

## LABORATORY DATA CONSULTANTS, INC.

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

Tetra Tech EC, Inc. 19803 North Creek Parkway Bothell, WA 98011 ATTN: Ms. Mary Diesel September 30, 2008

SUBJECT: Lockheed West Seattle Superfund Site, Data Validation

Dear Ms. Diesel,

Enclosed are the final validation reports for the fractions listed below. These SDGs were received on September 12, 2008. Attachment 1 is a summary of the samples that were reviewed for each analysis.

## **LDC Project # 19462:**

SDG#	<u>Fraction</u>
K0803139	Polynuclear Aromatic Hydrocarbons, Chlorinated Pesticides, Polychlorinated Biphenyls, Metals, Butyltins, Dioxins/Dibenzofurans

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

- 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
- USEPA, Contract Laboratory Program National Functional Guidelines for Polychlorinated Dioxins/Diobenzofurans Data Review, September 2005
- 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,

Erlinda T. Rauto

**Operations Manager/Senior Chemist** 

Attachment 1

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# Lockheed West Seattle Superfund Site Data Validation Reports LDC# 19462

Polynuclear Aromatic Hydrocarbons



## Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Lockheed West Seattle Superfund Site

**Collection Date:** 

April 8, 2008

LDC Report Date:

September 25, 2008

Matrix:

Sediment/Tissue

Parameters:

Polynuclear Aromatic Hydrocarbons

Validation Level:

EPA Level III

Laboratory:

Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): K0803139

## Sample Identification

A1-IT Sed

A1-IT Tissue

A1-IT SedMS

A1-IT SedMSD

A1-IT TissueMS

A1-IT TissueMSD

## Introduction

This data review covers 3 sediment samples and 3 tissue samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8270C using Selected Ion Monitoring (SIM) for Polynuclear Aromatic Hydrocarbons.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as 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 XVI.

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/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals. All ion abundance requirements were met.

## III. Initial Calibration

Initial calibration was performed using required standard concentrations.

Percent relative standard deviations (%RSD) were less than or equal to 30.0% for all compounds.

Average relative response factors (RRF) for all target compounds and system monitoring compounds were within validation criteria.

## IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

All of the continuing calibration percent differences (%D) between the initial calibration RRF and the continuing calibration RRF were less than or equal to 25.0%.

The percent difference (%D) of the second source calibration standard were less than or equal to 25.0% for all compounds.

All of the continuing calibration RRF values were within validation criteria.

## V. Blanks

Method blanks were reviewed for each matrix as applicable. No polynuclear aromatic hydrocarbon contaminants were found in the method blanks with the following exceptions:

Method Blank ID	Extraction Date	Compound TIC (RT in minutes)	Concentration	Associated Samples
KWG0803638-5	4/21/08	Naphthalene	0.83 ug/Kg	A1-IT Sed

Sample concentrations were compared to concentrations detected in the method blanks. The sample concentrations were either not detected or were significantly greater (>10X for common contaminants, >5X for other contaminants) than the concentrations found in the associated method blanks.

No field blanks were identified in this SDG.

## 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) and relative percent differences (RPD) were within QC limits.

## IX. Regional Quality Assurance and Quality Control

Not applicable.

## X. Internal Standards

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

## XI. Target Compound Identifications

Raw data were not reviewed for this SDG.

## XII. Compound Quantitation and CRQLs

Raw data were not reviewed for this SDG.

## XIII. Tentatively Identified Compounds (TICs)

Raw data were not reviewed for this SDG.

## XIV. System Performance

Raw data were not reviewed for this SDG.

## XV. Overall Assessment

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

## XVI. Field Duplicates

No field duplicates were identified in this SDG.

## Lockheed West Seattle Superfund Site Polynuclear Aromatic Hydrocarbons - Data Qualification Summary - SDG K0803139

No Sample Data Qualified in this SDG

Lockheed West Seattle Superfund Site Polynuclear Aromatic Hydrocarbons - Laboratory Blank Data Qualification Summary - SDG K0803139

No Sample Data Qualified in this SDG

Lockheed West Seattle Superfund Site Polynuclear Aromatic Hydrocarbons - Field Blank Data Qualification Summary - SDG K0803139

No Sample Data Qualified in this SDG

	19462A2b VA K0803139	ALIDATION	COMPL Le	ETENESS evel III	WORK	SHEET		Date: 9/6 Page:
orato	ory: Columbia Analytical Se	rvices						Reviewer:
THO san	D: GC/MS Polynuclear Arc nples listed below were rev on findings worksheets.	matic Hydroc					findir	2nd Reviewer:
	Validation Are	a				Commer	nts	
	Technical holding times		Д	Sampling dates:	4/8	1/08		
	GC/MS Instrument performance	check	Δ		!	I		
	Initial calibration		Δ					
	Continuing calibration/ICV		Α	1 CV -	= >			
	Blanks		SW					
	Surrogate spikes		Δ					
l.	Matrix spike/Matrix spike duplica	Δ	- 10					
11.	Laboratory control samples		Δ	ics 10				
	Regional Quality Assurance and	Quality Control	N					
	Internal standards		Δ					
1.	Target compound identification		N _					
1.	Compound quantitation/CRQLs		N					
11.	Tentatively identified compound	s (TICs)	N					
V.	System performance		N					
V.	Overall assessment of data		A					
<b>√</b> I.	Field duplicates		N,					
 ∕II.	Field blanks		$\sim$					
e:	A = Acceptable N = Not provided/applicable SW = See worksheet	R = Rin	o compounds sate eld blank	s detected	D = Dup TB = Tri EB = Eq			
date	d Samples: Selinet	+ Tiss	08036 08073	71			<del>- i</del>	
T	A1-IT Sed 1	KUJG	08036	3×+35T			31	

Valida	ated Samples:	ent +	Tissue		
1	A1-IT Sed	11	KWG0803638	215	31
2	A1-IT Tissue	12	KWG0803638 KWG0807353	-25	32
3	A1-IT SedMS	13	•	23	33
4	A1-IT SedMSD	14		24	34
5	A1-IT TissueMS	15		25	35
6	A1-IT TissueMSD	16		26	36
7		17		27	37
8		18		28	38
9		19		29	39
10		20		30	40

# VALIDATION FINDINGS WORKSHEET

METHOD: GC/MS BNA (EPA SW 846 Method 8270C)

A. Phenol**	P. Bis(2-chloroethoxy)methane	EE. 2,6-Dinitrotoluene	TT. Pentachlorophenol**	III. Benzofalnurana**
B. Bis (2-chloroethyl) ether	Q. 2,4-Dichlorophenol**	FF. 3-Nitroanlline	UU. Phenanthrene	and the former and th
C. 2-Chlorophenol	R. 1.2 4-Trichlorohamana			oss. mueno(1,2,3-ca)pyrene
		GG. Acenaphthene**	VV. Anthracene	KKK. Dibenz(a,h)anthracene
D. 1,3-Dichiorobenzene	S. Naphthalene	HH. 2,4-Dinitrophenol*	WW. Carbazole	111. Benzolo h Inserdens
E. 1,4-Dichlorobenzene**	T. 4-Chloroaniline	II. 4-Nitrophenoi*	XX Dischartering	
F 12-Dichlorohaman			con principal de la constante	MMM. Bis(2-Chloroisopropyl)ether
· ', z-Dicilioropenzene	U. Hexachlorobutadiene**	JJ. Dibenzofuran	YY. Fluoranthene**	NNN. Aniline
G. 2-Methylphenol	V. 4-Chloro-3-methylphenol**	KK. 2,4-Dinitrotoluene	ZZ. Pyrene	OOO. N-Nitrosodimethylamine
H. 2,2'-Oxybis(1-chloropropane)	W. 2-Methylnaphthalene	LL. Diethylphthalate	AAA. Butvibenzvinhthalate	
1. 4-Methylphenol	X. Hexachioroccolosasisasis			FFF. Benzoic Acid
	DI BORING DE LA COMPANIA DE LA COMPA	MM. 4-Chlorophenyl-phenyl ether	BBB. 3,3*Dichlorobenzidine	QQQ. Benzyl alcohol
J. N-Nitroso-di-n-propylamine*	Y. 2,4,6-Trichlorophenol**	NN. Fluorene	CCC. Benzo(a)anthracene	RRR. Pyridine
K. Hexachloroethane	Z. 2,4,5-Trichlorophenoi	OO. 4-Nitroaniline	DDD Chaman	
L. Nitrobenzene	AA 2-Chloronanhthalana			SSS. Benzidine
		PP. 4,6-Dinitro-2-methylphenol	EEE. Bis(2-ethylhexyl)phthalate	TTT.
M. Isophorone	BB. 2-Nitroaniline	QQ. N-Nitrosodiphenylamine (1)**	FFF. Di-n-octylohthalate**	
N. 2-Nitrophenoi**	CC. Dimethylphthalate	00 A 000		
			GGG. Benzo(b)fluoranthene	vvv.
O. 2,4-Dimethylphenol	DD. Acenaphthylene	SS. Hexachlorobenzene	HHH. Benzo(k)fluoranthene	WWW

Votes: = System performance check compound (SPCC) for RRF; \*\* = Calibration check compound (CCC) for %RSD.

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LDC #:	SDG #:

# VALIDATION FINDINGS WORKSHEET Blanks

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

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

Was a method blank analyzed for each matrix?

Was a method blank analyzed for each concentration preparation level? Was a method blank associated with every sample?

Was the blank contaminated? If yes, please see qualification below. Blank extraction date:  $\frac{4/27/08}{2}$  Blank analysis date:  $\frac{4/25/08}{2}$ 

Sample identification Associated Samples: KW 60843638-5 0.83 Blank 10 Conc. units: Ug /kg Compound S

Associated Samples:

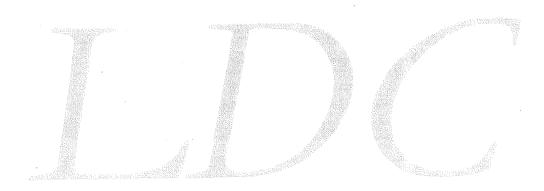
Blank analysis date:

Blank extraction date:\_

CIRCLED RESULTS WERE NOT QUALIFIED. ALL RESULTS NOT CIRCLED WERE QUALIFIED BY THE FOLLOWING STATEMENT:
Common contaminants such as the phthalates and TICs noted above that were detected in samples within ten times the associated method blank concentration were qualified as not detected, "U". Other contaminants within five times the method blank concentration were also qualified as not detected, "U".

## Lockheed West Seattle Superfund Site Data Validation Reports LDC# 19462

**Chlorinated Pesticides** 



# Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Lockheed West Seattle Superfund Site

**Collection Date:** 

April 8, 2008

LDC Report Date:

September 23, 2008

Matrix:

Sediment/Tissue

Parameters:

Chlorinated Pesticides

Validation Level:

EPA Level III

Laboratory:

Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): K0803139

Sample Identification

A1-IT Sed

A1-IT Tissue

A1-IT TissueMS

A1-IT TissueMSD

## Introduction

This data review covers one sediment sample and 3 tissue samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8081A for Chlorinated Pesticides.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as 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.

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 single and multicomponent compounds was performed for the primary (quantitation) column and confirmation column as required by this 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 with the following exceptions:

Date	Standard	Column	Compound	%D	Associated Samples	Flag	A or P
4/29/08	0428F020/24	DB-35MS	Toxaphene	18	A1-IT Sed KWG0803699-9	J (all detects) UJ (all non-detects)	А
8/8/08	0808F004/08	DB-XLB	Endosulfan sulfate cis-Nonachlor Mirex	16 16 15.2	A1-IT Tissue A1-IT TissueMS A1-IT TissueMSD KWG0807318-4	J (all detects) UJ (all non-detects)	А

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

The individual 4,4'-DDT and Endrin breakdowns (%BD) were less than or equal to 15.0%.

## V. Blanks

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

No field blanks were identified in this SDG.

## 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) and relative percent differences (RPD) 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 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

The sample results for detected compounds from the two columns were within 40% relative percent difference (RPD) with the following exceptions:

Sample	Compound	RPD	Flag	A or P
A1-IT Tissue	4,4'-DDD	63.2	J (all detects)	А

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.

## Lockheed West Seattle Superfund Site Chlorinated Pesticides - Data Qualification Summary - SDG K0803139

SDG	Sample	Compound	Flag	A or P	Reason
K0803139	A1-IT Sed	Toxaphene	J (all detects) UJ (all non-detects)	А	Continuing calibration (%D)
K0803139	A1-IT Tissue	Endosulfan sulfate cis-Nonachlor Mirex	J (all detects) UJ (all non-detects)	A	Continuing calibration (%D)
K0803139	A1-IT Tissue	4,4'-DDD	J (all detects)	А	Compound quantitation and CRQLs (RPD)

Lockheed West Seattle Superfund Site Chlorinated Pesticides - Laboratory Blank Data Qualification Summary - SDG K0803139

No Sample Data Qualified in this SDG

Lockheed West Seattle Superfund Site Chlorinated Pesticides - Field Blank Data Qualification Summary - SDG K0803139

No Sample Data Qualified in this SDG

LDC #:_	19462A3a	VALIDATION COMPLETENESS WORKSHEET
SDG #:_	K0803139	Level III
Laborato	ry: <u>Columbia</u>	nalytical Services

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081A)

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	Δ	Sampling dates: 4/g/0 ¥
II.	GC/ECD Instrument Performance Check	Δ	. / 1
III.	Initial calibration	Ą	
IV.	Continuing calibration/ICV	حس	1CV = 15
V.	Blanks	Δ	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	كملحر	
VIII.	Laboratory control samples	Α	Les 10
IX.	Regional quality assurance and quality control	N-	
Xa.	Florisil cartridge check	N	
Xb.	GPC Calibration	N	
XI.	Target compound identification	N	G.T.
XII.	Compound quantitation and reported CRQLs	SW	
XIII.	Overall assessment of data	4	
XIV.	Field duplicates	N	
XV.	Field blanks	N	

Note:

A = Acceptable

N = Not provided/applicable

SW = See worksheet

ND = No compounds detected

D = Duplicate

R = Rinsate

TB = Trip blank

FB = Field blank

EB = Equipment blank

Validated Samples:

Vanda	Sed +	Tus	sue		
1	A1-IT Sed	11	KWG0803699-4	721	31
2	A1-IT Tissue	12	KWG0807318-4	22	32
3	A1-IT TissueMS	13	•	23	33
4	A1-IT TissueMSD	14		24	34
5		15		25	35
6		16		26	36
7		17		27	37
8		18		28	38
9		19		29	39
8 9 10		20		30	40

# VALIDATION FINDINGS WORKSHEET

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

A. alpha-BHC

A alpha-BHC	100				
-		I. Dieldrin	Q. Endrin ketone		
B. beta-BHC				Y. Aroclor-1242	.00
	<b>3</b>	J. 4,4'-DDE	R Roders		
1 2 2 2				Z. Aroclor-1248	XX
	<u> </u>	K. Endrin	S. aloha-Chlordene		
6				AA. Aroclor-1254	
U. gamma-BHC	OHE	L. Endosulfan II	+		
		,	- gamma-Chlordane	BB. Aroclor-1260	
E. Heptachlor	lor	M. 4.4"-DDD			
			U. Toxaphene	CC DB eve	
F. Aldrin					KK.
		N. Endosulfan sulfate	V. Aroclor-1016		
9				DD. DB 1701	7,
G. neptachior epoxide	lor epoxide	0. 4,4'-DDT			<del>- 1</del>
			W. Arocior-1221	EE.	
H. Endosulfan t					MM.
		P. Methoxychlor	X. Aroclor-1232		
				r.	N

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

Notes:

1946243 SDG#: LDC #:

METHOD: VGC HPLC

# VALIDATION FINDINGS WORKSHEET Continuing Calibration

Page: of Reviewer:

2nd Reviewer:\_

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

Y N NIA V N NIA Level IV Only

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

( ) KWGOSO369-9, ( ) KWGOSO73/8-4, ( ) L2-9 U ( ) U (	#	Date	Standard ID	Detector/ Column	Compound	%D / RPD (Limit ≤ 15.0)	RT (limit)	Associated Samples	Qualifications
8/08 0808 FOOH/08 DB-XLB N 16  mirex /5.2  mirex (5.2)		20/62/4		DB-35M3	h	81	(	KWG0803699-9,	1/143/1A
8/08 0808 FOOT/08 DB-XLB N 16 ( ) ( ) ( ) ( ) ( ) ( ) ( ) ( ) ( ) (			,				( )		
8/08 0808 Foot for 16 ( )   (L ( ) )   (L (							( )		
8/08 0808 Foot /08				- 1			( )		
	-	80/8/8	80/10018080	l	N.		)	KWG08073/8-4	
			,		cior Nonach,		( )	747	
					Mirex	15.2	( )	1	<i>&gt;</i>
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# VALIDATION FINDINGS WORKSHEET Compound Quantitation and Reported CRQLs

Page: \_\_\_of \_\_ Reviewer: \_\_\_\_\_ 2nd Reviewer: \_\_\_\_

METHOD: GC HPLC

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

Y N N/A

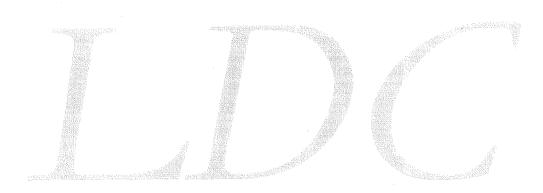
Were CRQLs adjusted for sample dilutions, dry weight factors, etc.? Did the reported results for detected target compounds agree within 10.0% of the recalculated results?

