APPENDIX I

DATA VALIDATION REPORTS FOR PHASE 2 RI ANALYSES

LABORATORY DATA CONSULTANTS, INC.
2701 Loker Ave. West, Suite 220, Carlsbad, CA 92010 Bus: 760-827-1100 Fax: 760-827-1099

Anchor QEA, LLC
720 Olive Way, Suite 900
Seattle, WA 98101
ATTN: Ms. Cindy Fields

May 12, 2016

SUBJECT: DeNovo 8th Avenue, Data Validation

Dear Ms. Fields,

Enclosed are the final validation reports for the fractions listed below. These SDGs were received on May 3, 2015. Attachment 1 is a summary of the samples that were reviewed for each analysis.

LDC Project #36266:

SDG #	Fraction
ARX9, ARZ2 ARZ6, ARZ8 ARZ9	Semivolatiles, Polynuclear Aromatic Hydrocarbons Polychlorinated Biphenyls, Metals, Total Solids, Total Petroleum Hydrocarbons as Extractables, Polychlorinated Dioxins/Dibenzofurans

The data validation was performed under Stage 2B & Stage 4 guidelines. The analyses were validated using the following documents, as applicable to each method:

- Final Quality Assurance Project Plan, Remedial Investigation, Crowley Marine Services 8th Avenue S. Site, Seattle, Washington, October 2012
- USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review, June 2008
- USEPA Contract Laboratory National Functional Guidelines for Inorganic Superfund Data Review, January 2010
- USEPA Contract Laboratory Program National Functional Guidelines for Chlorinated Dibenzo-p-Dioxins and Chlorinated Dibenzofurans Data Review, September 2011
- 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; update V, July 2014

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

Sincerely,

Christina Rink
Project Manager/Chemist

7,026 pages-SF

Attachment 1

Stage 2B/Dioxins Stage4 EDD

LDC #36266 (Anchor Environmental-Seattle WA / DeNovo 8th Avenue)

LDC	SDG#	DATE REC'D	(2) DATE DUE	SVOA (8270D)		SVOA (8270D-SIM)		PAHs (8270D-SIM)		PCBs (8082A)		Metals (200.8/ 7000)		TPH-E (NWTPH Dx)		Dioxins (1613B)		Total Solids (2540G)																	
Matrix:	Water/Soil			W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	ARX9	05/03/16	05/17/16	0	8	0	8	0	4	0	4	0	3	0	1	0	10	0	20																
B	ARZ2	05/03/16	05/17/16	0	3	0	3	-	-	0	17	-	-	-	-	0	6	0	20																
C	ARZ6	05/03/16	05/17/16	0	4	0	4	0	2	0	4	0	2	0	4	0	10	0	20																
D	ARZ8	05/03/16	05/17/16	0	7	0	7	0	9	0	13	0	3	0	1	0	6	0	18																
E	ARZ9	05/03/16	05/17/16	-	-	-	-	0	2	0	2	0	2	-	-	-	-	0	2																
Total	T/CR			0	22	0	22	0	17	0	40	0	10	0	6	0	32	0	80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	229

Shaded cells indicate Stage 4 validation (all other cells are Stage 2B validation). These sample counts do not include MS, MSD, or DUP's.

L:\Anchor\DeNovo\36266ST.wpd

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: DeNovo 8th Avenue

LDC Report Date: May 6, 2016

Parameters: Semivolatiles

Validation Level: Stage 2B

Laboratory: Analytical Resources, Inc.

