adequately check with PFK?	✓			
III. Initial calibration				
Was the initial calibration performed at 5 concentration levels?	✓			
Were all percent relative standard deviations (%RSD) ≤ ~~25%~~ 20% for unlabeled standards and ≤ ~~35%~~ for labeled standards?	✓			
Did all calibration standards meet the Ion Abundance Ratio criteria?	✓			
Was the signal to noise ratio for each target compound ≥ 2.5 and for each recovery and internal standard ≥ 10?	✓			
IV. Continuing calibration				
Was a routine calibration performed at the beginning of each 12 hour period?	✓			
Were all percent differences (%D) ≤ ~~40%~~ 30/50% for unlabeled and labeled standards?	✓			
Did all routine calibration standards meet the Ion Abundance Ratio criteria?	✓			
V. Blanks				
Was a method blank associated with every sample in this SDG?	✓			
Was a method blank performed for each matrix and concentration?	✓			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.	✓			
VI. Matrix spike/Matrix spike duplicates				
Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.		✓		
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			✓	
VII. Laboratory control samples				
Was an LCS analyzed for this SDG?	✓			CRM
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	✓			

LDC #: 19259A3
SDG #: See cover

VALIDATION FINDINGS CHECKLIST

Reviewer: ST
2nd Reviewer: M

Validation Area	Yes	No	NA	Findings/Comments
VIII. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?		✓		
Were the performance evaluation (PE) samples within the acceptance limits?			✓	
IX. Internal standards				
Were internal standard recoveries within the 25-150% criteria?	✓			
Was the minimum S/N ratio of all internal standard peaks > 10?	✓			
X. Target compound identification				
For polychlorinated biphenyl congeners with associated labeled standards, were the retention times of the two quantitation peaks within -1 to 3 sec. of the RT of the labeled standard?	✓			
For polychlorinated biphenyl congeners without associated labeled standards, were the relative retention times of the two quantitation peaks within 0.005 time units of the RRT measured in the routine calibration?	✓			
For other polychlorinated biphenyl congeners, were the retention times of the two quantitation peaks within RT established in the performance check solution?	✓			
Did compound spectra contain all characteristic ions listed in the table attached?	✓			
Was the Ion Abundance Ratio for the two quantitation ions within criteria?	✓			
Was the signal to noise ratio for each target compound and labeled standard > 2.5?	✓			
Does the maximum intensity of each specified characteristic ion coincide within ± 2 seconds (includes labeled standards)?	✓			
Was an acceptable lock mass recorded and monitored?	✓			
XI. Compound quantitation/CRQLs				
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the compound?	✓			
Were compound quantitation and CRQLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XII. System performance				
System performance was found to be acceptable.	✓			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			
XIV. Field duplicates				
Field duplicate pairs were identified in this SDG.		✓		
Target compounds were detected in the field duplicates.			✓	
XV. Field blanks				
Field blanks were identified in this SDG.		✓		
Target compounds were detected in the field blanks.			✓	

LDC #: 19259A3
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Blanks

Page: 1 of 1
Reviewer: 9
2nd Reviewer: n

METHOD: HRGC/HRMS Polychlorinated Biphenyls (EPA Method 1668)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Were all samples associated with a method blank?
Y N N/A Was a method blank performed for each matrix and whenever a sample extraction was performed?
Y N N/A Was method blank contamination less < CRQL for all target compounds?

Blank extraction date: 6/9/08 **Blank analysis date:** 6/28/08 **Associated samples:** All (<5x)
Conc. units: pg/L

Compound	Blank ID	Sample Identification								
WF-35504-101										
PCB 44/47/65	18.5									
59/62/75	1.59									
83/99	4.65									
90/101/113	9.57									
129/138/160/163	8.68									
153/168	9.38									
180/193	3.85									
187	4.75									
Total TetraChloroBiphenyls	20.1									
PentaChloroBiphenyls	14.2									
HexaChloroBiphenyls	18.1									
HeptaChloroBiphenyls	8.60									
qual	F	as	U							

CIRCLED RESULTS WERE NOT QUALIFIED. ALL RESULTS NOT CIRCLED WERE QUALIFIED BY THE FOLLOWING STATEMENT:
All contaminants within five times the method blank concentration were qualified as not detected, "U".

LDC #: 19259A3
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Duplicate Analysis

Page: 1 of 1
Reviewer: 4
2nd Reviewer: K

METHOD: ___ GC _V_ ~~HPLC~~ HRGC/HRMS

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Was a duplicate sample analyzed for each matrix in this SDG?

Y N N/A Were all duplicate sample relative percent differences (RPD) ≤ 50?

LEVEL IV ONLY:

Y N N/A Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations.