Qualifications	1/A dit								
Associated Samples	2								
% RPD Bet 200/um, Finding 440	63.2								
Compound Name	Ŵ								
*									

Comments: See sample calculation verification worksheet for recalculations

## Lockheed West Seattle Superfund Site Data Validation Reports LDC# 19462

Polychlorinated Biphenyls



# Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Lockheed West Seattle Superfund Site

**Collection Date:** 

April 8, 2008

LDC Report Date:

September 23, 2008

Matrix:

Sediment/Tissue

Parameters:

Polychlorinated Biphenyls

Validation Level:

EPA Level III

Laboratory:

Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): K0803139

Sample Identification

A1-IT Sed

A1-IT Tissue

A1-IT TissueMS

A1-IT TissueMSD

## Introduction

This data review covers one sediment sample and 3 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 a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as 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.

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 differences (%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.

No field blanks were identified in this SDG.

## 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) and relative percent differences (RPD) 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 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

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.

Lockheed West Seattle Superfund Site Polychlorinated Biphenyls - Data Qualification Summary - SDG K0803139

No Sample Data Qualified in this SDG

Lockheed West Seattle Superfund Site Polychlorinated Biphenyls - Laboratory Blank Data Qualification Summary - SDG K0803139

No Sample Data Qualified in this SDG

Lockheed West Seattle Superfund Site Polychlorinated Biphenyls - Field Blank Data Qualification Summary - SDG K0803139

No Sample Data Qualified in this SDG

**VALIDATION COMPLETENESS WORKSHEET** LDC #: 19462A3b Level III SDG #: K0803139 Laboratory: Columbia Analytical Services

Reviewer: 2nd Reviewer:

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

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

	Validation Area		Comments
I.	Technical holding times	Δ	Sampling dates: 4/8/08
11.	GC/ECD Instrument Performance Check	Δ	, ,
111.	Initial calibration	Α	
IV.	Continuing calibration/ICV	Д	1CV = 15
V.	Blanks	Д	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	۵	
VIII.	Laboratory control samples	A	LCS/P
IX.	Regional quality assurance and quality control	N	
Xa.	Florisil cartridge check	N	
Xb.	GPC Calibration	N	
XI.	Target compound identification	N	
XII.	Compound quantitation and reported CRQLs	N	
XIII.	Overall assessment of data	Ą	
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

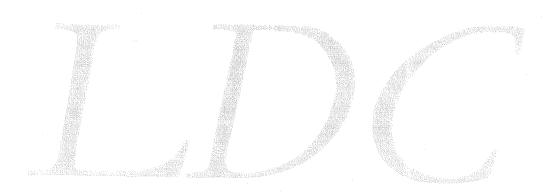
TB = Trip blank

EB = Equipment blank

Validated Samples: KWG0803700 31 11 A1-IT Sed KWG0807317-32 12 A1-IT Tissue 33 23 13 A1-IT TissueMS 3 34 24 A1-IT TissueMSD 14 35 25 15 36 16 26 6 37 27 17 38 18 28 8 39 29 19 9 30 40 20 10

## Lockheed West Seattle Superfund Site Data Validation Reports LDC# 19462

Metals



# Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Lockheed West Seattle Superfund Site

**Collection Date:** 

April 8, 2008

LDC Report Date:

September 22, 2008

Matrix:

Sediment/Tissue

Parameters:

Metals

Validation Level:

EPA Level III

Laboratory:

Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): K0803139

## Sample Identification

A1-IT Sed

A1-IT Tissue

A1-IT SedMS

A1-IT SedDUP

A1-IT TissueMS

A1-IT TissueDUP

## Introduction

This data review covers 3 sediment samples and 3 tissue samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Methods 6020, 6010B, and 7000 for Metals. The metals analyzed were Antimony, Arsenic, Cadmium, Chromium, Cobalt, Copper, Lead, Mercury, Molybdenum, Nickel, Selenium, Silver, Thallium, Vanadium, and Zinc.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (October 2004) as there are no current guidelines for the methods stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as 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.

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

An initial calibration was performed.

The frequency and analysis criteria of the initial calibration verification (ICV) and continuing calibration verification (CCV) were met.

## 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	Maximum Concentration	Associated Samples
PB (prep blank)	Chromium Cobalt Copper Lead Molybdenum	0.15 mg/Kg 0.004 mg/Kg 0.03 mg/Kg 0.07 mg/Kg 0.09 mg/Kg	A1-IT Sed
ICB/CCB	Cobalt Copper Molybdenum Silver	0.011 ug/L 0.04 ug/L 0.04 ug/L 0.022 ug/L	A1-IT Sed
PB (prep blank)	Arsenic Molybdenum Zinc	0.09 mg/Kg 0.013 mg/Kg 0.05 mg/Kg	A1-IT Tissue
ICB/CCB	Arsenic Silver	0.23 ug/L 0.019 ug/L	A1-IT Tissue

Data qualification by the initial, continuing and preparation blanks (ICB/CCB/PBs) was based on the maximum contaminant concentration in the ICB/CCB/PBs in the analysis of each analyte. The sample concentrations were either not detected or were significantly greater (>5X blank contaminants) than the concentrations found in the associated method blanks.

No field blanks were identified in this SDG.

## 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) analyses were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	%R (Limits)	Flag	A or P
A1-IT SedMS (A1-IT Sed)	Copper	170.5 (70-116)	J (all detects)	Α
A1-IT TissueMS (A1-IT Tissue)	Antimony Mercury Silver	55.6 (70-130) 53.8 (60-130) 53.3 (70-130)	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 with the following exceptions:

DUP ID (Associated Samples)	Analyte	RPD (Limits)	Difference (Limits)	Flag	A or P
A1-IT SedDUP (A1-IT Sed)	Lead	57.8 (≤20)	-	J (all detects) UJ (all non-detects)	Α
,	Zinc	46.4 (≤20)	-	J (all detects) UJ (all non-detects)	

## VII. Laboratory Control Samples (LCS)

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

## VIII. Internal Standards

Raw data were not reviewed for this SDG.

## IX. Furnace Atomic Absorption QC

All reported MSAs were reviewed and found acceptable.

Raw data were not reviewed for this SDG.

## X. ICP Serial Dilution

ICP serial dilution analysis was performed by the laboratory. The analysis criteria were met.

## XI. Sample Result Verification

Raw data were not reviewed for this SDG.

## XII. Overall Assessment of Data

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

## XIII. Field Duplicates

No field duplicates were identified in this SDG.

#### Lockheed West Seattle Superfund Site Metals - Data Qualification Summary - SDG K0803139

SDG	Sample	Analyte	Flag	A or P	Reason
K0803139	A1-IT Sed	Copper	J (all detects)	А	Matrix spike analysis (%R)
K0803139	A1-IT Tissue	Antimony Mercury Silver	J (all detects) UJ (all non-detects)	А	Matrix spike analysis (%R)
K0803139	A1-IT Sed	Lead Zinc	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	А	Duplicate analysis (RPD)

Lockheed West Seattle Superfund Site Metals - Laboratory Blank Data Qualification Summary - SDG K0803139

No Sample Data Qualified in this SDG

Lockheed West Seattle Superfund Site Metals - Field Blank Data Qualification Summary - SDG K0803139

No Sample Data Qualified in this SDG

METHOD: Metals (EPA SW 846 Method 6010B/7000) / 6000 9m €  The samples listed below were reviewed for each of the following validation areas. Validation finding validation findings worksheets.    Validation Area	Page: _ l of _ l Reviewer: _ M G 2nd Reviewer: _ V
The samples listed below were reviewed for each of the following validation areas. Validation finding validation findings worksheets.    Validation Area	
The samples listed below were reviewed for each of the following validation areas. Validation finding validation findings worksheets.    Validation Area	
I. Technical holding times  A Sampling dates: 4-8-08  II. Calibration  A Sampling dates: 4-8-08  III. Blanks  IV. ICP Interference Check Sample (ICS) Analysis  V. Matrix Spike Analysis  VI. Duplicate Sample Analysis  VII. Laboratory Control Samples (LCS)  VIII. Internal Standard (ICP-MS)  IX. Furnace Atomic Absorption QC  X. ICP Serial Dilution	gs are noted in attached
II. Calibration  III. Blanks  IV. ICP Interference Check Sample (ICS) Analysis  V. Matrix Spike Analysis  VI. Duplicate Sample Analysis  VII. Laboratory Control Samples (LCS)  VIII. Internal Standard (ICP-MS)  IX. Furnace Atomic Absorption QC  X. ICP Serial Dilution	
II. Calibration  A  III. Blanks  IV. ICP Interference Check Sample (ICS) Analysis  V. Matrix Spike Analysis  VI. Duplicate Sample Analysis  VII. Laboratory Control Samples (LCS)  VIII. Internal Standard (ICP-MS)  IX. Furnace Atomic Absorption QC  X. ICP Serial Dilution	
III.   Blanks   Sw     IV.   ICP Interference Check Sample (ICS) Analysis   A     V.   Matrix Spike Analysis   Sw   M S     VI.   Duplicate Sample Analysis   9n	
IV. ICP Interference Check Sample (ICS) Analysis  V. Matrix Spike Analysis  VI. Duplicate Sample Analysis  VII. Laboratory Control Samples (LCS)  VIII. Internal Standard (ICP-MS)  IX. Furnace Atomic Absorption QC  X. ICP Serial Dilution  A  MS  DUP  L C S  N O+ reviewed  A	
V. Matrix Spike Analysis  VI. Duplicate Sample Analysis  VII. Laboratory Control Samples (LCS)  VIII. Internal Standard (ICP-MS)  IX. Furnace Atomic Absorption QC  X. ICP Serial Dilution  SW MS  DUP  LCS  N D+ reviewed  A	
VI. Duplicate Sample Analysis  914 SWA DUP  VII. Laboratory Control Samples (LCS)  VIII. Internal Standard (ICP-MS)  IX. Furnace Atomic Absorption QC  X. ICP Serial Dilution  DUP  LCS  N O+ reviewed  A	
VII. Laboratory Control Samples (LCS)  VIII. Internal Standard (ICP-MS)  IX. Furnace Atomic Absorption QC  X. ICP Serial Dilution  A LCS  N O+ reviewed  A	
VIII. Internal Standard (ICP-MS)  IX. Furnace Atomic Absorption QC  X. ICP Serial Dilution  N Not reviewed  A	
IX. Furnace Atomic Absorption QC A  X. ICP Serial Dilution A	
	(Se Hydride)
XI. Sample Result Verification	
XII. Overall Assessment of Data	
XIII. Field Duplicates	
XIV. Field Blanks	
Note: A = Acceptable ND = No compounds detected N = Not provided/applicable R = Rinsate TB = Trip blank EB = Equipment blank	
Validated Samples:	
1 A1-IT Sed 11 21 31	
2 A1-IT Tissue 12 22 32	
3 1 A1-IT SedMS 13 23 33	
4 I A1-IT SedDUP 14 24 34	
5 A1-IT TissueMS 15 25 35	
6 A1-IT TissueDUP 16 26 36	
7   985   17   27   37	
8 2 PBT 18 28 38	
9 19 29 39	
10 20 30 40	
Notes:	

Date: 9-15-08

LDC #: 1946244 SDG #: K0803139

#### VALIDATION FINDINGS WORKSHEET Sample Specific Element Reference

Page:	1_of
Reviewer:	MG
2nd reviewer:_	\~\

All circled elements are applicable to each sample.

1		
Sample ID	Matrix	Target Analyte List (TAL)
1,2	Sed /tiss.	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,
@c 3 > 6	1.53.	AI, Sb. AS Ba, Be, Cd, Ca, Cr, Co, Cu Fe, Pb, Mg, Mn, Hg, Ni) K, Se, Ag, Na, (1, V, Zn, Mo) B, Si, CN',
<u> </u>	- * -	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 <sup>-</sup> ,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN',
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
· · · · · ·		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN <sup>-</sup> ,
		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 <sup>-</sup> ,
		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 <sup>-</sup> ,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al. Sb. As. Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN <sup>-</sup> ,
		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 <sup>-</sup> ,
		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 <sup>-</sup> ,
		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, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Analysis Method
ICP		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
ICP Trace	tissue	Al, Sb, As, Ba, Be, Cd, Ca, Cr Co, Cu Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, TI V Mo, B, Si, CN,
ICP-MS	sed/tis	AI, 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,
GFAA	tissue	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,

Comments: Mercury by CVAA if performed

19462A4 K0803139 SDG#:

METHOD: Trace Metals (EPA SW 846 Method 6010/7000) Sample Concentration units, unless otherwise noted: wng.

5x di VALIDATION FINDINGS WORKSHEET PB/ICB/CCB QUALIFIED SAMPLES Şoil preparation factor applied: 100 x

Page: Lof L Reviewer: MC 2nd Reviewer:

Associated Samples:

|gual:f: | Sample Identification N25 Sample ż Blank Action 0.055 0.038 imit 0.15 0.35 7, 0.15 0 Maximum ICB/CCB\* .022 110.0 04 0.0y Ö 0 Maximum PB. Maximum (mg/lKg) 0.004 0.15 0.03 70.07 0.09 PB. Analyte တ္တ Ba Be 8 ပ္ပ ප ਹ § ξ ₽ As 뫈 Zu S Ö Z

Samples with analyte concentrations within five times the associated ICB, CCB or PB concentration are listed above with the identifications from the Validation Completeness Worksheet. These sample results were Note: a - The listed analyte concentration is the highest ICB, CCB, or PB detected in the analysis of each element.

19462A4 K0803139

SDG #:

VALIDATION FINDINGS WORKSHEET PB/ICB/CCB QUALIFIED SAMPLES METHOD: Trace Metals (EPA SW 846 Method 6010/7000)

Page: Lof L Reviewer: MG

2nd Reviewer:

Soil preparation factor applied: 100 x ICP-MS: 5x4il

Associated Samples:

9

ified qual 3 O Sampl o N 0.065 0.25 0.048 Sample Concentration units, unless otherwise noted: Blank Action Limit 0.575 Maximum ICB/CCB\* 9.0.0 0.23 Maximum PB, Ton Maximum PB\* 0.013 0.05 mq(Ka) 60.0 Analyte Z S ₽ Se Ag Ra Ę ₽ 운 Ь F ပိ ವ Ξ S S Sp As Ва Be ర ₹

Samples with analyte concentrations within five times the associated ICB, CCB or PB concentration are listed above with the Identifications from the Validation Completeness Worksheet. These sample results were qualified as not defected, "U".

Note: a - The listed analyte concentration is the highest ICB, CCB, or PB detected in the analysis of each element.

LDC #: 14462A4 SDG #: K0803139 19462A4

## VALIDATION FINDINGS WORKSHEET Matrix Spike Analysis

Page: Reviewer:\_ 2nd 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".

| N 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 AN NA

of 4 or more, no action was taken. Was a post digestion spike analyzed for ICP elements that did not meet the required criteria for matrix spike recovery? LEVEL IV ONLY: N NA

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

Y N N/A

							F
*	Matrix Spike ID	Matrix	Analyte	<b>8</b> 8	Associated Samples	Qualifications	71
Ŀ	3	sed	Ca	170.5 (70-116)		Jdets/A	
رو	v	+1,550e	98	1	٣	<b>す/ひず/A</b>	<del></del>
			Hg				<del></del>
	->	->	A	53.3 (70-130)	•	^	
			D				٠.,
							_
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							_
							_
							_
	Commonte						ı
	.3.2						1
							1

SDG #: KOBO 3139 LDC #: 19462A4

## **VALIDATION FINDINGS WORKSHEET Duplicate Analysis**

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

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

Were all duplicate sample relative percent differences (RPD) < 20% for water samples and < 35% for soil samples? If no, see qualifications below. A control limit of ±R.L. (±2X R.L. for soil) was used for sample values that were <5X the R.L., including the case when only one of the duplicate sample values was <5X R.L.. If field blanks were used for laboratory duplicates, note in the Overall Assessment.

LEVEL IV ONLY:
Y N N/A We

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

y Sed Pb 57.8 (≤ 30) y Zn 46.4 ( t ) 1.34 y 2n 46.4 (t ) 1.34 y 3.75 y 3.	*	Duplicate ID	Matrix	Analyto	RPD (I	RPD (Limits)	Difference (Limits)	Associated Samples	Qualifications	
4 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	_	7	sed	Ьb	57.8	(30)			T/11.7/A	
		^	1	Σν	46.4	<b>→</b>			1 1 1	
									<b>&gt;</b>	
										Ī
										bracklet
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	1									Ī
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#### Lockheed West Seattle Superfund Site Data Validation Reports LDC# 19462

Butyltin



### Laboratory Data Consultants, Inc. Data Validation Report

**Project/Site Name:** 

Lockheed West Seattle Superfund Site

**Collection Date:** 

April 8, 2008

LDC Report Date:

September 25, 2008

Matrix:

Sediment/Tissue

Parameters:

**Butyltins** 

Validation Level:

EPA Level III

Laboratory:

Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): K0803139

Sample Identification

A1-IT Sed A1-IT Tissue

#### Introduction

This data review covers one sediment sample and one tissue sample listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per the Krone Method for Butyltins.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as 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

Initial calibration of compounds was performed as required by the method.

