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 #	Fraction
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,

ETRauto

Erlinda T. Rauto
Operations Manager/Senior Chemist

Attachment 1

III EDD

LDC #19462 (Tetra Tech EC, Inc.-Bothell, WA / Lockheed West Seattle Superfund Site)

Project#: 5205

LDC	SDG#	DATE REC'D	(3) DATE DUE	PAHs (8270C -SIM)		Pest. (8081A)		PCBs (8082)		Metals (SW846)		Butyl -tins (Krone)		Dioxins (8290)																			
Matrix: Tissue/Sediment				T	S	T	S	T	S	T	S	T	S	T	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	K0803139	09/12/08	10/03/08	1	1	1	1	1	1	1	1	1	1	1	1																
Total	T/SC			1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12

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

19462ST.wpd

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

LDC #: 19462A2b
SDG #: K0803139
Laboratory: Columbia Analytical Services

VALIDATION COMPLETENESS WORKSHEET
Level III

Date: 9/23/08
Page: 1 of 1
Reviewer: [illegible]
2nd Reviewer: [illegible]

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
I.	Technical holding times	A	Sampling dates: 4/8/08
II.	GC/MS Instrument performance check	A	
III.	Initial calibration	A	
IV.	Continuing calibration/ICV	A	ICV %R
V.	Blanks	SW	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	A	
VIII.	Laboratory control samples	A	LCS/D
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	A	
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: Sediment + Tissue

1	A1-IT Sed	11	KWG0803638-215			31	
2	A1-IT Tissue	12	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. Benzo(a)pyrene**
B. Bis (2-chloroethyl) ether	Q. 2,4-Dichlorophenol**	FF. 3-Nitroaniline	UU. Phenanthrene	JJJ. Indeno(1,2,3-cd)pyrene
C. 2-Chlorophenol	R. 1,2,4-Trichlorobenzene	GG. Acenaphthene**	VV. Anthracene	KKK. Dibenz(a,h)anthracene
D. 1,3-Dichlorobenzene	S. Naphthalene	HH. 2,4-Dinitrophenol*	WW. Carbazole	LLL. Benzo(g,h,I)perylene
E. 1,4-Dichlorobenzene**	T. 4-Chloroaniline	II. 4-Nitrophenol*	XX. Di-n-butylphthalate	MMM. Bis(2-Chloroisopropyl)ether
F. 1,2-Dichlorobenzene	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. Butylbenzylphthalate	PPP. Benzoic Acid
I. 4-Methylphenol	X. Hexachlorocyclopentadiene*	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-Trichlorophenol	OO. 4-Nitroaniline	DDD. Chrysene	SSS. Benzidine
L. Nitrobenzene	AA. 2-Chloronaphthalene	PP. 4,6-Dinitro-2-methylphenol	EEE. Bis(2-ethylhexyl)phthalate	TTT.
M. Isophorone	BB. 2-Nitroaniline	QQ. N-Nitrosodiphenylamine (1)**	FFF. Di-n-octylphthalate**	UUU
N. 2-Nitrophenol**	CC. Dimethylphthalate	RR. 4-Bromophenyl-phenylether	GGG. Benzo(b)fluoranthene	VVV.
O. 2,4-Dimethylphenol	DD. Acenaphthylene	SS. Hexachlorobenzene	HHH. Benzo(k)fluoranthene	WWW.

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

LDC #: 19462A2b
SDG #: pet coney

VALIDATION FINDINGS WORKSHEET
Blanks

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

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".

Y N N/A Was a method blank analyzed for each matrix?
Y N N/A Was a method blank analyzed for each concentration preparation level?
Y N N/A Was a method blank associated with every sample?
Y N N/A Was the blank contaminated? If yes, please see qualification below.

Blank extraction date: 4/21/08 **Blank analysis date:** 4/25/08
Conc. units: ug/kg Associated Samples: 1 7 5X

Compound	Blank ID	Sample Identification								
	KW4080	3638-5								
S	0.83									

Blank extraction date: _____ **Blank analysis date:** _____
Conc. units: _____ Associated Samples: _____

Compound	Blank ID	Sample Identification								

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)	A
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)	A

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)	A

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)	A	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)	A	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
SDG #: K0803139
Laboratory: Columbia Analytical Services

VALIDATION COMPLETENESS WORKSHEET
Level III

Date: 9/23/08
Page: 1 of 1
Reviewer:
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
I.	Technical holding times	A	Sampling dates: 4/8/08
II.	GC/ECD Instrument Performance Check	A	
III.	Initial calibration	A	
IV.	Continuing calibration/ICV	SW	ICV ≤ 15
V.	Blanks	A	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates A	~~SW~~	
VIII.	Laboratory control samples	A	LCS ID
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	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: Sed + Tissue

1	A1-IT Sed	11	KWG0803699-9	21		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	
10		20		30		40	

VALIDATION FINDINGS WORKSHEET

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

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

Notes: _____

LDC #: 19462A3a
SDG #: su cover

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

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

METHOD: ✓ GC ___ HPLC

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

#	Date	Standard ID	Detector/ Column	Compound	%D / RPD (Limit ≤ 15.0)	RT (limit)	Associated Samples	Qualifications
	4/29/08	0428F020/24	DB-35MS	U	18	( )	KWG0803699-9,	J/UJ/A
						( )	/	
						( )		
						( )		
	8/8/08	0808F004/08	DB-XLB	N	16	( )	KWG0807318-4,	↓
				cis-Nonachlor	16	( )	2 → 4	
				Mirex	15.2	( )	↓	↓
						( )		
						( )		
						( )		
						( )		
						( )		
						( )		
						( )		
						( )		
						( )		
						( )		
						( )		
						( )		
						( )		
						( )		
						( )		
						( )		

LDC #: 19462A5a
SDG #: All cores

VALIDATION FINDINGS WORKSHEET
Compound Quantitation and Reported CRQLs

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

METHOD: ___ GC ___ HPLC

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

Level IV/D Only

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

#	Compound Name	% RPD Bet 2 column Finding ≤40	Associated Samples	Qualifications
	M	63.2	2	J/A det

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

LDC #: 19462A3b

SDG #: K0803139

Laboratory: Columbia Analytical Services

VALIDATION COMPLETENESS WORKSHEET
Level III

Date: 9/23/08

Page: 1 of 1

Reviewer: FF

2nd Reviewer:

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

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

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 4/8/08
II.	GC/ECD Instrument Performance Check	A	
III.	Initial calibration	A	
IV.	Continuing calibration/ICV	A	ICV ≤ 15
V.	Blanks	A	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	A	
VIII.	Laboratory control samples	A	LCS/D
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	A	
XIV.	Field duplicates	N	
XV.	Field blanks	N	

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

ND = No compounds detected
R = Rinsate
FB = Field blank

D = Duplicate
TB = Trip blank
EB = Equipment blank

Validated Samples: Sediment + Tissue

1	A1-IT Sed	11	KWG0803700-213			31	
2	A1-IT Tissue	12	KWG0807317-224			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	
10		20		30		40	