Sample Delivery Group (SDG): ARX9

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
EMW-22D-12.5-14.5	ARX9G	Soil	11/24/14
DMW-6A-2-3	ARX9H	Soil	11/26/14
DMW-6A-3-3.5	ARX9I	Soil	11/26/14
DMW-6A-6.5-8	ARX9J	Soil	11/26/14
DMW-6A-8-10	ARX9K	Soil	11/26/14
DMW-6A-11-13	ARX9L	Soil	11/26/14
DMW-6A-15-17	ARX9M	Soil	11/26/14
DMW-6A-18-20	ARX9N	Soil	11/26/14
DMW-6A-18-20MS	ARX9NMS	Soil	11/26/14
DMW-6A-18-20MSD	ARX9NMSD	Soil	11/26/14

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Final Quality Assurance Project Plan, Remedial Investigation, Crowley Marine Services 8th Avenue S. Site, Seattle, Washington (October 2012) and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines (CLPNFG) for Superfund Organic Methods Data Review (June 2008). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Semivolatile Organic Compounds (SVOCs) by Environmental Protection Agency (EPA) SW 846 Method 8270D

All sample results were subjected to Stage 2B data validation, which comprises an evaluation of quality control (QC) summary results.

The following are definitions of the data qualifiers utilized during data validation:

J (Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.

U (Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

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.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition and cooler temperatures upon receipt met validation criteria.

All technical holding time requirements for frozen samples were met with the following exceptions:

Sample	Compound	Total Time From Sample Collection Until Extraction	Required Holding Time From Sample Collection Until Extraction	Flag	A or P
EMW-22D-12.5-14.5	All compounds	1 year 21 days	1 year	J (all detects) UJ (all non-detects)	P
DMW-6A-2-3 DMW-6A-3-3.5 DMW-6A-6.5-8 DMW-6A-8-10 DMW-6A-11-13 DMW-6A-15-17 DMW-6A-18-20	All compounds	1 year 19 days	1 year	J (all detects) UJ (all non-detects)	P

II. GC/MS Instrument Performance Check

A decafluorotriphenylphosphine (DFTPP) tune was performed at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration and Initial Calibration Verification

An initial calibration was performed as required by the method.

For compounds where average relative response factors (RRFs) were utilized, percent relative standard deviations (%RSD) were less than or equal to 20.0%.

In the case where the laboratory used a calibration curve to evaluate the compounds, all coefficients of determination (r^2) were greater than or equal to 0.990.

Average relative response factors (RRF) for all compounds were within validation criteria.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 30.0% for all compounds with the following exceptions:

Date	Compound	%D	Associated Samples	Flag	A or P
12/15/15	2,4-Dinitrophenol	63.8	All samples in SDG ARX9	UJ (all non-detects)	A

Date	Compound	%D	Associated Samples	Flag	A or P
12/15/15	Fluorene	42.3	EMW-22D-12.5-14.5 DMW-6A-2-3 DMW-6A-3-3.5 DMW-6A-15-17	J (all detects)	A
12/15/15	Fluorene	42.3	DMW-6A-6.5-8 DMW-6A-8-10 DMW-6A-11-13 DMW-6A-18-20	NA	-
12/15/15	3,3'-Dichlorobenzidine	45.6	All samples in SDG ARX9	NA	-

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

The percent differences (%D) were less than or equal to 20.0% for all compounds with the following exceptions:

Date	Compound	%D	Associated Samples	Flag	A or P
12/23/15 (14:37)	Hexachlorocyclopentadiene 2,4-Dinitrophenol 4-Nitrophenol 4,6-Dinitro-2-methylphenol	33.6 29.7 27.8 21.2	All samples in SDG ARX9	NA	-
12/23/15 (14:37)	4-Bromophenyl-phenyl ether	58.8	All samples in SDG ARX9	UJ (all non-detects)	A

All of the continuing calibration relative response factors (RRF) were within validation criteria.

V. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks with the following exceptions:

Blank ID	Extraction Date	Compound	Concentration	Associated Samples
MB-121515	12/15/15	Naphthalene	15 ug/Kg	All samples in SDG ARX9

Sample concentrations were compared to concentrations detected in the laboratory 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 laboratory blanks with the following exceptions:

Sample	Compound	Reported Concentration	Modified Final Concentration
DMW-6A-2-3	Naphthalene	43 ug/Kg	43U ug/Kg
DMW-6A-6.5-8	Naphthalene	21 ug/Kg	21U ug/Kg
DMW-6A-15-17	Naphthalene	33 ug/Kg	33U ug/Kg

VI. Field Blanks

No field blanks were identified in this SDG.