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

#### b. Calibration Verification

Calibration verification was performed at the required frequencies.

The percent differences (%D) of continuing standard mixtures were within the 25.0% QC limits.

The percent differences (%D) of the second source calibration standard were less than or equal to 25.0% for all compounds.

#### III. Blanks

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

No field blanks were identified in this SDG.

#### IV. Accuracy and Precision Data

#### a. Surrogate Recovery

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

#### b. 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.

#### c. Laboratory Control Samples

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

#### V. Target Compound Identification

Raw data were not reviewed for this SDG.

#### VI. Compound Quantitation and CRQLs

Raw data were not reviewed for this SDG.

#### **VII. System Performance**

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.

Lockheed West Seattle Superfund Site
Butyltins - Data Qualification Summary - SDG K0803139

No Sample Data Qualified in this SDG

Lockheed West Seattle Superfund Site Butyltins - Laboratory Blank Data Qualification Summary - SDG K0803139

No Sample Data Qualified in this SDG

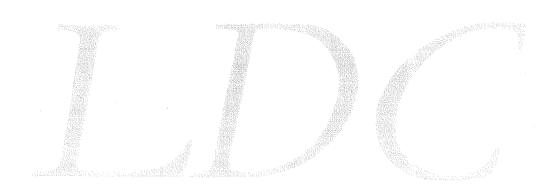
Lockheed West Seattle Superfund Site Butyltins - Field Blank Data Qualification Summary - SDG K0803139

No Sample Data Qualified in this SDG

SDG	#:19462A19 #:K0803139 ratory:_Columbia Analytic				LETEI Level II	NESS WOR	KSHEET	Date: 9/33/08 Page:lof/ Reviewer:
MET	HOD: GC Butyltins (Kron	e Me	thod)					2nd Reviewer:
The s	samples listed below were ation findings worksheets	e revi	ewed for ea	ch of the fo	ollowing	validation area	as. Validation	findings are noted in attached
	Validation	Area					Commer	nts
<u>l.</u>	Technical holding times			Δ	Sampling	dates:	1/8/00	
lla.	Initial calibration			۸		0 = 20		
IIb.	Calibration verification/ICV			٨	1 '	/cov = >	~	
111.	Blanks			Δ	1			
IVa	Surrogate recovery			A				
IVb	Matrix spike/Matrix spike du	plicate	es	N	ch	ent spe	difiel	
IVc	Laboratory control samples			A	Le	<del>&gt;</del> J	V	
<u>V.</u>	Target compound identifica	tion		N				
VI.	Compound Quantitation and	CRQ	Ls	N				
VII.	System Performance	nen a		N				
VIII	Overall assessment of data			Δ				
IX.	Field duplicates			N				
X.	Field blanks			N				
Note:	A = Acceptable N = Not provided/applicable SW = See worksheet		R = Rins	o compounds sate eld blank	s detected	TB = Tri		
Valida	ted Samples: Sidinent	4	Tissus	<u> </u>				
1 1	A1-IT Sed	11 \	1	80338	1-4 21		31	
2 <b>2</b>	A1-IT Tissue	12 2	KWGO	801275	- 4 22		32	
3 4		13			23		33	
4		14			24		34	
5		15			25		35	
6		16			26		36	
7		17			27		37	
8		18			28		38	
9		19			29		39	
10		20			30		40	
Notes	:							

### Lockheed West Seattle Superfund Site Data Validation Reports LDC# 19462

Dioxins/Dibenzofurans



### Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Lockheed West Seattle Superfund Site

**Collection Date:** 

April 8, 2008

LDC Report Date:

September 24, 2008

Matrix:

Sediment/Tissue

Parameters:

Dioxins/Dibenzofurans

Validation Level:

EPA Level III

Laboratory:

Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): K0803139

Sample Identification

A1-IT Sed

A1-IT Tissue

A1-IT TissueMS

A1-IT TissueMSD

#### Introduction

This data review covers one sediment samples and 3 tissue samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8290 for Polychlorinated Dioxins/Dibenzofurans.

This review follows USEPA Contract Laboratory Program National Functional Guidelines for Polychlorinated Dioxins/Dibenzofurans Data Review (September 2005) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as 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.

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. HRGC/HRMS instrument Performance Check

Instrument performance was checked at the required daily frequency.

Retention time windows were established for all homologues. The chromatographic resolution between 2,3,7,8-TCDD and peaks representing any other unlabeled TCDD isomer was less than or equal to 25%.

#### III. Initial Calibration

A five point initial calibration was performed as required by the method.

Percent relative standard deviations (%RSD) were less than or equal to 20.0% for unlabeled compounds and less than or equal to 30.0% for labeled compounds.

The ion abundance ratios for all PCDDs and PCDFs were within validation criteria.

#### 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 20.0% for unlabeled compounds and less than or equal to 30.0% for labeled compounds with the following exceptions:

Date	Compound	%D	Associated Samples	Affected Compound	Flag	A or P
8/12/08	<sup>13</sup> C-OCDD	35.92	A1-IT Tissue A1-IT TissueMS	OCDD	J (all detects) UJ (all non-detects)	А
			A1-IT TissueMSD EQ0800331-01	OCDF	J (all detects) UJ (all non-detects)	

The ion abundance ratios for all PCDDs and PCDFs were within validation criteria.

#### V. Blanks

Method blanks were reviewed for each matrix as applicable. No polychlorinated dioxin/dibenzofuran contaminants were found in the method blanks with the following exceptions:

Method Blank ID	Extraction Date	Compound	Concentration	Associated Samples
EQ0800166-01	4/18/08	1,2,3,4,6,7,8-HpCDD OCDD Total HpCDD	0.269 ng/Kg 1.33 ng/Kg 0.533 ng/Kg	A1-IT Sed
EQ0800331-01	8/1/08	1,2,3,4,6,7,8-HpCDD OCDD 2,3,7,8-TCDF 1,2,3,4,6,7,8-HpCDF OCDF Total HpCDD Total TCDF Total PeCDF Total HpCDF Total HpCDF	4.70 ng/Kg 51.3 ng/Kg 0.137 ng/Kg 0.479 ng/Kg 5.85 ng/Kg 7.44 ng/Kg 0.137 ng/Kg 0.679 ng/Kg 1.93 ng/Kg	A1-IT Tissue

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
A1-IT Tissue	1,2,3,4,6,7,8-HpCDD	4.67 ng/Kg	4.67U ng/Kg
	OCDD	38.4 ng/Kg	38.4U ng/Kg
	1,2,3,4,6,7,8-HpCDF	0.823 ng/Kg	3.13U ng/Kg
	OCDF	4.23 ng/Kg	6.26U ng/Kg
	Total HpCDD	12.1 ng/Kg	12.1U ng/Kg
	Total PeCDF	0.169 ng/Kg	3.13U ng/Kg
	Total HpCDF	3.73 ng/Kg	3.73U ng/Kg

No field blanks were identified in this SDG.

#### VI. 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 the QC limits with the following exceptions:

Spike ID (Associated Samples)	Compound	MS (%R) (Limits)	MSD (%R) (Limits)	RPD (Limits)	Flag	A or P
A1-IT TissueMS/MSD (A1-IT Tissue)	2,3,7,8-TCDD	-	136 (87-135)	-	J (all detects)	A

#### VII. Laboratory Control Samples (LCS)

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

LCS ID (Associated Samples)	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Flag	A or P
EQ0800331-02 (A1-IT Tissue EQ0800331-01)	2,3,7,8-TCDD	140 (87-135)	•	•	J (all detects)	Р

#### VIII. Regional Quality Assurance and Quality Control

Not applicable.

#### IX. Internal Standards

All internal standard recoveries were within QC limits.

#### X. Target Compound Identifications

Raw data were not reviewed for this SDG.

#### XI. Compound Quantitation and CRQLs

Raw data were not reviewed for this SDG.

#### XII. System Performance

Raw data were not reviewed for this SDG.

#### XIII. Overall Assessment of Data

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

#### XIV. Field Duplicates

No field duplicates were identified in this SDG.

#### Lockheed West Seattle Superfund Site Dioxins/Dibenzofurans - Data Qualification Summary - SDG K0803139

SDG	Sample	Compound	Flag	A or P	Reason
K0803139	A1-IT Tissue	OCDD	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	А	Routine calibration (%D)
K0803139	A1-IT Tissue	2,3,7,8-TCDD	J (all detects)	A	Matrix spike/Matrix spike duplicates (%R)
K0803139	A1-IT Tissue	2,3,7,8-TCDD	J (all detects)	Р	Laboratory control samples (%R)

#### Lockheed West Seattle Superfund Site Dioxins/Dibenzofurans - Laboratory Blank Data Qualification Summary - SDG K0803139

SDG	Sample	Compound	Modified Final Concentration	A or P
K0803139	A1-IT Tissue	1,2,3,4,6,7,8-HpCDD OCDD 1,2,3,4,6,7,8-HpCDF OCDF Total HpCDD Total PeCDF Total HpCDF	4.67U ng/Kg 38.4U ng/Kg 3.13U ng/Kg 6.26U ng/Kg 12.1U ng/Kg 3.13U ng/Kg 3.73U ng/Kg	А

Lockheed West Seattle Superfund Site Dioxins/Dibenzofurans - Field Blank Data Qualification Summary - SDG K0803139

No Sample Data Qualified in this SDG

)G #:	19462A21 K0803139 tory: Columbia Analyti			N COMPLE Leve		WORKS	HEET	Date:
ETHO	DD: HRGC/HRMS Did	oxins/Dib	enzofuran	s (EPA SW 84	6 Method	3290)		
e sa idati	mples listed below we on findings worksheet	ere reviev ts.	ved for ead	ch of the follow	<i>i</i> ng validat	on areas. '	Validation fi	ndings are noted in attache
	Validatio	- Aros					Comment	\$
	Technical holding times	II Alea		∧ San	npling dates:	4/8	108	
<u>I.</u> II.	HRGC/HRMS Instrument	nerformar	ce check	A				
III.	Initial calibration	penonna	ice check	Δ				
IV.	Routine calibration/ICV			sw				
V.	Blanks			SW				
VI.	Matrix spike/Matrix spike	duplicates		SW				
VII.	Laboratory control sample			5 <b>W</b>	ws/p			
VIII.	Regional quality assurance		lity control	N				
IX.	Internal standards			Λ.				
X.	Target compound identifi	cations		N				
XI.	Compound quantitation a		3	N				
XII.	System performance			N				
XIII.	Overall assessment of da	ata		A				
XIV.	Field duplicates			N				
				N				
XV. ote:	Field blanks  A = Acceptable N = Not provided/applica SW = See worksheet ad Samples:		R = Riı FB = F	ield blank	tected	D = Duplic TB = Trip I EB = Equi		
		11 /		100166-0	/ 21		31	
	A1-IT Sed	12 2	E008	(0033/-0)	1 22		32	
	A1-IT Tissue A1-IT TissueMS	13			23		33	
	A1-IT TissueMSD	14			24		34	
	AT-IT TISSUEIVISU	15	·		25		35	
<u>-</u>		16			26		36	
,		17			27		37	
,		18			28		38	
3		19			29		39	
9		19			+		40	

# VALIDATION FINDINGS WORKSHEET

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)

A. 2,3,7,8-TCDD	F. 1,2,3,4,6,7,8-HpCDD	K. 1,2,3,4,7,8-HxCDF	P. 1,2,3,4,7,8,9-HpCDF	U. Total HpCDD
B. 1,2,3,7,8-PeCDD	G. OCDD	L. 1,2,3,6,7,8-HxCDF	a. ocdf	V. Total TCDF
C. 1,2,3,4,7,8-HxCDD	H. 2,3,7,8-TCDF	M. 2,3,4,6,7,8-HxCDF	R. Total TCDD	W. Total PeCDF
D. 1,2,3,6,7,8-HxCDD	I. 1,2,3,7,8-PeCDF	N. 1,2,3,7,8,9-HxCDF	S. Total PeCDD	X. Total HxCDF
E. 1,2,3,7,8,9-HxCDD	J. 2,3,4,7,8-PeCDF	O. 1,2,3,4,6,7,8-HpCDF	T. Total HxCDD	Y. Total HpCDF

Notes:

LDC #: 1946 2.42/ SDG #: 100 cover

# **VALIDATION FINDINGS WORKSHEET**

Routine Calibration

Reviewer:\_ 2nd Reviewer:

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)

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

Was a routine calibration was performed at the beginning and end of each 12 hour period? Were all percent differences (%D) of RRFs  $\leq$  20% for unlabeled compounds and  $\leq$  30% for labeled?

Y N N/A

Did all routine calibration standards meet the Ion Abundance Ratio criteria?

	Date	Standard ID	Compound	Finding %D (Limit: ≤30.0%)	Finding Ion Abundance Ratio	Associated Samples		Qualifications
1/2	80/e//8	10/0026	130-000		(38)	EQU800331-01,	n/ (	147/A OUAL
‡		(Ending car)				74-6		9+6
		/ P						
					A COUNTY OF THE PARTY OF THE PA			
		PCDDs S	Selected ions (m/z)	lon Abundance Ratio	PCDFs	Selected ions (m/z)	(m/z)	Ion Abundance Ratio
🖺	Tetra-		M/M+2	0.65-0.89	Tetra-	M/M+2		0.65-0.89
۵	Penta-		M+2/M+4	1.32-1.78	Penta-	M+2/M+4		1.32-1.78
Ĭ	Hexa-		M+2/M+4	1.05-1.43	Hexa-	M+2/M+4		1.05-1.43
エ	exa-13C-H	Hexa- <sup>13</sup> C-HxCDF (IS) only	M/M+2	0.43-0.59	Hexa- <sup>13</sup> C-HxCDF (IS) only	y M/M+2		0.43-0.59
Ĭ	epta- <sup>13</sup> C-H	Hepta-13C-HpCDF (IS) only	M/M+2	0.37-0.51	Hepta-13C-HpCDF (IS) only	lly M/M+2		0.37-0.51
Ť	Hepta-		M+2/M+4	0.88-1.20	Hepta-	M+2/M+4		0.88-1.20
$\Gamma_{c}$	Octa-		M+2/M+4	0.76-1.02	Octa-	M+2/M+4		0.76-1.02

9462A21	per cours
LDC #:	SDG #:

## **VALIDATION FINDINGS WORKSHEET** Blanks

Reviewer:\_ 2nd Reviewer:\_

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)

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

Were all samples associated with a method blank?

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

Was the method blank contaminated? Blank extraction date: 4/18/08 Conc. units: 79/kg √/N N/A

Blank analysis date:  $\frac{4/22}{0}$ 

Associated samples:

Compound	Blank ID			Sar	Sample Identification	ion		
	F& 08 00 166-01	10-99						
Æ	0.369							
9	7.33							
N	655.0							

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# 1946242/ SDG#: per cover

# VALIDATION FINDINGS WORKSHEET Blanks

Page: \_\_\_\_ot\_\_ Reviewer: \_\_\_\_\_\_ 2nd Reviewer: \_\_\_\_\_

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)

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

Was a method blank performed for each matrix and whenever a sample extraction was performed? Were all samples associated with a method blank? Y N/A N/A N/A Y N/A

Y N/A Was the method blank contaminated?

Blank extraction date: 8//2 Blank analysis date: 8//2/0 X

Associated samples:

eg.

Sample Identification 16.269 0.169/31/34 13/34 4.67/4 38.4/4 0,823 4.23 0 33/ FQ OYOG Blank ID 0.737 4.70 0.479 0.679 1.93 5,82 7.44 0.137 Compound Conc. units: 199 3 P O 2 U Ø

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".

19462421 LDC #:\_ SDG #:

## VALIDATION FINDINGS WORKSHEET Matrix Spike/Matrix Spike Duplicates

Page: Reviewer. 2nd Reviewer:

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)

الاالا". Bease qualifications below for all questions answered "N". Not applicable questions are identified as

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. ∀N Z

N/A

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?

	Qualifications	2/400																	
	Associated Samples	2																	
	RPD (Limits)	( )	( )	( )	( )	( )	( )	( )	( )			)	( )	( )			( )		,
COM	MSD %R (Limits)	136 (87-135)	( )		( )	( )	( )	( )				( )	( )			( )			(
	MS %R (Limits)	( )	( )				(					( )	( )						( )
	Compound	∀																	
	DI OSW/SW	778										L_							
	# Date	╬.																	