Lockheed West Seattle Superfund Site
Data Validation Reports
LDC# 19462

Metals

LDC Report# 19462A4

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)	A
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)	A

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 Zinc	57.8 (≤20) 46.4 (≤20)	- -	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	A

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)	A	Matrix spike analysis (%R)
K0803139	A1-IT Tissue	Antimony Mercury Silver	J (all detects) UJ (all non-detects)	A	Matrix spike analysis (%R)
K0803139	A1-IT Sed	Lead Zinc	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	A	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

LDC #: 19462A4

SDG #: K0803139

Laboratory: Columbia Analytical Services

VALIDATION COMPLETENESS WORKSHEET

Level III

Date: 9-15-08

Page: 1 of 1

Reviewer: MG

2nd Reviewer: ✓

METHOD: Metals (EPA SW 846 Method 6010B/7000)/6020 9mA

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

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 4-8-08
II.	Calibration	A	
III.	Blanks	SW	
IV.	ICP Interference Check Sample (ICS) Analysis	A	
V.	Matrix Spike Analysis	SW	MS
VI.	Duplicate Sample Analysis 9mA	SW A	DUP
VII.	Laboratory Control Samples (LCS)	A	LCS
VIII.	Internal Standard (ICP-MS)	N	Not reviewed
IX.	Furnace Atomic Absorption QC	A	(Se Hydride)
X.	ICP Serial Dilution	A	
XI.	Sample Result Verification	SW N	
XII.	Overall Assessment of Data	A	
XIII.	Field Duplicates	N	
XIV.	Field Blanks	N	

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

ND = No compounds detected
R = Rinsate
FB = Field blank

D = Duplicate
TB = Trip blank
EB = Equipment blank

Validated Samples:

1 1	A1-IT Sed	11		21		31	
2	A1-IT Tissue	12		22		32	
3 1	A1-IT SedMS	13		23		33	
4 1	A1-IT SedDUP	14		24		34	
5	A1-IT TissueMS	15		25		35	
6	A1-IT TissueDUP	16		26		36	
7 1	PBS	17		27		37	
8 2	PBT	18		28		38	
9		19		29		39	
10		20		30		40	

Notes: _____

LDC #: 19462A4
SDG #: K0803139

VALIDATION FINDINGS WORKSHEET
Sample Specific Element Reference

Reviewer: MG
2nd reviewer: [signature]

All circled elements are applicable to each sample.

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, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
QC 3→6	↓	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
Analysis Method		
ICP		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
ICP Trace	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^-, ___ ___
ICP-MS	sed/tiss	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN^-, ___ ___
GFAA	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

LDC #: 19462A4
SDG #: K0803139

VALIDATION FINDINGS WORKSHEET
PB/ICB/CCB QUALIFIED SAMPLES

Reviewer: MG
2nd Reviewer: LC

METHOD: Trace Metals (EPA SW 846 Method 6010/7000)
Soil preparation factor applied: 100 x, 5x dil
Sample Concentration units, unless otherwise noted: mg/kg
Associated Samples: 1

Analyte	Maximum PB[a] (mg/Kg)	Maximum PB[a] (ug/L)	Maximum ICB/CCB[a] (ug/L)	Blank Action Limit	Sample Identification: No sample was qualified
Al					
Sb					
As					
Ba					
Be					
Cd					
Ca					
Cr	0.15			0.75	
Co	0.004		0.011	0.028	
Cu	0.03		0.04	0.15	
Fe					
Pb	0.07			0.35	
Mg					
Mn					
Hg					
Mo	0.09		0.04	0.45	
Ni					
K					
Se					
Ag			0.022	0.055	
Na					
Tl					
V					
Zn					
Sn					
B					

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.

LDC #: 19462A4
SDG #: K0803139

VALIDATION FINDINGS WORKSHEET
PB/ICB/CCB QUALIFIED SAMPLES

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

METHOD: Trace Metals (EPA SW 846 Method 6010/7000) Soil preparation factor applied: 100 x ICP-MS: 5xdil
Sample Concentration units, unless otherwise noted: mg/kg Associated Samples: 2

Analyte	Maximum PB[a] (mg/Kg)	Maximum PB[a] (ug/L)	Maximum ICB/CCB[a] (ug/L)	Blank Action Limit	Sample Identification									
					—	—	No	sample	was	qualified	—	—	—	
Al														
Sb														
As	0.09		0.23	0.575										
Ba														
Be														
Cd														
Ca														
Cr														
Co														
Cu														
Fe														
Pb														
Mg														
Mn														
Hg														
Mo	0.013			0.065										
Ni														
K														
Se														
Ag			0.019	0.048										
Na														
Tl														
V														
Zn	0.05			0.25										
Sn														
B														

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.

LDC #: 19462A4
SDG #: K0803139

VALIDATION FINDINGS WORKSHEET
Matrix Spike Analysis

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

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

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

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

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

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

LEVEL IV ONLY:

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

#	Matrix Spike ID	Matrix	Analyte	%R	Associated Samples	Qualifications
1	3	sed	Cu	170.5 (70-116)	1	J dets / A
2	5	tissue	Sb	55.6 (70-130)	2	J / UJ / A
	↓	↓	Hg	53.8 (60-130)	↓	↓
	↓	↓	Ag	53.3 (70-130)	↓	↓

Comments: _____

LDC #: 19462A4
SDG #: K0803139

VALIDATION FINDINGS WORKSHEET
Duplicate Analysis

Reviewer: MG
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".

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

Y (N) N/A Were all duplicate sample relative percent differences (RPD) ≤ 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 Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations.

#	Duplicate ID	Matrix	Analyte	RPD (Limits)	Difference (Limits)	Associated Samples	Qualifications
1	4	sed	Pb	57.8 (≤ 20)		1	J/UJ/A
	↓	↓	Zn	46.4 (↓)		↓	↓

Comments:

Lockheed West Seattle Superfund Site
Data Validation Reports
LDC# 19462

Butyltin

LDC Report# 19462A19

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

LDC #: 19462A19 **VALIDATION COMPLETENESS WORKSHEET** Date: 9/23/08
SDG #: K0803139 Level III Page: 1 of 1
Laboratory: Columbia Analytical Services Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: GC Butyltins (Krone Method)

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

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 4/8/08
IIa.	Initial calibration	A	%RSD ≤ 20
IIb.	Calibration verification/ICV	A	ICV/CCV ≤ 25
III.	Blanks	A	
IVa.	Surrogate recovery	A	
IVb.	Matrix spike/Matrix spike duplicates	N	client specified
IVc.	Laboratory control samples	A	LCS
V.	Target compound identification	N	
VI.	Compound Quantitation and CRQLs	N	
VII.	System Performance	N	
VIII.	Overall assessment of data	A	
IX.	Field duplicates	N	
X.	Field blanks	N	

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

Validated Samples: Sediment + Tissue

1 1	A1-IT Sed	11 1	KWG0803381-4	21		31	
2 2	A1-IT Tissue	12 2	KWG0807275-4	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	

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	^{13}C-OCDD	35.92	A1-IT Tissue A1-IT TissueMS A1-IT TissueMSD EQ0800331-01	OCDD OCDF	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	A