VII. Surrogates

Surrogates were added to all samples as required by the method. Surrogate recoveries (%R) were not within QC limits for sample DMW-6A-3-3.5. Using professional judgment, no data were qualified when one base or one acid surrogate %R was outside the QC limits and the %R was greater than or equal to 10%.

VIII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

IX. Laboratory Control Samples

Laboratory control samples (LCS) were analyzed as required by the method. Percent recoveries (%R) were within QC limits.

X. Field Duplicates

No field duplicates were identified in this SDG.

XI. Internal Standards

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

XII. Compound Quantitation

Raw data were not reviewed for Stage 2B validation.

XIII. Target Compound Identifications

Raw data were not reviewed for Stage 2B validation.

XIV. System Performance

Raw data were not reviewed for Stage 2B validation.

XV. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

Due to holding time exceedance and ICV and continuing calibration %D, data were qualified as estimated in eight samples.

Due to laboratory blank contamination, data were qualified as not detected in three samples.

The quality control criteria reviewed, other than those discussed above, were met and are considered acceptable. Sample results that were found to be estimated (J) are usable for limited purposes only. Based upon the data validation all other results are considered valid and usable for all purposes.

DeNovo 8th Avenue
Semivolatiles - Data Qualification Summary - SDG ARX9

Sample	Compound	Flag	A or P	Reason
EMW-22D-12.5-14.5 DMW-6A-2-3 DMW-6A-3-3.5 DMW-6A-6.5-8 DMW-6A-8-10 DMW-6A-11-13 DMW-6A-15-17 DMW-6A-18-20	All compounds	J (all detects) UJ (all non-detects)	P	Technical holding time
EMW-22D-12.5-14.5 DMW-6A-2-3 DMW-6A-3-3.5 DMW-6A-6.5-8 DMW-6A-8-10 DMW-6A-11-13 DMW-6A-15-17 DMW-6A-18-20	2,4-Dinitrophenol	UJ (all non-detects)	A	Initial calibration verification (%D)
EMW-22D-12.5-14.5 DMW-6A-2-3 DMW-6A-3-3.5 DMW-6A-15-17	Fluorene	J (all detects)	A	Initial calibration verification (%D)
EMW-22D-12.5-14.5 DMW-6A-2-3 DMW-6A-3-3.5 DMW-6A-6.5-8 DMW-6A-8-10 DMW-6A-11-13 DMW-6A-15-17 DMW-6A-18-20	4-Bromophenyl-phenyl ether	UJ (all non-detects)	A	Continuing calibration (%D)

DeNovo 8th Avenue
Semivolatiles - Laboratory Blank Data Qualification Summary - SDG ARX9

Sample	Compound	Modified Final Concentration	A or P
DMW-6A-2-3	Naphthalene	43U ug/Kg	A
DMW-6A-6.5-8	Naphthalene	21U ug/Kg	A
DMW-6A-15-17	Naphthalene	33U ug/Kg	A

LDC #: 36266A2a **VALIDATION COMPLETENESS WORKSHEET** Date: 5/4/16
SDG #: ARX9 Stage 2B Page: 1 of 1
Laboratory: Analytical Resources, Inc. Reviewer: FM
2nd Reviewer: AV

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

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

	Validation Area	FM	Comments
I.	Sample receipt/Technical holding times	A SW A SW	
II.	GC/MS Instrument performance check	A	
III.	Initial calibration/ICV	A, SW	% RSD ≤ 20, r² ICV ≤ 30
IV.	Continuing calibration	SW	CCV ≤ 20
V.	Laboratory Blanks	SW	
VI.	Field blanks	N	
VII.	Surrogate spikes	SW	
VIII.	Matrix spike/Matrix spike duplicates	A	
IX.	Laboratory control samples	A	LCS
X.	Field duplicates	N	
XI.	Internal standards	A	
XII.	Compound quantitation RL/LOQ/LODs	N	
XIII.	Target compound identification	N	
XIV.	System performance	N	
XV.	Overall assessment of data	A	

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; SB=Source blank; OTHER:

	Client ID	Lab ID	Matrix	Date
1	EMW-22D-12.5-14.5	ARX9G	Soil	11/24/14
2	DMW-6A-2-3	ARX9H	Soil	11/26/14
3	DMW-6A-3-3.5	ARX9I	Soil	11/26/14
4	DMW-6A-6.5-8	ARX9J	Soil	11/26/14
5	DMW-6A-8-10	ARX9K	Soil	11/26/14
6	DMW-6A-11-13	ARX9L	Soil	11/26/14
7	DMW-6A-15-17	ARX9M	Soil	11/26/14
8	DMW-6A-18-20	ARX9N	Soil	11/26/14
9	DMW-6A-18-20MS	ARX9NMS	Soil	11/26/14
10	DMW-6A-18-20MSD	ARX9NMSD	Soil	11/26/14
11				
12	MB - 121515			
13				

VALIDATION FINDINGS WORKSHEET

METHOD: GC/MS SVOA

A. Phenol	AA. 2-Chloronaphthalene	AAA. Butylbenzylphthalate	AAAA. Dibenzothiophene	A1.
B. Bis (2-chloroethyl) ether	BB. 2-Nitroaniline	BBB. 3,3'-Dichlorobenzidine	BBBB. Benzo(a)fluoranthene	B1.
C. 2-Chlorophenol	CC. Dimethylphthalate	CCC. Benzo(a)anthracene	CCCC. Benzo(b)fluorene	C1.
D. 1,3-Dichlorobenzene	DD. Acenaphthylene	DDD. Chrysene	DDDD. cis/trans-Decalin	D1.
E. 1,4-Dichlorobenzene	EE. 2,6-Dinitrotoluene	EEE. Bis(2-ethylhexyl)phthalate	EEEE. Biphenyl	E1.
F. 1,2-Dichlorobenzene	FF. 3-Nitroaniline	FFF. Di-n-octylphthalate	FFFF. Retene	F1.
G. 2-Methylphenol	GG. Acenaphthene	GGG. Benzo(b)fluoranthene	GGGG. C30-Hopane	G1.
H. 2,2'-Oxybis(1-chloropropane)	HH. 2,4-Dinitrophenol	HHH. Benzo(k)fluoranthene	HHHH. 1-Methylphenanthrene	H1.
I. 4-Methylphenol	II. 4-Nitrophenol	III. Benzo(a)pyrene	IIII. 1,4-Dioxane	I1.
J. N-Nitroso-di-n-propylamine	JJ. Dibenzofuran	JJJ. Indeno(1,2,3-cd)pyrene	JJJJ. Acetophenone	J1.
K. Hexachloroethane	KK. 2,4-Dinitrotoluene	KKK. Dibenz(a,h)anthracene	KKKK. Atrazine	K1.
L. Nitrobenzene	LL. Diethylphthalate	LLL. Benzo(g,h,i)perylene	LLLL. Benzaldehyde	L1.
M. Isophorone	MM. 4-Chlorophenyl-phenyl ether	MMM. Bis(2-Chloroisopropyl)ether	MMMM. Caprolactam	M1.
N. 2-Nitrophenol	NN. Fluorene	NNN. Aniline	NNNN. 2,6-Dichlorophenol	N1.
O. 2,4-Dimethylphenol	OO. 4-Nitroaniline	OOO. N-Nitrosodimethylamine	OOOO. 2,6-Dinitrotoluene	O1.
P. Bis(2-chloroethoxy)methane	PP. 4,6-Dinitro-2-methylphenol	PPP. Benzoic Acid	PPPP. 3-Methylphenol	P1.
Q. 2,4-Dichlorophenol	QQ. N-Nitrosodiphenylamine	QQQ. Benzyl alcohol	QQQQ. 3&4 Methylphenol	Q1.
R. 1,2,4-Trichlorobenzene	RR. 4-Bromophenyl-phenylether	RRR. Pyridine	RRRR. 4-Dimethyldibenzothiphene (4MDT)	R1.
S. Naphthalene	SS. Hexachlorobenzene	SSS. Benzidine	SSSS. 2/3-Dimethyldibenzothiophene (4MDT)	S1.
T. 4-Chloroaniline	TT. Pentachlorophenol	TTT. 1-Methylnaphthalene	TTTT. 1-Methyldibenzothiophene (1MDT)	T1.
U. Hexachlorobutadiene	UU. Phenanthrene	UUU.Benzo(b)thiophene	UUUU.	U1.
V. 4-Chloro-3-methylphenol	VV. Anthracene	VVV.Benzonaphthothiophene	VVVV.	V1.
W. 2-Methylnaphthalene	WW. Carbazole	WWW.Benzo(e)pyrene	WWWW.	W1.
X. Hexachlorocyclopentadiene	XX. Di-n-butylphthalate	XXX. 2,6-Dimethylnaphthalene	XXXX.	X1.
Y. 2,4,6-Trichlorophenol	YY. Fluoranthene	YYY. 2,3,5-Trimethylnaphthalene	YYYY.	Y1.
Z. 2,4,5-Trichlorophenol	ZZ. Pyrene	ZZZ. Perylene	ZZZZ.	Z1.