(9462AD) des coner

> LDC #: SDG#:

# VALIDATION FINDINGS WORKSHEET

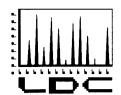
Page: Reviewer.\_ 2nd Reviewer.\_

Laboratory Control Samples (LCS)

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)

Was a LCS required? Was a LCS analyzed every 20 samples for each matrix or whenever a sample extraction was performed? Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits? Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A". AN N N

						_					-10		<del>-</del> -	 <del>-</del>	_	7	_	<del>-</del>	_	<del>-  </del> -	1	- 1	-	_	Т	7	T	7
	Qualifications	) Itali																										
	Associated Samples	EQ080033/0/	7																									
	RPD (Limits)	( )	( )	(			( )	( )	( )	( )	( )	(		7		( )		( )	( )	( )	( )	( )				)	)	( )
	LCSD %R (Limits)	( )				( )	( )	( )						( )		( )	(	( )	( )	( )	( )				)	( )		
1	LCS %R (Limits)	1251-121 AV			( )	( )	( )								( )	( )		( )	( )	)					( )	( )		
l lecoveries	pullodado	2. A																										
Were the LCS percent recoveries ( /arx)	oonorojed/di ne i		#Q 0000 2010																									
/ N N/A		# Date																										



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

Tetra Tech EC, Inc. 19803 North Creek Parkway

Bothell, WA 98011

ATTN: Ms. Mary Diesel

SUBJECT: Lockheed West Seattle Superfund Site, Data Validation

Dear Ms. Diesel,

Enclosed are the revised data validation reports for the fractions listed below. Please replace the previously submitted reports with the enclosed revised reports.

SDG# LDC# **Fraction** 19481A4 K0804288 Metals

19481A21 Dioxins/Dibenzofurans K0804288

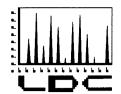
Please feel free to contact us if you have any questions.

Sincerely,

Erlinda T. Rauto

**Operations Manager/Senior Chemist** 

October 22, 2008



#### LABORATORY DATA CONSULTANTS, INC.

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

Tetra Tech EC, Inc. 19803 North Creek Parkway Bothell, WA 98011 ATTN: Ms. Mary Diesel October 2, 2008

SUBJECT: Lockheed West Seattle Superfund Site, Data Validation

Dear Ms. Diesel,

Enclosed are the final validation reports for the fractions listed below. This SDG was received on September 17, 2008. Attachment 1 is a summary of the samples that were reviewed for each analysis.

#### **LDC Project # 19481:**

#### SDG # Fraction

K0804288 Semivolatiles, Polynuclear Aromatic Hydrocarbons, Chlorinated

Pesticides, Polychlorinated Biphenyls, Metals, Butyltins,

Dioxins/Dibenzofurans

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

- 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
- USEPA, Contract Laboratory Program National Functional Guidelines for Polychlorinated Dioxins/Diobenzofurans Data Review, September 2005
- 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; IIIB, November 2004; Update IV, February 2007

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

Sincerely,

Erlinda T. Rauto

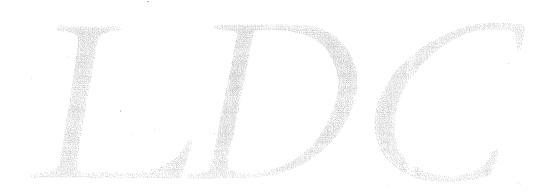
Operations Manager/Senior Chemist

Attachment 1

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hE	Pest. (8081A)	⊢	2																														7
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īa	PAHS (8270C -SIM)	S	0																														0
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#### Lockheed West Seattle Superfund Site Data Validation Reports LDC# 19481

Semivolatiles



### Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Lockheed West Seattle Superfund Site

**Collection Date:** 

May 13 through May 14, 2008

LDC Report Date:

September 25, 2008

Matrix:

Sediment/Water

Parameters:

Semivolatiles

Validation Level:

EPA Level III

Laboratory:

Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): K0804288

#### Sample Identification

5A-S

4B-S

3A-S

3D-S

RB-S

#### Introduction

This data review covers 4 sediment samples and one water sample listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8270C for Semivolatiles.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as 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 XVI.

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/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

#### III. Initial Calibration

Initial calibration was performed using required standard concentrations.

Percent relative standard deviations (%RSD) were less than or equal to 15.0% for each individual compound and less than or equal to 30.0% for calibration check compounds (CCCs).

In the case where %RSD was greater than 15.0%, the laboratory used a calibration curve to evaluate the compound. All coefficients of determination  $(r^2)$  were greater than or equal to 0.990.

For the purposes of technical evaluation, all compounds were evaluated against the 30.0% (%RSD) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria.

Average relative response factors (RRF) for all semivolatile target compounds were greater than or equal to 0.05 as required.

#### IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

Percent differences (%D) between the initial calibration RRF and the continuing calibration RRF were within the method criteria of less than or equal to 20.0% for calibration check compounds (CCCs).

For the purposes of technical evaluation, all compounds were evaluated against the 25.0% (%D) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria.

The percent differences (%D) of the second source calibration standard were less than or equal to 25.0% for all compounds.

All of the continuing calibration RRF values were greater than or equal to 0.05.

#### V. Blanks

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

Sample RB-S was identified as a rinsate blank. No semivolatile contaminants were found in this blank.

#### 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

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.

#### VIII. Laboratory Control Samples (LCS)

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

#### IX. Regional Quality Assurance and Quality Control

Not applicable.

#### X. Internal Standards

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

#### XI. Target Compound Identifications

Raw data were not reviewed for this SDG.

#### XII. Compound Quantitation and CRQLs

Raw data were not reviewed for this SDG.

#### XIII. Tentatively Identified Compounds (TICs)

Raw data were not reviewed for this SDG.

#### XIV. System Performance

Raw data were not reviewed for this SDG.

### XV. Overall Assessment

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

### XVI. Field Duplicates

Samples 3A-S and 3D-S were identified as field duplicates. No semivolatiles were detected in any of the samples with the following exceptions:

	Concentra	tion (ug/Kg)	
Compound	3A-S	3D-S	RPD
Naphthalene	55	57	4
2-Methylnaphthalene	34	37	8
Acenaphthylene	<sub>,</sub> 100	110	10
Acenaphthene	140	160	13
Dibenzofuran	76	79	4
Fluorene	160	170	6
Phenanthrene	1200	1200	0
Anthracene	320	380	17
Fluoranthene	2000	2000	0
Pyrene	2100	2000	5
Benzo(a)anthracene	930	970	4
Chrysene	1500	1500	0
Benzo(b)fluoranthene	1700	1700	0
Benzo(k)fluoranthene	610	560	9
Benzo(a) pyrene	1200	1200	0
Indeno(1,2,3-cd)pyrene	760	780	3

	Concentra		
Compound	3A-S	3D-S	RPD
Dibenz(a,h)anthracene	190	200	5
Benzo(g,h,i)perylene	660	680	3

Lockheed West Seattle Superfund Site Semivolatiles - Data Qualification Summary - SDG K0804288

No Sample Data Qualified in this SDG

Lockheed West Seattle Superfund Site Semivolatiles - Laboratory Blank Data Qualification Summary - SDG K0804288

No Sample Data Qualified in this SDG

Lockheed West Seattle Superfund Site Semivolatiles - Field Blank Data Qualification Summary - SDG K0804288

No Sample Data Qualified in this SDG

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METH	atory: <u>Columbia</u> HOD: GC/MS Po	lvnuclea	Aror	matic Hvdro	carbons (El	PA SW	/ 846	at Fo Method	8270C)		2nd	Reviewer: Reviewer:	77
The s	amples listed bel tion findings wor	benzo low were	revie	ewed for eac	ch of the fol	lowing	valida	ation are	eas. Validat	ion find	dings are	noted in a	attached
	Val	idation	Area						Com	nents			
I.	Technical holding	times			Δ	Sampling	g dates	: S	13- 5	1141	03		
11.	GC/MS Instrumen	t performa	nce cl	neck	4					1., (			
III.	Initial calibration				А	% Ps	-D,	_(	20.990	)	PRF	no spe	ce
IV.	Continuing calibra	tion/ICV			Δ	la	£ 2	_				<u> </u>	
V.	Blanks				Δ								
VI.	Surrogate spikes				A								
VII.	Matrix spike/Matri	x spike duj	olicate	s	N	<u>chi</u>		me in	Jii				
VIII.	Laboratory contro	l samples			A	LC	> lp	1					
IX.	Regional Quality	Assurance	and C	uality Control	N								
X.	Internal standards	i			$\triangle$								
XI.	Target compound identification			N									
XII.	Compound quanti	tation/CR0	QLs		N								
XIII.	Tentatively identif	ied compo	unds (	TICs)	N								
XIV.	System performal	nce			N								
XV.	Overall assessme				Δ								
		- Cr data			2W	n	<b>~</b>		. 1				
XVI.				:		<u> </u>		<u>31</u>	Ч				
XVII	Field blanks				ן מא	KY	5 5	<u> </u>					
Note:	A = Acceptable N = Not provided/ SW = See worksl			R = Rins	compounds sate eld blank	detected	d	TB =	uplicate Trip blank Equipment bla	ınk			
Validat	ed Samples:		ùer	* + u	alw								
1	5A-S <b>\$</b>	ed	11	KWG	080690	1-5				31			
2	4B-S		12	1	0804750	1 .				32			
3	3A-S		13			23				33			
4	3D-S	1	14			24				34			
5	RB-S V	<b>/</b>	15			25				35			
6			16			26				36			
7			17			27				37			
8			18			28				38			
9			19			29	,			39			

LDC#: <u>19481A2a</u> SDG#: <u>K0804288</u>

### VALIDATION FINDINGS WORKSHEET Field Duplicates

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

$\mathbf{Y}_{I}$	N	NA
	N	NA

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

	Concentra	tion (ug/Kg)		
Compound	3	4	RPD	
Naphthalene	55	57	4	
2-Methylnaphthalene	34	37	8	
Acenaphthylene	100	110	10	
Acenaphthene	140	160	13	
Dibenzofuran	76	79	4	
Fluorene	160	170	6	
Phenanthrene	1200	1200	0	
Anthracene	320	380	17	
Fluoranthene	2000	2000	0	
Pyrene	2100	2000	5	
Benzo(a)anthracene	930	970	4	
Chrysene	1500	1500	0	
Benzo(b)fluoranthene	1700	1700	0	
Benzo(k)fluoranthene	610	560	9	
Benzo(a)pyrene	1200	1200	0	
Indeno(1,2,3-cd)pyrene	760-	780	3	
Dibenz(a,h)anthracene	190	200	5	
Benzo(g,h,i)perylene	660	680	3	

### Lockheed West Seattle Superfund Site Data Validation Reports LDC# 19481

Polynuclear Aromatic Hydrocarbons



### Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Lockheed West Seattle Superfund Site

**Collection Date:** 

May 13, 2008

LDC Report Date:

September 25, 2008

Matrix:

Tissue

Parameters:

Polynuclear Aromatic Hydrocarbons

Validation Level:

EPA Level III

Laboratory:

Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): K0804288

Sample Identification

5A-C

4B-C

### Introduction

This data review covers 2 tissue samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8270C using Selected Ion Monitoring (SIM) for Polynuclear Aromatic Hydrocarbons.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as 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 XVI.

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/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

### III. Initial Calibration

Initial calibration was performed using required standard concentrations.

Percent relative standard deviations (%RSD) were less than or equal to 30.0% for all compounds.

Average relative response factors (RRF) for all target compounds and system monitoring compounds were within validation criteria.

### IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

All of the continuing calibration percent differences (%D) between the initial calibration RRF and the continuing calibration RRF were less than or equal to 25.0%.

The percent differences (%D) of the second source calibration standard were less than or equal to 25.0% for all compounds.

All of the continuing calibration RRF values were within validation criteria.

### V. Blanks

Method blanks were reviewed for each matrix as applicable. No polynuclear aromatic hydrocarbon contaminants were found in the method blanks.

No field blanks were identified in this SDG.

### 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

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.

### VIII. Laboratory Control Samples (LCS)

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

### IX. Regional Quality Assurance and Quality Control

Not applicable.

### X. Internal Standards

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

### XI. Target Compound Identifications

Raw data were not reviewed for this SDG.

### XII. Compound Quantitation and CRQLs

Raw data were not reviewed for this SDG.

### XIII. Tentatively Identified Compounds (TICs)

Raw data were not reviewed for this SDG.

### XIV. System Performance

Raw data were not reviewed for this SDG.

### XV. Overall Assessment

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

### XVI. Field Duplicates

No field duplicates were identified in this SDG.

Lockheed West Seattle Superfund Site Polynuclear Aromatic Hydrocarbons - Data Qualification Summary - SDG K0804288

No Sample Data Qualified in this SDG

Lockheed West Seattle Superfund Site Polynuclear Aromatic Hydrocarbons - Laboratory Blank Data Qualification Summary - SDG K0804288

No Sample Data Qualified in this SDG

Lockheed West Seattle Superfund Site Polynuclear Aromatic Hydrocarbons - Field Blank Data Qualification Summary - SDG K0804288

No Sample Data Qualified in this SDG

LDC #:_	19481A2b	VALIDATION COMPLETENESS WORKSHEET	Date: 9/23/
SDG #:_	K0804288	Level III	Page: /of/
Laborato	ory: Columbia Analyt	ical Services	Reviewer:
			2nd Reviewer:

METHOD: GC/MS Polynuclear Aromatic Hydrocarbons (EPA SW 846 Method 8270C-SIM)

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		Sampling dates: 5//3/68
11.	GC/MS Instrument performance check	Δ	,
III.	Initial calibration	Δ_	
IV.	Continuing calibration/ICV	A	1CV = 25
V.	Blanks	Δ	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	N	client specifical
VIII.	Laboratory control samples	Δ	LCS/P
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	Δ	
XI.	Target compound identification	N	
XII.	Compound quantitation/CRQLs	N	
XIII.	Tentatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data	A	
XVI.	Field duplicates	N	
XVII.	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:

-	Pessue					
1	5A-C	11	KWG0807353.	25	31	
2	4B-C	12		22	 32	
3		13		23	33	
4		14		24	34	
5		15		25	35	
6		16		26	36	
7		17		27	37	
8		18		28	38	
9		19		29	39	
10		20		30	40	

### Lockheed West Seattle Superfund Site Data Validation Reports LDC# 19481

**Chlorinated Pesticides** 



### Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Lockheed West Seattle Superfund Site

**Collection Date:** 

May 13 through May 14, 2008

LDC Report Date:

September 25, 2008

Matrix:

Sediment/Tissue/Water

Parameters:

Chlorinated Pesticides

Validation Level:

EPA Level III

Laboratory:

Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): K0804288

### Sample Identification

5A-S

5A-C

4B-S

4B-C

3A-S

3D-S

RB-S

5A-SMS

5A-SMSD

4B-SMS

4B-SMSD

3A-SMS

3A-SMSD

3D-SMS

3D-SMSD

### Introduction

This data review covers 12 sediment samples, 2 tissue samples, and one water sample listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8081A for Chlorinated Pesticides.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as 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.

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 single and multicomponent compounds was performed for the primary (quantitation) column and confirmation column as required by this method.

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

A curve fit, based on the initial calibration, was established for quantitation for selected compounds. The coefficient of determination  $(r^2)$  was greater than or equal to 0.990.

### 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 with the following exceptions:

Date	Standard	Column	Compound	%D	Associated Samples	Flag	A or P
8/8/08	0808F004/08	DB-XLB	Endosulfan sulfate cis-Nonachlor Mirex	16 16 15.2	5A-C 4B-C KWG0807318-4	J (all detects) UJ (all non-detects)	Α
5/29/08	0828F023/27	DB-XLB	2,4'-DDE	17	RB-S KWG0804653-9	J (all detects) UJ (all non-detects)	А

The percent differences (%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	Flag	A or P
5/28/08	CAL7391-ICV	DB-XLB	4,4'-DDE	30	RB-S KWG0804653-9	J (all detects) UJ (all non-detects)	Α

Date	Standard	Column	Compound	%D	Associated Samples	Flag	A or P
5/28/08	CAL7391-ICV	DB-35M	4,4'-DDD	39	RB-S KWG0804653-9	J (all detects) UJ (all non-detects)	А

The individual 4,4'-DDT and Endrin breakdowns (%BD) were less than or equal to 15.0%.

