# **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 S. Cuenco

Project Manager/Senior Chemist

#### Attachment 1

	EDD	LDC#	<del>‡</del> 17546	N) 6	/inc	lwa	rd	Enν	/iro	nm	ent	al,	LLC	; - \$	Sea	ttle	W/	4 / L	OV	ver	Du	war	nis	h W	/ate	rwa	ay (	Gro	up)						
LDC	·SDG#	DATE REC'D	(3) DATE DUE	4	otal As 638)	A	10. As 332)	So	% lids 0.3)																	_	·								
Matri	x: Tissue/Sediment			Т	s	Т	s	Т	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
Α	WIN004	10/01/07	10/22/07	24	13	24	0	24	13																										
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# Lower Duwamish Waterway Group Data Validation Reports LDC# 17546

Arsenic

# 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-CompDUP

LDW-07-C1-CompMSDRE

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

<sup>\*\*</sup>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-C1-SMS LDW-07-C1-SMSD LDW-07-C1-SDUP PB	J+ (all detects)	Р

#### 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)	А

# 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:

	Concentra		
Analyte	LDW-07-C10-2-S	LDW-07-C10-2-S-FD	RPD
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)	Р	Calibration (%R)
WIN004	LDW-07-C4-Comp	Inorganic arsenic	J- (all detects) UJ (all non-detects)	А	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		Date: <u>Vold∫av</u> Page: <u>_</u> of
Laboratory: Brook	s Rand	Reviewer: www
		2nd Reviewer:
METHOD: Total Ar	rsenic (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 Area		Comments
l.	Technical holding times	A	Sampling dates: 8/14/07 - 8/18/09
11.	Calibration	GN/	/
111.	Bianks	6	
IV.	ICP Interference Check Sample (ICS) Analysis	N	ht required
V.	Matrix Spike Analysis	SW	> 615/ M51/12-4
VI.	Duplicate Sample Analysis	<u> </u>	
VII.	Laboratory Control Samples (LCS)	A	LCS, SRM.
VIII.	Internal Standard (ICP-MS)	A	
IX.	Furnace Atomic Absorption QC	'A	
Х.	ICP Serial Dilution	$\mathcal{N}$	hit mair h
XI.	Sample Result Verification	A	Not reviewed for Level III validation.
XII.	Overall Assessment of Data	Ä	
XIII.	Field Duplicates	5W	(30, 31)
XIV.	Field Blanks	N	

Note:

A = Acceptable

validation findings worksheets.

N = Not provided/applicable SW = See worksheet

ND = No compounds detected R = Rinsate

D = Duplicate TB = Trip blank EB = Equipment blank

FB = Field blank

Validated Samples: \*\* Indicates sample underwent Level IV validation

1	LDW-07-C1-Comp (issue	11	LDW-07-C4-Comp Tissue	21	LDW-07-C2-1-S Selvent	31	LDW-07-C10-2-S-FD 52Jul
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 ていい
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 selimet	30	LDW-07-C10-2-S	40	LDW-07-C11-Comp

Notes:	

SDG _abor <b>METH</b> The s	#: 17546A4 #: WIN004 ratory: Brooks Rand HOD: Total Arsenic (EPA amples listed below were tion findings worksheets	· \ Me	 thod 1638), Ir	Le norganic A	eve .rse	el II			Date: WS/Page: Lof V Reviewer: WM 2nd Re
	Validation	Are	a				Comm	<u>nents</u>	
I,	Technical holding times				Sai	mpli	ng dates:		
II.	Calibration								
111.	Blanks								
IV.	ICP Interference Check Sar	mple	(ICS) Analysis						
V.	Matrix Spike Analysis								
VI.	Duplicate Sample Analysis								
VII.	Laboratory Control Sample	s (LC	S)				gege !		
VIII.	Internal Standard (ICP-MS)	1					Çuc 10	·	
IX.	Furnace Atomic Absorption	QC							
X.	ICP Serial Dilution								
XI.	Sample Result Verification				No	ot re	viewed for Level III validation.		
XII.	Overall Assessment of Data	a							
XIII.	Field Duplicates								
XIV.	Field Blanks								
Note: √alidat	A = Acceptable N = Not provided/applicable SW = See worksheet ed Samples: ** Indicates sam		R = Rins FB = Fie	eld blank	de	etecte	D = Duplicate TB = Trip blank EB = Equipment blan	nk	
41	LDW-07-C10-1-Comp 7,350	51	L <del>:DW=07-C1-Gor</del>	7ر7 <del>np-depDUP</del> 1	بر 6	了 1	LDW-07-C8-SDUP Cally way	71	
42	LDW-07-C10-1-Comp-dep		LDW-07-C4-Cor	1	6:	2	LDW-07-C7-Comp-depMS てっぷい	72	
43	LDW-07-C11-Comp-dep	53	LDW-07-C4-Cor	mpMSD	6	3	LDW-07-C7-Comp-depMSD	73	
44	LDW-07-C12-Comp	54	LDW-07-C4-Cor	npDUP J	6	4	LDW-07-C7-Comp-depDUP	74	
45	LDW-07-C12-Comp-dep	55	LDW-07-C1-SM	s siling	6	5	LDW-07-C8-Comp-depMS	75	
46	LDW-07-C12-S Sebert	56	LDW-07-C1-SM	SD	6	6	LDW-07-C8-Comp-depMSD	76	
47	LDW-07-C1-CompMS イバソル	57	LDW-07-C1-SD	UP	6	7	LDW-07-C8-Comp-depDUP	77	
48	LDW-07-C1-CompMSD	58	LDW-07-C10-2-	SMS	6	8	LDW-07-C10-1-Comp-depMS	78	
49	LDW-07-C1-CompMSDRE	59	LDW-07-C10-2-		6	9	LDW-07-C10-1-Comp-depMSD	79	
50	LDW-07-C1-CompDUP	60	LDW-07-C10-2-	SDUP	70	o o	LDW-07-C10-1-Comp-depDUP	80	

Notes:\_

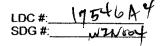
LDC #: 1546 AY SDG #: WIN 00 7

#### **VALIDATION FINDINGS CHECKLIST**

Page: of Y Reviewer: My 2nd Reviewer:

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

Method: Metals (EPA SW 846 Method 6010/7000/6020)	<del>,</del>	T		1
Validation Area	Yes	No	NA	Findings/Comments
Brache Maddolfos; The College Madding Sec. 11	į į			
All technical holding times were met.	1	ļ		
Cooler temperature criteria was met.	1 0			
Were all instruments calibrated daily, each set-up time?	14		_	
Were the proper number of standards used?	/	,		
Were all initial and continuing calibration verification %Rs within the 90.410% (80-120% for mercury and 85-115% for cyanide) QC limits?		1		
Were all initial calibration correlation coefficients > 0.995? (Level IV only)	V			
indians and the second				
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.		/		
DATE BIJO CHEX Samples 11 - 12 - 12 - 12 - 13 - 14 - 14 - 14 - 14 - 14 - 14 - 14				
Were ICP interference check samples performed daily?			6	,
Were the AB solution percent recoveries (%R) with the 80-120% QC limits?	-10-4-24-24		V V	
W-Maune spike Marros spice Unpicates				
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.	1			
V-Laboratory control samples	12.1	100	\$ ( <b>1</b>	II.
	/		28227756	
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?	/			
Vi. Furnace Atomic Absorption QC				
If MSA was performed, was the correlation coefficients > 0.995?			1	
Do all applicable analysies have duplicate injections? (Level IV only)			1	
For sample concentrations > RL, are applicable duplicate injection RSD values < 20%? (Level IV only)			/	
Were analytical spike recoveries within the 85-115% QC limits?				



#### **VALIDATION FINDINGS CHECKLIST**

Page: Vof Y Reviewer: VM 2nd Reviewer:

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Validation Area	Yes	No	NA	Findings/Comments
WIL-ICE Senal Childen 18 15 20 2 20 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2				Natural Company
Was an ICP serial dilution analyzed if analyte concentrations were > 50X the IDL?		<u> </u>	1	
Were all percent differences (%Ds) < 10%?			~	
Was there evidence of negative interference? If yes, professional judgement will be used to qualify the data.			/	
Continuence assertations are asserted by the continuence of the contin				
Were all the percent recoveries (%R) within the 30-120% of the intensity of the internsity of the internal standard in the associated initial calibration?	/			
If the %Rs were outside the criteria, was a reanalysis performed?		No company		
Concentration of the second state of the second				
Were performance evaluation (PE) samples performed?			1	
Were the performance evaluation (PE) samples within the acceptance limits?				
Were RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?				
Overall assessment of data was found to be acceptable.	7			
NUMBER OF THE PROPERTY OF THE				
Field duplicate pairs were identified in this SDG.	1			
Target analytes were detected in the field duplicates.	1			
XIII Feldi blanks				
Field blanks were identified in this SDG.		V		
Target analytes were detected in the field blanks.			7	

LDC #: 17546A.F. SDG #: WTWOOF

# VALIDATION FINDINGS WORKSHEET Sample Specific Element Reference

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

All circled elements are applicable to each sample.

Sample ID	Matrix	Target Analyte List (TAL)
1-19 75-45		Al, Sb(As) Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN, As
11111010	11/2	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	Colont	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,
	/ - 11-1	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',
47.48,5,52	It Ton	Al, Sto, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, 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, Ti, V, Zn, Mo, B, Si, CN,
62-64 681	to time	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,
45-17 X	selut	Al, Sb, (As), Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, 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
47-50,02-4	4 Trysu	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, Thy H
65-69	1	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, Ti, 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, Ti, 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, Ti, 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. TI, 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, Ti, 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, Ti, 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, Ti, 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, TI, 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,

Comments: Mercury by CVAA if performed

LDC #:	N+46AY
SDG #:	Wayory

# VALIDATION FINDINGS WORKSHEET Calibration

	Page:_	
	Reviewer:	MH
2nd	Reviewer:	N

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".

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

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

LEVEL IV ONLY:

Was a midrange cyanide standard distilled?

Y N NA Are all correlation coefficients >0.995?

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	9/7/09	ewg	As	133 (75-15)	Associated Samples  20 -> 4, 55-57, PB	J+ L+/P
$\vdash$	•					
است	:			1		

Comments:	

LDC #:	12546A1C
SDG #:	WWOOL

# VALIDATION FINDINGS WORKSHEET <u>Matrix Spike Analysis</u>

Page:_	of
Reviewer:	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \
nd Reviewer:	_/_

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".

YN N/A Was a matrix spike analyzed for each matrix in this SDG?

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

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	Tissu	Trojonie A	s 63	1	No gual ( Verun - of P3
┞╌┼╴						wer with direct
2	12	Tissue	Trongouer	As 63	(1	J-/4J/4 (#   4 Es/198
$\vdash$						were with
₩						
	**************************************					
$\vdash \vdash$						
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$\vdash$						
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$\vdash \vdash$						

Comments:	

LDC#:_	17000	0A4	
SDG#	See	Cover	

# **VALIDATION FINDINGS WORKSHEET**

Field Duplicates

Page:_		
Reviewer:	$\sim$	_
2nd Reviewer:	и	_

METHOD: Metals (EPA Method 1638)

(YN NA

Were field duplicate pairs identified in this SDG? Were target analytes detected in the field duplicate pairs?

	Concentrat	RPD		
Compound	30	31		
Arsenic	8.101	7.219	12	

V:\FIELD DUPLICATES\FD\_inorganic\FDUP.wpd

# **VALIDATION FINDINGS WORKSHEET** Initial and Continuing Calibration Calculation Verification

	Page:	of/
	Reviewer:	<u></u>
2nd	Reviewer:	

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:

 $%R = Found \times 100$ 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

					Receiculated	Reported	
Standard ID	Type of Analysis	Element	Found (ug/L)	True (ug/L)	%R	%R	Acceptable (Y/N)
TW	ICP (Initial calibration)	As	50.84	50	102	[27	4
V	GFAA (Initial calibration)	As	5-11 mg	the sta	102	(02 f d	y
·	CVAA (Initial calibration)					,	,
cu	ICF (Continuing calibration)	Az	5.452	5.0	109	109	· · · · · <b>y</b>
Y	GFAA (Continuing calibration)	As	5,38 mg	by onto	108	los t	J
	CVAA (Continuing calibration)						
	Cyanide (Initial calibration)						
:	Cyanide (Continuing calibation)						

Comments:	Refer to Calibration	Verification fin	dings work	ksheet for lis	st of qual	ifications	and associated s	samples wher	n renorted res	uilte do not ec	rea within 10	no/ of the
recalculated	results.	4	horn -	row +	et.	•		Tallipies Wilei	110001100 163	ula do Hot at	HAR MITHELL IO	.0% OI III
		-		· · · · · · · · · · · · · · · · · · ·			<del></del>		· · · · · · · · · · · · · · · · · · ·			
				<del></del>								

# VALIDATION FINDINGS WORKSHEET Level IV Recalculation Worksheet

Page:	of
Reviewer:_	mm
2nd Reviewer:	11
-	-

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 = Found 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:

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

Where, S = Original sample concentration

D = Duplicate sample concentration

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

 $%D = | I - SDR | \times 100$ 

Where, I = Initial Sample Result (mg/L)

SDR = Serial Dilution Result (mg/L) (Instrument Reading x 5)

			Found / S / I	True / D / SDR (units)	Recalculated	Reported	
Sample ID	Type of Analysis	Element	(unita)	Tide / B / GBK (drinks)	%R/RPD/%D	%R / RPD / %D	Acceptable (Y/N)
M	ICP interferance check						
M	Laboratory control sample	mogori	0926	1.10	93	94	Y
47	Matrix spike	As	(SSR-SR) 4,126	4.91	84	84	
44	Duplicate	Thorgan	6.657	buff	3	3	
	ICP serial dilution	77	<u> </u>			-	·

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.
<del></del>	

LDC #:_	17546Ar
SDG #:	Mary

# VALIDATION FINDINGS WORKSHEET Sample Calculation Verification

Page:_	01
Reviewer:	MD
2nd reviewer:	_ N /

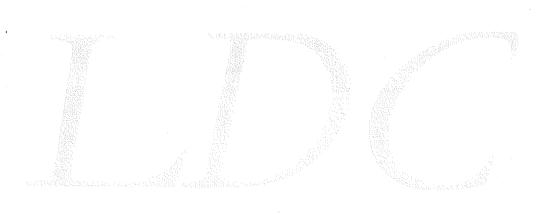
METHOD: Trace Metals (EPA SW 846 Method 6010/7000)

Please (Y N O N Y N	<u>NA</u> NA	Have results been reported a	nd calculated correctly ed range of the instrun	applicable questions are identified as "N/A".  ? nents and within the linear range of the ICP?
	ed analy	te results fortion:	3, n	were recalculated and verified using the
Concent	ration =	(RD)(FV)(Dil) (In. Vol.)(%S)	Recalculation:	26.93 44 myl. x 0.0 th
RD FV	# #	Raw deta concentration Final volume (ml)	#2 1/25=	26.93 44 4/2 x 0.05l = 3.625 3/2
in, Vol. Dii %S	=======================================	Initial volume (ml) or weight (G) Dilution factor Decimal percent solids	•	

Sample ID	Analyte	Reported Concentration ( My / y )	Calculated Concentration (	Acceptable (Y/N)
3	As	4.97	4.99	У
'	mojon by	2.750	2.707	1
	, ,			
22	As	3.569	3-625	<u> </u>
				/
				•
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# Lower Duwamish Waterway Group Data Validation Reports LDC# 17546

%Solids



# 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-C9-Comp

LDW-07-C9-Comp-dep

LDW-07-C10-2-Comp

LDW-07-C2-1-S LDW-07-C1-Comp 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-C12-Comp-dep LDW-07-C4-S LDW-07-C2-2-Compp-dep\*\* LDW-07-C5-S\*\* LDW-07-C12-S LDW-07-C3-1-Comp\*\* LDW-07-C1-Comp-depDUP LDW-07-C6-S 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-C11-S LDW-07-C5-Comp 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-C8-Comp-dep

LDW-07-C8-Comp

LDW-07-C10-2-Comp-dep

LDW-07-C1-S LDW-07-C11-Comp

<sup>\*\*</sup>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:

	Concentra		
Analyte	LDW-07-C10-2-S	LDW-07-C10-2-S-FD	RPD
% 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

#### **VALIDATION COMPLETENESS WORKSHEET** LDC #: 17546A6 SDG #: **WIN004** Level III/IV Laboratory: Brooks Rand Reviewer: 2nd Reviewer:

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
l.	Technical holding times	A	Sampling dates: 8/14/07 -8/12/07
IIa.	Initial calibration	A	· · · · · · · · · · · · · · · · · · ·
IIb.	Calibration verification	'A	
III.	Blanks	A	
IV	Matrix Spike/Matrix Spike Duplicates	N	bit vagained
V	Duplicates	A	
VI.	Laboratory control samples	N	jet vegnirde
VII.	Sample result verification	A	Not reviewed for Level III validation.
VIII.	Overall assessment of data	Α	
IX.	Field duplicates	SW	(30,31)
х	Field blanks	$\sim$	·

Note:

A = Acceptable

ND = No compounds detected

D = Duplicate

N = Not provided/applicable SW = See worksheet

R = Rinsate FB = Field blank TB = Trip blank EB = Equipment blank

Validated Samples: \*\* Indicates sample underwent Level IV validation

		$\overline{}$	T The state of the			7	
1	LDW-07-C1-Comp Tissu	11	LDW-07-C4-Comp Tissue	21	LDW-07-C2-1-S 20 L'mt	31	LDW-07-C10-2-S-FD Sub-A
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
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 Salimet	30 <b>V</b>	LDW-07-C10-2-S	40	LDW-07-C11-Comp

Notes:_				

SDG	#:17546A6 #:WIN004 atory:_Brooks Rand	. <b>VA</b> - 	VALIDATION COMPLETENESS WORKSHEET Level III/IV				Page: Lof Log Reviewer: Log Reviewer: Log Log Reviewer: Log Log Reviewer: Log Reviewer	
The s	HOD: % Solids (EPA Met amples listed below were tion findings worksheets.	e revie	•	he follow	ving va	alidation areas.	Validation findi	ngs are noted in attached
	Validation	Area					Comments	:
1.	Technical holding times			Sam	npling d	ates:		
lla.	Initial calibration				•			·
llb.	Calibration verification							,
111.	Blanks							
IV	Matrix Spike/Matrix Spike D	uplicat	es					
V	Duplicates					Su	page 1	
VI.	Laboratory control samples							
VII.	Sample result verification			Not	review	ed for Level III vali	dation.	
VIII.	Overall assessment of data							
IX.	Field duplicates							
L <sub>X</sub>	Field blanks							
Note: Validat	A = Acceptable N = Not provided/applicable SW = See worksheet ed Samples: ** Indicates sam		ND = No compo R = Rinsate FB = Field blani lerwent Level IV valida	k	ected	D = Duplic TB = Trip EB = Equi		¥
	704		LDW-07-C8-Comp-de	T-	Jur	C .		,
41			LDVV-07-C8-Comp-de	epour II	1		71	
42	LDW-07-C10-1-Comp-dep	52			62		72	
43	LDW-07-C11-Comp-dep	53 54			63 64		73 74	
44 45	LDW-07-C12-Comp-dep	55			65		75	
46	LDW-07-C12-S				66		76	
	LDW-07-C1-Comp-depDUP 7				67		77	
47								

Notes:			

LDW-07-C1-SDUP

LDW-07-C8-SDUP

LDC #: 17546 AG SDG #: 12004

#### **VALIDATION FINDINGS CHECKLIST**

Page: 1 of 1
Reviewer: 444
2nd Reviewer: 444

Method:Inorganics (EPA Method (40.3))

Method:Inorganics (EPA Method (いう)				
Validation Area	Yes	No	NA	Findings/Comments
I Technical holding times		1.6	И.	17 17 17 17 17 17 17 17 17 17 17 17 17 1
All technical holding times were met.	/			
Coolor temperature criteria was met.	/			
Il Calabration	145			
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 as a very line of the control of the con	2.3			
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.				Pup ory
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) $\leq$ 20% for waters and $\leq$ 35% for soil samples? A control limit of $\leq$ CRDL( $\leq$ 2X CRDL for soil) was used for samples that were $\leq$ 5X the CRDL, including when only one of the duplicate sample values were $\leq$ 5X the CRDL.				
V Eaboratory control samples				The state of the s
Was an LCS anaylzed for this SDG?				
Was an LCS analyzed per extraction batch?			1	
Were the LCS percent recoverles (%R) and relative percent difference (RPD) within the 80-120% (85-115% for Method 300.0) QC limits?			1	
VI. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?			4	
Were the performance evaluation (PF) samples within the acceptance limits?			1	

LDC #: 17546 A6 SDG #: W715. +

#### **VALIDATION FINDINGS CHECKLIST**

Page: Yof Y Reviewer: M4 2nd Reviewer:

Validation Area	Yes	No	NA	Findings/Comments
VII. Sample Result Verification		i de la companya de La companya de la co		
Were RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	~			
Were detection limits < RL?	V			
VIII Style is a second second in the second	1401			Nesthment of the constant
Overall assessment of data was found to be acceptable.	<b>/</b>			
X Field dimicales (1)				<b>经</b> 算数据 20年代 港东岭 安静
Field duplicate pairs were identified in this SDG.	7			
Target analytes were detected in the field duplicates.	1	,		
XTried Danks The Property of the Control of the Con				
Field blanks were identified in this SDG.		~		
Target analytes were detected in the field blanks.			~	

LDC#:	17546A6
SDG#	WINDOA

# **VALIDATION** <u>Field</u>

N FINDINGS WORKSHEET	Page:	_of	
<u>Duplicates</u>	Reviewer:		
	2nd Reviewer:	Ø	$\overline{Z}$

Inorganics, Method EPA 160.3

YN NA YN NA

Were field duplicate pairs identified in this SDG? Were target analytes detected in the field duplicate pairs?