LDC #: 36266A2a

VALIDATION FINDINGS WORKSHEET
Technical Holding Times

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

All circled dates have exceeded the technical holding times.
Y N N/A Were all cooler temperatures within validation criteria?

METHOD : GC/MA BNA SW846 METHOD 8270D

Sample ID	Matrix	Preserved	Sampling Date	Extraction date	Analysis date	Total # of Days	Qualifier
1	SOIL	Frozen	11/24/14	12/15/15	12/23/15	1yr + 29 days	J/UJ/P ND+Det
2 thru 10	SOIL	Frozen	11/26/14	12/15/15	12/23/15	1yr + 19 days	J/UJ/P ND+Det
Frozen sample holding time = 1yr from sampling date							

TECHNICAL HOLDING TIME CRITERIA

Water: Extracted within 7 days, analyzed within 40 days.
Soil: Extracted within 14 days, analyzed within 40 days.

LDC #: 36266A2a

VALIDATION FINDINGS WORKSHEET
Initial Calibration Verification

Reviewer: FT
2nd Reviewer: CZ

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

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

Y N N/A Was an initial calibration verification standard analyzed after each ICAL for each instrument?

Y N N/A Were all %D within the validation criteria of ≤30 %D ?

#	Date	Standard ID	Compound	Finding %D (Limit: <30.0%)	Associated Samples	Qualifications
-	12/15/15	ICV	HH	63.8	All	J/UJ/A (ND)
+			NN	42.3	↓	J/UJ/A (1, 2, 3, 7 Det)
+			BBB	45.6	↓	↓ (ND)

ICVsvoa.wpd

LDC #: 36266A2a

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Reviewer: FT
2nd Reviewer: 9

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

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

Y N N/A Was a continuing calibration standard analyzed at least once every 12 hours of sample analysis for each instrument?
Y N N/A Were percent differences (%D) and relative response factors (RRF) within method criteria for all CCC's and SPCC's ?
Y N N/A Were all %D and RRFs within the validation criteria of ≤20 %D and ≥0.05 RRF ?

#	Date	Standard ID	Compound	Finding %D (Limit: ≤20.0%)	Finding RRF (Limit: ≥0.05)	Associated Samples	Qualifications
+	12/23/15	CCV	X	33.6		All	J(all ND) UJ/A
+	1437		HH	29.7			
+			II	27.8			
+			PP	21.2			
-			RR	58.8			UJ/A

LDC #: 36266A2a

VALIDATION FINDINGS WORKSHEET
Blanks

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

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

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: 12/15/15 **Blank analysis date:** ~~12/16~~ 12/23/15
Conc. units: ug/Kg Associated Samples: all

Compound	Blank ID								
	MB-121515	5X	2	4	7				
S	15	75	43 U	21 U	33 U				

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

Compound	Blank ID								

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".