### V. Blanks

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

Sample RB-S was identified as a rinsate blank. No chlorinated pesticide contaminants were found in this blank with the following exceptions:

Rinsate Blank ID	Sampling Date	Compound	Concentration	Associated Samples
RB-S	5/14/08	gamma-BHC	1.2 ng/L	All sediment samples in SDG K0804288

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

Spike ID (Associated Samples)	Compound	MS (%R) (Limits)	MSD (%R) (Limits)	RPD (Limits)	Flag	A or P
5A-SMS/MSD (5A-S)	Heptachlor Endrin aldehyde Methoxychlor	-	-	48 (≤40) 41 (≤40) 63 (≤40)	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) and relative percent differences (RPD) were within QC limits with the following exceptions:

LCS ID (Associated Samples)	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Flag	A or P
KWG0804653- LCS/D	Aldrin	23 (50-150)	22 (50-150)	-	J (all detects) UJ (all non-detects)	Р
(RB-S KWG0804653-9)	Toxaphene	-	-	37 (≤30)	J (all detects) UJ (all non-detects)	

### 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 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

The sample results for detected compounds from the two columns were within 40% relative percent difference (RPD) with the following exceptions:

Sample	Compound	RPD	Flag	A or P
5A-S	alpha-Chlordane 4,4'-DDE	74.5 87.3	J (all detects) J (all detects)	А
4B-S	Endrin	43.8	J (all detects)	А
3A-S	gamma-Chlordane	62.5	J (all detects)	А

Sample	Compound	RPD	Flag	A or P
3D-S	delta-BHC Endrin	50.0 43.9	J (all detects) J (all detects)	A
5A-C	gamma-Chlordane 4,4'-DDE 4,4'-DDD	80.0 46.2 46.9	J (all detects) J (all detects) J (all detects)	А
4B-C	gamma-Chlordane	54.5	J (all detects)	А

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

Samples 3A-S and 3D-S were identified as field duplicates. No chlorinated pesticides were detected in any of the samples with the following exceptions:

	Concentra	tion (ug/Kg)	
Compound	3A-S	3D-S	RPD
gamma-Chlordane	11	11U	200
alpha-Chlordane	0.48	0.68	34
Endrin	1.0	1.0	0
4,4'-DDD	3.4	4.2	21
2,4'-DDT	19	19	0
detta-BHC	1.8U	1.8	200

### Lockheed West Seattle Superfund Site Chlorinated Pesticides - Data Qualification Summary - SDG K0804288

SDG	Sample	Compound	Flag	A or P	Reason
K0804288	5A-C 4B-C	Endosulfan sulfate cis-Nonachlor Mirex	J (all detects) UJ (all non-detects)	А	Continuing calibration (%D)
K0804288	RB-S	2,4'-DDE	J (all detects) UJ (all non-detects)	Α	Continuing calibration (%D)
K0804288	RB-S	4,4'-DDE 4,4'-DDD	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	А	Continuing calibration (ICV %D)
K0804288	5A-S	Heptachlor Endrin aldehyde Methoxychlor	J (all detects) UJ (all non-detects)	А	Matrix spike/Matrix spike duplicates (RPD)
K0804288	RB-S	Aldrin	J (all detects) UJ (all non-detects)	Р	Laboratory control samples (%R)
K0804288	RB-S	Toxaphene	J (all detects) UJ (all non-detects)	Р	Laboratory control samples (RPD)
K0804288	5A-S	alpha-Chlordane 4,4'-DDE	J (all detects) J (all detects)	А	Compound quantitation and CRQLs (RPD)
K0804288	4B-S	Endrin	J (all detects)	A	Compound quantitation and CRQLs (RPD)
K0804288	3A-S 4B-C	gamma-Chlordane	J (all detects)	А	Compound quantitation and CRQLs (RPD)
K0804288	3D-S	delta-BHC Endrin	J (all detects) J (all detects)	А	Compound quantitation and CRQLs (RPD)
K0804288	5A-C	gamma-Chlordane 4,4'-DDE 4,4'-DDD	J (all detects) J (all detects) J (all detects)	А	Compound quantitation and CRQLs (RPD)

Lockheed West Seattle Superfund Site Chlorinated Pesticides - Laboratory Blank Data Qualification Summary - SDG K0804288

No Sample Data Qualified in this SDG

### Lockheed West Seattle Superfund Site Chlorinated Pesticides - Field Blank Data Qualification Summary - SDG K0804288

No Sample Data Qualified in this SDG

LDC #:	19481A3a	VALIDATION COMPLETENESS WORKSHEET
SDG #:_	K0804288	Level III
Laborato	ry: Columbia Analytica	Services

2nd Reviewer:

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081A)

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	A	Sampling dates: 5/13 - 5/14
II.	GC/ECD Instrument Performance Check	Δ	
III.	Initial calibration	Δ	1/2 20D, 12 20.990
IV.	Continuing calibration/ICV	ررىي	1CV = 15
V.	Blanks	A	
VI.	Surrogate spikes	Δ	
VII.	Matrix spike/Matrix spike duplicates	SW	AI-IT Tissue MS 10
VIII.	Laboratory control samples	5₩	109/0
IX.	Regional quality assurance and quality control	N	
Xa.	Florisil cartridge check	N	
Xb.	GPC Calibration	N	
XI.	Target compound identification	N	
XII.	Compound quantitation and reported CRQLs	SW	
XIII.	Overall assessment of data	A	
XIV.	Field duplicates	SW	P= 5+6
XV.	Field blanks	يسي	RB = 7

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: 1. Tisque & Walin

	Sek	enen,	-	~ a U	accr				
1 /	5A-S 🗻	Sediment	11	4B-SMSD	Sed	21 /	KW G0806929-		
2 1	5A-C	Tissiu	12	3A-SMS		222	KWG0807318-		
3 /	4B-S 🗸	Sid	13	3A-SMSD		23.3	KWG0804653-	33 /	
4 2	4B-C	Tissue	14	3D-SMS		24		34	
5 /	3A-S ,	Sul	15	3D-SMSD	<u> </u>	25		35	
6 /	3D-S	Seel	16			26		36	
7	RB-S	water	17			27		37	
8	5A-SMS	Sed	18			28		38	
9	5A-SMSD	1	19			29		39	
10	4B-SMS	۵	20			30		40	

## VALIDATION FINDINGS WORKSHEET

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

	Y. Argelog. 1242	90,		Z. Aroclor-1248		AA. Aroclor-1254			BB. Aroclor-1260	777		CC: DB 608		DO DB 4764	11		EE.	WW.		
O Charles	4. Endrin ketone		R. Endrin aldehyde		S S S S S S S S S S S S S S S S S S S	S. arpita-Chiordane		T. gamma-Chlordane			U. Toxaphene			V. Araciar-1016		W. Aroclor-1221	177)-10:00		X. Aroclor-1232	
1. Dieldrin		J. 4,4'-DDE			K. Endrin		L. Endoenifen :			M. 4,4".DDD			N. Endosulfan sulfate			O. 4,4-00T		P. Methoxychior		
A. alpha-BHC		B. beta-BHC		C. delta-BHC			U. gamma-BHC		E Hentschille			F. Aldrin			G. Heptachlor epoxide			H. Endosuifan I		

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

Notes:

1988/432 E 67 SDG#:\_ LDC #:

GC HPLC

METHOD:

### VALIDATION FINDINGS WORKSHEET

Continuing Calibration

2nd Reviewer:

Page: of

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%?

Level IV Anly NNA

Y N XVA

Were the retention times for all calibrated compounds within their respective acceptance windows?

Ousliffcations	7 // / /	40/1	<i></i>	Ą			140/A													
Associated Samples	12 18 18 17 18 18 18 18 18 18 18 18 18 18 18 18 18	7) 0/61 -80 17 0	/ / /	N		0 40//034/11/11	KWG080x63 3-7/				7	<b>*</b>								
RT (limit)						( )		(	(	(	( )		(	(	(	( )	(	(	(	(
%D / RPD (Limit ≤ 15.0)	9/					30	8				/7									
Compound	×	eio-Nonachbr	Wick			\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	\$				300-10 C									
Detector/ Column	PB-X1B					DB-X1B	DR-3545				VB-X1B									
	08 08F004/08	,				5/21/08 CAL 7391-1CV				1	052Broas/2/ VB-X1B									
# Date	20/8/8	,				5/m/s				0/2/2	20/20/5									

1948/A32 LDC #:\_\_ SDG#:

### VALIDATION FINDINGS WORKSHEET Field Blanks

Reviewer: 2nd Reviewer:\_ Page:

> Y N/A METHOD:

Were target compounds detected in the field blanks? GC HPLC
Were field blanks identified in this SDG? Y/N N/A

S/14/08 Sampling date: Blank units:

Field blank type: (circle one) Field Blank / Trip Blank / Atmospheric Blank / Ambient Blank

Associated Samples:

All sidinants

RB Rinsate / Equipment Rinsate / Equipment Blank / Source Blank / Other:

Compound         Blank ID         Sample Identification           Image: Compound of the co				
	-	Blank ID	Blank ID	Sample Identification
		L		
		1.2		

Associated sample units: Blank units:

Sampling date:

Field blank type: (circle one) Field Blank / Trip Blank/ Atmospheric Blank/ Ambient Blank

Rinsate / Equipment Rinsate / Equipment Blank / Source Blank / Other.

Associated Samples:

	***************************************		
Compound	Blank ID	Blank ID	Sample Identification
CRQL			

CIRCLED RESULTS WERE NOT QUALIFIED. ALL RESULTS NOT CIRCLED WERE QUALIFIED BY THE FOLLOWING STATEMENT:
Samples with compound concentrations within five times the associated field blank concentration are listed above, these sample results were qualified as not detected, "U".

LDC #:

VALIDATION FINDINGS WORKSHEET

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

HPLC

METHOD:

Matrix Spike/Matrix Spike Duplicates

Page: 2nd Reviewer. Reviewer:

4 80	MS %R (Limits) ( ) ( ) ( ) ( ) ( ) ( ) ( ) ( ) ( ) (	MSD   Compound   %R (Limits)   WRD   KR (Limits)   WRD   KR (Limits)   WRD   Climits)   WRD   Climits   WRD (Limits)   WRD (	RPD (Limits)  48 (40)  4// (	Associated Samples # /	Qualifications  J / UJ / A
	( )				
		( )	( )		
	)	( )	( )		
		(	( )		
		)	( )		
	<u> </u>				
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	^	( )	)		

SDG #: LK COURT

VALIDATION FINDINGS WORKSHEET Laboratory Control Samples (LCS)

\ o , Page: Reviewer: 2nd Reviewer:

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

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

N N/A

Was a LCS required? Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?

	ħ	T	T	T	T	T	Ī	T	ı	T	Τ	Ī	Τ	T	Γ	Ī		T	Ī		<u> </u>	<u> </u>	[ ·	
Qualifications	4/ (7//	11 1																						
Associated Samples	KU140804653-9	4	,																					
RPD (Limits)	( )	37 ( 30 )	-	)	)	( )	· ·	(	( )	( )	)	)	)	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )
LCSD %R (Limits)	(25/-05) 22	-	(	)	( )	( )		( )	( )	( )	( )	( )	( )	( )	( )	( )		( )	( )	( )	( )	( )	( )	(
LCS %R (Limits)	23 (50-100)	ı	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )		( )	( )	( )	( )	( )	)	
Compound	F	п																						
rcs/rcsd id	KWG0804653-	0/501																						
Date																								
#																								

(7xx/A3a	de cons
LDC #:	SDG #:

# VALIDATION FINDINGS WORKSHEET Compound Quantitation and Reported CRQLs

Page: of Reviewer:

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

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A". Level )V/D Only

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

E O O	" RAD But a column	Finding 2 40 Associated Samples	3 7/4 det	7		K 43.8		T 62.5		0 30.0	6.		
	See A Maria	Compound Name	0	٢		X				6	×		

Comments: See sample calculation verification worksheet for recalculations

LUC#: (748/10-SDG#:

Compound Quantitation and Reported CRQLs VALIDATION FINDINGS WORKSHEET

Page: Cof Z 2nd Reviewer: Reviewer:

6c HPLC

METHOD:

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

LevelAV/D Only

Y N/N/A

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

Y N/N/A

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

Qualifications	1/4 24	P		1/427				
Associated Samples	7	<b>*</b>		H				
% RPD Bet 2 w/umn Finding - 40	7.2/	46.9		54.5				
Compound Name	7	M	f					

Comments: See sample calculation verification worksheet for recalculations

VALIDATION FINDINGS WORKSHEET Field Duplicates

Reviewer: 2nd reviewer:\_

100 #: 1948/ 132 SDG #: Les const

METHOD:

✓6C HPLC
Were field duplicate pairs identified in this SDG?

Were target compounds detected in the field duplicate pairs?

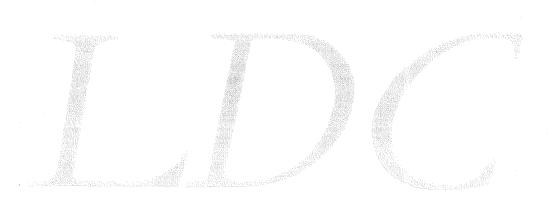
Pariodado	Concentration ( ug//g)	18/6n	%RPD	Qualification
	5	e	Canit	Parent only / All Samples
7	//	n//	000	
7	0.48	89.0	34	
K	0.7	0.7	C	
W	3.4	4.2	2/	
2,4- DOT	6/	61	0	
0	1.84	%:/	900	
!!:				

Parisonano	Concentration (	(	%RPD	Qualification
			Limit	Parent only / All Samples
•				

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### Lockheed West Seattle Superfund Site Data Validation Reports LDC# 19481

Polychlorinated Biphenyls



### Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Lockheed West Seattle Superfund Site

**Collection Date:** 

May 13 through May 14, 2008

LDC Report Date:

September 25, 2008

Matrix:

Sediment/Tissue/Water

Parameters:

Polychlorinated Biphenyls

Validation Level:

EPA Level III

Laboratory:

Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): K0804288

### Sample Identification

5A-S

5A-C

4B-S

4B-C

3A-S

зА-С

3D-S

RB-S

5A-SMS

5A-SMSD

### Introduction

This data review covers 6 sediment samples, 3 tissue samples, and one water sample 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 a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as 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.

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 differences (%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
6/6/08	CAL7420-ICV	DB-XLB	Aroclor-1260	16	RB-S KWG0804652-4	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.

Sample RB-S was identified as a rinsate blank. No polychlorinated biphenyl contaminants were found in this blank.

### 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

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

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

Samples 3A-S and 3D-S were identified as field duplicates. No polychlorinated biphenyls were detected in any of the samples with the following exceptions:

·	Concentra	tion (ug/Kg)	
Compound	3A-S	3D-S	RPD
Aroclor-1248	130	140	7
Aroclor-1254	360	330	9
Aroclor-1260	120	110	9

### Lockheed West Seattle Superfund Site Polychlorinated Biphenyls - Data Qualification Summary - SDG K0804288

SDG	Sample	Compound	Flag	A or P	Reason
K0804288	RB-S	Aroclor-1242 Aroclor-1248 Aroclor-1254 Aroclor-1260	J (all detects) UJ (all non-detects)	А	Continuing calibration (ICV %D)

Lockheed West Seattle Superfund Site Polychlorinated Biphenyls - Laboratory Blank Data Qualification Summary - SDG K0804288

No Sample Data Qualified in this SDG

Lockheed West Seattle Superfund Site Polychlorinated Biphenyls - Field Blank Data Qualification Summary - SDG K0804288

No Sample Data Qualified in this SDG

LDC #:	19481A3b	VALIDATION COMPLETENE	SS WORKSHEET
SDG #:	K0804288	Level III	
Laborator	y: <u>Columbia</u>	Analytical Services	

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
l.	Technical holding times	A	Sampling dates: 5/13 - 3/14/08
II.	GC/ECD Instrument Performance Check	NA	
III.	Initial calibration	A	
IV.	Continuing calibration/ICV	SW	100 6 15
٧.	Blanks	Δ	
VI.	Surrogate spikes	Δ	
VII.	Matrix spike/Matrix spike duplicates	4	
VIII.	Laboratory control samples	A	109
łX.	Regional quality assurance and quality control	N	
Xa.	Florisil cartridge check	N	
Xb.	GPC Calibration	N	
XI.	Target compound identification	N	
XII.	Compound quantitation and reported CRQLs	N	
XIII.	Overall assessment of data	Α	
XIV.	Field duplicates	JW	D=5 + 7
XV.	Field blanks	NP	RB = 8

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 water

	2001//			,		· ·		
1	5A-S	Sed	11 /	KWG0806921-12	21		31	
2	5A-C	Time	122	KWG0807317-Y KWG0804652-4	22		32	
3	4B-S	Seel	13.3	KWG0804652.4	23		33	
4	4B-C	Time	14		24		34	
<u>4</u> 5	3A-S	Sed	15		25		35	
6	за-с	Tisse	16		26		36	
7	3D-S	Seel	17		27		37	
8	RB-S	W	18		28		38	
9	5A-SMS	Sil	19		29		39	
10	5A-SMSD	Sed	20		30		40	

# VALIDATION FINDINGS WORKSHEET

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

A state of the sta				
A alpha-bitc	1. Dieldrin	Q. Endrin ketone	Y. Arocior-1242	00
B. beta-BHC	200177			
		R. Endrin aldehyde	Z. Aroclor-1248	HH
C. delta-BHC	K Enda			
		S. aipha-Chlordane	AA. Aroclor-1254	И.
D. gamma-BHC	T TO STATE OF THE			
		T. gamma-Chlordane	BB. Aroclor-1260	J.T.
E. Heptachlor	7 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1			
	1,4	U. Toxaphene	CC. DB 608	XK.
F. Aldrin				
	N. Endosulfan sulfate	V. Aroclor-1016	DD. DB 1701	L'.
G. Heptachlor apoxida				
	0. 4,4-501	W. Aroclor-1221	EE,	MM.
H. Endosuifan I				
	F. Methoxychlor	X. Aroclor-1232	ŗ.	2 2 2

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Notes:

LDC #: 1948/A36 AL COM SDG#: CGC HPLC

METHOD:

## VALIDATION FINDINGS WORKSHEET Continuing Calibration

Page: of Reviewer:

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

YN N/A

Were continuing calibration standards analyzed at the required frequencies?