	Concentra			
Analyte	30	31	RPD (≤20)	
% Solids	72.830	70.650	3	

V:\FIELD DUPLICATES\FD\_inorganic\17546A6.wpd

LDC #:	4546A6
SDG #:	WINDY

# VALIDATION FINDINGS WORKSHEET Level IV Recalculation Worksheet

		of
	Reviewer:	my'
2nd	Reviewer:	

METHOD: Inorganics, Method	16.3
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Percent recoveries (%R) for a laboratory control sample and a matrix spike sample were recalculated using the following formula:

%R = <u>Found</u> x 100 True

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:

 $RPD = |S-D| \times 100$  Where,

S =

Original sample concentration

(S+D)/2

D =

Duplicate sample concentration

	Type of Analysis	Element	Found / S (units)	True / D (units)	Recalculated  %R / RPD	Reported %R / RPD	Acceptable (Y/N)
Sample ID	Laboratory control sample	Lienton	(cm.e.)				
	Matrix spike sample		(SSR-SR)				
49	Duplicate sample	7. 5	77.to	19.85	3	3	7

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

LDC #: 17746A SDG #: WINN	VALIDATION FINDINGS WO Sample Calculation Verifi	· · · · · · · · · · · · · · · · · · ·
METHOD: Inorganics	s, Method (60.3	V
N N/A Have	ons below for all questions answered "N". Not apple e results been reported and calculated correctly? esults within the calibrated range of the instrument all detection limits below the CRQL?	·
Compound (analyte) recalculated and veri	results for	reported with a positive detect were
1) Solids = (cro	Grow wat wit - The wit)	5,50 - (1.9>2 - (0.38) ×100 70 5,500 - (0.38) = (9,59>2 70
		= (/\3/ PZ /0

#	Sample ID	Analyte	Reported Concentration ( 70 )	Calculated Concentration	Acceptable (Y/N)
	3	后 名5.13	19.590	19.590	4
2_	22	7. Solida	72,850	72,15	7
<b> </b>					



# 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

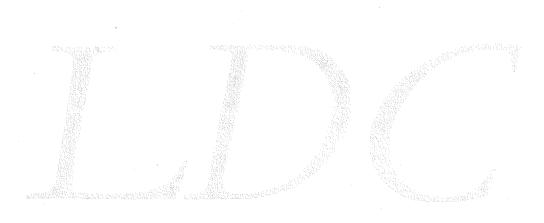
Project Manager/Senior Chemist

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	EDD LDC #17648 (Windward Environmental, LLC - Seattle WA / Lower Duwamish Waterway Group)																																		
LDC	SDG#	DATE REC'D	(3) DATE DUE		CBs (82)	Lip	% oids /B)																												
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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	0	0	24

# Lower Duwamish Waterway Group Data Validation Reports LDC# 17648

PCBs



# 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	А
LDW-07-C8-compDL	All TCL compounds except Aroclor-1254	R	А

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	А	Overall assessment of data
LO74	LDW-07-C8-compDL	All TCL compounds except Aroclor-1254	R	А	Overall assessment of data

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

No Sample Data Qualified in this SDG

	<u>17648A3b</u> <b>VALIDATIO</b> : LO74		PLETENESS WORKSHEET  Level III  Page:
	tory: Analytical Resources, Inc.		Reviewer: 13
4CT11	OD: CC Delivebleringted Binhamide (FDA	C\A/ 0.4C I	2nd Reviewer:
MEIH	OD: GC Polychlorinated Biphenyls (EPA	SVV 846 I	wethod 8082)
		ch of the f	ollowing validation areas. Validation findings are noted in attached
/alidati	on findings worksheets.		
	Validation Area		Comments
l.	Technical holding times	A	Sampling dates: 8 24 - 8 27 67
II.	GC/ECD Instrument Performance Check	AG	
Ш.	Initial calibration	Δ	
IV.	Continuing calibration	Δ	1CV = 15
V.	Blanks	Δ	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	Α	
VIII.	Laboratory control samples	4	LCS
IX.	Regional quality assurance and quality control	N	
Xa.	Florisil cartridge check	N	# 4,5,7-79 sulfur clean up performe
Xb.	GPC Calibration	N	0 1 1
XI.	Target compound identification	N	
XII.	Compound quantitation and reported CRQLs	SW/	
XIII.	Overall assessment of data	SW	
XIV.	Field duplicates	Ŋ	
XV.	Field blanks	N	
Note:	A = Acceptable ND = N N = Not provided/applicable R = Rir	lo compound	s detected D = Duplicate TB = Trip blank

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1,}	LDW-07-C2-1-comp	14	LDW-07-C10-1-comp	21	vogymbst	31	
∤ 2	LDW-07-C2-1-comp-dep	12	LDW-07-C10-1-comp-dep	22	MB-092507	32	
<b>₹</b>	LDW-07-C6-comp	13	LDW-07-C9-compMS	23	•	33	
4	LDW-07-C6-comp-dep 🗸	14	LDW-07-C9-compMSD	24		34	
<b>∤</b> 5	LDW-07-C7-comp	15	LDW-07-C8-C0mg	25 D	1_	35	
† 6	LDW-07-C7-comp-dep	16		26		36	
<del>†</del> 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	Ta
B. beta-BHC	J. 4,4'-DDE			GG.
	0. 4,4 -DDE	R. Endrin aldehyde	Z. Aroclor-1248	HH.
C. delta-BHC	K. Endrin	S. alpha-Chlordane	AA. Arocior-1254	
D. gamma-BHC	L. Endosulfan II		741.7400101-1254	
	Li Citobauliaji ji	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		
2 Handard		117400101-1010	DD. DB 1701	LL.
3. Heptachlor epoxide	O. 4,4'-DDT	W. Aroclor-1221	EE.	MM.
l. Endosulfan I	P. Methoxychlor	X. Aroclor-1232		
		7. AUGIOI-1232	FF.	NN.

Notes:	

C:\docs\Work\Pesticides\COMPLST-3S.wpd

LDC #:_	1764	87136
SDG #:	pu	
	6	

## **VALIDATION FINDINGS WORKSHEET Compound Quantitation and Reported CRQLs**

Page:	<u>/</u> of/
Reviewer: _	19
2nd Reviewer: _	U

METHOD:

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.?

Did the reported results for detected target compounds agree within 10.0% of the recalculated results?

#	Compound Name	Finding  exculed cal Pange	Associated Samples	Qualifications
	AA	excelled cal Pange	1000	NA
		·		

Comments:	See sample calculation verification worksheet for recalculations

LDC #: 17648736 SDG #: pu coner

# VALIDATION FINDINGS WORKSHEET <u>Overall Assessment of Data</u>

Page: _	
Reviewer:	ħ
2nd Reviewer:	_

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.

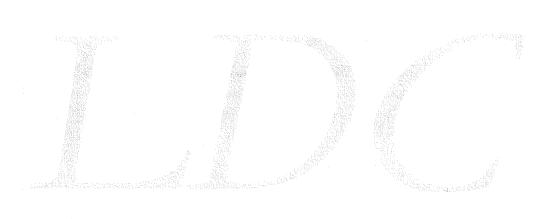
Y) N N/A Was the overall quality and usability of the data acceptable?

Compound Name	Finding	Associated Samples	Qualifications
AA	exceeded cal Range	7	R/A
	J		<i>'</i>
All except AA	diluted	15	R/A
		A.A exceeded cal Range	

Comments:			

# Lower Duwamish Waterway Group Data Validation Reports LDC# 17648

% Lipids



# 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.

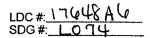
# Lower Duwamish Waterway Group % Lipids - Data Qualification Summary - SDG LO74

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  SDG #: LO74 Level IV  Laboratory: Analytical Resources, Inc.  Date: Mo/ I   0'  Reviewer: YN    2nd Reviewer: Analytical Resources   2nd Reviewer: Analytical Reviewer: A									
MET	'HOD: Percent Lipids (Bli	ah & I	Over)						
		_						e	P. A. d. C. attack and
	samples listed below were ation findings worksheets		ewed for ead	on of the fo	ollowing	alidation ar	reas. Validatio	n tina	lings are noted in attached
<del></del>				<b></b>					
	Validation	Area					Comm	ents	
<u>l.</u>	Technical holding times			A	Sampling	dates: 8/3	14-27lo7		
lla	. Initial calibration			H	3 B	alanch	check	YP	MR
lib	. Calibration verification			N	5.				
111	Blanks			A	_			•	
IV	Matrix Spike/Matrix Spike D	uplicat	tes	M	1	1 code	msnot	ap	sucable
L v	Duplicates			Α	Join	sheate		. \	· · ·
VI	. Laboratory control samples			N					
VI	. Sample result verification			A					
VII	Overall assessment of data	١		A					
ΙX	. Field duplicates			$\wedge$					
Lx	Field blanks		· · · · · · · · · · · · · · · · · · ·	$\wedge$					
Note:	N = Not provided/applicable SW = See worksheet		R = Rin	o compound sate eld blank	s detected	TB =	Duplicate <sup>:</sup> Trip blank <sup>:</sup> Equipment blanl	k	
	tusur		1			<u> </u>		Y	
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-c	ompDUP	23			33	
4	LDW-07-C6-comp-dep	14	LDW-07-C9-0	compTRP	24			34	and descriptions of the colors
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									



Method:Inorganics (EPA Method 2

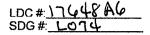
#### **VALIDATION FINDINGS CHECKLIST**

Reviewer: 2nd Reviewer:

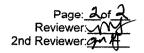
Validation Area No Findings/Comments I Technical holding times

All technical holding times were met Cooler temperature criteria was met. 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) habited ter Were balance checks performed as required? (Level IV only) 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)  $\leq$  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 (PF) samples within the acceptance limits?



#### **VALIDATION FINDINGS CHECKLIST**



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?	1			
Vill. Overall assessment of data	De seu	MA S		
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.		1		
Target analytes were detected in the field blanks.			-	

LDC #: 17648A6 SDG #: LO 74

## VALIDATION FINDINGS WORKSHEET Level IV Recalculation Worksheet

Page:	1 of 1
Reviewer:	my
2nd Reviewer:_	guy

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

 $%R = Found \times 100$  Where True

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 =  $\frac{|S-D|}{|S-D|} \times 100$  Where,

S =

Original sample concentration

(S+D)/2

D =

Duplicate sample concentration

ſ					Recalculated	Reported	
Sample ID	Type of Analysis	Element	Found / S (units)	True / D (units)	%R / RPD	%R / RPD	Acceptable (Y/N)
	Laboratory control sample						·
		(	$\triangle$				
	Matrix spike sample		(SSR-SR)				
	Duplicate sample						
13		Lipob	0.994%	1-08%	8.3	8.3	У

	the part agree within 10.0% of the recalculated
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.	
results	

LDC	#: <u>\</u>	76	48	<u>46</u>
		70		

## **VALIDATION FINDINGS WORKSHEET**

Sample Calculation Verification

Page:_	ւ of	1
Reviewer:	m	
nd reviewer:	mey	

	2nd reviewer: // V
METHOD: Inorganics, Method	٥
	ns answered "N". Not applicable questions are identified as "N/A".
Y N N/A Have results been reported a	ind calculated correctly?
Y N N/A Are results within the calibrat	ed range of the instruments?
Y N N/A Are all detection limits below	
1 14 14/A Ale di detection intitte potenti	1
Compound (analyte) results for recalculated and verified using the following	reported with a positive detect were equation:
Concentration =	Recalculation:
20 Lipido = Jace sp	l. wt Jareweight X 100 = 1.1574-1.1153 v riginal comple at.

#	Sample ID	Analyte	Reported Concentration ( / ) o )	Calculated Concentration	Acceptable (Y/N)
	2	20 Lipids	0 835	0.837	Y
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## 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#	<u>Fraction</u>
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

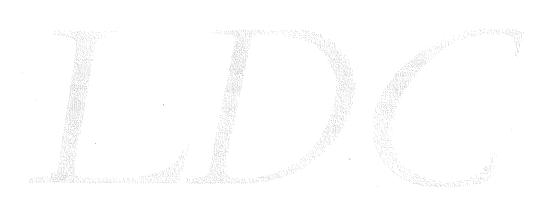
Project Manager/Senior Chemist

## Attachment 1

	EDD	LDC #	¥17652	? (W	/inc	lwa	rd	Env	⁄iro	nm	ent	al,	LLC	) - (	Sea	ttle	W/	<b>A / I</b>	Lov	ver	Du	war	nis	h W	ate	rwa	ay (	3ro	up)						
LDC	SDG#	DATE REC'D	(3) DATE DUE	Lip	% oids /B)																										-				
Matri	k: Water/Tissue		-	w	Т	w	Т	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
Α	LO75	10/23/07	11/13/07	0	10																														
Α	LO75		11/13/07	THE RESIDENCE OF	8																														
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# Lower Duwamish Waterway Group Data Validation Reports LDC# 17652

% Lipids



# 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

<sup>\*\*</sup>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

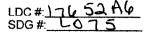
No Sample Data Qualified in this SDG

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	#: <u>LO75</u> atory: <u>Analytical Resourc</u>	es, I	nc.	Le	eve	el IV					2nd	Pag Review Review	e: <u> </u> o er: <u>   ∕∕ ∕</u> er: <u> <i>∕⁄</i>/⁄</u>	Ŋ
The sa	IOD: Percent Lipids (Bligamples listed below were tion findings worksheets	e revi		ch of the fol	low	ing va	alidatic	n area	ıs. Vali	dation find	dings are	noted i	n atta	ch
	Validation	Area							Co	omments				
1.	Technical holding times			As	Sam	pling d	ates: 8	124	- 28 <sup>1</sup>	107				-
IIa.	Initial calibration			N	<u> </u>		IMR		Ba	land	Chec	k \		
IIb.	Calibration verification			N.	5		•							
III.	Blanks			Α										
IV	Matrix Spike/Matrix Spike D	uplicat	tes	N	-					*** * * *				
V	Duplicates		*	Ä										
VI.	Laboratory control samples			~										
VII.	Sample result verification			A										
VIII.	Overall assessment of data			A							-			ſ
IX.	Field duplicates			<b>N</b>		:							/	/
х_	Field blanks												. (	_
lote: ′alidate	A = Acceptable N = Not provided/applicable SW = See worksheet ed Samples:	•	R = Rin:	o compounds o sate eld blank	dete	cted		D = Dup TB = Tri EB = Ec	ip blank	t blank	·	-		-\
1 L	DW-07-C1-comp ½★	11	LDW-07-C5-c	omp ;	**	21				31				=
2 L	DW-07-C1-comp-dep	12	LDW-07-C5-c			22				32				
3 L	DW-07-C2-2-comp	13	LDW-07-C10-			23				33				
	DW-07-C2-2-comp-dep	14	LDW-07-C10-	-2-comp-dep	V	24				34				
5 L	DW-07-C3-1-comp	15	LDW-07-C11-			25				35				
3 L	DW-07-C3-1-comp-dep	16	LDW-07-C11-	-comp-dep		26				36				
	DW-07-C3-2-comp	17	LDW-07-C12-			27				37				
B L	DW-07-C3-2-comp-dep	18	LDW-07-C12-	comp-dep		28				38				_
9 L	DW-07-C4-comp	19	LDW-07-C1-c	ompDUP		29				39				
	DW-07-C4-comp-dep	20	mB			30				40				

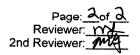
Page: 1 of 2 Reviewer: Wf 2nd Reviewer: awf

Method: Inorganics (EPA Method % finds

Method: Inorganics (EPA Method % 5000)			<del>,</del>	
Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	V			Somple flosen unti
Cooler temperature criteria was met.	/			unalizais
II. Calibration				U training
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: Blanksi				
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.		V		
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				To the time the second
Was an LCS anaylzed for this SDG?		$\checkmark$	_	
Was an LCS analyzed per extraction batch?		$\checkmark$	_	
Were the LCS percent recoverles (%R) and relative percent difference (RPD) within the 80-120% (85-115% for Method 300.0) QC limits?			4	
VI. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?		4		
Were the performance evaluation (PF) samples within the acceptance limits?			/	



## **VALIDATION FINDINGS CHECKLIST**



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?	1			
Were detection limits < RL?	/			
VIII Overall assessment of data	i de la companion de la compan			
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 #: LO75

## VALIDATION FINDINGS WORKSHEET Level IV Recalculation Worksheet

	Page:	1_9f_	)
	Reviewer:	MY.	
2nd	Reviewer:	que	

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

 $%R = Found \times 100$  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:

 $RPD = \frac{!S-D!}{} \times 100 \text{ Where,}$ 

S =

Original sample concentration

(S+D)/2

True

D =

Duplicate sample concentration

	·				Recalculated	Reported	4 t-blo
Sample ID	Type of Analysis	Element	Found / S (units)	True / D (units)	%R / RPD	%R / RPD	Acceptable (Y/N)
	Laboratory control sample	)					
	·						
	Matrix spike sample	> N/A	(SSR-SR)				
	Duplicate sample						
19		20 Lipido	0.689%	0.6802	1.3	1.3	7

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	

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# VALIDATION FINDINGS WORKSHEET

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Reviewer:	my
2nd reviewer:	my

SDG #: <u>しつし</u>	5	sample Cal	iculation verification	2nd reviewer: M	
	ganics, Method				•
(Y) N N/A	ifications below for all que: Have results been reporte Are results within the calib Are all detection limits bel	rated range o	of the instruments?	uestions are identified as "N/A".	
Compound (and recalculated and	alyte) results for d verified using the following	ng equation:		reported with a positive detect	were
Concentration =		Recalcui	lation:		
Due	Somple - Jall Spl. wt.	΄χιοο ΄	1.2271-1.	1248 × 100 = 1.023	<b>.</b>

#	Sample ID	Analyte	Reported Concentration ( ්/) ු )	Calculated Concentration	Acceptable (Y/N)
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## 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 February 26, 2008

ATTN: Ms. Marina Mitchell

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#	<u>Fraction</u>
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, Polychlorinated Biphenyls, % Lipids & Total Solids LT32, LT33, LT34

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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LDC	SDG#	DATE REC'D	(3) DATE DUE	(80	CBs 082)	Lip	% oids //B)	So	otal lids (0.3)																										
Matrix	:: Water/Tissue				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
Α	LT29		01/16/08	_	20	_	<del></del>	0	20	<u> </u>	ļ	<u> </u>																							
В	LT30	12/24/07	01/16/08	0	9	0	9	0	9												<u></u>														
С	LT31	12/24/07	01/16/08	0	12	0	12	0	12				<u> </u>		ļ																				
D	LT32	12/24/07	01/16/08	0	11	0	11	0	11																									ĺ	
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																										
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# Lower Duwamish Waterway Group Data Validation Reports LDC# 18015

**PCBs** 

# LDC Report# 18015A3b

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

<sup>\*</sup>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	-

<sup>\*</sup>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)	Р
MB-110807-2	ZB-35	Hexabromobiphenyl	17782520 (3781362-15125446)	Aroclor-1260	J (all detects) UJ (all non-detects)	Р

# 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)	А
*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)	А
LDW-07-T2-M-SC-EM-comp3	Aroclor-1248	44	J (all detects)	А

#### \*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	А
LDW-07-T3-M-DC-HP-comp3RE	All TCL compounds except Aroclor-1254 Aroclor-1260	R	А

<sup>\*</sup>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)	А	Matrix spike/Matrix spike duplicates (%R)
LT29	LDW-07-T1-M-SC-EM-comp3	Aroclor-1254	J (all detects)	А	Compound quantitation and CRQLs (RPD)
LT29	LDW-07-T2-M-SC-EM-comp3	Aroclor-1248	J (all detects)	А	Compound quantitation and CRQLs (RPD)
LT29	LDW-07-T3-M-DC-HP-comp3	Aroclor-1254 Aroclor-1260	R R	А	Overall assessment of data
LT29	LDW-07-T3-M-DC-HP-comp3RE	All TCL compounds except Aroclor-1254 Aroclor-1260	R	А	Overall assessment of data