LDC #: 36266A2a

VALIDATION FINDINGS WORKSHEET

Surrogate Recovery

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

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

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

Y [✓ N] ~~N/A~~ Were percent recoveries (%R) for surrogates within QC limits?
Y N [✓ N/A] If 2 or more base neutral or acid surrogates were outside QC limits, was a reanalysis performed to confirm %R?
Y N [✓ N/A] If any %R was less than 10 percent, was a reanalysis performed to confirm %R?

#	Sample ID	Surrogate	%R (Limits)	Qualifications
	3	TBP	22.3 (24-134)	no qual
			( )	
			( )	
			( )	
			( )	
			( )	
			( )	
			( )	
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			( )	

(NBZ) = Nitrobenzene - d5
(FBP) = 2-Fluorobiphenyl
(TPH) = Terphenyl - d14

(2FP) = 2-Fluorophenol
(TBP) = 2,4,6 -Tribromophenol
(2CP) = 2-Chlorophenol - d4

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: DeNovo 8th Avenue

LDC Report Date: May 6, 2016

Parameters: Semivolatiles

Validation Level: Stage 2B

Laboratory: Analytical Resources, Inc.

Sample Delivery Group (SDG): ARX9

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
EMW-22D-12.5-14.5	ARX9G	Soil	11/24/14
DMW-6A-2-3	ARX9H	Soil	11/26/14
DMW-6A-3-3.5	ARX9I	Soil	11/26/14
DMW-6A-6.5-8	ARX9J	Soil	11/26/14
DMW-6A-8-10	ARX9K	Soil	11/26/14
DMW-6A-11-13	ARX9L	Soil	11/26/14
DMW-6A-15-17	ARX9M	Soil	11/26/14
DMW-6A-18-20	ARX9N	Soil	11/26/14
DMW-6A-18-20MS	ARX9NMS	Soil	11/26/14
DMW-6A-18-20MSD	ARX9NMSD	Soil	11/26/14

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Final Quality Assurance Project Plan, Remedial Investigation, Crowley Marine Services 8th Avenue S. Site, Seattle, Washington (October 2012) and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines (CLPNFG) for Superfund Organic Methods Data Review (June 2008). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Semivolatile Organic Compounds (SVOCs) by Environmental Protection Agency (EPA) SW 846 Method 8270D in Selected Ion Monitoring (SIM) mode

All sample results were subjected to Stage 2B data validation, which comprises an evaluation of quality control (QC) summary results.

The following are definitions of the data qualifiers utilized during data validation:

J (Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.

U (Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

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.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition and cooler temperatures upon receipt met validation criteria.

All technical holding time requirements for frozen samples were met with the following exceptions:

Sample	Compound	Total Time From Sample Collection Until Extraction	Required Holding Time From Sample Collection Until Extraction	Flag	A or P
EMW-22D-12.5-14.5	All compounds	1 year 21 days	1 year	J (all detects) UJ (all non-detects)	P
DMW-6A-2-3 DMW-6A-3-3.5 DMW-6A-6.5-8 DMW-6A-8-10 DMW-6A-11-13 DMW-6A-15-17 DMW-6A-18-20	All compounds	1 year 19 days	1 year	J (all detects) UJ (all non-detects)	P

II. GC/MS Instrument Performance Check

A decafluorotriphenylphosphine (DFTPP) tune was performed at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

An initial calibration was performed as required by the method.

For compounds where average relative response factors (RRFs) were utilized, percent relative standard deviations (%RSD) were less than or equal to 20.0%.

In the case where the laboratory used a calibration curve to evaluate the compounds, all coefficients of determination (r^2) were greater than or equal to 0.990.

Average relative response factors (RRF) for all compounds were within validation criteria.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

The percent differences (%D) were less than or equal to 20.0% for all compounds with the following exceptions:

Date	Compound	%D	Associated Samples	Flag	A or P
12/23/15	Phenol	21.5	All samples in SDG ARX9	J (all detects)	A

All of the continuing calibration relative response factors (RRF) were within validation criteria.

V. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks.

VI. Field Blanks

No field blanks were identified in this SDG.

VII. Surrogates

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

VIII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

IX. Laboratory Control Samples

Laboratory control samples (LCS) were analyzed as required by the method. Percent recoveries (%R) were within QC limits.