YN N/A

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

Level IX Only

Were the retention times for all calibrated compounds within their respective acceptance windows?

		#													=						<u> </u>	Γ
Qualifications	J/W/K	purer 12 A	98																			
Associated Samples	KWG0804659-4	8																				
RT (limit)		(	( )	( )	(	( )	( )	( )	( )	)	( )	( )	(	( )	( )	( )	( )	( )	(	(	(	
%D / RPD (Limit s 15.0)	9/																					
Compound	88																					
Detector/ Column	PB-XLB																					
Standard ID	CAL 7420-1CV																					
Date	189/9/9	, ,																				
#																						

LDC #: 1948/ A36

VALIDATION FINDINGS WORKSHEET Field Duplicates

2nd reviewer: Reviewer:\_\_\_ Page:

GC HPLC
Were field duplicate pairs identified in this SDG? METHOD:

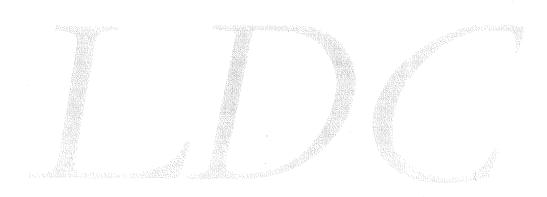
Were target compounds detected in the field duplicate pairs?

	Concentration ( 49/Kg)	ug/kg)	%RPD	Qualification
Compound	5	7	Limit	Parent only / All Samples
2	/30	061	7	
44	098	330	6	
88	720	011	6	
	Concentration (	(	%RPD	Qualification
Compound				rarent only / All Samples
			-	
•	=			

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### Lockheed West Seattle Superfund Site Data Validation Reports LDC# 19481

Metals



### LDC Report# 19481A4

### Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Lockheed West Seattle Superfund Site

**Collection Date:** 

May 13 through May 14, 2008

**LDC Report Date:** 

October 22, 2008

Matrix:

Sediment/Water/Tissue

Parameters:

Metals

Validation Level:

EPA Level III

Laboratory:

Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): K0804288

### Sample Identification

5A-S

5A-C

4B-S

4B-C

3A-S

ЗА-С

3D-S

RB-S

4B-SMS

4B-SDUP

3A-SMS

3A-SDUP

**RB-SMS** 

**RB-SDUP** 

### Introduction

This data review covers 8 sediment samples, 3 water samples, and 3 tissue samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Methods 6010B and 7000 for Metals. The metals analyzed were Antimony, Arsenic, Cadmium, Chromium, Cobalt, Copper, Lead, Mercury, Molybdenum, Nickel, Selenium, Silver, Thallium, Vanadium, and Zinc.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (October 2004) as there are no current guidelines for the methods stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as 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.

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

An initial calibration was performed.

The frequency and analysis criteria of the initial calibration verification (ICV) and continuing calibration verification (CCV) were met.

### 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	Maximum Concentration	Associated Samples
PB (prep blank)	Cobalt Molybdenum Nickel	0.005 mg/Kg 0.06 mg/Kg 0.08 mg/Kg	All sediment samples in SDG K0804288
ICB/CCB	Chromium	2.1 ug/L	All sediment samples in SDG K0804288
PB (prep blank)	Arsenic Molybdenum Zinc	0.09 mg/Kg 0.013 mg/Kg 0.05 mg/Kg	All tissue samples in SDG K0804288
ICB/CCB	Arsenic Nickel Silver	0.23 ug/L 0.11 ug/L 0.019 ug/L	All tissue samples in SDG K0804288
PB (prep blank)	Chromium Lead Thallium Zinc	0.06 ug/L 0.004 ug/L 0.003 ug/L 0.21 ug/L	All water samples in SDG K0804288
ICB/CCB	Cadmium Arsenic	0.017 ug/L 0.015 ug/L	All water samples in SDG K0804288

Data qualification by the initial, continuing and preparation blanks (ICB/CCB/PBs) was based on the maximum contaminant concentration in the ICB/CCB/PBs in the analysis of each analyte. 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	Analyte	Reported Concentration	Modified Final Concentration
RB-S	Cadmium	0.012 ug/L	0.012U ug/L
	Chromium	0.11 ug/L	0.11U ug/L
	Lead	0.010 ug/L	0.010U ug/L
	Zinc	0.59 ug/L	0.59U ug/L

Sample RB-S was identified as a rinsate blank. No metal contaminants were found in this blank with the following exceptions:

Rinsate Blank ID	Sampling Date	Analyte	Concentration	Associated Samples
RB-S	5/14/08	Cadmium Chromium Copper Lead Vanadium Zinc	0.012 ug/L 0.11 ug/L 0.02 ug/L 0.010 ug/L 0.06 ug/L 0.59 ug/L	3A-S 3D-S

Sample concentrations were compared to concentrations detected in the field blanks. The sample concentrations were either not detected or were significantly greater ( >5X blank contaminants) than the concentrations found in the associated field 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) analyses were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	%R (Limits)	Flag	A or P
A1-IT TissueMS (All tissue samples in SDG K0804288)	Antimony Mercury Silver	55.6 (70-130) 53.8 (60-130) 53.3 (70-130)	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 with the following exceptions:

DUP ID (Associated Samples)	Analyte	RPD (Limits)	Difference (Limits)	Flag	A or P
4B-SDUP (All sediment samples in SDG K0804288)	Antimony Lead Nickel	22 (≤20) 47 (≤20) 28 (≤20)	- - -	J (all detects) UJ (all non-detects)	А

### VII. Laboratory Control Samples (LCS)

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

### VIII. Internal Standards

Raw data were not reviewed for this SDG.

### IX. Furnace Atomic Absorption QC

All reported MSAs were reviewed and found acceptable.

Raw data were not reviewed for this SDG.

### X. ICP Serial Dilution

ICP serial dilution analysis was performed by the laboratory. The analysis criteria were met with the following exceptions:

Diluted Sample	Analyte	%D (Limits)	Associated Samples	Flag	A or P
4B-SL	Antimony Cobalt Nickel	17 (≤10) 20 (≤10) 24 (≤10)	All sediment samples in SDG K0804288	J (all detects) J (all detects) J (all detects)	А

### XI. Sample Result Verification

Raw data were not reviewed for this SDG.

### XII. Overall Assessment of Data

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

### \*XIII. Field Duplicates

Samples 3A-S and 3D-S were identified as field duplicates. No metals were detected in any of the samples with the following exceptions:

	Concentrat	tion (mg/Kg)	
Analyte	3A-S	3D-S	RPD
Antimony	5.350	6.140	14
Arsenic	30.6	29.5	4
Cadmium	0.526	0.519	1
Chromium	63.0	55.8	12
Cobalt	9.280	8.590	8
Copper	252	278	10
Lead	133	115	15
Mercury	0.873	0.688	24
Molybdenum	3.77	3.67	3
Nickel	20.1	19.0	6
Selenium	1.0	1.1	10
Silver	0.397	0.380	4
Thallium	0.159	0.151	5
Vanadium	65	64	2
Zinc	259	258	0

<sup>\*</sup>Added above Field duplicates (RPD) findings.

### Lockheed West Seattle Superfund Site Metals - Data Qualification Summary - SDG K0804288

SDG	Sample	Analyte	Flag	A or P	Reason
K0804288	5A-C 4B-C 3A-C	Antimony Mercury Silver	J (all detects) UJ (all non-detects)	А	Matrix spike analysis (%R)
K0804288	5A-S 4B-S 3A-S 3D-S	Antimony Lead Nickel	J (all detects) UJ (all non-detects)	А	Duplicate analysis (RPD)
K0804288	5A-S 4B-S 3A-S 3D-S	Antimony Cobalt Nickel	J (all detects) J (all detects) J (all detects)	А	ICP serial dilution (%D)

### Lockheed West Seattle Superfund Site Metals - Laboratory Blank Data Qualification Summary - SDG K0804288

SDG	Sample	Analyte	Modified Final Concentration	A or P
K0804288	RB-S	Cadmium Chromium Lead Zinc	0.012U ug/L 0.11U ug/L 0.010U ug/L 0.59U ug/L	A

Lockheed West Seattle Superfund Site Metals - Field Blank Data Qualification Summary - SDG K0804288

No Sample Data Qualified in this SDG

		9481A4 (0804288	VA	ALIDATIO	N COM	PLE <sup>.</sup> Leve		S WOR	KSHEE	T	Date: <u>9-19-0</u> Page: <u>1</u> of_1
.abora	atory:_	Columbia Analyti  fletals (EPA SW 8			3/7000)		» III				Reviewer: MG 2nd Reviewer:
he sa	amples		e revi			follow	ving valid	lation area	s. Valida	ition finding	gs are noted in attached
		Validation	Area	1					Com	ments	
l.	Techn	nical holding times			Α	Sam	pling date	s: 5-13	-08	through	5-14-08
II.	Calibr	ation			A					0	
III.	Blank	S			SW						
IV.	ICP In	nterference Check Sar	nple (I	ICS) Analysis	Α						
V.	Matrix	Spike Analysis			SW	M	S	(SDG:	K080	3139	
VI.	Duplic	cate Sample Analysis			Sw	0	901	(	1		
VII.	Labor	atory Control Samples	(LCS	5)	A	L	cs				
VIII.	Intern	al Standard (ICP-MS)			7	N	ot re	viewed			
iX.	Furna	ce Atomic Absorption	QC		Α						(Se Hydride)
Χ.	ICP S	erial Dilution			SW						
XI.	Samp	le Result Verification	·		N						
XII.	Overa	II Assessment of Data	1		A		·				
XIII.	Field I	Duplicates			5W		D= 5	<del>+</del> 7			
XIV.	Field I	Blanks			SW		RB=		·		
ote:	N = N	cceptable lot provided/applicable See worksheet lles:	•	R = Rins	o compound sate eld blank	ds dete	cted	D = Dupi TB = Trip EB = Eq		ank	
	5A-S	ક્ટડ	11	3A-SMS		Sed	21			31	
	5A-C	tis	12	3A-SDUP		1	22			32	
	4B-S	sed	13	RB-SMS		W	23			33	
],	4B-C	+is	14	RB-SDUP		Ţ	24			34	
/ 1	3A-S	sed	15				25			35	
	3A-C	tis	16				26			36	
₹;	3D-S	sed	17				27			37	
	RB-S	w.	18				28			38	
4	4B-SMS	sed	19				29			39	
	4B-SDU	l	20				30		***	40	

LDC #: 1948144 SDG #: <u>K0804</u>288

### VALIDATION FINDINGS WORKSHEET Sample Specific Element Reference

Page:_	l of l
Reviewer:	MG
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All circled elements are applicable to each sample.

	<del></del>	
Sample ID		Target Analyte List (TAL).
18	Sed/ +is/w	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',
QC 9.10,	Sed/w	Al, Sb, As Ba, Be, Cd) Ca, Cr, Co, Cu) Fe, Pb) Mg, Mn, Hg, Ni) K, Se, Ag, Na, (Ti, V, Zn, Mg, B, Si, CN,
11,12	sed	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,
	<u> </u>	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, Ba, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN',
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni; K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Ba, 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 <sup>*</sup> ,
		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 <sup>-</sup> ,
		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 <sup>*</sup> ,
		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 <sup>-</sup> ,
		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 <sup>-</sup> ,
		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 <sup>-</sup> ,
		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 <sup>-</sup> ,
		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',
		Ai, 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 <sup>-</sup> ,
		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 <sup>-</sup> ,
		Analysis Method
ICP		Ai, 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 <sup>-</sup> ,
ICP Trace	sed/tis	Al, Sb, As, Ba, Be, Cd, Ca, Cr) Co, Cu) Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, (Y, Zn) Mo, B, Si, CN',
ICP-MS	sed/tis	AI, 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,
GFAA	tis	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,

Comments: Mercury by CVAA if performed	

LDC#: [4 4 81 A 4 SDG #: <u>K つ 8 ○ 4</u> 3 8 8 METHOD: Trace Metals (EPA SW 846 Method 6010/7000) Soil preparation factor applied: <u>10 〇 x</u> Sample Concentration units, unless otherwise noted: mg / kg Associated Samples:

all sediment

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Allanyte	Maximum PB* (ma/Ka)	Maximum PB*	Maximum ICB/CCB*	Blank Action	+	No sa	mples	Were	lere qualitied	ed		
A												
Sb												
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ර්			9.1	1.05								
8	0.005			260.0								
J.												
Fe												
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Mg												
Mn												
Hg												
Мо	0.06			0.30								
Z	80.0			0.40								
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В		В										

The listed analyte concentration is the highest ICB, CCB, or PB detected in the analysis of each element.

LDC#: 19481 A4 SDG#: KO804788

SDG #: KCECH & COOM & C

VALIDATION FINDINGS WORKSHEET PBICE/CCB QUALIFIED SAMPLES

Soil preparation factor applied: 100x Associated Samples:

all tissue

Page: 1 of 1 Reviewer: MG

al: f: 20 6 2 3 <del>0</del> les Samp Z 0.000 35 590.0 0.055 Blank Action 0.45 Ö. Maximum ICB/CCB\* 0.019 0.23 0.0 1001 Maximum **B8** Maximum 0.05 0.013 mg/Kg) 0.09 Analyte 울 Sn Μg Se å ₽ ဒ 9 모 88 8 Ca Ö E. Z Ba ঠ

Samples with analyte concentrations within five times the associated ICB, CCB or PB concentration are listed above with the identifications from the Validation Completeness Worksheet. These sample results were qualified as not detected, "U".

a - The listed analyte concentration is the highest ICB, CCB, or PB detected in the analysis of each element.

19481A4 KOBO4388 SDG #: LDC#:

VALIDATION FINDINGS WORKSHEET PB/ICB/CCB QUALIFIED SAMPLES

Soil preparation factor applied: NA

2nd Reviewer: Page: 1 of 1 Reviewer: MG all water Associated Samples: 0.013 ---တ METHOD: Trace Metals (EPA SW 846 Method 6010/7000) Sample Concentration units, unless otherwise noted: 0.085 Blank Action 1 Imit 0.300 Maximum ICB/CCB\* 710.0 (1)011) Maximum PB\* (ingil.) 90.0 Maximum PB\* (mg/Kg) Analyte 8 Ca ဒ ਰ Be ŝ Ö

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Samples with analyte concentrations within five times the associated ICB, CCB or PB concentration are listed above with the identifications from the Validation Completeness Worksheet. These sample results were qualified as not detected, "U".
Note: a - The listed analyte concentration is the highest ICB, CCB, or PB detected in the analysis of each element.

0.59

1.050

0.2

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0.015

0.003

0.075

0.015

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1948 144

SDG #: K0804988

VALIDATION FINDINGS WORKSHEET

Field Blanks

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

(V) N/A Field blanks were identified in this SDG.

(V) N/A Were target analytes detected in the field blanks?

Associated Samples: Blank units: 49/L Associated sample units: 49/kg Sampling date: 5-14-08 Soll factor applied 100x Field blank type: (circle one) Field Blank / Rinsate / Other) R.B.

1 ln.

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Sample Identification		- No Samples were outlified			1			1					
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Blank ID	a	0	0.012 0.006	0.1		0.03	0.000	2	2.0	0.59			
Analyte			Cd	S	,	3	Po	>	•	Zn			

Blank units:

Sampling date:

Soil factor applied
Field blank type: (circle one) Field Blank / Rinsate / Other: Blank units:

Associated Samples: Blank Blank ID Analyte

		Action	HOMEOUNIES INC.	
		Level		
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ALL DESCE OF THE	ATT COALFED B	N THE FOLLS	OI OWING STATEMENT	

ALL RESULTS WERE QUALIFIED BY THE FOLLOWING STATEMENT:
Samples with analyte concentrations within five times the associated field blank concentration are listed above, these sample results were qualified as not detected, "U".

LDC #: 19481 A4 SDG #: KO804988

## VALIDATION FINDINGS WORKSHEET Matrix Spike Analysis

Page: L of L Reviewer: 건숙 2nd 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".

N 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 (V) N/A

of 4 or more, no action was taken.

Was a post digestion spike analyzed for ICP elements that did not meet the required criteria for matrix spike recovery? Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations. (V)N N/A W& LEVEL IV ONLY: N N ×

	Matrix Spike ID	Matrix	Analyte	•	%R	Associated Samples	Qualifications	1
	AI-IT Tissue MS	tissue	95	55.6	(081-04)	all tissue	1/01/A	
	1 6#	-	Hq	53.8	53.8 (60-130)			Т
	<b>→</b>	<b>→</b>	Agu	53.3	(10-130)	<b>^</b>	7	
			D					
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1948144 SDG #: KO804788 LDC #:

### VALIDATION FINDINGS WORKSHEET **Duplicate Analysis**

200 Page: / of | Reviewer: 2nd 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". V/N N/A Was a duplicate sample analyzed for each matrix in this SDG?