<sup>\*</sup>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 <b>V</b> SDG #: LT29 Laboratory: Analytical Resources,	ALIDATION COMPLETENESS WORKSHEET Level IV Inc.	Date: // ¶/0 &  Page: / of /  Reviewer: / 2  2nd Reviewer:
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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
1.	Technical holding times	Ą	Sampling dates: 9 4 - 7 9 7 07
11.	GC/ECD Instrument Performance Check	NA	
111.	Initial calibration	Δ	
IV.	Continuing calibration	Α	1CV = 15
V.	Blanks	Δ_	
VI.	Surrogate spikes / ht Ala	SW	
VII.	Matrix spike/Matrix spike duplicates	رسي	LDW-07-T3-M
VIII.	Laboratory control samples	Δ	LCS
IX.	Regional quality assurance and quality control	SM/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	1	LDW-07-T1-M-DC-EM-comp1	112	LDW-07-T1-M-DC-HP-comp1	21 )	LDW-07-T3-M-DC-EM-comp3MS	31/	MB-110807-
2	-1	LDW-07-T3-M-DC-EM-comp1		LDW-07-T3-M-DC-HP-comp1	)	LDW-07-T3-M-DC-EM-comp3MSD	322	MB- 110807-
3	İ	LDW-07-T3-M-DC -EM-comp2	13	LDW-07-T3-M-DC-HP-comp2	23 *	LDW-07-T3-M-DC-HP-comp3MS	33 3	MB-012408
4	.1	LDW-07-T3-M-DC-EM-comp3		LDW-07-T3-M-DC-HP-comp3	24 7	LDW-07-T3-M-DC-HP-comp3MSD	34	
5	. 1	LDW-07-T1-M-SC-EM-comp1	153	LDW-07-T1-M-SC-HP-comp1	25 <b>3</b>	# 14 RE	35	
6	7	LDW-07-T1-M-SC-EM-comp2	163	LDW-07-T1-M-SC-HP-comp2	26 3	# 15 RE	36	
7	i	LDW-07-T1-M-SC-EM-comp3	173	LDW-07-T1-M-SC-HP-comp3	273	# IJARE	37	
8	,	LDW-07-T2-M-SC-EM-comp1	1.	LDW-07-T2-M-SC-HP-comp1	1 -	A TIRE	38	
9	1.	LDW-07-T2-M-SC-EM-comp2	٠	LDW-07-T2-M-SC-HP-comp2	i		39	
10		LDW-07-T2-M-SC-EM-comp3	20	LDW-07-T2-M-SC-HP-comp3	30		40	

LDC #: 18015 A36 SDG #: yeu cover

#### **VALIDATION FINDINGS CHECKLIST**

Page: /of / Reviewer: // 2nd Reviewer: //

Method: GC HPLC				
Validation Area	Ye	s N	o N	A Findings/Comments
L'Teamical poldingardies				
All technical holding times were met.	7/	1	Τ	
Cooler temperature criteria was met.	7	T		:
ilikuntakselinatoine isaassa saata <b>Euro</b>				
Did the laboratory perform a 5 point calibration prior to sample analysis?	1	1		
Was a linear fit used for evaluation? If yes, were all percent relative standard deviations (%RSD) ≤ 20%?	_	1		
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?	<u>L.</u>	1		
IX-recontributing collection: 15 10 10 10 10 10 10 10 10 10 10 10 10 10				
What type of continuing calibration calculation was performed?%D or%R	/	1		
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?		1		
V.Blanks 1.25 T. T. T. T. Blanks 1.25 T. T. T. T. T. T. T. T. T. T. T. T. T.				
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.		/	1	
Wi-Simogale spikesi				
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?				
Vilis Mators pike (Matinx spike minicales)				
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?				
/III/ Caborator/Control Samples :				
Was an LCS analyzed for this SDG?		THE WASHING	es está	STATE OF THE STATE
Was an LCS analyzed per extraction batch?		<u></u>		
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the OC limits?		<del>,</del> .	-	

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#### **VALIDATION FINDINGS CHECKLIST**

Page: 20f 2
Reviewer: 7
2nd Reviewer: 4

Validation Area	Yes	No	NA	Findings/Comments
IX Regionalisability essurance and country coducit				
Were performance evaluation (PE) samples performed?	<u> </u>		/	
Were the performance evaluation (PE) samples within the acceptance limits?		150.5000		
Morane Committating store as a second store of the second store of				
Were the retention times of reported detects within the RT windows?		San San San San San San San San San San	0.00	
A temponium annianon en				
Were compound quantitation and CRQLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?				
System performance was found to be acceptable.				
All security sets implications in the security of the security				
Overall assessment of data was found to be acceptable.				
Specifical diplomates (Control of the Control of th				
Field duplicate pairs were identified in this SDG.				
Target compounds were detected in the field duplicates.			-	
W Seltenia				
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		
3. beta-BHC			Y. Araclor-1242	GG.
	J. 4,4'-DDE	R. Endrin aldehyde	7 Acada (2)	
delta-BHC	K. Endrin		Z. Aracior-1248	нн,
		S. alpha-Chlordane	AA. Araclor-1254	II.
). gamma-BHC	L. Endosulfan II	T. gamma-Chlordane		
. Heptachlor		- Sincipality	BB. Aroclor-1260	JJ.
	M. 4,4'-DDD	U. Toxaphene	CC. DB 608	
Aldrin	N. Endosulfan sulfate			KK.
		V. Araclor-1016	DD. DB 1701	LL,
3. Heptach or epoxide	O. 4,4'-ODT	W. Aroclor-1221		
I. Endosuljan I	2.4.4		EE.	MM.
	P. Methoxychlor	X. Aroclor-1232	FF.	N. C.
				NN.

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# **VALIDATION FINDINDS WORKSHEET Surrogate Recovery**

Page: /_of	1
Reviewer:	
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METHOD:

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".

YN N/A Were surrogates spiked into all samples and blanks?

YN N/A Did all surrogate recoveries (%R) meet the QC limits?

A / N W/F				t) meet the QC limits?					
#	Sample ID	Detecte Colum		Surrogate Compound		%R (Limits	)		Qualifications
				TCMX	25.5	~	33-12/)	F.	IW/P N.A
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	.5			<b>₩</b>	19.7	7 (	( 33-/2/ )		7
							( )		
	9			<i>\( \)</i>	27. :	3	( 33~/2/ )		+ V
							( )		
	15			DCB	20.		( 32-155 )		J/UJ/P
				TLMX	/3.	8	( 33-/2/ )		<del></del>
<u> </u>							()		
	16				₹0.	4 .	( 1 )		7
				T	15.	6	( <i>V</i> )		V
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<b> </b>	Since DCB			P.R. Well in . W.	zing grote	dessional julgant.		te_nt	
<b> </b>		dofr	was	not justified	0 1 0	(	)		
						(	)		
	Surrogate Comp	pound		Surrogate Compound		Surre	gate Compound		Surrogate Compound
A	Chlorobenzene (	CBZ)	G	Octacosane	M		Benzo(e)Pyrene	\$	1-Chloro-3-Nitrobenzene
В	4-Bromofluorobenze	ne (BFB)	н	Ortho-Terphenyl	N		Terphenyl-D14	Т	3,4-Dinitrotoluene
<u> </u>	a,a,a-Trifluorotol			Fluorobenzene (FBZ)	0	Decaf	luorobiphenyl (DCB)	V	TripentyItin
P -	Bromochlorober			n-Triacontane	Р		ethvinaphthalene	V	Tri-n-propyltin
<u> </u>	1,4-Diohlorobut		K	Hexacosane	<u> </u>		enyl Acetic Acid (DCAA)	w	Tributyl Phosphate
F	1,4-Difluorobenzen	e (DFB)	L	Bromobenzene	R		4-Nitrophenol	Х	Triphenyl Phosphate

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## **VALIDATION FINDINGS WORKSHEET** Matrix Spike/Matrix Spike Duplicates

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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?

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

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

	#	MS/MSD ID	Compound	MS %R (Li		M	SD .imits)	RPD (Li		Associated Samples	Qualifications
A	0	2/122	BB	16.0	(38-152)	15.0	(38-159	(	)	4	J/UJ/A
4					( )		( )	(	)		OUAL Y, Z, AA
					( )		( )		)		BB
					( )		( )		)		,
					( )		( )		)		
$/\!\!\!\mid$	$\rightarrow$						()	(	)		
	り	LDW-07-73-  -E3-WB -com			يري		( )		)		
$\dashv$	Ŋ	-ES-WB-com	PSEBB	350	(38-152	335	(38-152	) (	)	ron	NO OUAL
					( )		( )	(	)		
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LDC #:	18012	A36
SDG #:_	pie	coner

# **VALIDATION FINDINGS WORKSHEET** Internal Standards

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	Reviewer:	5
	Reviewer:	

8082

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

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

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

#	Colum I	Sample ID	Internal Standard	Area (Limits)	RT (Limits)	Qualifications
	ZB-5	MB-110807-2	Hexabromobi'ph	my/ 25102480 (54196	.34-21678536)	J/UJ/P GUALBE
		4	,			
	28-35	1	J	17782520(37813	62 - 15 125446.)	J/4J/P QUALBB
			·			
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	<del> </del>					
	<u> </u>					
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			1			

(BCM)	==	Bromochioromethane
MER!	-	1.4-Diffuorobenzene

(CBZ) = Chlorobenzene-d5

(PFB) = Pentafluorobenzene

(4DCB) = 1,4-Dichlorobenzene-d4

(2DCB) = 1,2-Dichlorobenzene-d4

(FBZ) = Fluorobenzene

LDC #:_	1901	5 A3b,
SDG #:_	pel	coned

# **VALIDATION FINDINGS WORKSHEET** Compound Quantitation and Reported CRQLs

Page:	
Reviewer:	<u></u>
2nd Reviewer:	M_

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 Y N N/A

Were CRQLs adjusted for sample dilutions, dry weight factors, etc.?

Did the reported results for detected target compounds agree within 10.0% of the recalculated results?

		% RPD Bet Zcolumn	,	
#	Compound Name	Finding	Associated Samples	Qualifications
	A_	40,26	6	JA do pr
		, , , , , , , , , , , , , , , , , , , ,		
	AA	45.65 46	7	J/A sut
<b> </b>				
	Z	43.74- 44	10	l l
<b> </b>				
		<u> </u>		<u> </u>

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

DC#: 15015A3b 3DG#: pu cong

# VALIDATION FINDINGS WORKSHEET Overall Assessment of Data

	Page:	of
	Reviewer:	FI
2nd	Reviewer:	V.

WETHOD: 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.

YN 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
	. 1)			
	All except above	higher RL	25	R/A
	AII	Jou surregate	15, 16, 17	RAN

Comments:		 	***		
	· · · · · · · · · · · · · · · · · · ·	 	,		

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LDC #:_	18013	5A3b
SDG #:_	su	coned

# VALIDATION FINDINGS WORKSHEET Initial Calibration Calculation Verification

	Page:_		
	Reviewer:_		
2nd	Reviewer:	N	

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

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

		Calibration		Reported	Recalculated	Reported	Recalculated	Reported	Recalculated
#	Standard ID	11/12/07	Compound	CF ( 25 <sup>0</sup> std)	CF (25 std)	Average CF (initial)	Average CF (initial)	%RSD	%RSD
	V-4 L		1260-1 ZB-5 1260-1 ZB-35	0.12498	0.12498	0.13116	0.13116	11.768	11.768
_		78-5		0.10230	0.10230	0.10438	0.10438	4,52	8.525
2					·		·		
						·			
3					· · · · · ·				
$\dashv$									
-					·				
4					·				
7									

Comments: Refer to Initial Calibra	tion findings we take the second			The state of the s
reculte	morning worksneet for list of qualifications and	decodoted semalarity		the state of the s
results.	tion findings worksheet for list of qualifications and	associated samples when reporte	d results do not same with	in 10 0% of the read and a series
			THE THE PART OF THE	in 10.0% of the recalculated
	***************************************			

LDC #:_	801.	5A3b
SDG #:_	w	coned
	/	

# **VALIDATION FINDINGS WORKSHEET** Continuing Calibration Results Verification

Page:_	
Reviewer:	
2nd Reviewer:	1

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

					Reported	Recalculated	Reported	Recalculated
#	Standard ID	Calibration Date	Compound	Average CF(Ical)/ CCV Conc.	CF/Conc. CCV	CF/Conc. CCV	%D	%D
1	1529	11/15/07	1260-1 28-5	P€D, O	226. 2	215-8	9.7	9-7
	138-		1260-1 ZB-35	1	248.2	240.2	3.9	3.9
2	cev @	11/20/07			244.%	244.8	2.	2.1
	0141		*	7	252.7	x2.7	1.)	1-)
3								
-								
4								
								***************************************

Comments:	Refer to Continuing Ca	libration findings worksheet for list of qualifications and approximate a second secon
recalculated	results.	libration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the

LDC #:	180	15A3b
SDG #:_		
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# VALIDATION FINDINGS WORKSHEET Surrogate Results Verification

Page:	of	_
Reviewer:_	$\overline{}$	_
2nd reviewer:_	- H =	,

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

Surrogate	Column/Detector	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
				Reported	Recalculated	
DCB	78-5	40	8.7	434	43.4	O
TLMX	<b>V</b>	40	5.1	25.5	25.5	0

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 #: 1801	SA3b
SDG #:_w_	coned

# VALIDATION FINDINGS WORKSHEET <u>Matrix Spike/Matrix Spike Duplicates Results Verification</u>

Page:	_of
Reviewer:_	
2nd Reviewer:	Í.

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LTI	_	114	· .	

\_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

RPD =(((SSCMS - SSCMSD) \* 2) / (SSCMS + SSCMSD))\*100

SA = Spike added MS = Matrix spike

MSD = Matrix spike duplicate

MS/MSD samples:

21+22

Compound		Ad	ike ded	Sample Cong,	Conce	Sample ntration	Matrix spike Matrix Spike D		Duplicate	cate MS/MSD		
Compound		0	/kg)	(ug/kg)	( 4	3/Kg_	Percent	Recovery	Percent R	ecovery	RP	D
		MS	MSD		MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Gasoline (80	15)											
Diesel (80	15)					<u> </u>						<del></del>
Benzene (802	?1B)						1					***************************************
Methane (RS	K-175)						<u> </u>					
2,4-D (815	11)											
Dinoseb (815	51)											
Naphthalene (831	0)											
Anthracene (831	0)						<b></b>					
HMX (833	0)				•		1					
2,4,6-Trinitrotoluene	(8330)			·								<del></del>
Aroclor 126	0	10	10	16-8	18.4	18.3	1813	16.0	15.0	15.0	0.5	0.5
						·	16.0				<i>پ</i> ين	0,5
**************************************												
omments: Refer to I				L								

of the recalculated results.

7	poratory Cont		N FINDINGS WORKSHEET ory Control Sample Duplicates	s Results Verification	Page:of Reviewer: 2nd Reviewer
The percent recoveries (%R) ar compounds identified below usi			e laboratory control sample and labora	atory control sample duplicate we	ere recalculated for the
%Recovery = 100 * (SSC - SC)/SA		SSC = Spiked concentration SA = Spike added	SC = Sample concentration		
RPD =(({SSCLCS - SSCLCSD} * 2) / (S	SCLCS + SSCLCSD)	)*100 LCS = Lab	oratory Control Sample percent recovery	LCSD = Laboratory Control Sample dup	dicate percent recovery

		Spil	ke	Sample	Spike S		LC	s	LCS	D	LCS/L	CSD
Compou	ind	(49)	% [/4]	conc.	Concen ( <i>u.g</i>	1/4	Percent Recovery		Percent Recovery		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)											
НМХ	(8330)											
2,4,6-Trinitrotolu	uene (8330)											
Aroclor 12	160	10.0	NA	O	5-0	NA	50.0	బు. ()				

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.

LCS-110807

LCS/LCSD samples:

LDC #: 18	OISABb
	e coner

# VALIDATION FINDINGS WORKSHEET Sample Calculation Verification

Page:		_
Reviewer:	/	5
2nd Reviewer:		7
		_

METHOD:	GCHPLC					
Y N N/A Y N N/A	Were all reported results recalcu Were all recalculated results for	lated and verified for all detected target compour	level IV samples	s? of the reported results?		
Concentration= (	(A)(Fv)(Df) RF)(Vs or Ws)(%S/100)	Example:	.1.4		•	
A= Area or height Fv= Final Volume Df= Dilution Facto		Sample ID	#1	Compound Name	Aroelor	1260
	nse factor of the compound libration of the sample f the sample	Concentration =	117.29	50)		

= 4.69 ug /kg

#	Sample ID	Compound	Reported Concentrations	Recalculated Results Concentrations	Qualifications
	Aroclo1 1260-2=	1066050 (80	= 169.95	1260-25	114.95
		(8585398) (0,0584	2	3 =	us.1
			,	4 =	91.1
				5-	93.0
					117.29

		,	
Commontes	•		
Comments:			
,			

# 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	یo/ <u>/ با /</u> 0
SDG #: <u>LT30</u>	Level III	Page: / of /
Laboratory: Analytical Resou	irces, Inc.	Reviewer:
		2nd Reviewer: A

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
1.	Technical holding times	Δ	Sampling dates: 9 4 07 _ 9 1 07
11.	GC/ECD Instrument Performance Check	NA	1
111.	Initial calibration	Δ	
IV.	Continuing calibration	A	1CV = 15
V.	Blanks	Δ	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	SWA	
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 (AII)
XI.	Target compound identification	N	45111ca Ge  1 1
XII.	Compound quantitation and reported CRQLs	N	
XIII.	Overall assessment of data	$\triangle$	
XIV.	Field duplicates	7	
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:

Tissur 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 LDW-07-T1-M-ES-FL-comp3 13 23 33 3 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 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 LDW-07-T3-M-ES-FL-comp2MS 20 30 40

# LDC Report# 18015C3b

# 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)	А

#### 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)	А

# 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)	А	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

SDG # Labora METHO	: LT31  tory: Analytical Resources, Inc.  OD: GC Polychlorinated Biphenyls (EPA	SW 846 N	PLETENESS WORKSHEET  Level III  Page: _/of _/ Reviewer: / 7 2nd Reviewer: / 7  Allethod 8082)  Date: / 4/  Page: _/of _/ Reviewer: / 7 2nd Reviewer: / 7  Date: / 4/  Page: _/of _/ Reviewer: / 7 2nd Reviewer: / 7  Date: / 4/  Page: / of/ Reviewer: / 7  2nd Reviewer: / 7  Date: / 4/  Reviewer: / 7  2nd Reviewer: / 7  Date: / 4/  Reviewer: / 7  2nd Reviewer: / 7  Date: / 4/  Reviewer: / 4/  Reviewer
	Validation Area		Comments
l.	Technical holding times	A	Sampling dates: 9/4 — 9/6/67
11.	GC/ECD Instrument Performance Check	NΔ	, , ,
111.	Initial calibration	Δ	
IV.	Continuing calibration	SW	1cv = 15
V.	Blanks	Δ	
VI.	Surrogate spikes	Α	
VII.	Matrix spike/Matrix spike duplicates	یسی	
VIII.	Laboratory control samples	A	LC9

Note:

IX.

Xa.

Xb.

XI.

XII.

XIII.

XIV.

XV.

Field duplicates Field blanks

Florisil cartridge check

**GPC Calibration** 

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

Target compound identification

Overall assessment of data

Regional quality assurance and quality control

Compound quantitation and reported CRQLs

ND = No compounds detected

N

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N

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N

R = Rinsate

FB = Field blank

D = Duplicate

TB = Trip blank

EB = Equipment blank

Validated Samples:

	[] 5501 (						
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

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

A. alpha.RHC				
- Laboration of the Control of the C	I. Dieldrin	Q. Endrin ketone		
B. beta-BHC		-	1. Augior-1242	.00
	J. 4,4'-DDE	R. Endrin aldebude		
6 to 11 to 1			Z. Aroclor-1248	HH.
	K. Endrin	S. alpha-Chlordana		
0.00			AA. Aroclor-1254	
	L. Endosuifan II	T. camma-Chlorden		
U			BB. Aroclor-1260	JJ.
E. Heptachlor	M. 4,4'-DDD	1		
		U. ioxaphene	CC. DB 608	
F. Aldrin				KK.
	N. Endosulfan sulfate	V. Aracior-1016		
S. Harden			10.08 1701	LL,
c. neptachior epoxide	O. 4,4'-DDT			
		VV. Arocior-1221	iii	
H. Endosulfan i			-	ww.
	r. Methoxychlor	X. Aroclor-1232		
			· ·	NN.

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# VALIDATION FINDINGS WORKSHEET <u>Continuing Calibration</u>

Page:_	<u>_</u> of_	_
Reviewer:		2_

METHOD:	/GC	HPLC

2nd Reviewer: \_\_\_\_\_\_\_\_

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".
الكلايat type of continuing calibration calculation was performed?%D orRPD
N/A Were continuing calibration standards analyzed at the required frequencies?
What type of continuing calibration calculation was performed?%D orRPD  VN_N/A Were continuing calibration standards analyzed at the required frequencies?  VN_N/A Did the continuing calibration standards meet the %D / RPD validation criteria of ≤15.0%?