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

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)	P

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 OCDF	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	A	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)	P	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	A

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

No Sample Data Qualified in this SDG

LDC #: 19462A21
SDG #: K0803139
Laboratory: Columbia Analytical Services

VALIDATION COMPLETENESS WORKSHEET
Level III

Date: 9/23/08
Page: 1 of 2
Reviewer: [illegible]
2nd Reviewer: [illegible]

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

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

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 4/8/08
II.	HRGC/HRMS Instrument performance check	A	
III.	Initial calibration	A	
IV.	Routine calibration/~~ICV~~	SW	
V.	Blanks	SW	
VI.	Matrix spike/Matrix spike duplicates	SW	
VII.	Laboratory control samples	SW	LCS/LD
VIII.	Regional quality assurance and quality control	N	
IX.	Internal standards	A	
X.	Target compound identifications	N	
XI.	Compound quantitation and CRQLs	N	
XII.	System performance	N	
XIII.	Overall assessment of data	A	
XIV.	Field duplicates	N	
XV.	Field blanks	N	

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

Validated Samples: Sediment + Tissue

1 1	A1-IT Sed	11 1	EQ0800166-01	21		31	
2 2	A1-IT Tissue	12 2	EQ0800331-01	22		32	
3 2	A1-IT TissueMS	13		23		33	
4 2	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	
10		20		30		40	

Notes: _____

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 #: 19462A21
SDG #: full cover

VALIDATION FINDINGS WORKSHEET
Routine Calibration

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

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?
Y N N/A Were all percent differences (%D) of RRFs ≤ 20% for unlabeled compounds and ≤ 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
	8/12/08	P200101 (Ending ccv)	13C-OCDD	35.92 (≤35)		EQ0800331-01, 2→4	J/UJ/A QUAL G & Q

	PCDDs	Selected ions (m/z)	Ion Abundance Ratio		PCDFs	Selected ions (m/z)	Ion Abundance Ratio
	Tetra-	M/M+2	0.65-0.89		Tetra-	M/M+2	0.65-0.89
	Penta-	M+2/M+4	1.32-1.78		Penta-	M+2/M+4	1.32-1.78
	Hexa-	M+2/M+4	1.05-1.43		Hexa-	M+2/M+4	1.05-1.43
	Hexa-^{13}C-HxCDF (IS) only	M/M+2	0.43-0.59		Hexa-^{13}C-HxCDF (IS) only	M/M+2	0.43-0.59
	Hepta-^{13}C-HpCDF (IS) only	M/M+2	0.37-0.51		Hepta-^{13}C-HpCDF (IS) only	M/M+2	0.37-0.51
	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

LDC #: 19462A21
SDG #: see cover

VALIDATION FINDINGS WORKSHEET
Blanks

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

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

Blank extraction date: 4/18/08 **Blank analysis date:** 4/22/08 **Associated samples:** 1 7 5 X

Conc. units: ng/kg

Compound	Blank ID	Sample Identification								
	FB0800166-01									
F	0.269									
G	1.33									
U	0.533									

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 #: 19462A21
SDG #: pre cover

VALIDATION FINDINGS WORKSHEET
Blanks

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

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 Were all samples associated with a method blank?

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

Y N N/A Was the method blank contaminated?

Blank extraction date: 8/1/08 **Blank analysis date:** 8/12/08 **Associated samples:** 2

Conc. units: ng/kg

Compound	Blank ID	Sample Identification								
	EQ0800	331-01		2						
F	4.70			4.67 /U						
G	51.3			38.4 /U						
H	0.137			-						
O	0.479			0.823 /3.134						
Q	5.85			4.23 /6.264						
U	7.44			12.1 /U						
V	0.137			-						
W	0.679			0.169 /3.134						
Y	1.93			3.73 /U						

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

LDC #: 19462A21
SDG #: See cover

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

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

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 — 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.

Y N N/A — Was a MS/MSD analyzed every 20 samples of each matrix?

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

#	Date	MS/MSD ID	Compound	MS %R (Limits)	MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		3 + 4	A	( )	136 (87-135)	( )	2	J/A det
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
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				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

LDC #: 19462A21
SDG #: see cover

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

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

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 LCS required?
Y N N/A Was a LCS analyzed every 20 samples for each matrix or whenever a sample extraction was performed?
Y N N/A Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?

#	Date	Lab ID/Reference	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		EQ0800331-02	A	140 (87-135)	( )	( )	EQ0800331-01, 2	J/Pdet
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
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				( )	( )	( )		
				( )	( )	( )		

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

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

October 22, 2008

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
K0804288	19481A4	Metals
K0804288	19481A21	Dioxins/Dibenzofurans

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

Sincerely,

ERauto

Erlinda T. Rauto
Operations Manager/Senior Chemist

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,

ERauto

Erlinda T. Rauto
Operations Manager/Senior Chemist

Attachment 1

LDC #19481 (Tetra Tech EC, Inc.-Bothell, WA / Lockheed West Seattle Superfund Site)

III EDD

Project#: 5205

LDC	SDG#	DATE REC'D	(3) DATE DUE	PAHs (8270C)		PAHs (8270C -SIM)		Pest. (8081A)			PCBs (8082)			Metals (SW846)			Butyl -tins (Krone)			Dioxins (8290)															
Matrix:	Water/Tissue/Sediment			W	S	T	S	W	T	S	W	T	S	W	T	S	W	T	S	W	T	S	W	S	W	S	W	S	W	S	W	S	W	S	S
A	K0804288	09/17/08	10/08/08	1	4	2	0	1	2	4	1	3	4	1	3	4	1	2	4	1	2	4													
Total	T/SC			1	4	2	0	1	2	4	1	3	4	1	3	4	1	2	4	1	2	4	0	0	0	0	0	0	0	0	0	0	0	0	44

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

19481ST.wpd

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:

Compound	Concentration (ug/Kg)		RPD
	3A-S	3D-S	
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

Compound	Concentration (ug/Kg)		RPD
	3A-S	3D-S	
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

LDC #: 19481A2a **VALIDATION COMPLETENESS WORKSHEET** Date: 9/23/08

SDG #: K0804288 Level III Page: 1 of 1

Laboratory: Columbia Analytical Services Semivolatiles Reviewer: M

2nd Reviewer:

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

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

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 5/13 - 5/14/08
II.	GC/MS Instrument performance check	A	
III.	Initial calibration	A	%RSD, r^2 ≥ 0.990 RRF no spec ↓
IV.	Continuing calibration/ICV	A	ICV ≤ 25
V.	Blanks	A	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	N	client specific
VIII.	Laboratory control samples	A	LCS/D
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	A	
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	SW	D = 3 + 4
XVII.	Field blanks	ND	RB = 5

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: Sediment + water

1	5A-S sed	11	KWG0806901- 5			31	
2	4B-S ↓	12	KWG0806750- 4			32	
3	3A-S	13		23		33	
4	3D-S ↓	14		24		34	
5	RB-S W	15		25		35	
6		16		26		36	
7		17		27		37	
8		18		28		38	
9		19		29		39	
10		20		30		40	