#	Duplicate ID	Matrix	Compound	%RPD (Limits)	Associated Samples	Qualifications
	~~7/8~~ 8	Tissue	PCB24	50.8 (≤ 50)	7-8	Vdets/A

Comments: _____

DUPNew.wpd

LDC #: 19059A3
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Reviewer: 9
2nd Reviewer: M

METHOD: HRGC/HRMS Polychlorinated Biphenyls (EPA Method 1668)

The Relative Response Factor (RRF), average RRF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following calculations:

RRF = $(A_x)(C_s)/(A_s)(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of compound, A_s = Area of associated internal standard
C_x = Concentration of compound, C_s = Concentration of internal standard
S = Standard deviation of the RRFs, X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Reported Average RRF (initial)	Recalculated Average RRF (initial)	Reported RRF (CS3 std)	Recalculated RRF (CS3 std)	Reported %RSD	Recalculated %RSD
1	ICAL	4/23/08	PCB-~~77~~79 (^{13}C-PCB-~~77~~79)	1.02	1.02	1.04	1.04	4.71	4.53
			PCB-105 (^{13}C-PCB-105)	0.87	0.87	0.84	0.84	3.35	3.47
			PCB-156 (^{13}C-PCB-156)	0.94	0.94	0.95	0.95	3.74	3.70
			PCB-180~~9~~ (^{13}C-PCB-180~~9~~)	0.82	0.82	0.79	0.79	2.92	2.89
2	ICAL	7/18/08	PCB-~~78~~81 (^{13}C-PCB-~~77~~81)	1.18	1.18	1.12	1.12	4.27	4.19
			PCB-105 (^{13}C-PCB-105)						
			PCB-156 (^{13}C-PCB-156)						
			PCB-180 (^{13}C-PCB-180)						
3			PCB-77 (^{13}C-PCB-77)						
			PCB-105 (^{13}C-PCB-105)						
			PCB-156 (^{13}C-PCB-156)						
			PCB-180 (^{13}C-PCB-180)						

Comments: Refer to Initial Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 19259A3
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Routine Calibration Results Verification

Page: 1 of 1
Reviewer: Q
2nd Reviewer: M

METHOD: HRGC/HRMS Polychlorinated Biphenyls (EPA Method 1668)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
$RRF = (A_x)(C_{is})/(A_{is})(C_x)$

Where: ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
A_x = Area of compound, A_{is} = Area of associated internal standard
C_x = Concentration of compound, C_{is} = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Average RRF (initial)	Reported RRF conc (CC)	Recalculated RRF conc (CC)	Reported %D	Recalculated %D
1	PBBC-26A	6/27/08	PCB-~~77~~19 (^{13}C-PCB-~~77~~19)	1.02	26.1	26.1		
	=1		PCB-105 (^{13}C-PCB-105)	0.8T	55.5	55.5		
			PCB-156 (^{13}C-PCB-156)	0.94	11T	11.8		
			PCB-180 (^{13}C-PCB-180)	0.82	53.4	53.4		
2	DT8B182	7/28/08	PCB-~~77~~81 (^{13}C-PCB-~~77~~81)	1.18	~~49.4~~	45.5		
	5=1		PCB-105 (^{13}C-PCB-105)		45.4			
			PCB-156 (^{13}C-PCB-156)					
			PCB-180 (^{13}C-PCB-180)					
3	PBBC-26A	6/30/08	PCB-~~77~~19 (^{13}C-PCB-~~77~~19)	1.02	26.3	26.5		
	5=1		PCB-105 (^{13}C-PCB-105)	0.8T	43.4	43.4		
			PCB-156 (^{13}C-PCB-156)	0.94	102	102		
			PCB-180 (^{13}C-PCB-180)	0.82	41.7	41.6		

Comments: Refer to Routine Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 19259A3
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Routine Calibration Results Verification

Reviewer: 9
2nd Reviewer: 4

METHOD: HRGC/HRMS Polychlorinated Biphenyls (EPA Method 1668)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
$RRF = (A_x)(C_{is})/(A_{is})(C_x)$

Where: ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
A_x = Area of compound, A_{is} = Area of associated internal standard
C_x = Concentration of compound, C_{is} = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Average RRF (initial)	Reported RRF (CC)	Recalculated RRF (CC)	Reported %D	Recalculated %D
1	DFBB-176 S=3	7/19/08	PCB-~~77~~ 81 (¹³C-PCB-~~77~~ 81)	1.18	AT.3	AT.3		
			PCB-105 (¹³C-PCB-105)					
			PCB-156 (¹³C-PCB-156)					
			PCB-180 (¹³C-PCB-180)					
2	DB8C-765 S=1	6/30/08	PCB-~~77~~ 19 (¹³C-PCB-~~77~~ 19)	1.02	26.7	26.7		
			PCB-105 (¹³C-PCB-105)	0.87	AT.2	AT.2		
			PCB-156 (¹³C-PCB-156)	0.94	103	104		
			PCB-~~180~~ 9 (¹³C-PCB-~~180~~ 9)	0.82	42.1	42.1		
3			PCB-77 (¹³C-PCB-77)					
			PCB-105 (¹³C-PCB-105)					
			PCB-156 (¹³C-PCB-156)					
			PCB-180 (¹³C-PCB-180)					