Y (N) N/A

Were all duplicate sample relative percent differences (RPD) < 20% for water samples and < 35% for soil samples? If no, see qualifications below. A control limit of ±R.L. (±2X R.L for soil) was used for sample values that were <5X the R.L., including the case when only one of the duplicate sample values was <5X R.L.. If field blanks were used for laboratory duplicates, note in the Overall Assessment. LEVEL IV ONLY:

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

L							
*		Matrix	Analyte	RPD (Limits)	Difference (Limits)	Associated Samples	Qualifications
且	01	sed	<b>S</b> b	(⊙e≯) €€		all sediment	J/UJ/A
1			Pb	(   ) Lh			
1	<b>→</b>	>	Z	38 ( 🙏 )		-	>
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· mo	Comments:						

SDG #: KO804388 LDC#: 19481A4

## VALIDATION FINDINGS WORKSHEET ICP Serial Dilution

Page: 2nd Reviewer: Reviewer:

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

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

Y N N/A

If analyte concentrations were > 50X the MDL (ICP), or >100X the MDL (ICP/MS), was a serial dilution analyzed?

Y N N/A

Were ICP serial dilution percent differences (%D) ≤10%?

Is there evidence of negative interference? If yes, professional judgement will be used to qualify the data.

Y N N/A IS

Were recalculated results acceptable? See Level IV Recalculation Y N N/A

LDC#: 19481A4 SDG#: KOBO4388

### VALIDATION FINDINGS WORKSHEET

Field Duplicates

Page: \_\_l of \_\_ Reviewer: \_\_M G\_\_ 2nd Reviewer: \_\_\_\_

METHOD: Metals (EPA Method 6010B/7000)

**⊘**N NA **⊘**N NA Were field duplicate pairs identified in this SDG?

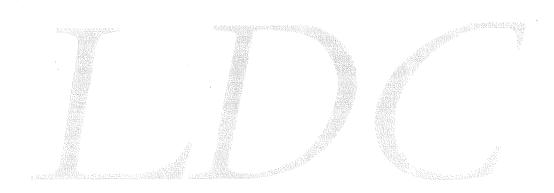
Were target analytes detected in the field duplicate pairs?

	Concentrat	tion (mg/kg)	RPD	
Compound	5	7	RPD	
Antimony	5.350	6.140	14	
Arsenic	30.6	29.5	4	
Cadmium	0.526	0.519	1	
Chromium	63.0	55.8	12	
Cobalt	9.280	8.590	8	
Copper	252	278	10	
Lead	133	115	15	
Mercury	0.873	0.688	24	
Molybdenum	3.77	3.67	3	
Nickel	20.1	19.0	6	
Selenium	1.0	1.1	10	
Silver	0.397	0.380	4	
Thallium	0.159	0.151	5	
Vanadium	65	64	2	
Zinc	259	258	. 0	

V:\FIELD DUPLICATES\FD\_inorganic\19481A4.WPD

### Lockheed West Seattle Superfund Site Data Validation Reports LDC# 19481

Butyltin



### Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Lockheed West Seattle Superfund Site

**Collection Date:** 

May 13 through May 14, 2008

LDC Report Date:

September 25, 2008

Matrix:

Sediment/Tissue/Water

Parameters:

**Butyltins** 

Validation Level:

**EPA Level III** 

Laboratory:

Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): K0804288

### Sample Identification

5A-S

5A-C

4B-S

4B-C

3A-S

3D-S

RB-S

3D-SMS

3D-SMSD

### Introduction

This data review covers 6 sediment sample, 2 tissue samples, and one water sample listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per the Krone Method for Butyltins.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as 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

Initial calibration of compounds was performed as required by the method.

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

### b. Calibration Verification

Calibration verification was performed at the required frequencies.

The percent differences (%D) of continuing standard mixtures were within the 25.0% QC limits.

The percent differences (%D) of the second source calibration standard were less than or equal to 25.0% for all compounds with the following exceptions:

Date	Column	Compound	%D	Associated Samples	Flag	A or P
5/9/08	RTX-35	n-Butyltin	27	5A-S 4B-S 3A-S 3D-S RB-S 3D-SMS 3D-SMSD KWG0807057-4 KWG0804723-3	J (all detects) UJ (all non-detects)	А

### III. Blanks

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

Sample RB-S was identified as a rinsate blank. No butyltin contaminants were found in this blank.

### IV. Accuracy and Precision Data

### a. Surrogate Recovery

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

### b. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable. Percent recoveries (%R) were not within QC limits. Since the sample concentration was greater than the spiked concentration, no data were qualified.

### c. Laboratory Control Samples

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

### V. Target Compound Identification

Raw data were not reviewed for this SDG.

### VI. Compound Quantitation and CRQLs

The sample results for detected compounds from the two columns were within 40% relative percent difference (RPD) with the following exceptions:

Sample	Compound	RPD	Flag	A or P
4B-S	Tetra-n-butyltin	58.8	J (all detects)	А

Raw data were not reviewed for this SDG.

### VII. System Performance

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

Samples 3A-S and 3D-S were identified as field duplicates. No butyltins were detected in any of the samples with the following exceptions:

	Concentra	tion (ug/Kg)	
Compound	3A-S	3D-S	RPD
Tetra-n-butyltin	23	29	23
Tri-n-butyltin	1800	2000	11
Di-n-butyltin	630	600	5
n-Butyltin	110	140	24

### Lockheed West Seattle Superfund Site Butyltins - Data Qualification Summary - SDG K0804288

SDG	Sample	Compound	Flag	A or P	Reason
K0804288	5A-S 4B-S 3A-S 3D-S RB-S	n-Butyltin	J (all detects) UJ (all non-detects)	A	Continuing calibration (%D)
K0804288	4B-S	Tetra-n-butyltin	J (all detects)	А	Compound quantitation and CRQLs (RPD)

Lockheed West Seattle Superfund Site Butyltins - Laboratory Blank Data Qualification Summary - SDG K0804288

No Sample Data Qualified in this SDG

Lockheed West Seattle Superfund Site Butyltins - Field Blank Data Qualification Summary - SDG K0804288

No Sample Data Qualified in this SDG

SDG Laboi	#: 19481A19 #: K0804288 ratory: Columbia Analytica	ıl Ser			LETENE evel III	ESS W	ORKS	HEET	2r	Date: Page:_ Reviewer: d Reviewer:	9/23/E 1 of / 1
	amples listed below were ation findings worksheets.	revie	wed for ead	ch of the fo	llowing va	alidation	areas. \	√alidation f	indings a	are noted in a	attached
	Validation	Area						Commen	ts		
I.	Technical holding times	1122		Λ	Sampling da	ates:	5	3		108	
lla.	Initial calibration			Δ	pg		<del></del>			H	
IIb.	Calibration verification/ICV			رسى	/cv	/ccv =	£ 25				
III.	Blanks			A	/						
IVa.	Surrogate recovery			A							
IVb.	Matrix spike/Matrix spike dup	olicates		سى							
IVc.	Laboratory control samples			Δ	LC>/	D					
V.	Target compound identificati	on		N	•						
VI.	Compound Quantitation and	CRQL	5	5\W			···				
VII.	System Performance			N							
VIII.	Overall assessment of data			Δ						· · · · · · · · · · · · · · · · · · ·	
IX.	Field duplicates			ડω		5 7	· (,				
Χ.	Field blanks			$\mathcal{N}$	RB	= 7					
Note:	A = Acceptable N = Not provided/applicable SW = See worksheet		R = Rin:	o compounds sate eld blank	detected	TE	= Duplica 3 = Trip bl 3 = Equip				
/alida	ted Samples: Scdin	مصه	, Tisse	ue u	سعقة						
1 <i>l</i>	5A-S Sed.	11 L	KWGD	80705	7-421			31			
<sub>2</sub> 2	5A-C Tissue	12 2	KWGO	807275	- 422			32			
3 1	5A-C Tissur 4B-S Sed	13B	KWGO	804723	3-3 23			33			
42	4B-C Tissue	14			24			34			
<sub>5</sub> /	3A-S Ser	15			25			35			
6 <i>[</i>	3D-S Suil	16			26			36			
7 <u>3</u>	RB-S Water	17			27			37	-		
8	3D-SMS	18			28			38			
9	3D-SMSD	19			29			39			
10		20			30			40	i		

(9/8/A/9) SDG#: LDC #:

METHOD: \_\_GC\_\_ HPLC

## VALIDATION FINDINGS WORKSHEET Continuing Calibration

Page: of Reviewer: 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

X N/A

Were continuing calibration standards analyzed at the required frequencies?

Y/N/N/A

Did the continuing calibration standards meet the %D / RPD validation criteria of <18.0%?

Y N N/A Y N N/A Level IV, Only V Z X

Were the retention times for all calibrated compounds within their respective acceptance windows?

Qualifications 2/43 KW GO 804723 -KW40807057-Associated Samples <del>م</del> w) RT (limit) %D / RPD (Limit < 45.0) 25 27 n-Buty Compound ATX-35 Detector/ Column CAL7345-1CV Standard ID 2/2/08 Date

LDC #:

VALIDATION FINDINGS WORKSHEET

Page: Reviewer: 2nd Reviewer:

Matrix Spike/Matrix Spike Duplicates

 METHOD:
 GC
 HPLC

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

Was an MS/MSD analyzed every 20 samples for each matrix or whenever a sample extraction was performed? Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG?

N N N N N N A/N(N

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

			F	ĭ																						
	Qualifications	no and parent	100	1000	*																					
	Associated Samples	Q	1																							
		( )				<u></u>						^ )	( )			^ )	(				•	<u> </u>				7
MSD %R (Limits)	1.01 61.	l	(///-0/) 0	`		^ )	( )	( )	( )	)			( )	· ·		`						( )	)			] (
MS %R (Limits)			(111-0) 0 00	( )	)				( )	( )	)			( )		( )	(	( )	( )	(		( )	( )	)	)	
Compound	Tri-n-buty	5	Man - may 1 mg	2																						
CII QSW/WSD	6+8																									
*																						T	T		1	

LDC# 1948/A17 SDG #: Les cons

## Compound Quantitation and Reported CRQLs VALIDATION FINDINGS WORKSHEET

Page: / of / Reviewer:

> GC\_HPLC METHOD:

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

N N N N N N

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?

	Qualifications	J/ART								
	Associated Samples	<b>E</b>								
of RPD Bet 2 column	Finding $= 90$	8.83								
	Compound Name	Tetra-n-butyltin								
	#									

Comments: See sample calculation verification worksheet for recalculations

LDC#: 1948/4/7 SDG#: 100 const

VALIDATION FINDINGS WORKSHEET Field Duplicates

Reviewer:\_ 2nd reviewer:\_

GC \_\_ HPLC Were field duplicate pairs identified in this SDG?

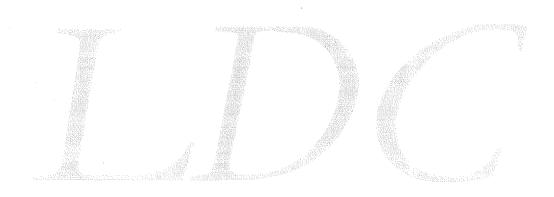
Were target compounds detected in the field duplicate pairs?

Y N N/A METHOD:

	Concentration ( ug/kg)	ug/kg)	%RPD	Qualification
Compound	ما	9		Parent Only / All Samples
Teta-0-butylho	23	29	23	
Tri- n- butaltin	0081	2000	//	
Di- n- buty/tin	630	009	2	
n- butyltin	911	041	24	

### Lockheed West Seattle Superfund Site Data Validation Reports LDC# 19481

Dioxins/Dibenzofurans



### LDC Report# 19481A21

### Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Lockheed West Seattle Superfund Site

**Collection Date:** 

May 13 through May 14, 2008

**LDC Report Date:** 

October 22, 2008

Matrix:

Sediment/Tissue/Water

Parameters:

Dioxins/Dibenzofurans

Validation Level:

EPA Level III

Laboratory:

Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): K0804288

### Sample Identification

5A-S

5A-C

4B-S

4B-C

3A-S

3D-S RB-S

### Introduction

This data review covers 4 sediment samples, 2 tissue samples, and one water sample listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8290 for Polychlorinated Dioxins/Dibenzofurans.

This review follows USEPA Contract Laboratory Program National Functional Guidelines for Polychlorinated Dioxins/Dibenzofurans Data Review (September 2005) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as 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.

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. HRGC/HRMS Instrument Performance Check

Instrument performance was checked at the required daily frequency.

Retention time windows were established for all homologues. The chromatographic resolution between 2,3,7,8-TCDD and peaks representing any other unlabeled TCDD isomer was less than or equal to 25%.

### III. Initial Calibration

A five point initial calibration was performed as required by the method.

Percent relative standard deviations (%RSD) were less than or equal to 20.0% for unlabeled compounds and less than or equal to 30.0% for labeled compounds.

The ion abundance ratios for all PCDDs and PCDFs were within validation criteria.

### 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 20.0% for unlabeled compounds and less than or equal to 35.0% for labeled compounds with the following exceptions:

Date	Compound	%D	Associated Samples	Affected Compound	Flag	A or P
8/12/08	<sup>13</sup> C-OCDD	35.92	5A-C 4B-C EQ0800331-01	OCDF	J (all detects) UJ (all non-detects) J (all detects)	A
					UJ (all non-detects)	

The ion abundance ratios for all PCDDs and PCDFs were within validation criteria.

### V. Blanks

Method blanks were reviewed for each matrix as applicable. No polychlorinated dioxin/dibenzofuran contaminants were found in the method blanks with the following exceptions:

Method Blank ID	Extraction Date	Compound	Concentration	Associated Samples
EQ0800348-01	8/20/08	1,2,3,6,7,8-HxCDD 1,2,3,4,6,7,8-HpCDD OCDD 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,4,6,7,8-HpCDF OCDF Total PeCDD Total HxCDD Total HpCDD Total PeCDF Total HxCDF Total HxCDF Total HxCDF	0.159 ng/Kg 0.872 ng/Kg 2.44 ng/Kg 0.132 ng/Kg 0.440 ng/Kg 0.698 ng/Kg 0.563 ng/Kg 0.287 ng/Kg 1.16 ng/Kg 0.872 ng/Kg 0.444 ng/Kg 0.903 ng/Kg 0.698 ng/Kg	All sediment samples in SDG K0804288
EQ0800277-01	6/26/08	OCDD Total HpCDD Total PeCDF Total HxCDF Total HpCDF	24.5 pg/L 61.7 pg/L 4.64 pg/L 15.0 pg/L 41.4 pg/L	All water samples in SDG K0804288
EQ0800331-01	8/1/08	1,2,3,4,6,7,8-HpCDD OCDD 2,3,7,8-TCDF 1,2,3,4,6,7,8-HpCDF OCDF Total HpCDD Total TCDF Total PeCDF Total HpCDF	4.70 ng/Kg 51.3 ng/Kg 0.137 ng/Kg 0.479 ng/Kg 5.85 ng/Kg 7.44 ng/Kg 0.137 ng/Kg 0.679 ng/Kg 1.93 ng/Kg	All tissue samples in SDG K0804288

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
5A-S	2,3,4,7,8-PeCDF	0.293 ng/Kg	1.13U ng/Kg
	1,2,3,4,7,8-HxCDF	1.09 ng/Kg	1.13U ng/Kg
	Total PeCDD	1.17 ng/Kg	1.17U ng/Kg
3A-S	2,3,4,7,8-PeCDF	0.215 ng/Kg	1.54U ng/Kg
	1,2,3,4,7,8-HxCDF	1.18 ng/Kg	1.54U ng/Kg

Sample	Compound	Reported Concentration	Modified Final Concentration
RB-S	OCDD	5,38 pg/L	104U pg/L
5A-C	1,2,3,4,6,7,8-HpCDD	8.26 ng/Kg	8.26U ng/Kg
	OCDD	68.4 ng/Kg	68.4U ng/Kg
	1,2,3,4,6,7,8-HpCDF	1.21 ng/Kg	2.79U ng/Kg
	Total HpCDD	36.3 ng/Kg	36.3U ng/Kg
	Total PeCDF	0.312 ng/Kg	2.79U ng/Kg
	Total HpCDF	4.40 ng/Kg	4.40U ng/Kg
4B-C	1,2,3,4,6,7,8-HpCDD	7.83 ng/Kg	7.83U ng/Kg
	OCDD	58.2 ng/Kg	58.2U ng/Kg
	1,2,3,4,6,7,8-HpCDF	0.946 ng/Kg	4.47U ng/Kg
	OCDF	3.45 ng/Kg	8.94U ng/Kg
	Total HpCDD	34.6 ng/Kg	34.6U ng/Kg
	Total PeCDF	0.654 ng/Kg	4.47U ng/Kg
	Total HpCDF	3.88 ng/Kg	4.47U ng/Kg

Sample RB-S was identified as a rinsate blank. No polychlorinated dioxin/dibenzofuran contaminants were found in this blank with the following exceptions:

Rinsate Blank ID	Sampling Date	Compound	Concentration	Associated Samples
RB-S	5/14/08	OCDD	5.38 pg/L	All sediment samples in SDG K0804288

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

### 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.

### VII. Laboratory Control Samples (LCS)

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

LCS ID (Associated Samples)	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Flag	A or P
EQ0800331-02 (5A-C 4B-C EQ0800331-01)	2,3,7,8-TCDD	140 (87-135)	-	-	J (all detects)	Þ
EQ0800348-02 (5A-S 4B-S 3A-S 3D-S EQ0800348-01)	1,2,3,6,7,8-HxCDD 1,2,3,4,6,7,8-HpCDF	-	137 (82-136) 132 (91-131)	1-1	J (all detects) J (all detects)	Р

### VIII. Regional Quality Assurance and Quality Control

Not applicable.