LDC#: 19481A2a
SDG#: K0804288

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: RT
2nd Reviewer: [illegible]

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

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

Compound	Concentration (ug/Kg)		RPD	
	3	4		
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: 9/23/08
SDG #: K0804288 Level III Page: 1 of 1
Laboratory: Columbia Analytical Services Reviewer: EJ
2nd Reviewer: [illegible]

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
I.	Technical holding times	A	Sampling dates: 5/13/08
II.	GC/MS Instrument performance check	A	
III.	Initial calibration	A	
IV.	Continuing calibration/ICV	A	ICV ≤ 25
V.	Blanks	A	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	N	client specified
VIII.	Laboratory control samples	A	LCS/D
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	A	
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: Tissue

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)	A
5/29/08	0828F023/27	DB-XLB	2,4'-DDE	17	RB-S KWG0804653-9	J (all detects) UJ (all non-detects)	A

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)	A

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)	A

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)	A

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 (RB-S KWG0804653-9)	Aldrin	23 (50-150)	22 (50-150)	-	J (all detects) UJ (all non-detects)	P
	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	74.5	J (all detects)	A
	4,4'-DDE	87.3	J (all detects)	
4B-S	Endrin	43.8	J (all detects)	A
3A-S	gamma-Chlordane	62.5	J (all detects)	A

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)	A
4B-C	gamma-Chlordane	54.5	J (all detects)	A

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:

Compound	Concentration (ug/Kg)		RPD
	3A-S	3D-S	
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
delta-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)	A	Continuing calibration (%D)
K0804288	RB-S	2,4'-DDE	J (all detects) UJ (all non-detects)	A	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)	A	Continuing calibration (ICV %D)
K0804288	5A-S	Heptachlor Endrin aldehyde Methoxychlor	J (all detects) UJ (all non-detects)	A	Matrix spike/Matrix spike duplicates (RPD)
K0804288	RB-S	Aldrin	J (all detects) UJ (all non-detects)	P	Laboratory control samples (%R)
K0804288	RB-S	Toxaphene	J (all detects) UJ (all non-detects)	P	Laboratory control samples (RPD)
K0804288	5A-S	alpha-Chlordane 4,4'-DDE	J (all detects) J (all detects)	A	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)	A	Compound quantitation and CRQLs (RPD)
K0804288	3D-S	delta-BHC Endrin	J (all detects) J (all detects)	A	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)	A	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
SDG #: K0804288
Laboratory: Columbia Analytical Services

VALIDATION COMPLETENESS WORKSHEET
Level III

Date: 9/23/08
Page: 1 of 1
Reviewer: [illegible]
2nd Reviewer: [illegible]

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
I.	Technical holding times	A	Sampling dates: 5/13 – 5/14
II.	GC/ECD Instrument Performance Check	A	
III.	Initial calibration	A	%RSD, r^2 ≥ 0.990
IV.	Continuing calibration/ICV	SW	ICV = 15
V.	Blanks	A	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	SW	A1 – IT Tissue MS/D
VIII.	Laboratory control samples	SW	LCS/D
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	D = 5 + 6
XV.	Field blanks	SW	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: Sediment, Tissue & Water

1	1	5A-S	Sediment	11	4B-SMSD	Sed	21	KWG0806929-	31 28
2	2	5A-C	Tissue	12	3A-SMS		22	KWG0807318-	32 4
3	1	4B-S	Sed	13	3A-SMSD		23	KWG0804653-	33 9
4	2	4B-C	Tissue	14	3D-SMS		24		34
5	1	3A-S	Sed	15	3D-SMSD		25		35
6	1	3D-S	Sed	16			26		36
7		RB-S	water	17			27		37
8		5A-SMS	Sed	18			28		38
9		5A-SMSD		19			29		39
10		4B-SMS		20			30		40

VALIDATION FINDINGS WORKSHEET

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

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

Notes: _____

LDC #: 19481A3a
SDG #: All cover

METHOD: ___ GC ___ HPLC

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

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

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

Y N N/A Were continuing calibration standards analyzed at the required frequencies?
Y N N/A Did the continuing calibration standards meet the %D / RPD validation criteria of ≤15.0%?

Level IV Only

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

#	Date	Standard ID	Detector/ Column	Compound	%D / RPD (Limit ≤ 15.0)	RT (limit)	Associated Samples	Qualifications
	5/8/08	0508F004/08	DB-XLB	N	16	( )	KWG0807318-4,	J/UJ/A
				cis-Nonachlor	16	( )	2, 4	↓
				Mirex	15.2	( )	↓	
						( )		
						( )		
						( )		
	5/22/08	CAL7391-ICV	DB-XLB	J	30	( )	KWG0804653-9,	J/UJ/A
			DB-35MS	M	39	( )	7	
						( )		
						( )		
						( )		
	5/29/08	0528F023/27	DB-XLB	2,4'-DDE	17	( )	↓	↓
						( )		
						( )		
						( )		
						( )		
						( )		
						( )		
						( )		
						( )		
						( )		
						( )		

LDC #: 19481A3a
SDG #: pre cover

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: MZ
2nd Reviewer: Q

METHOD: __ GC __ HPLC

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

Blank units: ng/L **Associated sample units:** ug/Kg
Sampling date: 5/14/08
Field blank type: (circle one) Field Blank / Trip Blank / Atmospheric Blank / Ambient Blank
Rinsate / Equipment Rinsate / Equipment Blank / Source Blank / Other: RB

Associated Samples: All sediments (ND)

Compound	Blank ID	Blank ID	Sample Identification							
	7									
D	1.2									
CRQL										

Blank units: _____ **Associated sample 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 #: 1948/A3a
SDG #: see cover

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

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

METHOD: ✓ GC ___ HPLC

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

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

#	MS/MSD ID	Compound	MS %R (Limits)	MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
	8 + 9	E	( )	( )	48 (40)	# 1	J/UJ/A
		R	( )	( )	41 (↓)	↓	↓
		P	( )	( )	63 (↓)	↓	↓

MSDNew.wpd

LDC #: [illegible]
SDG #: see cover

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

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

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".

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

#	Date	LCS/LCSD ID	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		KWG0804653-	F	23 (50-150)	22 (50-150)	( )	KWG0804653-9	J/UJ/P
		lcs/D	U	( )	( )	37 (30)	7	↓
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
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				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

LDC #: 17481A3a
SDG #: All cores

VALIDATION FINDINGS WORKSHEET
Compound Quantitation and Reported CRQLs

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

METHOD: ✓ GC __ HPLC

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

Level IV/D Only

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

#	Compound Name	%RPD Bet 2 column Finding ≤40	Associated Samples	Qualifications
	S	74.5	1	J/A det
	J	87.3	↓	↓
	K	43.8	3	↓
	T	62.5	5	↓
	C	50.0	6	↓
	K	43.9	↓	↓

Comments: See sample calculation verification worksheet for recalculations

LDC #: 17487/T5-C
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Compound Quantitation and Reported CRQLs

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

METHOD: ✓ GC __ HPLC

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

Level IV/D Only

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

#	Compound Name	% RPD Bet 2 column ≤ 40 Finding	Associated Samples	Qualifications
	T	80.0	2	J/A det
	J	46.2	↓	↓
	M	46.9		
	T	54.5	4	J/A det

Comments: See sample calculation verification worksheet for recalculations

LDC #: 1948/A3a
SDG #: see cover

VALIDATION FINDINGS WORKSHEET
Field Duplicates

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

METHOD: X GC __ HPLC

(Y) N N/A Were field duplicate pairs identified in this SDG?
(Y) N N/A Were target compounds detected in the field duplicate pairs?