Level IV Only

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	101	7B-35	BB	16.76	( )	MB-111707, 13,14	J/UJ/A OUAL BBOOK Y, Z + AA
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Y (N) N/A

## **VALIDATION FINDINGS WORKSHEET** Matrix Spike/Matrix Spike Duplicates

	Page:_	_	_of_	_
	Reviewer:		F	2
2nd	Reviewer:		4	

METHOD: VGC HPLC

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

N N/A

Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SD Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? 夕N\_N/A

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

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 ( <del>50-159</del>	40-1 (50-15)	( )	8	J/W/A
			13 ( <del>50-159</del> (38-150)	( )	( )		OUAL Y, Z, AA,
			( )	( )	()		B/3
			( )	( )	( )		
			( )	( )	( )		
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### LDC Report# 18015D3b

# 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		Aroclor-1248 Aroclor-1254	J (all detects) UJ (all non-detects)	А

#### 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)	А

<sup>\*</sup>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	А
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	А
LDW-07-T3-M-ES-WB-comp4	Aroclor-1254 Aroclor-1260	R R	А
LDW-07-T3-M-ES-WB-comp4DL	All TCL compounds except Aroclor-1254 Aroclor-1260	R	А

<sup>\*</sup>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)	А	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)	А	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	А	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	А	Overall assessment of data
LT32	LDW-07-T3-M-ES-WB-comp4	Aroclor-1254 Aroclor-1260	R R	А	Overall assessment of data
LT32	LDW-07-T3-M-ES-WB-comp4DL	All TCL compounds except Aroclor-1254 Aroclor-1260	R	А	Overall assessment of data

<sup>\*</sup>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 VALIDATION COMPLETENESS WORKSHEET  SDG #: LT32 Laboratory: Analytical Resources, Inc.	Date: // 4/0 8  Page: _/of_/  Reviewer:7  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: 9/5 - 7 9/12/07
11.	GC/ECD Instrument Performance Check	NA	
IH.	Initial calibration	Δ,	
IV.	Continuing calibration	5 <b>/</b> /	1cd = 15
V.	Blanks	_ <u>A</u>	
VI.	Surrogate spikes / Word St. St.	SW	
VII.	Matrix spike/Matrix spike duplicates	SA	165
VIII.	Laboratory control samples	A	
IX.	Regional quality assurance and quality control	N N	
Xa.	Florisil cartridge check  GPC Calibration	N N	GPC clean-up performed all silica Gel
Xb.	Target compound identification	N	1 Silica Gel /
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:

Valluat	TISSUE						<del></del>
	LDW-07-T3-M-ES-WB-comp1	11	LDW-07-T4-M-ES-WB-comp1	21	MB-112607	31	
	LDW-07-T3-M-ES-WB-comp1DL		LDW-07-T4-M-SF-FL-comp1	22 2	MB-012408	32	
3	LDW-07-T3-M-ES-WB-comp2		LDW-07-T4-M-SF-WB-comp1	23		33	
3	LDW-07-T3-M-ES-WB-comp2DL		LDW-07-T4-M-SF-WB-comp2	24		34	
-	LDW-07-T3-M-ES-WB-comp3		LDW-07-T4-M-SF-WB-comp3	25		35	
5	LDW-07-T3-M-ES-WB-comp3DL		LDW-07-T3-M-ES-WB-comp3MS	26		36	
<u></u>	AA, 8 B LDW-07-T3-M-ES-WB-comp4		LDW-07-T3-M-ES-WB-comp3MSD	27		37	
-	LDW-07-T3-M-ES-WB-comp4DL		1000	28		38	
8 _ ~		192	4 0 D- 40 C-	29		39	
9	LDW-07-T3-M-ES-WB-comp6	202	11 90E MSD	30		40	

# VALIDATION FINDINGS WORKSHEET

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

alpha-BIIC	1. Dieldrin	Q. Endrin ketone	Y. Aroclor-1242	
beta-BHC	J. 4,4'-DDE		11.700(01-1242	GG.
	414000	R. Endrin aldehyde	Z. Araclar-1248	нн.
delta-BHC	K. Endrin	S. alpha-Chlordane		
gamma-BHC	L. Endosulfan II		.AA. Aroclor-1254	II.
	Endosultan II	T. gamma-Chlordane	BB. Araclor-1250	JJ.
Heptachlor	M. 4,4'-DDD	U. Toxaphene	CC. DB 608	
Aldrin	N. Endosulfan sulfate		GG. DB 606	KK.
	II. Endosulian suitate	V. Aroclor-1016	DD. DB 1701	LL,
Heptachlor epoxide	O. 4,4'-DDT	W. Arocior-1221		
Endosulfan I			<b>EE.</b>	MM.
	P. Methoxychlor	X. Aroclor-1232	FF.	NN.

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#### **VALIDATION FINDINGS WORKSHEET Continuing Calibration**

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Reviewe	r: <i></i>	2

METHOD: GC \_\_ HPLC

2nd Reviewer:

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

Were continuing calibration standards analyzed at the required frequencies?

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

Level W Only

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	7B-35	BB	16.76	( )	2, 4, 6, 8	1/U1/A
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# VALIDATION FINDINGS WORKSHEET Matrix Spike/Matrix Spike Duplicates

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2nd Reviewer:	n

METHOD: \_\_ GC \_\_ HPLC

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

Y M N/A

Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG?

Was an MS/MSD analyzed every 20 samples for each matrix or whenever a sample extraction was

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
	19420 /3X	BB	350 (38-154)	335 (38-15P	( )	18	J/A aut
			( )	( )	( )		OUAL Y.Z. AA
			( )	( )	(		BB
			( )	( )	( )		
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## **VALIDATION FINDINGS WORKSHEET** Compound Quantitation and Reported CRQLs

Page: _	of
Reviewer:	13
2nd Reviewer:	

METHOD:

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.?

Did the reported results for detected target compounds agree within 10.0% of the recalculated results? Y N N/A

#	Compound Name	Finding	Associated Samples	Qualifications
	AA	Finding exceeded cal range	1, 2, 5	NA
		U	<b>O</b> ,	
		,		
	AA, BB	<b>√</b>	7	NA

Comments: _	See sample calculation	verification worksheet for	r recalculations			
					 ·····	

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# VALIDATION FINDINGS WORKSHEET Overall Assessment of Data

	Page:	<u></u>
	Reviewer:	
2nd	Reviewer:	11

METHOD: \_\_GC \_\_ HPLC

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

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

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

#	Compound Name	Finding	Associated Samples	Qualifications
	AA	exceeded cal range	1,3,5	R/A
		<u> </u>		
(2)	all except AA	diluted	2, 4, 6	R/A
(3)				
	AA, BB	exceeded cal range	7	R/A
12	All except above	diluter	8	R/A
		,		
13/	A-//	to sunge		R/A-
		2 /		
	use the	RE		

Comments:	

OVRNew.wpd

#### LDC Report# 18015E3b

# 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-D-SS-WB-comp1MSD

LDW-07-T3-F-SS-WB-comp1 LDW-07-T3-F-SS-WB-comp1DL LDW-07-T3-D-SS-WB-comp1MS

<sup>\*</sup>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)	А
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)	А

<sup>\*</sup>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	А
LDW-07-T3-F-SS-WB-comp1DL	All TCL compounds except Aroclor-1260	R	А

<sup>\*</sup>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-D-SS-WB-comp1 LDW-07-T2-E-SS-WB-comp1 LDW-07-T3-A-SS-WB-comp1 LDW-07-T3-B-SS-WB-comp1 LDW-07-T3-B-SS-WB-comp1 LDW-07-T3-B-SS-WB-comp1 LDW-07-T3-B-SS-WB-comp1 LDW-07-T3-B-SS-WB-comp1 LDW-07-T3-B-SS-WB-comp1 LDW-07-T3-B-SS-WB-comp1 LDW-07-T3-B-SS-WB-comp1 LDW-07-T3-F-SS-WB-comp1 LDW-07-T3-F-SS-WB-comp1	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	А	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	VALIDATION COMPLETENESS WORKSHEET	Date: 1/4/08/ Page: (of /
SDG #LT33	<del></del>	Reviewer: 7
Laboratory: Analytical Resou		2nd Reviewer:
METHOD: GC Polychlorinal	ed 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	Δ	Sampling dates: 9 4 - 9 7 0 7
11.	GC/ECD Instrument Performance Check	NA	•
111.	Initial calibration	Δ	
IV.	Continuing calibration	ىسى	1CV = 15
V.	Blanks	Α	
VI.	Surrogate spikes / Wf AM	SW	
VII.	Matrix spike/Matrix spike duplicates	SW	
VIII.	Laboratory control samples	A	169
IX.	Regional quality assurance and quality control	N	
Xa.	Florisil cartridge check	N	
Xb.	GPC Calibration	N	GPC chan up performed (AII)
XI.	Target compound identification	N	- Silica Gej
XII.	Compound quantitation and reported CRQLs	5W	
XIII.	Overall assessment of data	ઙ₩	
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		
B. beta-BHC	14400		Y. Aroclor-1242	GG.
	J. 4,4'-DDE	R. Endrin aldehyde	Z. Aroclor-1248	
C. delta-BHC	K. Endrin	C alaba state		HH.
D. gamma-BHC		S. alpha-Chlordane	AA. Aroclor-1254	II.
- gamana-Dric	L. Endosulfan II	T. gamma-Chlordane	BB. Aroclor-1260	
E. Heptachior	M. 4,4'-DDD		20. Addier-1260	11.
		U. Toxaphene	CC. DB 608	KK.
- Aldrin	N. Endosulfan sulfate	V. Aroclor-1016	00.00.400	
3. Heptach or epoxide	O. 4,4'-DDT		DD. DB 1701	LL.
	0. 1,1 1001	W. Aroclor-1221	EE.	MM.
H. Endosulfan i	P. Methoxychlor	X. Aroclor-1232		
			FF.	NN.

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## **VALIDATION FINDINGS WORKSHEET Continuing Calibration**

Page:_	/of_	_
Reviewer:	F	2_

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

Were continuing calibration standards analyzed at the required frequencies? Y N N/A 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	( )	ANY BIF except #4	J/UJ/A
	/ /		78-35	BB	17-36	()	1 1	<b>/</b>
						( )		OUAL Y, Z, BB,
						( )	·	AA
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#### **VALIDATION FINDINGS WORKSHEET** Matrix Spike/Matrix Spike Duplicates

	Page:_	_or_	_/
	Reviewer:		2
2nd	Reviewer:	1	

GC \_\_ HPLC METHOD:

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?

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?

#		Compound	MS %R (Limits)	MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
(1)	20+2/(3X	BB	0 (38-159	0 (38-157)	( )	16	po oual
			( )	( )	( )		parent 74X spike Amt
			( )	( )	( )		spik Amt
			( )	( )	( )		/
			( )	( )	( )		
			( )	( )	( )		
2	LOW-07-73-N	BB	330 ( V )	335 (V)	( )	nn	no OuAL
	LDW-07-73-N -E5-WB-COMP	5RE	( )	( )	( )		
	MS/D		( )	( )	( )		
	(3X)		( )	( )	( )		
-	( 1 )		( )	( )	( )		
	`		( )	( )	( )		
			( )	( )	( )		
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SDG #:	pre	<u>coud</u>	

## **VALIDATION FINDINGS WORKSHEET** Compound Quantitation and Reported CRQLs

Page: _	
Reviewer:	_77
2nd Reviewer:	_/

METHOD:

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
Y N N/A

Were CRQLs adjusted for sample dilutions, dry weight factors, etc.?

Did the reported results for detected target compounds agree within 10.0% of the recalculated results?

#	Compound Name	Finding	Associated Samples	Qualifications
	&B	Finding exceeded cal Bange	18	NA
-				
<b> </b>				
				<u></u>
1				

Comments:	See sample calculation verification worksheet for recalculations

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# VALIDATION FINDINGS WORKSHEET Overall Assessment of Data

Page:fof	_
Reviewer:	
2nd Reviewer:	

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
0	BB	exceeded cal range	18	R/A
2	al except BB	diluted	19	· R/A
3)	A//	lor jungati	4	P/A -9
	use RE.			

Comments:	
	•

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## LDC Report# 18015F3b

# 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)	А
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)	А

#### 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)	А

#### 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)	А	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	/ALIDATION COMPLETENESS WORKSHEET  Level III  . Inc.	Date: 1/4/08 Page: 1/of 1/2 Reviewer: 1/2 2nd Reviewer: 1/3
METHOD: GC Polychlorinated B	iphenyls (EPA SW 846 Method 8082)	
The samples listed below were revalidation findings worksheets.	eviewed for each of the following validation areas. Validation find	dings are noted in attached

	Validation Area		Comments
ı.	Technical holding times	A	Sampling dates: 9 5 07
11.	GC/ECD Instrument Performance Check	NA	
111.	Initial calibration	Δ	
IV.	Continuing calibration	لىپى	1CV = 15
V.	Blanks	A	
VI.	Surrogate spikes / hd All	4	
VII.	Matrix spike/Matrix spike duplicates	SW	
VIII.	Laboratory control samples	Α	LCS
IX.	Regional quality assurance and quality control	N	
Xa.	Florisil cartridge check	N	
Xb.	GPC Calibration	N	GPC + Silica Gol clan up perpormed (All
XI.	Target compound identification	N	<i>y y</i>
XII.	Compound quantitation and reported CRQLs	N	
XIII.	Overall assessment of data	A	
XIV.	Field duplicates	N	
XV.	Field blanks	N	

Note:

A = Acceptable

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

# VALIDATION FINDINGS WORKSHEET

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

A alpha-BHC	I. Dieldrin	Q. Endrin ketone	Y. Aroclor-1242	
B. beta-BHC	J. 4,4'-DDE			GG.
		R. Endrin aldehyde	Z. Aroclor-1248	нн.
C. delta-BHC	K. Endrin	S. alpha-Chlordane	AA. Aroclor-1254	II.
O. gamma-BHC	L. Endosulfan (I	T. gamma-Chlordane		"-
. Heptach(or			BB. Aroclor-1260	JJ.
	M. 4,4'-DDD	U. Toxaphene	CC. DB 608	KK.
. Aldrin	N. Endosulfan sulfate	V. Aroclor-1016	DD. DB 1701	
3. Heptach or epoxide	O. 4,4'-DDT			LL.
	0. 4,4-001	W. Aroclor-1221	EE.	MM.
i. Endosulfan I	P. Methoxychlor	X. Aroclor-1232	FF.	
				NN.

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LDC#: 18015F36	
SDG #: per cour	

# VALIDATION FINDINGS WORKSHEET **Continuing Calibration**

Page:_	<u>of</u>	_
leviewer:	£	2_

2nd	Reviewer:
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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 NINA

Were continuing calibration standards analyzed at the required frequencies?

Did the continuing calibration standards meet the %D / RPD validation criteria of ≤15.0%?

Y N/N/A 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	1cV	28-5	BB	18.20	( )	AV + B/K	J/UJ/A
			28-35	βB	17.36	( )	1	1
						( )		OUAL T, Z, AA,
						( )		BB
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# **VALIDATION FINDINGS WORKSHEET** Matrix Spike/Matrix Spike Duplicates

	Page:_	
	Reviewer:	
2nd	Reviewer:	N

METHOD: GC HPLC

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

Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG?

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

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

A/N N/A

Y N AVA

#	MS/MSD ID	Compound	MS %R (Limits)	MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
	5+6(3x)	BB	( )	34.6 (38-159)	( )	2	Qualifications  J/UJ/A
			( )	( )	( )		BUALY, Z, AA, B
			( )	( )	()_		
			( )	( )	( )		
			( )	( )	( )		
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# Lower Duwamish Waterway Group Data Validation Reports LDC# 18015

% Lipids & Total Solids

# 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-comp3DUP

 LDW-07-T3-M-DC-EM-comp1
 LDW-07-T3-M-DC-EM-comp3TRP

 LDW-07-T3-M-DC-EM-comp2
 LDW-07-T3-M-DC-HP-comp3DUP

 LDW-07-T3-M-DC-EM-comp3
 LDW-07-T3-M-DC-HP-comp3TRP

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

#### 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
РВ	% 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-comp1 LDW-07-T2-M-SC-EM-comp2 LDW-07-T3-M-DC-EM-comp3 LDW-07-T3-M-DC-EM-comp3DUP LDW-07-T3-M-DC-EM-comp3TRP
РВ	% Lipids	0.0080 %	LDW-07-T1-M-DC-HP-comp1 LDW-07-T3-M-DC-HP-comp2 LDW-07-T3-M-DC-HP-comp3 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-comp1 LDW-07-T2-M-SC-HP-comp2 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 VALIDATION COMPLETENESS WORKSHEET  SDG #: LT29 Level IV  Laboratory: Analytical Resources, Inc.								2	Date: 1319 Page: 10f Reviewer: 44		
METI	HOD: Percent Lipids (Bligh	n & D	yer), Total (	Solids (EP	A Me	ethod	160.3)				
	samples listed below were ation findings worksheets.	revie	wed for eac	ch of the fo	llowi	ing va	ilidation ar	eas. Valida	ition findi	ings	are noted in attached
	Validation A	Area						Con	nments		
I.	Technical holding times			A	Sam	pling da	ates: 9	4 -> 9	7   5-	1	
lla.				A					<u> </u>		
IIb.				Α					·····		
10.				SW							
IV		uplicate	es	2	}	Down	2 TRP				
V	Duplicates			SZJA							
VI.				2							
VII.				A							
VIII.	. Overall assessment of data		1	Α							
IX.				2							
_x_	Field blanks			N							
Note: Valida	NO. 10 annual de detected D Duplicate										
1	LDW-07-T1-M-DC-EM-comp1	T	LDW-07-T1-N		1 mp1	21	LDW-07-T3	s-M-DC-EM-co	mp3DUP	31	
	LDW-07-T3-M-DC-EM-comp1		LDW-07-T3-N					3-M-DC-EM-co		32	
	LDW-07-T3-M-DC -EM-comp2		LDW-07-T3-N					3-M-DC-HP-co		33	
	LDW-07-T3-M-DC-EM-comp3	14	LDW-07-T3-N			1		3-M-DC-HP-ca		34	
	LDW-07-T1-M-SC-EM-comp1	15	LDW-07-T1-N			25	27			35	
	LDW-07-T1-M-SC-EM-comp2	16	LDW-07-T1-N			26				36	
	LDW-07-T1-M-SC-EM-comp3	17	LDW-07-T1-N			27				37	
	LDW-07-T2-M-SC-EM-comp1	18	LDW-07-T2-N			28				38	
	LDW-07-T2-M-SC-EM-comp2	19	LDW-07-T2-N	M-SC-HP-co	mp2	29				39	

10 LDW-07-T2-M-SC-EM-comp3 20

LDC	#:_1	8015A6
SDG	#-	LTAG

# VALIDATION FINDINGS CHECKLIST

Method:Inorganics (EPA Method & Cour)

Method:Inorganics (EPA Method & Crur)				
Validation Area	Yes	No	NA	FindIngs/Comments
1-Technical holding times				
All technical holding times were met.	/			
Coolor temperature criteria was met.	1/		<u> </u>	
II; Calibration				
Were all instruments calibrated daily, each set-up time?	1			
Were the proper number of standards used?	1			
Were all initial calibration correlation coefficients   0.9957	/			
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)				
WEDISTRESS TRANSPORTED TO THE PROPERTY OF THE				
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 outplicates 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.I. aboratory control samples:				
Was an LCS anaylzed for this SDG?			_	
Was an LCS analyzed per extraction batch?			4	
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 80-120% (85-115% for Method 300.0) QC limits?		ACCES NAME OF THE	1	
VI. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?	_	4	$\perp$	
Were the performance evaluation (PE) samples within the acceptance limits?	L		1	

#### VALIDATION FINDINGS CHECKLIST

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

Validation Area	Yes	No	NA	Findings/Comments
VII-Samble Result Vernication				
Were RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	-			
Were detection limits < RL?				
VIII Overal) assessment of data as the second secon				
Overall assessment of data was found to be acceptable.	/			
X Field duplicates ( ) ( ) ( ) ( ) ( ) ( ) ( ) ( ) ( ) (				
Field duplicate pairs were identified in this SDG,				
Farget analytes were detected in the field duplicates.			/	
Greichbanks 7 12 or greiche Land 18 20 20 20 20 20 20 20 20 20 20 20 20 20				
ield blanks were identified in this SDG.		1		
arget analytes were detected in the field blanks.			7	

LDC #: 18015AL

# VALIDATION FINDINGS WORKSHEET Sample Specific Analysis Reference

Page:of	
Reviewer: A	
2nd reviewer:	

All circled methods are applicable to each sample.