Comments: Refer to Routine Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 19259A3
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Laboratory Control Sample Results Verification

Page: 1 of 1
Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: HRGC/HRMS Polychlorinated Biphenyls (EPA Method 1668)

The percent recoveries (%R) and Relative Percent Difference (RPD) of the laboratoy control sample and laboratory control sample duplicate (if applicable) were recalculated for the compounds identified below using the following calculation:

% Recovery = 100 * SSC/SA Where: SSC = Spiked sample concentration; SA = Spike added

RPD = I LCS - LCSD I * 2/(LCS + LCSD) LCS = Laboraotry control sample percent recovery LCSD = Laboratory control sample duplicate percent recovery

LCS ID: WG25504-102

Compound	Spike Added (ng/mL)		Spiked Sample Concentration (ng/mL)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalculated
~~PCB-77~~	~~50.0~~									
PCB-81	50.0	NA	55.0	NA	110	110				
PCB-105	↓	↓	48.8	↓	97.6	97.6				
PCB-114			49.2		98.5	98.4				
PCB-118			50.9		102	102				
PCB-123			50.9		102	102				
PCB-126			50.2		100	100				
PCB-156	100		107		107	107				
~~PCB-157~~										
PCB-167	50.0		54.3		109	109				
PCB-169	↓	↓	54.3	↓	109	109				
~~PCB-170~~										
PCB-180										
~~PCB-189~~										

Comments: Refer to Laboratory Control Sample findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 19259A3
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: 1 of 1
Reviewer: 9
2nd reviewer: M

METHOD: HRGC/HRMS Polychlorinated Biphenyls (EPA Method 1668)

Y N N/A Were all reported results recalculated and verified for all level IV samples?

Y N N/A Were all recalculated results for detected target compounds agree within 10.0% of the reported results?

Concentration = $\frac{(A_x)(I_s)(DF)}{(A_{is})(RRF)(V_o)(\%S)}$

A_x = Area of the characteristic ion (EICP) for the compound to be measured

A_{is} = Area of the characteristic ion (EICP) for the specific internal standard

I_s = Amount of internal standard added in nanograms (ng)

RRF = Relative response factor of the calibration standard.

V_o = Volume or weight of sample pruged in milliliters (ml) or grams (g).

Df = Dilution factor.

%S = Percent solids, applicable to soils and solid matrices only.

Example:

Sample I.D. 1, PCB19

Conc. = (2.73e+05)(4000)( )
(7.55e+06)(1.02)(2.17)( )

= 65.3 ng/kg

#	Sample ID	Compound	Reported Concentration ( )	Calculated Concentration ( )	Qualification

Ions Monitored for HRGC/HRMS Analysis of Polychlorinated Biphenyls

Descriptor	Accurate mass[a]	Ion ID	Analyte	Substance
1	289.9224	M	C12 H6 35Cl4	TCB
	291.9194	M+2	C12 H6 35Cl3 37Cl4	TCB
	301.9626	M	13C12 H6 35Cl4	PeCB
	303.9597	M+2	13C12 H6 35Cl3 37Cl	PeCB
	325.8804	M+2	C12 H5 35Cl4 37Cl	PeCB
	327.8775	M+4	C12 H5 35Cl3 37Cl2	PeCB
	[292.9825]	Lock	C7 F11	PFK
2	325.8804	M+2	C12 H5 35Cl4 37Cl	PeCB
	327.8775	M+4	C12 H5 35Cl3 37Cl2	PeCB
	337.9207	M+2	13C12 H5 35Cl4 37Cl	PeCB
	339.9178	M+4	13C12 H5 35Cl3 37Cl2	PeCB
	359.8415	M+2	C12 H4 35Cl5 37Cl	HxCB
	361.8385	M+4	C12 H4 35Cl4 37Cl2	HxCB
	371.8817	M+2	13C12 H4 35Cl5 37Cl	HxCB
	373.8788	M+4	13C12 H4 35Cl4 37Cl2	HxCB
	393.8025	M+2	C12 H3 35Cl6 37Cl	HpCB
	395.7996	M+4	C12 H3 35Cl5 37Cl2	HpCB
	405.8428	M+2	13C12 H3 35Cl6 37Cl	HpCB
	407.8398	M+4	13C12 H3 35Cl5 37Cl2	HpCB
	[354.9892[	Lock	C9F13	PFK
3	509.7229	M+4	13C12 35Cl10 37Cl2	DCB
	511.7199	M+6	13C12 35Cl9 37Cl3	
	513.7170	M+8	13C12 35Cl8 37Cl4	
	[442.9728]	Lock	C10 F17	PFK

S = internal/recovery standard

H = 1.007825
C = 12.000000
^{13}C = 13.003355
F = 18.9984

^{35}Cl = 34.968853
^{37}Cl = 36.965903