Compound	Concentration (ug/kg)		%RPD Limit____	Qualification Parent only / All Samples
	5	6		
T	11	114	200	
S	0.48	0.68	34	
K	1.0	1.0	0	
M	3.4	4.2	21	
2,4'-DDT	19	19	0	
C	1.84	1.8	200	

Compound	Concentration ( )		%RPD Limit____	Qualification Parent only / All Samples

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
3A-C
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)	A

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:

Compound	Concentration (ug/Kg)		RPD
	3A-S	3D-S	
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)	A	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

SDG #: K0804288

Laboratory: Columbia Analytical Services

VALIDATION COMPLETENESS WORKSHEET

Level III

Date: 9/23/08

Page: 1 of 1

Reviewer: [illegible]

2nd Reviewer: [illegible]

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

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

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 5/13 → 5/14/08
II.	GC/ECD Instrument Performance Check	NA	
III.	Initial calibration	A	
IV.	Continuing calibration/ICV	SW	ICV ≤ 15
V.	Blanks	A	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	A	
VIII.	Laboratory control samples	A	LCS
IX.	Regional quality assurance and quality control	N	
Xa.	Florisil cartridge check	N	
Xb.	GPC Calibration	N	
XI.	Target compound identification	N	
XII.	Compound quantitation and reported CRQLs	N	
XIII.	Overall assessment of data	A	
XIV.	Field duplicates	SW	D = 5 + 7
XV.	Field blanks	ND	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: Sediment, ~~Soil~~ Tissue, water

1	5A-S	Sed	11	KWG0806921-12	21		31	
2	5A-C	Tissue	12	KWG0807317-4	22		32	
3	4B-S	Sed	13	KWG0804652-4	23		33	
4	4B-C	Tissue	14		24		34	
5	3A-S	Sed	15		25		35	
6	3A-C	Tissue	16		26		36	
7	3D-S	Sed	17		27		37	
8	RB-S	W	18		28		38	
9	5A-SMS	Sed	19		29		39	
10	5A-SMSD	Sed	20		30		40	

VALIDATION FINDINGS WORKSHEET

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

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

Notes:

LDC #: 19481A3b
SDG #: All cover

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

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

METHOD: ✓ GC ___ HPLC

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

What type of continuing calibration calculation was performed? ___%D or ___RPD

Y N N/A (Y circled) Were continuing calibration standards analyzed at the required frequencies?

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

Level IV Only

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

#	Date	Standard ID	Detector/ Column	Compound	%D / RPD (Limit ≤ 15.0)	RT (limit)	Associated Samples	Qualifications
	6/6/08	CAL7420-ICV	PB-XLB	BB	16	( )	KWG0804652-4,	J/UJ/A
						( )	8	Qual 1, 2, AA,
						( )		BB
						( )		
						( )		
						( )		
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						( )		

LDC #: 19481A36
SDG #: see cover

VALIDATION FINDINGS WORKSHEET
Field Duplicates

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

METHOD: ✓ GC __ HPLC

Y N N/A Were field duplicate pairs identified in this SDG?
Y N N/A Were target compounds detected in the field duplicate pairs?

Compound	Concentration (ug/kg)		%RPD Limit____	Qualification Parent only / All Samples
	5	7		
Z	130	140	7	
AA	360	330	9	
BB	120	110	9	

Compound	Concentration ( )		%RPD Limit _____	Qualification Parent only / All Samples

Lockheed West Seattle Superfund Site
Data Validation Reports
LDC# 19481

Metals

Revision 1

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
3A-C
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

*Indicates change as the result of report review.

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 Chromium Lead Zinc	0.012 ug/L 0.11 ug/L 0.010 ug/L 0.59 ug/L	0.012U ug/L 0.11U ug/L 0.010U 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)	A

*Indicates change as the result of report review.

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)	A

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)	A

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.

*Indicates change as the result of report review.

*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:

Analyte	Concentration (mg/Kg)		RPD
	3A-S	3D-S	
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

*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)	A	Matrix spike analysis (%R)
K0804288	5A-S 4B-S 3A-S 3D-S	Antimony Lead Nickel	J (all detects) UJ (all non-detects)	A	Duplicate analysis (RPD)
K0804288	5A-S 4B-S 3A-S 3D-S	Antimony Cobalt Nickel	J (all detects) J (all detects) J (all detects)	A	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

*Indicates change as the result of report review.

LDC #: 19481A4 **VALIDATION COMPLETENESS WORKSHEET** Date: 9-19-08
SDG #: K0804288 Level III Page: 1 of 1
Laboratory: Columbia Analytical Services Reviewer: MG
2nd Reviewer:

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

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

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 5-13-08 through 5-14-08
II.	Calibration	A	
III.	Blanks	SW	
IV.	ICP Interference Check Sample (ICS) Analysis	A	
V.	Matrix Spike Analysis	SW	MS (SDG: K0803139)
VI.	Duplicate Sample Analysis	SW	DUP (↓)
VII.	Laboratory Control Samples (LCS)	A	LCS
VIII.	Internal Standard (ICP-MS)	N	Not reviewed
IX.	Furnace Atomic Absorption QC	A	(Se Hydride)
X.	ICP Serial Dilution	SW	
XI.	Sample Result Verification	N	
XII.	Overall Assessment of Data	A	
XIII.	Field Duplicates	SW	D = 5+7
XIV.	Field Blanks	SW	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:

1	5A-S	sed	11	3A-SMS	sed	21		31	
2	5A-C	tis	12	3A-SDUP	↓	22		32	
3	4B-S	sed	13	RB-SMS	w	23		33	
4	4B-C	tis	14	RB-SDUP	↓	24		34	
5 ✓	3A-S	sed	15			25		35	
6	3A-C	tis	16			26		36	
7 ✓	3D-S	sed	17			27		37	
8	RB-S	w	18			28		38	
9	4B-SMS	sed	19			29		39	
10	4B-SDUP	↓	20			30		40	

Notes:

LDC #: 19481A4
SDG #: K0804288

VALIDATION FINDINGS WORKSHEET
Sample Specific Element Reference

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

All circled elements are applicable to each sample.