Sample ID	Parameter
1-20	PH TDS CI F NO, NO, SO, PO, ALK CN' NH, TKN TOC CR (Tot. 5.1:2)
	PH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN NH <sub>3</sub> TKN TOC CR <sup>6+</sup>
21-24	PH TDS CI F NO, NO, SO, PO, ALK CN NH, TKN TOC CR (1/L; 2:45)
	PH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN NH <sub>3</sub> TKN TOC CR°+
	PH TDS CI F NO, NO, SO, PO, ALK CN' NH, TKN TOC CR
	PH TDS CI F NO, NO, SO, PO, ALK CN' NH, TKN TOC CR°+
	PH TDS CI F NO, NO, SO, PO, ALK CN' NH, TKN TOC CR8+
	ph tds ci f no, no, so, po, alk cn nh, tkn toc cr
	PH TDS CI F NO, NO, SO, PO, ALK CN' NH, TKN TOC CRS+
	ph TDS CI F NO, NO, SO, PO, ALK CN' NH, TKN TOC CR"+
	ph tos ci f no, no, so, po, alk cn nh, tkn toc cr <sup>5+</sup>
	PH TDS CI F NO, NO, SO, PO, ALK CN' NH, TKN TOC CR6+
	PH TDS CI F NO, NO, SO, PO, ALK CN' NH, TKN TOC CR6+
	PH TDS CI F NO, NO, SO, PO, ALK CN' NH, TKN TOC CR8+
	PH TDS CI F NO, NO, SO, PO, ALK CN' NH, TKN TOC CR°+
	ph tds ci f no <sub>3</sub> no <sub>2</sub> so <sub>4</sub> po <sub>4</sub> alk cn. nh, tkn toc cr.
	PH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>5</sup> NH <sub>3</sub> TKN TOC CR <sup>5+</sup>
	PH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN NH <sub>3</sub> TKN TOC CR <sup>6+</sup>
	ph tds ci f No <sub>3</sub> No <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN NH <sub>3</sub> TKN TOC CR <sup>6+</sup>
	PH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN' NH <sub>3</sub> TKN TOC CR <sup>5+</sup>
	PH TDS CI F NO <sub>8</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN NH <sub>3</sub> TKN TOC CR <sup>5+</sup>
•	ph tos ci f no, no, so, po, alk cn' nh, tkn toc cr'
	PH TDS CI F NO, NO, SO, PO, ALK CN' NH, TKN TOC CRO+
	PH TDS CI F NO, NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN NH <sub>3</sub> TKN TOC CR <sup>6+</sup>
	ph tos cif no, no, so, po, alk cn nh, tkn toc cro+

Comments:	75		

LDC #: 18015A6 SDG #: LT19							
METHOD: Inorganics, Method	- Covi		·				
	questions answered "N". Not applicable que ted with a given method blank? aminants detected above the reporting limit		ualifications below.				
Conc. units: '/-	Associated Samples:	1-102/20(75x)					
Analyta Blank ID Maylmum	Blank	Sample Identification					

Conc. units			<del></del>		hiea					
Analyte	Blank ID	Maximum ICB/CCB	Blank Action Limit			San	nple identificati	on		
	713	ICB/CCB	Action Limit							
1. Lipids			0.02							 
			•							
						<del></del>				
										 <del>,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,</del>
<b> </b>										
									· · · · · · · · · · · · · · · · · · ·	

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 #: \\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	S- Co	VALIDATION FINDINGS WORKSHEET <u>Blanks</u>	Page: 2 of 2 Reviewer: 4 2nd Reviewer:			
		swered "N". Not applicable questions are identified as "N/A". en method blank? cted above the reporting limit in the method blanks? If yes, pleated Samples:	ase see qualifications below.			
Analyte Blank ID Maximum ICB/CCB	Blank Action Limit	Sample Identification				

Cone. units	Conc. units: 1. Associated Samples: (1-20/1(73x)											
Analyte	Blank ID	Maximum ICB/CCB	Blank Action Limit				San	nple identificati	on			
	\$B	ICB/CCB	Action Limit									ĺ
1. Lipids			0.04									
			•									
	•											
												<u> </u>
										ļ		

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	
	#: 4714	

# VALIDATION FINDINGS WORKSHEET Level IV Recalculation Worksheet

	Page:_	of
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2nd	Reviewer:	

		2nd Reviewer:
METHOD: Inorganics, Method	In Con	· · · · · · · · · · · · · · · · · · ·
Percent recoveries (%R) for a laborated	oratory control samp	le and a matrix spike sample were recalculated using the following formula:
%R = <u>Found</u> x 100 Where, True	Found =	concentration of each analyte measured in the analysis of the sample. For the matrix spike calculation,
	True =	Found = SSR (spiked sample result) - SR (sample result). concentration of each analyte in the source.
A sample and duplicate relative pe	ercent difference (RI	PD) was recalculated using the following formula:
RPD = $\frac{ S-D }{(S+D)/2}$ x 100 Where,	S == D ==	Original sample concentration  Duplicate sample concentration
•		a aprilate outletitiation

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)				
					***************************************		
LTZGNOWP	Duplicate sample	1. Lipids	6.10	7.52	23.9	20.9	7

omments: Refer to appropriate worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculate	Comments results.
	<del></del>

TOTCLC,6

LDC #: 18015A6

# VALIDATION FINDINGS WORKSHEET Sample Calculation Verification

Page:_	of	
Reviewer:_	<u> </u>	
2nd reviewer:_	1	-

SDG #: <u>LT14</u>	Sample Calculation Verification	2nd reviewer:
METHOD: Inorganics, Method	In Con	<b>O</b>
W N N/AHave results beW N N/AAre results with	for all questions answered "N". Not applicable of een reported and calculated correctly? in the calibrated range of the instruments? In limits below the CRQL?	questions are identified as "N/A".
Compound (analyte) results for recalculated and verified using		reported with a positive detect were
Concentration =	Recalculation:	
1/. Li aid	(1.2301-1.1197) x 2 x 100 =	. 0.4416

#	Sample ID	Anaiyte	Reported Concentration	Calculated Concentration	Acceptable · (Y/N)
	ı	Tot. Solids	15.80	15.70	Υ ΄
		1. Lipids	0.440	0.4416	Υ
<u> </u>					
<u> </u>	11	Tol. Solids	15.42	15.42	Υ
	·	Tot. Solids '/. Lipids	3.72	3.727	7
		-			
<b> </b>					
<u> </u>					
		·			
١ ١			]	1	4

Note:		 

## LDC Report# 18015B6

# 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
РВ	% 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

SDG	#: 18015B6 V #: LT30 ratory: Analytical Resources				PLETEN _evel bl		S WORKSHEET	2	Date: 1/2/09 Page: 10f 1 Reviewer: 24 2nd Reviewer: 1
	HOD: Percent Lipids (Bligh 8								
The s	samples listed below were re ation findings worksheets.	view	ed for ead	ch of the fo	ollowing v	/alida	tion areas. Validation find	dings	are noted in attached
	Validation Ar	ea					Comments		
1.	Technical holding times			A	Sampling	dates:	9/4 -> 9/6/0	7	
lla				А					
IIb	Calibration verification			A					
111.	Blanks			sω					
ΙV	Matrix Spike/Matrix Spike Dupli	cates		2	300	SP	Tap		
V	Duplicates			A			•		
VI.	Laboratory control samples			2					
VII	. Sample result verification			N					
VII	. Overall assessment of data			Α					
ΙX	Field duplicates			N					
Lx	Field hlanks			\ \ \					
Note:	A = Acceptable N = Not provided/applicable SW = See worksheet		R = Rin	o compound sate eld blank	s detected		D = Duplicate TB = Trip blank EB = Equipment blank		
Valida	ated Samples:	τ /	-~ 12 i						
1	LDW-07-T1-M-ES-FL-comp1	11	LDW-07-T	3-M-ES-FL-c	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 #: LT 30

# VALIDATION FINDINGS WORKSHEET Sample Specific Analysis Reference

Page:_	1	_of_	1
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-		<del></del>	

All circled methods are applicable to each sample.

Cample ID	Parameter
Sample ID	
1-9	pH TDS CI F NO, NO, SO, PO, ALK CN NH, TKN TOC CR"+ (Tol. Selic) (1. L: pl.)
	ph tds ci f No <sub>3</sub> No <sub>2</sub> So <sub>4</sub> Po <sub>4</sub> ALK CN NH <sub>3</sub> TKN TOC CR <sup>6+</sup>
10-11	pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN' NH <sub>3</sub> TKN TOC CR <sup>6+</sup>
	PH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN' NH <sub>3</sub> TKN TOC CR°+
	ph tds cif no3 no2 so4 po4 alk cn nh3 tkn toc cr8+
	PH TDS CIF NO3 NO2 SO4 PO4 ALK CN' NH3 TKN TOC CR8+
	PH TDS CI F NO3 NO2 SO4 PO4 ALK CNT NH3 TKN TOC CR6+
	PH TDS CIF NO3 NO2 SO4 PO4 ALK CN' NH3 TKN TOC CR8+
	PH TDS CI F NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR6+
	PH TDS CI F NO3 NO2 SO4 PO4 ALK CN' NH3 TKN TOC CR8+
	PH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN NH <sub>3</sub> TKN TOC CR <sup>5+</sup>
	PH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN' NH <sub>3</sub> TKN TOC CR <sup>6+</sup>
	ph tds ci f No <sub>3</sub> No <sub>2</sub> So <sub>4</sub> Po <sub>4</sub> alk cn Nh <sub>3</sub> tkn toc cr <sup>6+</sup>
	ph tds ci f No <sub>3</sub> No <sub>2</sub> So <sub>4</sub> Po <sub>4</sub> Alk Cn' Nh <sub>3</sub> TKN TOC CR <sup>6+</sup>
	ph tds ci f No <sub>3</sub> No <sub>2</sub> So <sub>4</sub> Po <sub>4</sub> Alk cn' Nh <sub>3</sub> TKN TOC CR <sup>8+</sup>
	ph tds ci f No <sub>3</sub> No <sub>2</sub> So <sub>4</sub> Po <sub>4</sub> Alk cn' Nh <sub>3</sub> TKN TOC CR <sup>8+</sup>
	pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN' NH <sub>3</sub> TKN TOC CR <sup>8+</sup>
	pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN NH <sub>3</sub> TKN TOC CR <sup>8+</sup>
	pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN' NH <sub>3</sub> TKN TOC CR <sup>6+</sup>
	pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN' NH <sub>3</sub> TKN TOC CR <sup>6+</sup>
	ph tds ci f No <sub>3</sub> No <sub>2</sub> So <sub>4</sub> Po <sub>4</sub> ALK CN NH <sub>3</sub> TKN TOC CR <sup>6+</sup>
	PH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN' NH <sub>3</sub> TKN TOC CR <sup>6+</sup>
	pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN NH <sub>3</sub> TKN TOC CR <sup>6+</sup>
	pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN NH <sub>3</sub> TKN TOC CR <sup>6+</sup>
	pH TDS CI F NO, NO, SO, PO, ALK CN NH, TKN TOC CR +

Comments:	>>

LDC #:_	W15B6
SDG #:_	<u>LT30</u>

# **VALIDATION FINDINGS WORKSHEET Blanks**

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	Reviewer:_	e	1	
2nd	Reviewer:_	_		

METHOD:	Inorganics.	Method	Su	ſ
MICI NOD.	morganics,	Memod	344	

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	Conc. units: 1. Associated Samples: (>5x)										
Analyte	Blank ID	Maximum Blank Sample Identification									
	PB	ICB/CCB	Action Limit								
1. Lizid	0.0080	g sh	0.040	·							
			•								
											<u> </u>
											L
									 ~		
•										<u></u>	
						<u> </u>		<u> </u>			
						<u> </u>					<u> </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 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
РВ	% 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

	#: <u>18015C6</u> #: <u>LT31</u> atory: <u>Analytical Resources</u>		DATION		LETENI ₋evel Ø∔		WORKSHEET	2	Page: \(\frac{1}{2}\right) of \(\frac{1}{2}\right)  Reviewer: \(\frac{1}{2}\right)  nd Reviewer: \(\frac{1}{2}\right)
	HOD: Percent Lipids (Bligh of amples listed below were re	-	,					ndinas	are noted in attached
valida	tion findings worksheets.				T				
	Validation Ar	ea					Comment	s	
I.	Technical holding times		A	Sampling d	ates:	7/4 - 9/6/5	7		
IIa.	Initial calibration			A					
IIb.	Calibration verification								
111.	Blanks		sω						
IV	Matrix Spike/Matrix Spike Dupl		2	7 3	'c 1	TRP			
V	Duplicates			A					
VI.	Laboratory control samples	•							
VII.	Sample result verification			N					
VIII.	Overall assessment of data			A					
IX.	Field duplicates			7					
X	Field blanks			~					
Note:	A = Acceptable N = Not provided/applicable SW = See worksheet		ND = No R = Rins FB = Fie		s detected		D = Duplicate TB = Trip blank EB = Equipment blank		
Valida	ted Samples:	Ţ;	35 W_						
1	LDW-07-T1-M-ES-WB-comp1	11	LDW-07-T2	2-A-ES-WB-	comp5	21		31	
2	LDW-07-T1-M-ES-WB-comp2	12	LDW-07-T2	2-A-ES-WB-	comp6	22		32	
3	LDW-07-T1-M-ES-WB-comp3	13	LDW-07-T2	2-A-ES-WB-	comp2DUP	23		33	
4	LDW-07-T1-M-ES-WB-comp4	14	LDW-07-T2	2-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	4
9	LDW-07-T2-A-ES-WB-comp3	19				29		39	
10	LDW-07-T2-A-ES-WB-comp4	20				30		40	

LDC #: 18015 C6
SDG #: LT 3 1

# VALIDATION FINDINGS WORKSHEET Sample Specific Analysis Reference

Page:_	of
Reviewer:	1
2nd reviewer:	

All circled methods are applicable to each sample.

	Parameter
Sample ID	
1-12	pH TDS CI F NO, NO, SO, PO, ALK CN NH, TKN TOC CROC Tot. Solit (1. Ligit)
	pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN NH <sub>3</sub> TKN TOC CR <sup>6+</sup>
13-14	pH TDS CI F NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR6+ (1. Ligit)
	PH TDS CIF NO3 NO2 SO4 PO4 ALK CN' NH3 TKN TOC CR°+
	PH TDS CLF NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CRS+
	PH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN NH <sub>3</sub> TKN TOC CR <sup>6+</sup>
	PH TDS CLF NO3 NO2 SO4 PO4 ALK CN' NH3 TKN TOC CR8+
	ph TDS CI F NO3 NO2 SO4 PO4 ALK CN' NH3 TKN TOC CR0+
	pH TDS CI F NO3 NO2 SO4 PO4 ALK CN' NH3 TKN TOC CR6+
	pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN' NH <sub>3</sub> TKN TOC CR <sup>6+</sup>
	pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN NH <sub>3</sub> TKN TOC CR <sup>6+</sup>
	pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN NH <sub>3</sub> TKN TOC CR <sup>6+</sup>
	pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN NH <sub>3</sub> TKN TOC CR <sup>6+</sup>
	ph tds ci f NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN' NH <sub>3</sub> TKN TOC CR <sup>6+</sup>
	ph tds ci f No <sub>3</sub> No <sub>2</sub> So <sub>4</sub> Po <sub>4</sub> Alk Cn NH <sub>3</sub> TKN TOC CR <sup>8+</sup>
	ph tds ci f NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN' NH <sub>3</sub> TKN TOC CR <sup>6+</sup>
	ph tds ci f No <sub>3</sub> No <sub>2</sub> So <sub>4</sub> Po <sub>4</sub> Alk CN NH <sub>3</sub> TKN TOC CR <sup>6+</sup>
	PH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN NH <sub>3</sub> TKN TOC CR <sup>6+</sup>
	pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN' NH <sub>3</sub> TKN TOC CR <sup>6+</sup>
	ph tds ci f No <sub>3</sub> No <sub>2</sub> So <sub>4</sub> Po <sub>4</sub> Alk Cn' Nh <sub>3</sub> TKN TOC CR <sup>6+</sup>
	ph tds ci f NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN NH <sub>3</sub> TKN TOC CR <sup>6+</sup>
	ph tds ci f No <sub>3</sub> No <sub>2</sub> SO <sub>4</sub> Po <sub>4</sub> ALK CN NH <sub>3</sub> TKN TOC CR <sup>6+</sup>
	pH TDS CI F NO, NO, SO, PO, ALK CN NH, TKN TOC CR6+
	ph tds ci f NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN NH <sub>3</sub> TKN TOC CR <sup>8+</sup>
	pH TDS CI F NO, NO, SO, PO, ALK CN' NH, TKN TOC CR"+

Comments:	34

LDC #: 18015CC	VALIDATION FINDINGS WORKSHEET	Page: <u> </u>
SDG #: LT31	<u>Blanks</u>	Reviewer: Al
METHOD: Inorganics, Method Su Co.	<u>~ : </u>	2nd Reviewer:
N N/A Were all samples associated with a give	wered "N". Not applicable questions are identified as "N/A". en method blank?	
YN N/A Were any inorganic contaminants detec	eted above the reporting limit in the method blanks? If yes, please	e see qualifications below.
Conc. units: '/.	Associated Samples: BU (>5x)	

Associated Samples. 200 (131)											
Analyte	Blank ID	Maximum ICB/CCB	Blank Action Limit				San	nple Identificati	on		
	PIS	105,005	Addid Lillin								
1. Lipih	0.0050		0,040	·							
			•								
					-						
				<u> </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 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	#: <u>18015D6</u>	VAL	DAHOI				WORKSHEET		Date: 1 + 1 0>		
	DG #: LT32 Level IZ \\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\										
Labo	ratory: Analytical Resources	<u>, Inc.</u>	•					,	Reviewer:		
								4	2nd Reviewer:		
MET	HOD: Percent Lipids (Bligh	& Dve	er) Total :	Solids (FP	A Method	160.	3)		•		
	, , ,	-									
	samples listed below were re	eview	ed for eac	ch of the fo	ollowing va	alidati	on areas. Validation fin	dings	are noted in attached		
valid	ation findings worksheets.			•							
					Ī						
	Validation A	rea				Comments					
I.	Technical holding times			Ą	Sampling d	ates:	9/5 -> 9/14	107			
lla	Initial calibration			A			,				
Ilb				Α							
111	Blanks			A							
īV		icates		7	704	, 1 7	~ P				
V		ioutoo		Δ	7	~		***			
VI				1 2	1-3						
				2 2							
VII											
VII											
IX.			·	27							
ШΧ	Field blanks			2	<u> </u>						
N = Not provided/applicable R = Rins				o compound: sate eld blank	s detected		D = Duplicate TB = Trip blank EB = Equipment blank				
Valida	ated Samples:										
	Αν.	$\frac{\tau}{1}$	: <u>; ;,</u>			Γ					
1	LDW-07-T3-M-ES-WB-comp1	11	LDW-07-T4	4-M-SF-WB-	comp3	21		31			
2	LDW-07-T3-M-ES-WB-comp2	12	LDW-07-T	3-M-ES-WB-	-comp3DUP	22		32			
3	LDW-07-T3-M-ES-WB-comp3	13	LDW-07-T	3-M-ES-WB-	-comp3TRP	23		33			
4	LDW-07-T3-M-ES-WB-comp4	14	PB	<u>.</u>		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 #: 18015 BC SDG #: LT 3 L

## VALIDATION FINDINGS WORKSHEET Sample Specific Analysis Reference

Page: of Page: Pag

All circled methods are applicable to each sample.

	Parameter
Sample ID	
1-11	PH TDS CI F NO3 NO2 SO4 PO4 ALK CN' NH3 TKN TOC CRO+ (T. 1. Salida) (1. Ligid)
	PH TDS CI F NO, NO, SO, PO, ALK CN' NH, TKN TOC CR"+
12-13	pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN NH <sub>3</sub> TKN TOC CR <sup>0+</sup> (المناباتاتاتاتاتاتاتاتاتاتاتاتاتاتاتاتاتاتا
	PH TDS CI F NO3 NO2 SO4 PO4 ALK CN' NH3 TKN TOC CRO+
	pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN' NH <sub>3</sub> TKN TOC CR <sup>6+</sup>
	PH TDS CI F NO3 NO2 SO4 PO4 ALK CN' NH3 TKN TOC CR8+
	pH TDS CI F NO3 NO2 SO4 PO4 ALK CN' NH3 TKN TOC CR8+
	pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN' NH <sub>3</sub> TKN TOC CR <sup>8+</sup>
	ph tds ci f No <sub>3</sub> No <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN NH <sub>3</sub> TKN TOC CR <sup>6+</sup>
	ph tds ci f no, no, so, po, alk cn nh, tkn toc cr +
·	ph tds ci f No <sub>3</sub> No <sub>2</sub> So <sub>4</sub> Po <sub>4</sub> Alk Cn' Nh <sub>3</sub> TKN TOC CR <sup>6+</sup>
	pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN' NH <sub>3</sub> TKN TOC CR <sup>6+</sup>
	pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN' NH <sub>3</sub> TKN TOC CR <sup>6+</sup>
	pH TDS CI F NO3 NO2 SO4 PO4 ALK CN' NH3 TKN TOC CR8+
	pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN NH <sub>3</sub> TKN TOC CR <sup>6+</sup>
	pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN NH <sub>3</sub> TKN TOC CR <sup>6+</sup>
	pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN' NH <sub>3</sub> TKN TOC CR <sup>8+</sup>
	PH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN NH <sub>3</sub> TKN TOC CR <sup>6+</sup>
	pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN' NH <sub>3</sub> TKN TOC CR <sup>6+</sup>
	pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN' NH <sub>3</sub> TKN TOC CR <sup>6+</sup>
	ph tds ci f NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN NH <sub>3</sub> TKN TOC CR <sup>6+</sup>
	ph tds ci f NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN' NH <sub>3</sub> TKN TOC CR <sup>6+</sup>
	ph tds ci f No, No, So, Po, Alk CN NH, TKN TOC CR°+
	ph tds cif No, No, So, Po, Alk Cn Nh, TKN toc CR°+
	ph TDS CI F NO, NO, SO, PO, ALK CN NH, TKN TOC CR8+

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

SDG	#: 18015E6 ** #: LT33 ratory: Analytical Resources		DATIO		LETENI .evel 174		WORKSHEET	2	Page: \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \
The	HOD: Percent Lipids (Bligh samples listed below were reation findings worksheets.							indings	are noted in attached
	Validation A	rea					Commen	ts	
T.	Technical holding times			A	Sampling d	ates:	9/4 -> 9/7	157	
lla				A					
IIb	Calibration verification			A					
111.	Blanks								
IV	Matrix Spike/Matrix Spike Dup	licates		2	7 0	<u>e 1</u>	[RP		
V	Duplicates			ASTOR	)				
VI	Laboratory control samples			7					
VII	. Sample result verification			N					
VII	. Overall assessment of data			A					
IX	Field duplicates			N					
L <sub>X</sub>	Field blanks		<u> </u>	<u> </u>					
N = Not provided/applicable R = Rin				o compound sate eld blank	s detected		D = Duplicate TB = Trip blank EB = Equipment blank		
Valida	ated Samples:	$\tau_{i}$	s;m						
1	LDW-07-T1-A-SS-WB-comp1	11	LDW-07-T	2-E-SS-WB-	comp1	21	P8	31	
2	LDW-07-T1-B-SS-WB-comp1	12	LDW-07-T	2-F-SS-WB-	comp1	22		32	
3	LDW-07-T1-C-SS-WB-comp1	13	LDW-07-T	3-A-SS-WB-	comp1	23		33	
4	LDW-07-T1-D-SS-WB-comp1	14	LDW-07-T	3-B-SS-WB-	comp1	24		34	
5	LDW-07-T1-E-SS-WB-comp1	15	LDW-07-T	3-C-SS-WB-	comp1	25		35	
6	LDW-07-T1-F-SS-WB-comp1	16	LDW-07-T	3-D-SS-WB-	comp1	26		36	
7	LDW-07-T2-A-SS-WB-comp1	17	LDW-07-T	3-E-SS-WB-	comp1	27		37	
8	LDW-07-T2-B-SS-WB-comp1	18	LDW-07-T	3-F-SS-WB-	comp1	28		38	
9	LDW-07-T2-C-SS-WB-comp1	19	LDW-07-T	3-D-SS-WB-	comp1DUP	29		39	· · · · · · · · · · · · · · · · · · ·
10	LDW-07-T2-D-SS-WB-comp1	20	LDW-07-T	3-D-SS-WB-	comp1TRP	30		40	

LDC #: 18015EL SDG #: LT33

## VALIDATION FINDINGS WORKSHEET Sample Specific Analysis Reference

Page:_	of	1
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	V	

All circled methods are applicable to each sample.