### IX. Internal Standards

All internal standard recoveries were within QC limits.

### X. Target Compound Identifications

Raw data were not reviewed for this SDG.

### XI. Compound Quantitation and CRQLs

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

Sample	Compound	Finding	Criteria	Flag	A or P
5A-S 3A-S	OCDD	Sample result exceeded calibration range.	Reported result should be within calibration range.	J (all detects)	P
4B-S 3D-S	1,2,3,4,6,7,8-HpCDD OCDD	Sample result exceeded calibration range.	Reported result should be within calibration range.	J (all detects) J (all detects)	Р

Raw data were not reviewed for this SDG.

### XII. System Performance

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

Samples 3A-S and 3D-S were identified as field duplicates. No polychlorinated dioxins/dibenzofurans were detected in any of the samples with the following exceptions:

	Concentra	ition (ng/Kg)	
Compound	3A-S	3D-S	RPD
2,3,7,8-TCDD	0.0742*	0.150*	68
1,2,3,7,8-PeCDD	0.297	0.692	80
1,2,3,4,7,8-HxCDD	0.416	1.20	97
1,2,3,6,7,8-HxCDD	4.29	12.5	98
1,2,3,7,8,9-HxCDD	1.19	3.36	95
1,2,3,4,6,7,8-HpCDD	231	655	96
OCDD	1960	6300	105
2,3,7,8-TCDF	0.623	1.75	95
1,2,3,7,8-PeCDF	0.225	0.683	101
*2,3,4,7,8-PeCDF	0.215	0.968	127
1,2,3,4,7,8-HxCDF	1.18	3.41	97
1,2,3,6,7,8-HxCDF	0.371*	1.10	99
2,3,4,6,7,8-HxCDF	1.54U	0.891	200
1,2,3,4,6,7,8-HpCDF	20.0	55.9	95
1,2,3,4,7,8,9-HpCDF	1.84	6.04	107
OCDF	94.1	337	113

	Concentra	Concentration (ng/Kg)		
Compound	3A-S	3D-S	RPD	
Total TCDD	0.821	2.12	88	
Total PeCDD	1.80	8.66	131	
Total HxCDD	50.8	138	92	
Total HpCDD	697	1810	89	
Total TCDF	3.55	10.2	97	
Total PeCDF	4.65	15.1	106	
Total HxCDF	22.9	69.2	101	
Total HpCDF	103	293	96	

<sup>\*</sup>Corrected Concentration and RPD values for 2,3,4,7,8-PeCDF in above table.

	Concentra	tion (ng/Kg)	
Compound	3A-S	3D-S	RPD
2,3,7,8-TCDF	0.616U	0.645*	5

<sup>\*=</sup>EMPC

### Lockheed West Seattle Superfund Site Dioxins/Dibenzofurans - Data Qualification Summary - SDG K0804288

SDG	Sample	Compound	Flag	A or P	Reason
K0804288	5A-C 4B-C	OCDF	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	А	Routine calibration (%D)
K0804288	5A-C 4B-C	2,3,7,8-TCDD	J (all detects)	Р	Laboratory control samples (%R)
K0804288	5A-S 4B-S 3A-S 3D-S	1,2,3,6,7,8-HxCDD 1,2,3,4,6,7,8-HpCDF	J (all detects) J (all detects)	Р	Laboratory control samples (%R)
K0804288	5A-S 3A-S	OCDD	J (all detects)	Р	Compound quantitation and CRQLs
K0804288	4B-S 3D-S	1,2,3,4,6,7,8-HpCDD OCDD	J (all detects) J (all detects)	Р	Compound quantitation and CRQLs

### Lockheed West Seattle Superfund Site Dioxins/Dibenzofurans - Laboratory Blank Data Qualification Summary - SDG K0804288

SDG	Sample	Compound	Modified Final Concentration	A or P
K0804288	5A-S	2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF Total PeCDD	1.13U ng/Kg 1.13U ng/Kg 1.17U ng/Kg	А
K0804288	3A-S	2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF	1.54U ng/Kg 1.54U ng/Kg	А
K0804288	RB-S	OCDD	104U pg/L	А
K0804288	5A-C	1,2,3,4,6,7,8-HpCDD OCDD 1,2,3,4,6,7,8-HpCDF Total HpCDD Total PeCDF Total HpCDF	8.26U ng/Kg 68.4U ng/Kg 2.79U ng/Kg 36.3U ng/Kg 2.79U ng/Kg 4.40U ng/Kg	A

SDG	Sample	Compound	Modified Final Concentration	A or P
K0804288	4B-C	1,2,3,4,6,7,8-HpCDD OCDD 1,2,3,4,6,7,8-HpCDF OCDF Total HpCDD Total PeCDF Total HpCDF	7.83U ng/Kg 58.2U ng/Kg 4.47U ng/Kg 8.94U ng/Kg 34.6U ng/Kg 4.47U ng/Kg 4.47U ng/Kg	А

Lockheed West Seattle Superfund Site Dioxins/Dibenzofurans - Field Blank Data Qualification Summary - SDG K0804288

No Sample Data Qualified in this SDG

SDG # Labora <b>METH</b> The sa	: 19481A21  b: K0804288  atory: Columbia Analytica  OD: HRGC/HRMS Dioxi  amples listed below were  ion findings worksheets.	ns/Dibenzofuran	L s (EPA SV	₋eve V 846	el III 6 Method 8290	))	n finding	Date: 9/2 4/08 Page: /of / Reviewer: 77 2nd Reviewer: 1	
	Validation	Area				Comm	ents		
1.	Technical holding times		A	Samp	pling dates: 5	5/13 - 5/1	4/00		
11.	HRGC/HRMS Instrument pe	rformance check	A						
111.	Initial calibration		Δ						
IV.	Routine calibration/		5W						
V.	Blanks		لىي						
VI.	Matrix spike/Matrix spike du	olicates	~	C	hent	3 pe a fin	9		
VII.	Laboratory control samples		SW	1	CSID	<i>)</i> //			
VIII.	Regional quality assurance a	and quality control	N						
IX.	Internal standards		A						
Χ.	Target compound identificat	ons	N						
XI.	Compound quantitation and	CRQLs	JW/						
XII.	System performance		N		···				
XIII.	Overall assessment of data		A						
XIV.	Field duplicates		500	D	= 5+7	7			
XV.	Field blanks		سىي		RB= 8	***			
Note:									
1	5A-S / Sed		00277-0	01	21 .		31	-	
2 2	5A-C Tissu	12 2 EQ 08			22_		32		
3 4	4B-S Serl	133 EQ 040	0348-0	21	23_		33		
4 2	4B-C x time	14			24		34		
5 :	3A-S / Serl	15			25		35		
6	3 <del>4-C</del>	16			26		36		
7 ;	3D-S Sul	17			27		37		
8 1	RB-S / walro	18			28		38		
9		19			29		39		
10		20			30		40		

# VALIDATION FINDINGS WORKSHEET

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)

A. 2,3,7,8-TCDD	F. 1,2,3,4,6,7,8-HpCDD	K. 1,2,3,4,7,8-HxCDF	P. 1,2,3,4,7,8,9-HpCDF	U. Total HpCDD
B. 1,2,3,7,8-PeCDD	G. OCDD	L. 1,2,3,6,7,8-HxCDF	Q. OCDF	V. Total TCDF
C. 1,2,3,4,7,8-HxCDD	H. 2,3,7,8-TCDF	M. 2,3,4,6,7,8-HxCDF	R. Total TCDD	W. Total PeCDF
D. 1,2,3,6,7,8-HxCDD	I. 1,2,3,7,8-PeCDF	N. 1,2,3,7,8,9-HxCDF	S. Total PeCDD	X. Total HxCDF
E. 1,2,3,7,8,9-HxCDD	J. 2,3,4,7,8-PeCDF	O. 1,2,3,4,6,7,8-HpCDF	T. Total HxCDD	Y. Total HpCDF

### Notes:

LDC # 19481AV SDG # ver com

## **VALIDATION FINDINGS WORKSHEET**

Page: \_of\_

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

Routine Calibration

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)

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

Was a routine calibration was performed at the beginning and end of each 12 hour period?

Were all percent differences (%D) of RRFs  $\leq$  20% for unlabeled compounds and  $\leq$  30% for labeled? Did all routine calibration standards meet the lon Abundance Ratio criteria?

L							
*	Date	Standard ID	Compound	Finding %D (Limit: <30.0%)	Finding lon Abundance Ratio	Associated Samples	Oualifications
	80/21/8	1200101	130-0000			E &0080033 -0	A/10/1
	•	(Endhing)				7 7	10
		D					
		PCDDs	Selected ions (m/z)	lon Abundance Ratio	PCDFs	Selected ions (m/z)	/z) lon Abundance Ratio
	Tetra-		M/M+2	0.65-0.89	Tetra-	M/M+2	
	Penta-		M+2/M+4	1.32-1.78	Penta-	M+2/M+4	1.32-1.78
T	Неха-		M+2/M+4	1.05-1.43	Hexa-	M+2/M+4	1.05-1.43
T	Hexa- <sup>13</sup> C-Hxi	Hexa- <sup>13</sup> C-HxCDF (IS) only	M/M+2	0.43-0.59	Hexa-13C-HxCDF (IS) only		0.43-0.59
	Hepta-13C-Hr	Hepta-13C-HpCDF (IS) only	M/M+2	0.37-0.51	Hepta-13C-HpCDF (IS) only	ıly M/M+2	0.37-0.51
T	Hepta-		M+2/M+4	0.88-1.20	Hepta-	M+2/M+4	0.88-1.20
	Octa-		M+2/M+4	0.76-1.02	Octa-	M+2/M+4	0.76-1.02

Les const 19481421 SDG#: LDC #

### VALIDATION FINDINGS WORKSHEET

Page: / of 2 Reviewer:\_\_\_ 2nd Reviewer:\_

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290) Pease see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

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

Y N/A

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

Blank analysis date: 8 21 0 8 Was the method blank contaminated? Blank extraction date: 8/20/08 √N N/A

Associated samples:

All Sidineiro

Sample Identification 0,215 A.SHM 1.18 /1-9W É 0.293/1.134 1.09 A.134 1.17 /压路机 1 ( ١ 3-48-0 **EQUSOO** e. 69.8 0.872 0.440 0.563 0.287 Blank ID 0.872 0.903 0.132 0.444 0.698 **b**.159 ماب ها ۲ Conc. units: ng. ka **ゴ** 3 5 Compound 9 প্র J ш 0

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".

124/8/6	see coner
DC #: 7	SDG#:

## VALIDATION FINDINGS WORKSHEET

Page: 4 of 3 Reviewer:\_\_ 2nd Reviewer:

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)

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

Was a method blank performed for each matrix and whenever a sample extraction was performed? Were all samples associated with a method blank? N/A Y N N/A

Was the method blank contaminated?

Blank extraction date: 6 26 08

Blank analysis date:  $7/2|_{0}$ 

Associated samples:

All water

Sample Identification 5.38/10HV 1 1 1 0-11-c00 80 83 Blank ID 7,5 1 15.0 24,5 4.64 Conc. units: pall Compound 5 3 7 ত

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# 1948/A21 SDG #: Les cons

## VALIDATION FINDINGS WORKSHEET

Page: 3of 3

Reviewer:\_\_ 2nd Reviewer:

**METHOD:** HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290) 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? ∀ N V

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

Y N/A

Blank analysis date: 8/2/08 Y/N N/A Was the method blank contaminated?

Byank extraction date: 81108 Blank analysis

Associated samples: A\\

0.483 /V Sample Identification 12 - 14 18.944 4474 4.477 0.946/4470 N /58.L D.694 3.45 3.88 22 121/2.794 36.3/4 10/ f.xg 0.372 4.40 EQ 0800331-0 0.679 0.137 Blank ID 93 0.479 5.86 0.137 4.70 5/13 ゴゲー Conc. units: Not Ko Compound > 3 8 ゞ ユ Ф L ত

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#: 19481 A21 to cover SDG#:

# VALIDATION FINDINGS WORKSHEET

Field Blanks

Page: Reviewer. 2nd Reviewer:

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)

Slank units: 09 / Associated sample units: 09 / Sampling date: 09 / Sampling date: 09 / Shift of Field blank type: (circle one) Field Blank / Rinsate / Other:

Sampling date: 5/19/00	201	,	2		1 1 1 1 4	ノシン	
Field blank type: (circle one) Field Blank / Rinsate / Ot	e) Field Blank	her:	35	Associated Samples:	All ralinals	くつ	
Compound	Blank ID			Samp	Sample Identification		Г
	8						T
G	8.38						T
							T
							T
							T
							Ţ
							Т
CROL							T

Associated sample units: Blank units:

Sampling date:

Field blank type: (circle one) Field Blank / Rinsate / Other

Field blank type: (circle one) Field Blank / Rinsate / Other:	e) Field Blank	/ Rinsate / Other: Associated Samples:
Compound	Blank ID	
CRQL		

CIRCLED RESULTS WERE NOT QUALIFIED. ALL RESULTS NOT CIRCLED WERE QUALIFIED BY THE FOLLOWING STATEMENT:
Samples with compound concentrations within five times the associated field blank concentration are listed above, these sample results were qualified as not detected, "U".

LDC# 1948/A2/ SDG# 10 cours

### VALIDATION FINDINGS WORKSHEET Laboratory Control Samples (LCS)

Page: \_\_\_\_\_\_\_\_\_

Reviewer:\_\_

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)

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

Y N N/A Was a LCS required?

Y/N -N/A Was a LCS analyzed every N/A Were the LCS percent in the LCS percent i

Was a LCS analyzed every 20 samples for each matrix or whenever a sample extraction was performed?

Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?

										A CONTRACTOR OF THE CONTRACTOR
	Date	Lab ID/Reference	Compound	L %R((	LCS R (Limits)	LC %R (L	LCSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
,		£00800351.02	4	o <del>}</del> 1	(87-139	)	(	( )	F&OXO0331-01.	1/8 dut
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- 1						)	)	( )		
- 11							^	)		
- 1		EQ 0800348-03	Δ	-	(	(37 (	451-28)	( )	E60880348-01	J Part
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LDC# (9481A) SDG#:

### Compound Quantitation and Reported CRQLs VALIDATION FINDINGS WORKSHEET

Page: Reviewer:

2nd Reviewer:

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)

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

Y N N/A

	Qualifications	1/Pdt		Α	1			And the second s		
((5)00000000000000000000000000000000000	Associated Samples	51	2 2		WS					
	Finding	x'd cal Range	<i>\</i>		,					
	compound Sample ID.	6	F, G		6					
	Date									
L	*									

Comments: See sample calculation verification worksheet for recalculations

LDC#: 19481A2a SDG#: K0804288

### **VALIDATION FINDINGS WORKSHEET** Field Duplicates

Reviewer:\_ 2nd Reviewer:\_

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Methos 8290)

YN NA

Were field duplicate pairs identified in this SDG?

N NA

Were target analytes detected in the field duplicate pairs?

### Confirmation from DB-225

	Concentra	tion (ng/Kg)		
Compound	5	7	RPD	
А	0.0742 *	0.150 *	68	
В	0.297	0.692	80	
С	0.416	1.20	97	
D	4.29	12.5	98	
Е	1.19	3.36	95	
F	231	655	96	
G	1960	6300	105	
Н	0.623	1.75	95	
1	0.225	0.683	101	
J	9215 0.07	0.968	2   سھول	7
к	1.18	3.41	97	
L	0.371 *	1.10	99	
М	1.54u	0.891	200	
0	20.0	55.9	95	
Р	1.84	6.04	107	
Q	94.1	337	113	
R	0.821	2.12	88	
S	1.80	8.66	131	
Т	50.8	138	92	
υ	697	1810	89	
V	3.55	10.2	97	
w	4.65	15.1	106	
x	22.9	69.2	101	
Υ	103	293	96	

LDC#: <u>1948</u> SDG#: <u>K08</u>	11A2a 04288	VALIDATION FIN Field Duplicat	DINGS WORKSH	EET F Revie 2nd Revie	<del></del>
Y N NA	Were field dupl	xins/Dibenzofurans (E icate pairs identified in alytes detected in the f	this SDG?	290)	<del></del>

### Confirmation from DB-225

		tion (ng/Kg)		
Compound	5	7	RPD	
Н	0.616U	0.645*	5	

V:\FIELD DUPLICATES\templates\19481A21.wpd

\* EMPC