Sample ID	Matrix	Target Analyte List (TAL)
1 → 8	sed/tis/w	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$^-$, ___ ___
QC 9, 10, 13, 14	sed/w	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN$^-$, ___ ___
↓ 11, 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$^-$, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN$^-$, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN$^-$, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN$^-$, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN$^-$, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN$^-$, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN$^-$, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN$^-$, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN$^-$, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN$^-$, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN$^-$, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN$^-$, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN$^-$, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN$^-$, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN$^-$, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN$^-$, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN$^-$, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN$^-$, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN$^-$, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN$^-$, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN$^-$, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN$^-$, ___ ___
Analysis Method		
ICP		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN$^-$, ___ ___
ICP Trace	sed/tis	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN$^-$, ___ ___
ICP-MS	sed/tis w	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN$^-$, ___ ___
GFAA	tis	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

ELEMENTS.4

LDC #: 19481A4
SDG #: K0804788

VALIDATION FINDINGS WORKSHEET
PB/ICB/CCB QUALIFIED SAMPLES

Reviewer: MG
2nd Reviewer:

METHOD: Trace Metals (EPA SW 846 Method 6010/7000) Soil preparation factor applied: 100 x
Sample Concentration units, unless otherwise noted: mg/kg Associated Samples: all Sediment

Analyte	Maximum PB[a] (mg/Kg)	Maximum PB[a] (ug/L)	Maximum ICB/CCB[a] (ug/L)	Blank Action Limit	Sample Identification
					No samples were qualified
Al					
Sb					
As					
Ba					
Be					
Cd					
Ca					
Cr			2.1	1.05	
Co	0.005			0.025	
Cu					
Fe					
Pb					
Mg					
Mn					
Hg					
Mo	0.06			0.30	
Ni	0.08			0.40	
K					
Se					
Ag					
Na					
Tl					
V					
Zn					
Sn					
B					

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.

LDC #: 19481A4
SDG #: K0804288

VALIDATION FINDINGS WORKSHEET
PB/ICB/CCB QUALIFIED SAMPLES

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

METHOD: Trace Metals (EPA SW 846 Method 6010/7000) Soil preparation factor applied: 100x
Sample Concentration units, unless otherwise noted: mg/kg Associated Samples: all tissue

Analyte	Maximum PB[a] (mg/Kg)	Maximum PB[a] (ug/L)	Maximum ICB/CCB[a] (ug/L)	Blank Action Limit	Sample Identification
					No samples were qualified
Al					
Sb					
As	0.09		0.23	0.45	
Ba					
Be					
Cd					
Ca					
Cr					
Co					
Cu					
Fe					
Pb					
Mg					
Mn					
Hg					
Mo	0.013			0.065	
Ni			0.11	0.055	
K					
Se					
Ag			0.019	0.010	
Na					
Tl					
V					
Zn	0.05			0.25	
Sn					
B					

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.

LDC #: 19481A4
SDG #: K0804288

VALIDATION FINDINGS WORKSHEET
PB/ICB/CCB QUALIFIED SAMPLES

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

METHOD: Trace Metals (EPA SW 846 Method 6010/7000) Soil preparation factor applied: NA
Sample Concentration units, unless otherwise noted: mg/L Associated Samples: all water

Analyte	Maximum PB* (mg/Kg)	Maximum PB* (ug/L)	Maximum ICB/CCB* (ug/L)	Blank Action Limit	Sample Identification: 8									
Al														
Sb														
As														
Ba														
Be														
Cd			0.017	0.085	0.012									
Ca														
Cr		0.06		0.300	0.11									
Co														
Cu														
Fe														
Pb		0.004		0.020	0.010									
Mg														
Mn														
Hg														
Mo														
Ni														
K														
Se														
Ag			0.015	0.075										
Na														
Tl		0.003		0.015										
V														
Zn		0.21		1.050	0.59									
Sn														
B														

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.

LDC #: 19481A4
SDG #: K0804288

VALIDATION FINDINGS WORKSHEET
Field Blanks

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

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

(Y) N N/A Field blanks were identified in this SDG.
(Y) N N/A Were target analytes detected in the field blanks?

Blank units: ug/L Associated sample units: mg/kg
Sampling date: 5-14-08 Soil factor applied 100x
Field blank type: (circle one) Field Blank / Rinsate / (Other: RB) Associated Samples: 5, 7

Analyte	Blank ID	Blank Action Level	Sample Identification									
	8		No samples were qualified									
Cd	0.012	0.006										
Cr	0.11	0.055										
Cu	0.02	0.010										
Pb	0.010	0.005										
V	0.06	0.030										
Zn	0.59	0.295										

Blank units: _____ Associated sample units: _____
Sampling date: _____ Soil factor applied _____
Field blank type: (circle one) Field Blank / Rinsate / Other: _____ Associated Samples: _____

Analyte	Blank ID	Blank Action Level	Sample Identification									

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 #: 19481A4
SDG #: K0804388

VALIDATION FINDINGS WORKSHEET
Matrix Spike Analysis

Reviewer: MG
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".

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

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

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

LEVEL IV ONLY:

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

#	Matrix Spike ID	Matrix	Analyte	%R	Associated Samples	Qualifications
1	AI-IT Tissue MS	tissue	Sb	55.6 (70-130)	all tissue	J/UJ/A
	~~MS~~ ↓	↓	Hg	53.8 (60-130)	↓	↓
	↓	↓	Ag	53.3 (70-130)	↓	↓

Comments:

LDC #: 19481A4
SDG #: K0804288

VALIDATION FINDINGS WORKSHEET
Duplicate Analysis

Reviewer: MG
2nd Reviewer: L

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

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

(Y) N N/A Was a 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:

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

#	Duplicate ID	Matrix	Analyte	RPD (Limits)	Difference (Limits)	Associated Samples	Qualifications
1	10	sed	Sb	22 (≤20)		all sediment	J/UJ/A
	↓	↓	Pb	47 (↓)		↓	↓
			Ni	28 (↓)			

Comments: _____

DUP.4S2

LDC #: 19481A4
SDG #: K0804288

VALIDATION FINDINGS WORKSHEET
ICP Serial Dilution

Reviewer: MG
2nd Reviewer: [illegible]

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%?

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

LEVEL IV ONLY:

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

#	Date	Diluted Sample ID	Matrix	Analyte	%D (Limits)	Associated Samples	Qualifications
1	7-30-08	3	sed	Sb	17 (≤10)	all sediment	J dets / A
		↓	↓	Co	20 (		
				Ni	24 (↓)	↓	↓

Comments:

LDC#: 19481A4
SDG#: K0804288

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: MG
2nd Reviewer: K

METHOD: Metals (EPA Method 6010B/7000)

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

Compound	Concentration (mg/kg)		RPD	
	5	7		
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	

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)	A

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)	A

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:

Compound	Concentration (ug/Kg)		RPD
	3A-S	3D-S	
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)	A	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

LDC #: 19481A19 **VALIDATION COMPLETENESS WORKSHEET** Date: 9/23/08
SDG #: K0804288 Level III Page: 1 of 1
Laboratory: Columbia Analytical Services Reviewer: m
2nd Reviewer: [illegible]

METHOD: GC Butyltins (Krone Method)