Sample ID
PH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN NH <sub>3</sub> TKN TOC CR <sup>6+</sup>
PH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN' NH <sub>3</sub> TKN TOC CR <sup>8+</sup>
ph TDS CI F NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR6+         ph TDS CI F NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR6+         ph TDS CI F NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR6+         ph TDS CI F NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR6+         ph TDS CI F NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR6+         ph TDS CI F NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR6+         ph TDS CI F NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR6+         ph TDS CI F NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR6+         ph TDS CI F NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR6+         ph TDS CI F NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR6+         ph TDS CI F NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR6+         ph TDS CI F NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR6+
ph TDS CI F NO3 NO2 SO4 PO4 ALK CN' NH3 TKN TOC CR8+         ph TDS CI F NO3 NO2 SO4 PO4 ALK CN' NH3 TKN TOC CR8+         ph TDS CI F NO3 NO2 SO4 PO4 ALK CN' NH3 TKN TOC CR8+         ph TDS CI F NO3 NO2 SO4 PO4 ALK CN' NH3 TKN TOC CR8+         ph TDS CI F NO3 NO2 SO4 PO4 ALK CN' NH3 TKN TOC CR8+         ph TDS CI F NO3 NO2 SO4 PO4 ALK CN' NH3 TKN TOC CR8+         ph TDS CI F NO3 NO2 SO4 PO4 ALK CN' NH3 TKN TOC CR8+         ph TDS CI F NO3 NO2 SO4 PO4 ALK CN' NH3 TKN TOC CR8+         ph TDS CI F NO3 NO2 SO4 PO4 ALK CN' NH3 TKN TOC CR8+
ph tds ci f No3 No2 SO4 PO4 ALK CN NH3 TKN TOC CR8+         ph tds ci f No3 No2 SO4 PO4 ALK CN NH3 TKN TOC CR8+         ph tds ci f No3 No2 SO4 PO4 ALK CN NH3 TKN TOC CR8+         ph tds ci f No3 No2 SO4 PO4 ALK CN NH3 TKN TOC CR8+         ph tds ci f No3 No2 SO4 PO4 ALK CN NH3 TKN TOC CR8+         ph tds ci f No3 No2 SO4 PO4 ALK CN NH3 TKN TOC CR8+         ph tds ci f No3 No2 SO4 PO4 ALK CN NH3 TKN TOC CR8+         ph tds ci f No3 No2 SO4 PO4 ALK CN NH3 TKN TOC CR8+         ph tds ci f No3 No2 SO4 PO4 ALK CN NH3 TKN TOC CR8+
ph TDS CI F NO3 NO2 SO4 PO4 ALK CN' NH3 TKN TOC CR8+         ph TDS CI F NO3 NO2 SO4 PO4 ALK CN' NH3 TKN TOC CR8+         ph TDS CI F NO3 NO2 SO4 PO4 ALK CN' NH3 TKN TOC CR8+         ph TDS CI F NO3 NO2 SO4 PO4 ALK CN' NH3 TKN TOC CR8+         ph TDS CI F NO3 NO2 SO4 PO4 ALK CN' NH3 TKN TOC CR8+         ph TDS CI F NO3 NO2 SO4 PO4 ALK CN' NH3 TKN TOC CR8+         ph TDS CI F NO3 NO2 SO4 PO4 ALK CN' NH3 TKN TOC CR8+
ph TDS CI F NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR8+
ph TDS CI F NO3 NO2 SO4 PO4 ALK CN' NH3 TKN TOC CR8+
ph TDS CI F NO3 NO2 SO4 PO4 ALK CN' NH3 TKN TOC CR8+
ph tds ci f no <sub>3</sub> no <sub>2</sub> so <sub>4</sub> po <sub>4</sub> alk cn nh <sub>3</sub> tkn toc cr <sup>6+</sup>
ph tds ci f no <sub>3</sub> no <sub>2</sub> so <sub>4</sub> po <sub>4</sub> alk cn nh <sub>3</sub> tkn toc cr <sup>6+</sup>
PH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN NH <sub>3</sub> TKN TOC CR <sup>6+</sup>
pH TDS CI F NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR6+
ph tds ci f no3 no2 so4 po4 alk cn nh3 tkn toc cr8+
ph TDS CI F NO, NO, SO, PO, ALK CN NH, TKN TOC CR
ph tds ci f no, no, so, po, alk cn nh, tkn toc cr.
ph tds ci f no <sub>3</sub> no <sub>2</sub> so <sub>4</sub> po <sub>4</sub> alk cn nh <sub>3</sub> tkn toc cr <sup>6+</sup>
ph tds ci f No3 No2 SO4 PO4 ALK CN NH3 TKN TOC CR6+
ph tds ci f NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN NH <sub>3</sub> TKN TOC CR <sup>6+</sup>
PH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN NH <sub>3</sub> TKN TOC CR <sup>6+</sup>
ph tds ci f No <sub>3</sub> No <sub>2</sub> So <sub>4</sub> Po <sub>4</sub> Alk Cn Nh <sub>3</sub> Tkn toc CR <sup>8+</sup>
ph tds ci f No <sub>3</sub> No <sub>2</sub> So <sub>4</sub> Po <sub>4</sub> Alk cn Nh <sub>3</sub> TKN toc cr <sup>6+</sup>
ph tds ci f No <sub>3</sub> No <sub>2</sub> So <sub>4</sub> Po <sub>4</sub> Alk Cn Nh <sub>3</sub> Tkn toc Cr <sup>6+</sup>
ph tds ci f No <sub>3</sub> No <sub>2</sub> So <sub>4</sub> Po <sub>4</sub> Alk Cn Nh <sub>3</sub> TKN toc CR <sup>8+</sup>
pH TDS CI F NO, NO, SO, PO, ALK CN' NH, TKN TOC CR8+

Comments:_	
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## 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

SDG	#:_18015F6V #:LT34 ratory:_Analytical Resources		DATIO		PLETEN Level 14		WORKSHEET		Date: 1/2/0 Page: 1 of 1 Reviewer: 44 2nd Reviewer:
METI	HOD: Percent Lipids (Bligh 8	& Dye	er), Total	Solids (El	PA Method	160	.3)		
	amples listed below were re ation findings worksheets.	view	ed for ead	ch of the f	ollowing v	alidat	ion areas. Validatio	n finding	s are noted in attache
	Validation Ar	ea					Comm	ents	
I,	Technical holding times			Α	Sampling of	lates:	915/07		
lla.	Initial calibration			A					
IIb.	Calibration verification			A					
111.	Blanks			A					
IV	Matrix Spike/Matrix Spike Dupli	cates		2	7 >	. 1 -	CRP		
V	Duplicates			A	) )				
VI.	Laboratory control samples			2					
VII.	Sample result verification			N					
VIII.	Overall assessment of data			A					
IX.	Field duplicates			2					
Lx	Field blanks		<u>~</u>						
Note:	A = Acceptable N = Not provided/applicable SW = See worksheet		R = Rins	o compound sate eld blank	is detected		D = Duplicate TB = Trip blank EB = Equipment blan	ık	•
Valida	ted Samples:	Ţ;	15 m						
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	8 E	17				27		37	
8		18				28		38	
9		19				29		39	
10		20				30		40	

Notes:

LDC #: 180 12FC SDG #: LT 34

## VALIDATION FINDINGS WORKSHEET Sample Specific Analysis Reference

Page:_	1 of 1
Reviewer:_	<u>el</u>
2nd reviewer:_	

All circled methods are applicable to each sample.

Sample ID	Parameter
1-4	PH TDS CI F NO3 NO2 SO4 PO4 ALK CN' NH3 TKN TOC CRO+ (Tot. Solid) (LLigit)
1 7	ph tos ci f No <sub>3</sub> No <sub>2</sub> So <sub>4</sub> Po <sub>4</sub> Alk CN NH <sub>3</sub> TKN TOC CR <sup>6+</sup>
	pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN NH <sub>3</sub> TKN TOC CR <sup>6+</sup> (1. Lipida)
5-6	pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN NH <sub>3</sub> TKN TOC CR°+
	pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN' NH <sub>3</sub> TKN TOC CR <sup>6+</sup>
	pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN NH <sub>3</sub> TKN TOC CR <sup>6+</sup>
	pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN NH <sub>3</sub> TKN TOC CR <sup>8+</sup>
	pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN' NH <sub>3</sub> TKN TOC CR <sup>8+</sup>
	pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN NH <sub>3</sub> TKN TOC CR <sup>6+</sup>
	ph tds ci f no <sub>3</sub> no <sub>2</sub> so <sub>4</sub> po <sub>4</sub> alk cn nh <sub>3</sub> tkn toc ch <sup>5+</sup>
	ph tds ci f No <sub>3</sub> No <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN NH <sub>3</sub> TKN TOC CR <sup>6+</sup>
	pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN NH <sub>3</sub> TKN TOC CR <sup>6+</sup>
	pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN' NH <sub>3</sub> TKN TOC CR <sup>8+</sup>
	ph tds ci f No <sub>3</sub> No <sub>2</sub> So <sub>4</sub> Po <sub>4</sub> Alk CN' NH <sub>3</sub> TKN TOC CR <sup>6+</sup>
	PH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN' NH <sub>3</sub> TKN TOC CR <sup>6+</sup>
	PH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN' NH <sub>3</sub> TKN TOC CR®+
	PH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN' NH <sub>3</sub> TKN TOC CR <sup>5+</sup>
	PH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN NH <sub>3</sub> TKN TOC CR <sup>6+</sup>
	PH TDS CI F NO3 NO2 SO4 PO4 ALK CN' NH3 TKN TOC CRO+
	PH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN' NH <sub>3</sub> TKN TOC CR <sup>6+</sup>
	ph tds ci f no₃ no₂ so₄ po₄ alk cn nh₃ tkn toc cr°+
	PH TDS CI F NO3 NO2 SO4 PO4 ALK CN' NH3 TKN TOC CR6+
	pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN' NH <sub>3</sub> TKN TOC CR <sup>6+</sup>
	pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN NH <sub>3</sub> TKN TOC CR <sup>6+</sup>
	pH TDS CI F NO, NO, SO, PO, ALK CN' NH, TKN TOC CR6+

Comments:	54



## 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

August 13, 2008

ATTN: Ms. Marina Mitchell

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/ Polychlorinated Biphenyls as Congeners WG24520

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

## 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.
  - 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.
  - 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).

#### \*Ill. 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:

<sup>\*</sup>Changed text.

Method Blank ID	Extraction Date	Compound	Concentration	Associated Samples
WG24520-101	2/14/08	PCB-11 PCB-18/30 PCB-20/28 PCB-31 PCB-32 PCB-37 PCB-40 PCB-44/47/65 PCB-49/69 PCB-52 PCB-56 PCB-66 PCB-85/116/117 PCB-86/87/97/108/119/125 PCB-105 PCB-110/115 PCB-112 PCB-118 PCB-122 PCB-118 PCB-129/138/160/163 PCB-141/149 PCB-153/168 PCB-177 PCB-179 PCB-183/185 PCB-179 PCB-183/185 PCB-187 PCB-198/199 Total Di-CBs Total Tetra-CBs Total Hexa-CBs Total Hexa-CBs Total Hepta-CBs Total Octa-CBs	5.23 ng/Kg 4.29 ng/Kg 4.29 ng/Kg 2.67 ng/Kg 1.16 ng/Kg 2.95 ng/Kg 2.98 ng/Kg 5.81 ng/Kg 3.86 ng/Kg 8.46 ng/Kg 1.49 ng/Kg 1.49 ng/Kg 1.72 ng/Kg 4.48 ng/Kg 1.91 ng/Kg 6.691 ng/Kg 7.88 ng/Kg 1.51 ng/Kg 2.60 ng/Kg 1.52 ng/Kg 3.37 ng/Kg 3.87 ng/Kg 3.87 ng/Kg 5.94 ng/Kg 5.94 ng/Kg 5.94 ng/Kg 5.94 ng/Kg 5.94 ng/Kg	All samples in SDG DPWG25031/WG24520
WG24520-101i	2/14/08	PCB-81 PCB-126 PCB-169	0.701 ng/Kg 0.549 ng/Kg 0.401 ng/Kg	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

<sup>\*</sup>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

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	<sup>13</sup> C-PCB-1 <sup>13</sup> C-PCB-3 <sup>13</sup> C-PCB-4	14.1 (25-150) 17.3 (25-150) 21.4 (25-150) PCB-2 PCB-3 PCB-4 PCB-5 PCB-6 PCB-7 PCB-8 PCB-9 PCB-10 PCB-11 PCB-12 PCB-12 PCB-13 PCB-14 Total mono-CBs Total di-CBs		J (all detects) UJ (all non-detects)	Р
LDW-07-T1-M-DC-EM-COMP1	<sup>13</sup> C-PCB-1 <sup>13</sup> C-PCB-3 <sup>13</sup> C-PCB-4 <sup>13</sup> C-PCB-19 <sup>13</sup> 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	<sup>13</sup> C-PCB-1 <sup>13</sup> C-PCB-3 <sup>13</sup> C-PCB-4 <sup>13</sup> C-PCB-15 <sup>13</sup> C-PCB-19 <sup>13</sup> C-PCB-54 <sup>13</sup> 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 penta-CBs	J (all detects) UJ (all non-detects)	Р
LDW-07-T2-M-SC-EM-COMP1	<sup>13</sup> C-PCB-1 <sup>13</sup> C-PCB-3 <sup>13</sup> 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)	Р
LDW-07-T2-M-SC-EM-COMP1DUP	<sup>13</sup> C-PCB-3 14.6 (25-150) PCB-20 thru PCB-36		PCB-79 PCB-80 Total mono-CBs Total di-CBs Total tri-CBs	J (all detects) UJ (all non-detects)	Р

Sample	Internal Standard	%R (Limits)	Compound	Flag	A or P
LDW-07-T1-M-DC-HP-COMP1	<sup>13</sup> 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	<sup>13</sup> 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	<sup>13</sup> 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-13 PCB-14 PCB-15 Total di-CBs	J (all detects) UJ (all non-detects)	ρ
LDW-07-T3-M-ES-WB-COMP4	<sup>13</sup> C-PCB-4 <sup>13</sup> C-PCB-15 <sup>13</sup> 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)	Р
LDW-07-T1-8-SS-WB-COMP1	<sup>13</sup> 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-13 PCB-14 PCB-15 Total di-CBs	J (all detects) UJ (all non-detects)	Р

Sample	Internal Standard	%R (Limits)	Compound	Flag	A or P
LDW-07-T2-E-SS-WB-COMP1	<sup>13</sup> C-PCB-4 <sup>13</sup> C-PCB-15 <sup>12</sup> C-PCB-19 <sup>13</sup> 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)	Ρ
LDW-07-T3-F-SS-WB-COMP1	<sup>13</sup> C-PCB-4 <sup>13</sup> 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-13 PCB-14 PCB-15 Total di-CBs	J (all detects) UJ (all non-detects)	Р

## 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	А

## 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	AorP	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)	Р	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)	Р	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-C8s	J (all detects) UJ (all non-detects)	Р	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-13 PCB-14 PCB-15 Total di-CBs	J (all detects) UJ (all non-detects)	Р	Internal standards (%R)

SDG DPWG25031/ WG24520	Sample  LDW-07-T2-M-SC-EM-COMP1DUP	Compound  PCB-1 thru PCB-18 PCB-20 thru PCB-36 PCB-38 thru PCB-76 PCB-78 PCB-80 Total mono-CBs Total di-CBs Total tri-CBs Total tetra-CBs	Flag  J (all detects)  UJ (all non-detects)	P P	Reason 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)	Р	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	ਤੇ (all detects) UJ (all non-detects)	Р	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-14 PCB-15 Total di-CBs	J (all detects) UJ (all non-detects)	Р	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-E3-WB-COMP5 LDW-07-T2-A-ES-WB-COMP4 LDW-07-T3-M-E3-WB-COMP4 LDW-07-T18-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	А	Compound quantitation and CRQLs

Lower Duwamish Waterway Group Polychlorinated Biphenyls - Laboratory Blank Data Qualification Summary - SDG DPWG25031/WG24520

## Revision 1

SDG	Sample	Compound	Modified Final Concentration	A or P
DPWG25031/WG24520	LDW-07-T1-M-DC-EM-COMP1	PCB-11	6.25U ng/Kg	А
DPWG25031/WG24520	LDW-07-T3-M-DC-EM-COMP3	PCB-11	9.53U ng/Kg	А
DPWG25031/WG24520	LDW-07-T2-M-SC-EM-COMP1	PCB-11	3.66U ng/Kg	А
DPWG25031/WG24520	LDW-07-T2-M-SC-EM-COMP1DUP	PCB-11	3.42U ng/Kg	Α
DPWG25031/WG24520	LDW-07-T1-M-DC-HP-COMP1	PCB-11	24.5U ng/Kg	А

SDG	#:18590A3VALIDATION #:DPWG25031/WG24520 ratory: AXYS Analytical Services, Ltd.		<b>PLETEN</b> Level IV	ESS	S WORKSHEET		Date: 4/2/08 Page:/of /_ Reviewer:
METI	HOD: HRGC/HRMS Polychlorinated Bip	henyl Cona	eners (EP.	A Me	ethod 1668A)	2n	d Reviewer:
valida	samples listed below were reviewed for e ation findings worksheets.	each of the	following v	alida	tion areas. Validatio	n findings a	re noted in attached
	Validation Area				Comm	ents	
l.	Technical holding times	A	Sampling of	lates:	9/4 - 7/0	7	
II.	GC/MS Instrument performance check	4			7		
111,	Initial calibration	4	20%	•			
IV.	Routine calibration	A	30/4	<del>.</del> 07	0. (unt/2	)	
V.	Blanks	W	,				
VI.	Matrix spike/Matrix spike duplicates	N/A					
VII.	Laboratory control samples	<b>A</b>	OPR	/	CRM		
VIII.	Regional quality assurance and quality control	N					
IX.	Internal standards	IN					
X.	Target compound identifications	<b>A</b>					
XI.	Compound quantitation and CRQLs	W					
XII.	System performance						
XIII.	Overall assessment of data	w					
XIV.	Field duplicates						
XV.	Field blanks						
Note:	N = Not provided/applicable R = Ri SW = See worksheet FB = F	No compound insate Field blank	s detected		D = Duplicate TB = Trip blank EB = Equipment blank	<	
Validate	ed Samples: Tis≤ulS						
1 /	LDW-07-T1-M-DC-EM-COMP1 11 LDW-07-T	2-M-SC-EM-C	OMP1DUP	21	WF24520-	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 2	LDW-07-T1-M-DC-HP-COMP1 14			24		24	

1	LDW-07-T1-M-DC-EM-COMP1	11	LDW-07-T2-M-SC-EM-COMP1DUP	21	WF24520-10	31	
2 /	LDW-07-T3-M-DC-EM-COMP3	12		22		32	
3 /	LDW-07-T2-M-SC-EM-COMP1	13		23		33	
4 7	LDW-07-T1-M-DC-HP-COMP1.	<b>~14</b>		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	
В	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 #: 1859043 SDG #: 500 COVEY

## **VALIDATION FINDINGS CHECKLIST**

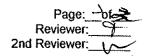
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Method: HRGC/HRMS Polychlorinated Biphenyls (EPA Method 1668)

WIELIOG: HRGC/HRMS Polychionnated Bipnenyls (EPA Me	T	r –	T	T .
Validation Area	Yes	No	<u>NA</u>	Findings/Comments
All technical holding times were met.	T-		Ī	1
Cooler temperature criteria was met.	1	1		
II. GC/MS instrument performance check	1		1	1
Was PFK exact mass 380.9760 verified?	Τ –		T	I -
Were the retention time windows established for all homologues?	+		<del>                                     </del>	
Is the static resolving power at least 10,000 (10% valley definition)?	1		-	
		<b>/</b>	<del> </del>	
Was the mass resolution adequately check with PFK?  III, Initial calibration	1/		<u> </u>	I
	Τ	Ι	Ι	T
Was the initial calibration performed at 5 concentration levels?	<del>                                     </del>			
Were all percent relative standard deviations (%RSD) ≤ 25% for unlabeled standards and < 30% for labeled standards?		~		
Did all calibration standards meet the Ion Abundance Ratio criteria?	7			
Was the signal to noise ratio for each target compound > 2.5 and for each recovery and internal standard > 10?	7			
fV. Continuing calibration				I
Was a routine calibration performed at the beginning of each 12 hour period?				
Were all percent differences (%D) < 48% 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 Rc)
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?				
VII. Laboratory control samples	1	1	1	
Was an LCS analyzed for this SDG?				
Was an LCS analyzed per extraction batch?	7			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the	7			

LDC#: 1859043 SDG#: See COUN

## **VALIDATION FINDINGS CHECKLIST**



Validation Area	Yes	No	NA	Findings/Comments
VIII. Regional Quality Assurance and Quality Control			1	1g
Were performance evaluation (PE) samples performed?				
Were the performance evaluation (PE) samples within the acceptance limits?				
IX: Internal standards	<b>—</b>	يرسا	,	<del>,</del>
Were internal standard recoveries within the 25-150% criteria?	<del>       </del>	_	_	
Was the minimum S/N ratio of all internal standard peaks > 10?				
X Target compound identification	<del>T</del>	T	1	T
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?			<u></u>	
Was the Ion Abundance Ratio for the two quantitation ions within criteria?	<u> </u>			
Was the signal to noise ratio for each target compound and labeled standard > 2.5?	1			
Does the maximum intensity of each specified characteristic ion coincide within ± 2 seconds (includes labeled standards)?	/			
Was an acceptable lock mass recorded and monitored?	<u> </u>			
XI. Compound quantitation/CRQLs	<del></del>		r	
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 performence				
System performance was found to be acceptable.	7			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	7			
XIV Field duplicates	<u>· · · · · · · · · · · · · · · · · · · </u>	1		
Field duplicate pairs were identified in this SDG.				
Target compounds were detected in the field duplicates.				
XV. Fleid blanks			•	
Field blanks were identified in this SDG.			Ţ	,
Target compounds were detected in the field blanks.			7	

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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". M'N NA

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? YN N/A

Was method blank contamination less < CRQL for all target compounds?