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

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 5/13 – 5/14/08
IIa.	Initial calibration	A	
IIb.	Calibration verification/ICV	SW	ICV/CCV ≤ 25
III.	Blanks	A	
IVa.	Surrogate recovery	A	
IVb.	Matrix spike/Matrix spike duplicates	SW	
IVc.	Laboratory control samples	A	LCS/D
V.	Target compound identification	N	
VI.	Compound Quantitation and CRQLs	SW	
VII.	System Performance	N	
VIII.	Overall assessment of data	A	
IX.	Field duplicates	SW	D = 5 & 6
X.	Field blanks	N	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: Sediments, Tissue, water

1 1	5A-S	Sed.	11 1	KWG0807057-4	21		31		
2 2	5A-C	Tissue	12 2	KWG0807275-4	22		32		
3 1	4B-S	Sed	13 3	KWG0804723-3	23		33		
4 2	4B-C	Tissue	14		24		34		
5 1	3A-S	Sed	15		25		35		
6 1	3D-S	Sed	16		26		36		
7 3	RB-S	water	17		27		37		
8	3D-SMS		18		28		38		
9	3D-SMSD		19		29		39		
10			20		30		40		

Notes: _____

LDC #: 19481A19
SDG #: All cover

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

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

METHOD: ✓ GC __ HPLC

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".
(Y) What type of continuing calibration calculation was performed? __%D or __RPD
Y N N/A Were continuing calibration standards analyzed at the required frequencies?
Y (N) N/A Did the continuing calibration standards meet the %D / RPD validation criteria of ≤~~15~~ 25.0%?

Level IV Only
Y N (N/A) Were the retention times for all calibrated compounds within their respective acceptance windows?

#	Date	Standard ID	Detector/ Column	Compound	%D / RPD (Limit ≤ ~~15.0~~ 25)	RT (limit)	Associated Samples	Qualifications
	5/9/08	CAL7345-ICV	RTX-35	n-Butyltin	27	( )	KWG0807057-4,	J/UJ/A
						( )	KWG0804723-3,	
						( )	1, 3, 5→9	
						( )		
						( )		
						( )		
						( )		
						( )		
						( )		
						( )		
						( )		
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						( )		
						( )		
						( )		
						( )		

LDC #: 19481A19
SDG #: see cover

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

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

METHOD: ✓ GC ___ HPLC

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

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

#	MS/MSD ID	Compound	MS %R (Limits)	MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
	8 + 9	Tri-n-butyltin	0 (13-124)	0 (13-124)	( )	6	no QUAL parent
		Di-n-Butyltin	0 (10-111)	0 (10-111)	( )	↓	> 4X spk Amt
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
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			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		

LDC #: 19481A17
SDG #: All cores

VALIDATION FINDINGS WORKSHEET
Compound Quantitation and Reported CRQLs

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

METHOD: ✓ GC __ HPLC

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

Level IV/D Only

Y N N/A Were CRQLs adjusted for sample dilutions, dry weight factors, etc.?

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

#	Compound Name	Finding (% RPD Bet 2 column ± 40)	Associated Samples	Qualifications
	Tetra-n-butyltin	58.8	3	J/Adt

Comments: See sample calculation verification worksheet for recalculations

LDC #: 19481A19
SDG #: see cover

VALIDATION FINDINGS WORKSHEET
Field Duplicates

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

METHOD: GC __ HPLC

Y N N/A Were field duplicate pairs identified in this SDG?
Y N N/A Were target compounds detected in the field duplicate pairs?

Compound	Concentration (ug/kg)		%RPD Limit____	Qualification Parent only / All Samples
	5	6		
Tetra - n - butyltin	23	29	23	
Tri - n - butyltin	1800	2000	11	
Di - n - butyltin	630	600	5	
n - butyltin	110	140	24	

Compound	Concentration ( )		%RPD Limit _____	Qualification Parent only / All Samples

FLDUPNew.wpd

Lockheed West Seattle Superfund Site
Data Validation Reports
LDC# 19481

Dioxins/Dibenzofurans

Revision 1

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	^{13}C-OCDD	35.92	5A-C 4B-C EQ0800331-01	OCDD OCDF	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	A

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

*Indicates change as the result of report review.

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

*Indicates change as the result of report review.

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 OCDD 1,2,3,4,6,7,8-HpCDF Total HpCDD Total PeCDF Total HpCDF	8.26 ng/Kg 68.4 ng/Kg 1.21 ng/Kg 36.3 ng/Kg 0.312 ng/Kg 4.40 ng/Kg	8.26U ng/Kg 68.4U ng/Kg 2.79U ng/Kg 36.3U ng/Kg 2.79U ng/Kg 4.40U ng/Kg
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	7.83 ng/Kg 58.2 ng/Kg 0.946 ng/Kg 3.45 ng/Kg 34.6 ng/Kg 0.654 ng/Kg 3.88 ng/Kg	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

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:

*Indicates change as the result of report review.

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)	P
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)	- -	J (all detects) J (all detects)	P

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)	P

Raw data were not reviewed for this SDG.

XII. System Performance

Raw data were not reviewed for this SDG.

*Indicates change as the result of report review.

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:

Compound	Concentration (ng/Kg)		RPD
	3A-S	3D-S	
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

*Indicates change as the result of report review.

Compound	Concentration (ng/Kg)		RPD
	3A-S	3D-S	
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

*Corrected Concentration and RPD values for 2,3,4,7,8-PeCDF in above table.

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

*=EMPC

*Indicates change as the result of report review.

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	OCDD OCDF	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	A	Routine calibration (%D)
K0804288	5A-C 4B-C	2,3,7,8-TCDD	J (all detects)	P	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)	P	Laboratory control samples (%R)
K0804288	5A-S 3A-S	OCDD	J (all detects)	P	Compound quantitation and CRQLs
K0804288	4B-S 3D-S	1,2,3,4,6,7,8-HpCDD OCDD	J (all detects) J (all detects)	P	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	A
K0804288	3A-S	2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF	1.54U ng/Kg 1.54U ng/Kg	A
K0804288	RB-S	OCDD	104U pg/L	A
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

*Indicates change as the result of report review.

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	A

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

No Sample Data Qualified in this SDG

*Indicates change as the result of report review.