Blank extraction date: - 14/.8 Blank analysis date: 3/28/.8 Associated samples: M Conc. units: ix

Compound	Blank ID				s	ample Identific	ation			
14	24520401		2	3		4	Ð			
FOB II	5:23	6.25/ U	9.53VI	3.66/U	3.43 y	245/1				
18/30	4.29	>5×	> 5	> 5	> 5	> 5				
20/28	4.35	+	1	1	,	_ < < _				
3	2.67	_								
32	1.16	_						<del>                                     </del>		
37	2.95									
40	2.98	+					<u>.</u>			
14/11/65	දුපි/	_								
49/69	3.86	-							<u> </u>	
52	8.46	-							<u> </u>	<del> </del>
56	1.38	_								<del> </del>
64	1.49	-					<del>-</del>			
66	3.60	1								
85/116/11T	1.72									
86/81/97/08/19/25	4.48									
105	191							<u> </u>		
/110/15	846					-   ,				
112	0.691	1				<del>- /  </del>				

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 #:	8590A3
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	Reviewer:	9_
2nd	Reviewer:	

METHOD: HRGC/HRMS Polychlorinated Biphenyls (EPA Method 1668)

Please see	qualifications	below for all	diestions answered #	SEE AL.A	<b>4</b> 2		
Y N N/A	Were all	samples ass	I questions answered "t	A. NOI	applicable question	s are identified	as "N/A".

Were all samples associated with a method blank? Y N NA

Was a method blank performed for each matrix and whenever a sample extraction was performed?

Was method blank contamination less < CRQL for all target compounds?

Blank analysis date: 3/28.8 Blank extraction date: 14/8
Conc. units: W

Compound							All (	
	Blank ID			Sample Identif	ication			27 <u> </u>
<b>P</b> ()	24520401				7		<del></del>	
atackno. Biphe	ws 5.94				+			
7		<del></del>				,		
								<del></del>
····				***************************************				
		<del> </del>	<del> </del>	<del>- </del>				
						<del></del>		
			1					
						-		
<del></del>	<del></del>							<del> </del>
······································					<del>                                     </del>	<del> </del>	<del> </del>	+
				<del> </del>	<del>- </del>	<del> </del>		
		 		<del>                                     </del>		<u> </u>		
	<u> </u>							<del></del>
							<del> </del>	<del> </del>
· · · · · · · · · · · · · · · · · · ·			·	<del></del>	<del> </del>	ļ	· <del> </del>	<u> </u>
		<del></del>			1 .	l	1	

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 #: 185	7°\$3
SDG #500	

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	Reviewer:	9
?nd	Reviewer:	6.0

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".

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 analysis date: 3/28.8 Blank extraction date: - 14/.8 Associated samples: W Conc. units: NO

			/				•	· <del></del>		
Compound	Blank ID					Sample identifi	cation			
#V	12452040	//						T		
POB 118	7.88							+	<del></del>	
138/60/16	3 (5.)				<del></del>					
41	2.60					<u> </u>				
146	1.82		<del></del>	·		-				
47/49	6.76	<u> </u>	<del> </del>							
153/168	13.0	<b> </b>								
174	4.52	<u> </u>								
177	3.37	<b> </b>								
179	2.28	<u> </u>			<u> </u>					
			<u> </u>	<u> </u>						1
183/185	3.87									
/187	7.77								<u> </u>	1
198/199	5.94							<u> </u>	<u> </u>	
Total Dickero Biphe	m/s 5.3						<del> </del>	<del> </del>	<u> </u>	
Trickero Bithony	15.4				<del>                                     </del>				<u> </u>	
Tehradyno	28.3				<del> </del> -	<u> </u>	<del> </del>			
Blacker	25.7									
Hoxalino		39.7								
L Hestachino	2.8									
CIRCLED REGILIETO LICENTA	ا <del>سب السبب المسادة السادة السادة المسادة المسادة المسادة المسادة المسادة المسادة المسادة المسادة المسادة المسادة</del>		<u> </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".

C:\WPDOCS\WRK\PCB\BLANKS.166

LDC #: 185	7°A3
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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".

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? YN N/A

Was method blank contamination less < CRQL for all target compounds? Blank extraction date: -/4/.8

Blank analysis date: 3/-8/8 Associated samples: Conc. units: N

Compound	Blank ID					Sampie Identifi	Cation			
. Kie	10-10-62	Ĩ		T T	T	- maple resident	T			
PB81	0.701				<del>†                                      </del>		<del></del>			
V 126	0.519		<del></del>	<u> </u>		<del> </del>				
PCB169	0.401		<del></del>	<u> </u>		<u> </u>				
1-3/1-3	1		· · · · · · · · · · · · · · · · · · ·							
			<del> </del>			<u> </u>				
			······································						<u> </u>	
			***					<del> </del>	<u> </u>	<del> </del>
									<del></del>	<del> </del>
						<del></del>			<u> </u>	
						<u> </u>				
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									<u> </u>	<u> </u>
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						· · · · · · · · · · · · · · · · · · ·				

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 #: 185943 SDG #: 20000

### VALIDATION FINDINGS WORKSHEET Internal Standards

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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".

YNN/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  $\geq 10$ ?

		1					
#	Date	Lab ID/Reference	Internal Standard		% Recovery (Limit: 25-15	10%)	Qualifications
		WF24520-101	13a-pcp 1	14.	1 (25	-(SU)	1/41/P(PCB 1-14
			3	17	<b>3</b> . (	)	Total Mone-CBS VDi-CBs)
				٤. ا	4 (	<i>(</i> )	LDI-CB.
					(	)	/
		(	BC-DOB1	a.6	ر ح	)	(POB1-14.16-30) POB35-76,78-80 Total Mono, DI, Tañ, Fetra-CBs
			3			)	PUR34-76 78-80
			4	13.5	. (	)	Total Have Di
			19	٠. [حد	Š (	)	To Fetra - CB-
			52	⇒3.	7 (	)	LA PETA-CEPS
					(	)	
		3	BC-PCB1	8.0	6 (	)	(INR 1-36 38-76
			3	10.	1 (	)	(70B1-3638-76 78-80.82-103.
			1 2	11.9	<del>,</del> (	)	106-113.115-117
			15	21.9	(	)	106-113.115-117
			19	20.	(	)	Total Mono, Di,
			5-4	23.8	' (	)	The Total and
			1-26	24.0		)	Tin Totra and Penta-CBs,
					(	)	(6:000 000 )
		め	(300		(	)	
					(	)	
		Internal Standards	Check Standard Use	od	Internal	Standards	Check Standard Used
Α.	<sup>13</sup> C-3,3′,4,4′-T∈			К.	<sup>13</sup> C-2,4,4'-TriCB		
В.	<sup>13</sup> C-2,3',4,4',5-	PentaCB		L			
C, D.	<sup>13</sup> C-3,3',4,4',5- <sup>13</sup> C-3,3',4,4',5,			M.			
υ. Ε.	C-3,3 ,4,4 ,5,			N. O.			
F.	<sup>13</sup> C-2,2',3,3',4,4			P.			
G.	13C-DCB			Q.			
Н.	<sup>13</sup> C-4-CB			R.			

LDC #: 18590 A3 SDG #: See COVEN

## VALIDATION FINDINGS WORKSHEET Internal Standards

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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".

Are all internal standard recoveries were within the 25-150% criteria?

Y N N/A Was the S/N ratio all internal standard peaks  $\geq$  10?

#	Date	Lab ID/Reference	Internal Standard		% Recovery (Limit: 25-15		Qualifications
		3	13e-peB1	is	2 (25	-150 1 V	M/P(PCBLIA.
			3	15	.T (	1 )	7-L 0 11/2 - B
			V A	18	6 (	,	Total Mono - Ba Di-CBs
					(	† <u> </u>	<u> </u>
		11	13C-POB 1	13.9	5 (	<u> </u>	(FOB 1-18.20-3. POB 38-76 78-80 Total Move, Di Tw., Tota-CBs
			3	14.0	(		DAR 38-7/ -9 9
			4	18.4	7 1	<del>                                     </del>	T0330-16 18-80
			, 5				Total Mono, Di
			54	23.	<del>/,                                     </del>		Tu, lotra-CBc
				I AT	-/	, ,	/
		4	12		3	, ,	
1			18c-Pe3 15	-3.4	7	)	(POB 5-15.
		5	IZ C b c Z l c c		(	)	total Di-CB=
-		<u>5</u>	13C-POB 15	20 6	2 (	)	
$\dashv$				3	(	)	
+		6	13C-POB 15	2000	3.9 (	)	
4					(	)	4
$\dashv$			13c-P0B4	2.2		)	(POB-5-15, 82-113
$\dashv$			1 15	<u> </u>	<u> </u>	)	12B106-113.115-117
-			V 104	ಎ3.		)	V POB 119-122 121-125
					(	)	1 POB 119-122, 124-125 127, Total Di, Pouta-C
		Internal Standards	Check Standard Used	1	Internal S	Standards	Check Standard Used
<u>.                                    </u>	<sup>13</sup> C-3,3',4,4'-Tetr			К.	<sup>13</sup> C-2,4,4'-TriCB		
	<sup>13</sup> C-2,3',4,4',5-Pe			L.			
	<sup>13</sup> C-3,3',4,4',5-P <sub>6</sub> <sup>13</sup> C-3,3',4,4',5,5'			M.			
	<sup>13</sup> C-2,2',3,4,4',5.			N. O.		<del> </del>	
	13C-2,2',3,3',4,4',	5,5'-OCB		P. P.			
_	<sup>13</sup> C-DCB			Q.			
. 1	13C-4-CB		1	R.			

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### VALIDATION FINDINGS WORKSHEET Internal Standards

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Reviewer: 2nd Reviewer: 2

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".

XIN N/A Are all internal standard recoveries were within the 25-150% criteria?

Y)N N	<u>/A</u> Was the	S/N ratio all	internal	standard	peaks > 10?	,
-------	-------------------	---------------	----------	----------	-------------	---

#	Date	Lab ID/Reference	Internal Standard		% Recovery (	(Limit: 25-150	%)		Qualifications
		8	BC-PEB 15	-3.	\$	(25-	(52)	VWV	/P/1085-15
		70				(	)	11	P(70B5-15
		9	13c-7c34	<u>  ~   . :</u>	<u> </u>	(	)		
			15	19.0	2	(	)	(-	DOBA-36. 38-39.
			. 19	64	124.1	{	)	P	13 128-155.158-16
		·	155	18	,0	(	)	D	013168
						(	)	1	03,68. Hal Di; Twi, Hoxa-es POB 4-15 Hal Di-013=)
			13e- par 4	18.3		(	)	1	DOB 4-15
			15	18.3	>	(	)	Į į	Hal Di-OBs)
						(	)		
						(	)		
						(	)		
$\dashv$						(	)		
						(	)		
						(	)		
_						(	)		
						(	)		
$\dashv$						(	)		
$\dashv$					· · · · · · · · · · · · · · · · · · ·	(	)	· <del></del>	
						(	)		
		Internal Standards	Check Standard Used			Internal St	andards		Check Standard Used
Α.	<sup>13</sup> C-3,3',4,4'-Tet	raCB		K.	<sup>13</sup> C-2,4,4'-TriC	В			
B. C.	<sup>13</sup> C-2,3',4,4',5-P <sup>13</sup> C-3,3',4,4',5-P				<b> </b>				
D.	<sup>13</sup> C-3,3',4,4',5,5'			M. N.	-				
Ε.	<sup>13</sup> C-2,2',3,4,4',5,			O.					
F. G.	<sup>13</sup> C-2,2',3,3',4,4' <sup>19</sup> C-DCB	,5,5'-OCB		Р.					
<del>С.</del> Н.	<sup>13</sup> C-4-CB -			Q. R.	<b> </b>				
1	<sup>13</sup> C-4 4'-DCB			T 7	<b> </b>				

LDC #:18590A3 SDG #:500 CONN

## VALIDATION FINDINGS WORKSHEET Compound Quantitation and Reported CRQLs

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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 Y N N/A Were the correct internal standard (IS), quantitation ions and relative response factors (RRF) used to quantitate the compound? Compound quantitation and CRQLs were adjusted to reflect all sample dilutions and dry weight factors (if necessary).

#	Date	Sample ID	Finding	Associated Samples	Qualifications
		<b>A</b> 11	k flag	al	И

Comments:	See sample calculation verification worksheet for recalculations	

## **VALIDATION FINDINGS WORKSHEET Overall Assessment of Data**

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	Reviewer:	
2nd	Reviewer:	$-\iota \sim$

POB S METHOD: HRGC/HRMS Dioxins/Dibenzofurans (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 leaka	ge from the sample	4	Tex +
_		sample extract we	it dry during concen	tration after	
			ean-up procedure +	1	Text
		after biobead cold	ent dry during con	centration esilica	
		dean-up procedu	mes.	2	
-		tample was spilled	Capproxivately a d	COPS ) 10	
1					
$\perp$					
+					

Comments;	
<del></del>	

#### **VALIDATION FINDINGS WORKSHEET** Initial Calibration Calculation Verification

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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:

 $RRF = (A_{\bullet})(C_{\bullet})/(A_{\bullet})(C_{\bullet})$ 

average RRF = sum of the RRFs/number of standards

%RSD = 100 \* (S/X)

 $A_x$  = Area of compound,

A<sub>a</sub> = Area of associated internal standard

C<sub>x</sub> = Concentration of compound,

C = Concentration of internal standard

S = Standard deviation of the RRFs, X = Mean of the RRFs

				Reported	Recalculated	Reported	Recalculated	Reported	Recalculated
#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Average RRF (initial)	Average RRF (initial)	RRF ( CS3std)	RRF ( ← ら→td)	%RSD	%RSD
1	10/1	7-6/.8	PCB-77 ( <sup>13</sup> C-PCB-77)	1.00	100	1.03	1.03	301	3.03
<u> </u>		7-0/0	PCB-105 (12C-PCB-105)	094	o.at	097	097	3.76	3.77
		,	PCB-156 ( <sup>13</sup> C-PCB-156)	0.95	0.95	1.01	1.01	3,67	3.96
			PCB-1807 ( <sup>II</sup> C-PCB-180)	091	0.9	0.96	0.90	285	2.98
2	ICAL	4/8/08	13c FOR8		1.13	1.15	1.15	3.56	3,56
			PCB-105 ("CPCB-105) - CPS/H / BC-+OBP	1-10	1.10	1.09	1.09	5,37	6-33
		/	PCB-156 (1°C-PCB-156) PCB-169 ( 1/169	1.08	1.08	109	1.001	415	4.19
			PCE 180 (*O-PCB-180)				/		
3			PCB-77 ( <sup>19</sup> C-PCB-77)						
			PCB-105 ( <sup>13</sup> C-PCB-105)						
			PCB-156 ( <sup>13</sup> C-PCB-156)						
			PCB-180 ( <sup>18</sup> C-PCB-180)						

Comments:	Refer to Initial Calibration findings worksheet for list of qualifications and associated samp	ales when reported i	roculte do not naroc	unithin to oc	ما الأمارة ما الأمارة
recalculated	results.	vice when reported	results do not agree	WIGHT 10.07	6 DI INE
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### **VALIDATION FINDINGS WORKSHEET Routine Calibration Results Verification**

	Page:_	
	Reviewer:	9
2nd	Reviewer:	

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

Where: ave. RRF = initial calibration average RRF

 $RRF = (A_{\bullet})(C_{\bullet})/(A_{\bullet})(C_{\bullet})$ 

RRF = continuing calibration RRF

A<sub>k</sub> = Area of associated internal standard

A. = Area of compound,

C<sub>x</sub> = Concentration of compound. C. = Concentration of internal standard

					Reported	Recalculated	Reported	Recalculated
#	Standard ID	Calibratio n Date	Compound (Reference Internal Standard)	Average RRF (initial)	RRFALOT (CC)	RREALL (CC)	%D	%D
	PB8C_136 S=1	3/28/g	PCB-77 ( <sup>13</sup> C-PCB-77) PCB-105 ( <sup>13</sup> C-PCB-105)	1.00	48.	48.		
		, , ,	PCB-156. ( <sup>13</sup> C-PCB-156)	0.94	105	53.2	·	<del></del>
			PCB-180 (13C-PCB-180)	0.91	47.9	47.9		
2	PB8C-1370 S:1	2/2/6	PCB-77 ( <sup>13</sup> C-PCB-77)	1.00	AT.7	47.5		
	Sil	77/0	PCB-105 (13C-PCB-105) PCB-156 (13C-PCB-156)	0.94	51.0	51.7		
			PCB-186 (1°C-PCB-186)	0.95	106	106		
3	DT8B_08T		PCB-72 ("C-PCB-74) PQB-81 (130-PQB81)	1.13	49.3	19.5		
		4/9/08	PCB-105 (13C-PEB-105)+DCB-126( ) PG)	1.10	49.2	49.3		·
		/	PCB-156 (*C-PCB-156) (*C-PCB-156) (*C-PCB-180)	1.08	19.2	49.2		

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.

## **VALIDATION FINDINGS WORKSHEET** Routine Calibration Results Verification

	Page:_	->	of
	Reviewer:	7	
2nd	Reviewer:		

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

% Difference = 100 \* (ave. RRF - RRF)/ave. RRF  $RRF = (A_{\star})(C_{\star})/(A_{\star})(C_{\star})$ 

Where: eve. RRF = initial calibration everage RRF

RRF = continuing calibration RRF

A<sub>x</sub> = Area of compound,  $\hat{C_x} = \text{Concentration of compound,}$ 

A<sub>k</sub> = Area of associated internal standard C = Concentration of internal standard

Reported Recalculated Reported Recalculated Calibratio BREAM Standard ID Average RRF BREA n Date Compound (Reference Internal Standard) (initial) (CC) (CC) 138C-148 %D %D PCB-77 (\*\*C-PCB-77) 100 48 5= / PCB-105 (<sup>13</sup>C-PCB-105) 0.94 50. PCB-156 (1°C-PCB-156) 0.95 07 07 PCB-180 (13C-PCB-180) Ch 19 2 2 PCB-77 (13C-PCB-77) PCB-105 (1°C-PCB-105) PCB-156 (1°C-PCB-156) PCB-180 (13C-PCB-180) 3 PCB-77 (13C-PCB-77) PCB-105 (13C-PCB-105) PCB-156 (1°C-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

LDC #: 18590A3 SDG #: 500 (10)/ex

## VALIDATION FINDINGS WORKSHEET Laboratory Control Sample Results Verification

Page:_	of
Reviewer:_	9
d Davious	1

METHOD: HRGC/HRMS Polychlorinated Biphenyls (EPA Method 1668)

The percent recoveries (%R) and Relative Percent Difference (RPD) of the laboratory 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 = ILCS - LCSD | \* 2/(LCS + LCSD)

LCS = Laboractry control sample percent recovery

LCSD = Laboratory control sample duplicate percent recovery

LCS ID: W = 2 520-102)

	SI	olke Mand	Spiked	Sample	Lo	s	LCS	SD	LCS	LCSD
Compound	Percent Recovery					Percent R	ecovery	R	PD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalculated
PCB-77	100	NA	96.6	NA	96.6	96.6				
PCB-81			(02		102	10-2				
PCB-105			106		106	106				
PCB-114			105		105	105				
PCB-118			105		105	105	-			
PCB-123			102		102	10-2				
PCB-126	V		103		103	103				
PCB-156 155	200		219		110	10				
PCB-157										
PCB-167	100		105		105	105				
PCB-169	<i>V</i>		108		108	108				
<del>*************************************</del>						100				
PCB-180										
PCB-189	100		91.0		91.0	910				
			1							
									· · · · · · · · · · · · · · · · · · ·	

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 <sup>(e)</sup>	lon ID	Analyte	Substance		
1	289.9224 291.9194 301.9626 303.9597 325.8804 327.8775 [292.9825]	M M+2 M M+2 M+2 M+4 Lock	C12 H6 35Cl4 C12 H6 35Cl3 37Cl4 13C12 H6 35Cl3 37Cl 13C12 H6 35Cl3 37Cl C12 H5 35Cl4 37Cl C12 H5 35Cl3 37Cl C12 H5 35Cl3 37Cl2 C7 F11	TCB TCB PeCB PeCB PeCB PeCB PFK		
2	325.8804 327.8775 337.9207 339.9178 359.8415 361.8385 371.8817 373.8788 393.8025 395.7996 405.8428 407.8398 [354.9892[	M+2 M+4 M+2 M+4 M+2 M+4 M+2 M+4 M+2 M+4 M+2 M+4 M+2	C12 H5 35Cl4 37Cl C12 H5 35Cl3 37Cl2 13C12 H5 35Cl3 37Cl2 13C12 H5 35Cl3 37Cl2 C12 H4 35Cl5 37Cl C12 H4 35Cl5 37Cl C12 H4 35Cl5 37Cl 13C12 H4 35Cl4 37Cl2 C12 H3 35Cl6 37Cl C12 H3 35Cl6 37Cl C12 H3 35Cl5 37Cl2 C12 H3 35Cl5 37Cl2 C12 H3 35Cl5 37Cl2 C12 H3 35Cl5 37Cl2 C9F13	PeCB PeCB PeCB PeCB PeCB PeCB HxCB HxCB HxCB HxCB HxCB HxCB HxCB HpCB HpCB HpCB PFK		
3	509.7229 511.7199 513.7170 [442.9728]	M+4 M+6 M+8 Lock	13C12 35Cl10 37Cl2 13C12 35Cl9 37Cl3 13C12 35Cl8 37Cl4 C10 F17	DCB PFK		

S = internal/recovery standard

H = 1.007825

<sup>35</sup>Cl = 34.968853 <sup>37</sup>Cl = 36.965903

C = 12.000000

 $^{13}$ C = 13.003355

F = 18.9984

#### **VALIDATION FINDINGS WORKSHEET Sample Calculation Verification**

Page:	
Reviewer:	
2nd reviewer:	
2nd reviewer:	-6

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?

Example:

Concentration = (A)(L)(DF) (A,)(RRF)(V,)(%S) Area of the characteristic ion (EICP) for the compound to be measured Area of the characteristic ion (EICP) for the specific internal standard Amount of internal standard added in nanograms (ng) RRF Relative response factor of the calibration standard. ٧. Volume or weight of sample pruged in milliliters (ml) or grams (g). Dilution factor. Df %S Percent solids, applicable to soils and solid

matrices only.

#	Sample ID	Compound	Reported Concentration ( )	Calculated Concentration ( )	Qualification
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#### 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

August 28, 2008

ATTN: Ms. Marina Mitchell

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

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	DPWG26063/WG25504	108/11/08	09/01/08	1-2400-000	7		<u> </u>	<del>  ``</del>	Ť	1	Ť	<del>                                     </del>	Ť	<del>                                     </del>	Ť	l'	Ť	<del>                                     </del>	Ť	<del>  '''</del>	۱Ť	<del>  ''</del>	۲	<del>                                     </del>	۲	<del>  ''</del>	ľ	<del>  ''</del>	۲	**	Ü	\ \ \ \ \	-	''	٦
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## Lower Duwamish Waterway Group Data Validation Reports LDC# 19259

Polychlorinated Biphenyls as Congeners



# 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.
  - 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.
  - 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 PCB-59/62/75 PCB-83/99 PCB-90/101/113 PCB-129/138/160/163 PCB-153/168 PCB-180-193 PCB-187 Total Tetra-CBs Total Penta-CBs Total Hexa-CBs	18.5 ng/Kg 1.59 ng/Kg 4.65 ng/Kg 9.57 ng/Kg 8.68 ng/Kg 9.38 ng/Kg 3.85 ng/Kg 4.75 ng/Kg 20.1 ng/Kg 14.2 ng/Kg 18.1 ng/Kg 8.60 ng/Kg	All samples in SDG DPWG26063/WG25504

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)	А

#### 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	А

#### 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

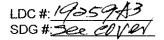
SDG	Sample	Compound	Flag	A or P	Reason
DPWG26063/ WG25504	LDW-07-T3-M-ES-WB-comp6 LDW-07-T3-M-ES-WB-comp6DUP	PCB-24	J (all detects)	А	Duplicate analysis (RPD)
DPWG26063/ WG25504	LDW-07-T1-C-SS-WB-comp1 LDW-07-T1-M-ES-WB-comp3 LDW-07-T1-M-SC-EM-comp2 LDW-07-T2-A-ES-WB-comp2 LDW-07-T2-B-SS-WB-comp1 LDW-07-T3-E-SS-WB-comp1 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	А	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#	: <u>19259A3</u> <b>V</b>	ALI	OITAC	N COMF	LETEN	ESS	WORKSHEET		Date:8/19/6
	#: <u>DPWG26063/WG2550</u>			l	_evel IV				Page: /of/
Labora	atory: <u>AXYS Analytical Servi</u>	ces, I	<u>_td.</u>						Reviewer:
METH	OD: HRGC/HRMS Polychic	rinate	ed Biphe	envi Conae	eners (EP	Ά Με	ethod 1668A)		2nd Reviewer:
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i ne sa validat	amples listed below were revi ion findings worksheets.	/iewe	d for ea	ch of the f	ollowing v	/alida	tion areas. Validation	i findings	s are noted in attached
	Validation Area						Comme	nts	
1,	Technical holding times			A	Sampling	dates:	-1.1 -1 -	7	
11.	GC/MS Instrument performance	check		Ā	- Cumpung	<u></u>	· / · / ·		
111.	Initial calibration	Oncor		A	207	70			
IV.	Routine calibration			A	30/	(-m)	<b>7</b> -		
V.	Blanks	••••••		W	30/3	<del>&gt; -/</del>			
			OUF				t sevilied	1	
VI.	Matrix spike/Matrix spike duplica	tes /		NEW	A 700	en	1 stople o		
VII,	Laboratory control samples			#	OTK.		<u> </u>		
VIII.	Regional quality assurance and o	quality	control	N A					
IX.	Internal standards			*					
X.	Target compound identifications					n			
XI.	Compound quantitation and CRC	ls		4	qua	Į.	k as u		
XII.	System performance			A	U		·		
XIII.	Overall assessment of data			A					
XIV.	Field duplicates			1					
XV.	Field blanks			//					
	1 i sou diame				1				
Note:	A = Acceptable N = Not provided/applicable		ND = Nc $R = Rins$	o compound: sate	s detected		D = Duplicate TB = Trip blank		
	SW = See worksheet		FB = Fie	eld blank			EB = Equipment blank		
/alidate	d Şamples: Ti≼≲U€ \$								
	_DW-07-T1-C-SS-WB-comp1	11	ا سرامه	) (~~~~) /	1 101				
			7	25504	1701	21		31	
	_DW-07-T1-M-ES-WB-comp3	12				22		32	
	_DW-07-T1-M-SC-EM-comp2	13				23		33	
	_DW-07-T2-A-ES-WB-comp2	14				24		34	
	.DW-07-T2-B-SS-WB-comp1	15				25		35	
6 L	.DW-07-T3-E-SS-WB-comp1	16				26		36	
7 L	DW-07-T3-M-ES-WB-comp6	17				27		37	

LDW-07-T3-M-ES-WB-comp6DUP 18



#### **VALIDATION FINDINGS CHECKLIST**

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Method: HRGC/HRMS Polychlorinated Biphenyls (EPA Method 1668)

Validation Area	Yes	No	NA	Findings/Comments
Technical holding times	1	1.40		i manga connenca
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?			<u></u>	
Is the static resolving power at least 10,000 (10% valley definition)?	_	,		
Was the mass resolution adequately check with PFK?		***************************************		
III. Initial calibration	<b>,</b> ,			
Was the initial calibration performed at 5 concentration levels?	/			
Were all percent relative standard deviations (%RSD) ≤ 25% for unlabeled standards and ≤ 36% 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% 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 Caboratory control samples				
Was an LCS analyzed for this SDG?				AN .
Was an LCS analyzed per extraction batch?				
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?				



#### **VALIDATION FINDINGS CHECKLIST**

Page → of → Reviewer: ↑ 2nd Reviewer:

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			r	
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 #: Secovar

## VALIDATION FINDINGS WORKSHEET Blanks

	Page:_	of
	Reviewer:	Q.
2nd	Reviewer:	i

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".

N N/A Were all samples associated with a method blank?

X/N N/A Was a method blank performed for each matrix and whenever a sample extraction was performed?

V N N/A Was method blank contamination less < CRQL for all target compounds?

Blank extraction date: 6/9/08

Blank analysis date: 6/9/08

Conc. units: 1/8/15/

Associated samples: M (>5×)

Compound	Blank ID			S	ample Identifica	ation		
ルチュ	504-101							
PCB 44/47/65	18.5							
59/62/75	1.59							
83/99	4.65							
90/101/113	9.57							
1-9/38/160/63	8.68 9.38							
153/168	9.38							
180/193	3.85							
1 187	4.75							
Total TetraduroBithe								
1 Fouta a Vino Bisher	14.2							
Hexadino Bithen								
V testacknoby how	x5 8.60							
gual	F	Q S	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 #: 500 COVD

## VALIDATION FINDINGS WORKSHEET <u>Duplicate Analysis</u>

	Page:	[ of [	
	Reviewer:	A	-
2nd	Reviewer:_	K	-

METHOD: GC VHPLCHRES HENS

প্ৰভাৱত হওৰ ব্ৰৱান্তিations below for all questions answered "N". Not applicable questions are identified as "N/A".

Was a duplicate sample analyzed for each matrix in this SDG?

Were all duplicate sample relative percent differences (RPD) < 57?

LEVEL PLONLY:

Y N\N/A

Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations.

#	Duplicate ID	Matrix	Compound	%RPD (Limits)	Associated Samples	Qualifications
	788	Tissue	PCB24	50.8 (550)	7-8	vdets/0
					•	

Comments:	

### **VALIDATION FINDINGS WORKSHEET** Initial Calibration Calculation Verification

	Page:	<u>of</u>
	Reviewer:	9
2nd	Reviewer:	N

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:

 $RRF = (A_x)(C_{in})/(A_{in})(C_x)$ average RRF = sum of the RRFs/number of standards

A, = Area of compound,

A<sub>s</sub> = Area of associated internal standard

 $C_x$  = Concentration of compound,

C<sub>s</sub> = Concentration of internal standard

%RSD = 100 \* (S/X)S = Standard deviation of the RRFs. X = Mean of the RRFs

				Reported	Recalculated	Reported	Recalculated	Reported	Recalculated
#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Average RRF (initial)	Average RRF (initial)	RRF ( ∠S⊰std)	RRF ( <>> std)	%RSD	%RSD
1	10AZ	4/23/08	PCB-719 (°C-PCB-2719)	1.02	1-0-2	1.04	1.04	<del>オ</del> ア1	4.53
-		7 700	PCB-105 ( <sup>13</sup> C-PCB-105)	0.87	0.87	0.84	0.84	3.35	3.47
<u> </u>			PCB-156 (13C-PCB-156)	0.94	0.94	0.95	0.95		3.70
			PCB-1867 (1°C-PCB-186)	0.82	0-8-	0.79	0.79	3.74	=.89
							,		7
2	1eAL	7/18/08	PCB-7x8 (1ºC-PCB-779-81)	1.18	1.18	1.12	1.1-	4.27	4.19
	,	717.0	PCB-105 ( <sup>13</sup> C-PCB-105)					/	
			PCB-156 ( <sup>13</sup> C-PCB-156)						
			PCB-180 ( <sup>13</sup> C-PCB-180)						
<u> </u>									
3			PCB-77 ( <sup>13</sup> C-PCB-77)						
			PCB-105 (13C-PCB-105)						
			PCB-156 ( <sup>13</sup> C-PCB-156)						
			PCB-180 ( <sup>13</sup> C-PCB-180)						·

Comments:	<u>Refer</u>	to Init	<u>ial Ca</u>	libration	findings	works	heet fo	<u>r list o</u>	of qu	ualifications	and	associate	d sam	ples v	vhen	reported	results	do	not agre	e withir	10.0%	of the
recalculated	result	s.											•									
																*						··········
	······································	**			***************************************																	

## **VALIDATION FINDINGS WORKSHEET** Routine Calibration Results Verification

	Page:_	
	Reviewer:	<i>A</i>
2nd	Reviewer:	_ <i>u</i>

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  $RRF = (A_x)(C_x)/(A_x)(C_x)$ 

Where: ave. RRF = initial calibration average RRF

RRF = continuing calibration RRF

 $A_x = Area of compound,$ 

A<sub>E</sub> = Area of associated internal standard

 $C_{v}$  = Concentration of compound,

Ck = Concentration of internal standard

					Reported	Recalculated	Reported	Recalculated
#	Standard ID	Calibratio n Date	Compound (Reference Internal Standard)	Average RRF (initial)	RRFCONC (CC)	RRFCOUC (CC)	%D	%D
1	PB8C-263		PCB-7X19(13C-PCB-77)19)	1.02	26.1	26.		
	=/	6/27/08	PCB-105 (13C-PCB-105)	087	55.5	<u>55.5</u>		
		/ /	PCB-156 ( <sup>18</sup> C-PCB-156)	0.94	117.	118.		
			PCB-184 (1°C-PCB-184)	0.82	53.4	53.4		
						/		
2	DT8B_182	7/ <del>2</del> 8/ <sub>0</sub> 8	PCB-7x8 (1°C-PCB-779-8)	1-18	49.4	45.5		
	5=1	170/10	PCB-105 ( <sup>13</sup> C-PCB-105)		45.4			
		/	PCB-156 ( <sup>13</sup> C-PCB-156)		/			
			PCB-180 ( <sup>13</sup> C-PCB-180)					
3	738C-264	. (0)	PCB-719 (1°C-PCB-77), 19 )	1.02	26.3	26.5		
	5=1	6\$0/08	PCB-105 ( <sup>19</sup> C-PCB-105)	0.87	43.4	43.4		
	,	/ /	PCB-156 ( <sup>13</sup> C-PCB-156)	0.94	102	10 >		
			PCB-186 (13C-PCB-186)	0.82	41.7	41.6		
			1					

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.

## VALIDATION FINDINGS WORKSHEET Routine Calibration Results Verification

	Page:	<u>۔</u>	of 2
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2nd	Reviewer:	ul	
		_	_

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  $RRF = (A_x)(C_x)/(A_x)(C_x)$ 

Where: ave. RRF = initial calibration average RRF

RRF = continuing calibration RRF  $A_x =$ Area of compound,

A<sub>k</sub> = Area of associated internal standard

 $\hat{C_x}$  = Concentration of compound,

C<sub>a</sub> = Concentration of internal standard

					Reported	Recalculated	Reported	Recalculated
#	Standard ID	Calibratio n Date	Compound (Reference Internal Standard)	Average RRF (initial)	RRFCOUC (CC)	RRF-COUC (CC)		%D
1	0[8B.176]	10/0	PCB-778 (1°C-PCB-779-8)	11.18	47.3	17.3	7,00	761
	ا (ج <sup>ی</sup> ک	7/19/08	PCB-105 ( <sup>13</sup> C-PCB-105)			-4(		
		,	PCB-156 ( <sup>13</sup> C-PCB-156)			<u></u>		
			PCB-180 ( <sup>13</sup> C-PCB-180)					
2	PB8c_765	1/2/8	PCB-7219(1°C-PCB-77)19)	1.02	26.7	0/7		
	5-1	6/2900	PCB-105 (13C-PCB-105)	0.87	47.5	26.		
		/	PCB-156 (13C-PCB-156)	0.94	103	104		
			PCB-186 (13C-PCB-186)	0-82	42.1	427		
						<del></del>		
3			PCB-77 ( <sup>13</sup> C-PCB-77)					
			PCB-105 ( <sup>13</sup> C-PCB-105)					
			PCB-156 ( <sup>13</sup> C-PCB-156)					
			PCB-180 ( <sup>13</sup> 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 #: 195945 SDG #: 500 COVEN

## VALIDATION FINDINGS WORKSHEET Laboratory Control Sample Results Verification

Page:	_of_	
Reviewer:	Y	

METHOD: HRGC/HRMS Polychlorinated Biphenyls (EPA Method 1668)

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2nd	Reviewe	r:	(	

The percent recoveries (%R) and Relative Percent Difference (RPD) of the laboratory 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 = ILCS - LCSD I \* 2/(LCS + LCSD)

LCS = Laboraotry control sample percent recovery

LCSD = Laboratory control sample duplicate percent recovery

LCS ID: W = 25024-10>

Compound	Sp Ad ( )A.S	oike ded W	Spiked Concer	tration	LC Percent I		LC:			/LCSD
		mx_	woul		Percent Recovery		Percent Recovery		l K	PD
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc,	Reported	Recalculated
P <del>CB-77-</del>	500									
PCB-81	50.0	NA	55.0	NX	110	110				
PCB-105		İ	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		100		107	107				
<del>PCB-157-</del>					7					
PCB-167	50.0		4.3		109	109	•			
PCB-169	J	V	64.3		109	109				
P <del>CB-17</del> 9,					, , , , , , , , , , , , , , , , , , ,	/				
PCB,180										
PCB-189.										
		<del>.</del>								<del> </del>

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 #:1925913 SDG #: Dec COVEN

matrices only.

### VALIDATION FINDINGS WORKSHEET Sample Calculation Verification

Page:_	/of
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?

Example: Concentration = (A,)(I,)(DF) (A<sub>a</sub>)(RRF)(V<sub>o</sub>)(%S) Area of the characteristic ion (EICP) for the compound to be measured Area of the characteristic ion (EICP) for the specific Conc. = (2.73e+0.5(4000)) (7.55e+0.6(1.02)(2.17))= 65.3 ns/sinternal standard Amount of internal standard added in nanograms (ng) RRF Relative response factor of the calibration standard. Volume or weight of sample pruged in milliliters (ml) ٧ or grams (g). Ðf Dilution factor. Percent solids, applicable to soils and solid %S

#	Commis ID	Compound	Reported Concentration ( )	Calculated Concentration ( )	Qualification
#	Sample ID	Compound	,	( )	Qualification
				,	
		4			
		i			
<b> </b>					

## Ions Monitored for HRGC/HRMS Analysis of Polychlorinated Biphenyls

Descriptor	Accurate mass <sup>(a)</sup>	Ion ID	Analyte	Substance
1	289.9224 291.9194 301.9626 303.9597 325.8804 327.8775 [292.9825]	M M+2 M M+2 M+2 M+4 Lock	C12 H6 35Cl4 C12 H6 35Cl3 37Cl4 13C12 H6 35Cl4 13C12 H6 35Cl3 37Cl C12 H5 35Cl4 37Cl C12 H5 35Cl3 37Cl2 C7 F11	TCB TCB PeCB PeCB PeCB PeCB PeCB PeCB
2	325.8804 327.8775 337.9207 339.9178 359.8415 361.8385 371.8817 373.8788 393.8025 395.7996 405.8428 407.8398 [354.9892[	M+2 M+4 M+2 M+4 M+2 M+4 M+2 M+4 M+2 M+4 M+2 M+4 M+2	C12 H5 35Cl4 37Cl C12 H5 35Cl3 37Cl2 13C12 H5 35Cl4 37Cl 13C12 H5 35Cl3 37Cl2 C12 H4 35Cl5 37Cl C12 H4 35Cl5 37Cl C12 H4 35Cl5 37Cl 13C12 H4 35Cl5 37Cl 13C12 H4 35Cl6 37Cl C12 H3 35Cl6 37Cl C12 H3 35Cl6 37Cl 13C12 H3 35Cl6 37Cl 13C12 H3 35Cl5 37Cl2 C9F13	PeCB PeCB PeCB PeCB HXCB HXCB HXCB HXCB HXCB HXCB HXCB HX
3	509.7229 511.7199 513.7170 [442.9728]	M+4 M+6 M+8 Lock	13C12 35Cl10 37Cl2 13C12 35Cl9 37Cl3 13C12 35Cl8 37Cl4 C10 F17	DCB PFK

S = internal/recovery standard

H = 1.007825C = 12.000000 $^{13}$ C = 13.003355

<sup>35</sup>Cl = 34.968853 <sup>37</sup>Cl = 36.965903

F = 18,9984