LDC #: 19481A21 **VALIDATION COMPLETENESS WORKSHEET** Date: 9/24/08
SDG #: K0804288 Level III Page: 1 of 1
Laboratory: Columbia Analytical Services Reviewer: FD
2nd Reviewer: [illegible]

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

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

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 5/13 — 5/14/08
II.	HRGC/HRMS Instrument performance check	A	
III.	Initial calibration	A	
IV.	Routine calibration/TEXT	SW	
V.	Blanks	SW	
VI.	Matrix spike/Matrix spike duplicates	N	client specific
VII.	Laboratory control samples	SW	LCS/D
VIII.	Regional quality assurance and quality control	N	
IX.	Internal standards	A	
X.	Target compound identifications	N	
XI.	Compound quantitation and CRQLs	SW	
XII.	System performance	N	
XIII.	Overall assessment of data	A	
XIV.	Field duplicates	SW	D = 5 + 7
XV.	Field blanks	SW	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: Soil, Tissue, + water

1	5A-S	Soil	11	EQ0800277-01	21		31	
2	5A-C	Tissue	12	EQ0800331-01	22		32	
3	4B-S	Soil	13	EQ0800348-01	23		33	
4	4B-C	Tissue	14		24		34	
5	3A-S	Soil	15		25		35	
6	~~3A-C~~		16		26		36	
7	3D-S	Soil	17		27		37	
8	RB-S	water	18		28		38	
9			19		29		39	
10			20		30		40	

Notes: RB-S was analyzed using method 1613B

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:

COMPNDL

LDC #: 19481A21
SDG #: see cover

VALIDATION FINDINGS WORKSHEET
Routine Calibration

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

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?
Y N N/A Were all percent differences (%D) of RRFs ≤ 20% for unlabeled compounds and ≤ 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
	8/12/08	P200101	13C-OCDD	35.92 (≤35)		EQ0800331-01,	J/UJ/A
		(Ending)				2, 4	BIAS G+Q

	PCDDs	Selected ions (m/z)	Ion Abundance Ratio		PCDFs	Selected ions (m/z)	Ion Abundance Ratio
	Tetra-	M/M+2	0.65-0.89		Tetra-	M/M+2	0.65-0.89
	Penta-	M+2/M+4	1.32-1.78		Penta-	M+2/M+4	1.32-1.78
	Hexa-	M+2/M+4	1.05-1.43		Hexa-	M+2/M+4	1.05-1.43
	Hexa-^{13}C-HxCDF (IS) only	M/M+2	0.43-0.59		Hexa-^{13}C-HxCDF (IS) only	M/M+2	0.43-0.59
	Hepta-^{13}C-HpCDF (IS) only	M/M+2	0.37-0.51		Hepta-^{13}C-HpCDF (IS) only	M/M+2	0.37-0.51
	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

LDC #: 19481A21
SDG #: see cover

VALIDATION FINDINGS WORKSHEET
Blanks

Reviewer: M
2nd Reviewer: L

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

Blank extraction date: 8/20/08 **Blank analysis date:** 8/27/08 **Associated samples:** All Sediments
Conc. units: ng/kg

Compound	Blank ID	Sample Identification								
	EQ0800348-01	1		B5						
D	0.159	-		-						
F	0.872	-		-						
G	2.44	-		-						
J	0.132	0.293/1.13M		0.215/1.54M						
K	0.440	1.09/1.13M		1.18/1.54M						
O	0.698	-		-						
Q	0.563	-		-						
S	0.287	1.17/1.13M		-						
T	1.16	-		-						
U	0.872	-		-						
W	0.444	-		-						
X	0.903	-		-						
Y	0.698	-		-						

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 #: see cover

VALIDATION FINDINGS WORKSHEET
Blanks

Reviewer: PT
2nd Reviewer: [signature]

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

Blank extraction date: 6/26/08 **Blank analysis date:** 7/8/08 **Associated samples:** All water
Conc. units: pg/L

Compound	Blank ID	Sample Identification								
	EQ080627-01	7								
G	24.5		5.38/10 4 U							
U	61.7		-							
W	4.64		-							
X	15.0		-							
Y	41.4		-							

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 #: see cover

VALIDATION FINDINGS WORKSHEET
Blanks

Reviewer: M
2nd Reviewer: L

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

Blank extraction date: 8/1/08 **Blank analysis date:** 8/12/08 **Associated samples:** All Tissue
Conc. units: ng/kg

Compound	Blank ID	Sample Identification								
	EQ080033 1-01	2		4		5				
F	4.70	8.26 U ~~2.79~~		7.83 U						
G	51.3	68.4 U		58.2 U						
H	0.137	—		—		0.623 U				
O	0.479	1.21 / 2.79 U		0.946 / 4.47 U						
Q	5.85	—		3.45 / 8.94 U						
U	7.44	36.3 U		~~3.32~~ 34.6 / ~~4.47~~ 4 U						
V	0.137	—		—						
W	0.679	0.312 / 2.79 U		0.654 / 4.47 U						
Y	1.93	4.40 U		3.88 / 4.47 U						

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

LDC #: 19481A21
SDG #: pe cover

VALIDATION FINDINGS WORKSHEET
Field Blanks

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

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

Y/N N/A Were field blanks identified in this SDG?
Blank units: pg/L **Associated sample units:** ng/kg
Sampling date: 5/14/08
Field blank type: (circle one) Field Blank / Rinsate / Other: RB Associated Samples: All Sediments 75X

Compound	Blank ID	Sample Identification								
	8									
G	5.38									
CRQL										

Blank units: _____ **Associated sample units:** _____
Sampling date: _____
Field blank type: (circle one) Field Blank / Rinsate / Other: _____ Associated Samples: _____

Compound	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 #: 19481A21
SDG #: see cover

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

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

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 LCS required?
(Y) N N/A	Was a LCS analyzed every 20 samples for each matrix or whenever a sample extraction was performed?
Y (N) N/A	Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?

#	Date	Lab ID/Reference	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		EQ0800331-02	A	140 (87-135)	( )	( )	EQ0800331-01,	J/P det
				( )	( )	( )	2, 4	
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
		EQ0800348-02	D	( )	137 (82-136)	( )	EQ0880348-01	J/P det
			O	( )	132 (91-131)	( )	1, 3, 5, 7	↓
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

LDC #: 19481A21
SDG #: pre event

VALIDATION FINDINGS WORKSHEET
Compound Quantitation and Reported CRQLs

Page: 1 of
Reviewer: P
2nd Reviewer: 9

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

#	Date	~~Sample ID~~ Compound	Finding	Associated Samples	Qualifications
		G	x'd cal Range	1, 5	J/Pdet
		F, G	↓	3, 7	↓
		G	↓	2 5	↓

Comments: See sample calculation verification worksheet for recalculations

LDC#: 19481A2a
SDG#: K0804288

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: EJ
2nd Reviewer:

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

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

Confirmation from DB-225

Compound	Concentration (ng/Kg)		RPD	
	5	7		
A	0.0742 *	0.150 *	68	
B	0.297	0.692	80	
C	0.416	1.20	97	
D	4.29	12.5	98	
E	1.19	3.36	95	
F	231	655	96	
G	1960	6300	105	
H	0.623	1.75	95	
I	0.225	0.683	101	
J	~~.0215~~ 0.215 0.02	0.968	~~198~~ 127	
K	1.18	3.41	97	
L	0.371 *	1.10	99	
M	1.54u	0.891	200	
O	20.0	55.9	95	
P	1.84	6.04	107	
Q	94.1	337	113	
R	0.821	2.12	88	
S	1.80	8.66	131	
T	50.8	138	92	
U	697	1810	89	
V	3.55	10.2	97	
W	4.65	15.1	106	
X	22.9	69.2	101	
Y	103	293	96	

LDC#: 19481A2a
SDG#: K0804288

VALIDATION FINDINGS WORKSHEET
Field Duplicates

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

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

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

Confirmation from DB-225

Compound	Concentration (ng/Kg)		RPD	
	5	7		
H	0.616U	0.645*	5	

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

* EMPC