X. Field Duplicates

No field duplicates were identified in this SDG.

XI. Internal Standards

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

XII. Compound Quantitation

Raw data were not reviewed for Stage 2B validation.

XIII. Target Compound Identifications

Raw data were not reviewed for Stage 2B validation.

XIV. System Performance

Raw data were not reviewed for Stage 2B validation.

XV. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

Due to holding time exceedance and continuing calibration %D, data were qualified as estimated in eight samples.

The quality control criteria reviewed, other than those discussed above, were met and are considered acceptable. Sample results that were found to be estimated (J) are usable for limited purposes only. Based upon the data validation all other results are considered valid and usable for all purposes.

DeNovo 8th Avenue
Semivolatiles - Data Qualification Summary - SDG ARX9

Sample	Compound	Flag	A or P	Reason
EMW-22D-12.5-14.5 DMW-6A-2-3 DMW-6A-3-3.5 DMW-6A-6.5-8 DMW-6A-8-10 DMW-6A-11-13 DMW-6A-15-17 DMW-6A-18-20	All compounds	J (all detects) UJ (all non-detects)	P	Technical holding time
EMW-22D-12.5-14.5 DMW-6A-2-3 DMW-6A-3-3.5 DMW-6A-6.5-8 DMW-6A-8-10 DMW-6A-11-13 DMW-6A-15-17 DMW-6A-18-20	Phenol	J (all detects)	A	Continuing calibration (%D)

DeNovo 8th Avenue
Semivolatiles - Laboratory Blank Data Qualification Summary - SDG ARX9

No Sample Data Qualified in this SDG

LDC #: 36266A2b

SDG #: ARX9

Laboratory: Analytical Resources, Inc.

VALIDATION COMPLETENESS WORKSHEET

Stage 2B

Date: 5/4/16

Page: 1 of 1

Reviewer: FT

2nd Reviewer: AL

METHOD: GC/MS Semivolatiles (EPA SW 846 Method 8270D-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.	Sample receipt/Technical holding times	A /SW	
II.	GC/MS Instrument performance check	A	
III.	Initial calibration~~/ICV~~	A / N	% RSD ≤ 20, r² ~~ICV ≤ 30~~ FT CCV ≤ 20
IV.	Continuing calibration	SW	
V.	Laboratory Blanks	A	
VI.	Field blanks	N	
VII.	Surrogate spikes	A	
VIII.	Matrix spike/Matrix spike duplicates	A	
IX.	Laboratory control samples	A	LCS
X.	Field duplicates	N	
XI.	Internal standards	A	
XII.	Compound quantitation RL/LOQ/LODs	N	
XIII.	Target compound identification	N	
XIV.	System performance	N	
XV.	Overall assessment of data	A	

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; SB=Source blank; OTHER:

	Client ID	Lab ID	Matrix	Date
1	EMW-22D-12.5-14.5	ARX9G	Soil	11/24/14
2	DMW-6A-2-3	ARX9H	Soil	11/26/14
3	DMW-6A-3-3.5	ARX9I	Soil	11/26/14
4	DMW-6A-6.5-8	ARX9J	Soil	11/26/14
5	DMW-6A-8-10	ARX9K	Soil	11/26/14
6	DMW-6A-11-13	ARX9L	Soil	11/26/14
7	DMW-6A-15-17	ARX9M	Soil	11/26/14
8	DMW-6A-18-20	ARX9N	Soil	11/26/14
9	DMW-6A-18-20MS	ARX9NMS	Soil	11/26/14
10	DMW-6A-18-20MSD	ARX9NMSD	Soil	11/26/14
11				
12	MB - 121515			
13				

LDC #: 36266A2b

VALIDATION FINDINGS WORKSHEET
Technical Holding Times

Reviewer: F2
2nd Reviewer: [illegible]

All circled dates have exceeded the technical holding times.
Y N N/A Were all cooler temperatures within validation criteria?

METHOD : GC/MA BNA SW846 METHOD 8270D

Sample ID	Matrix	Preserved	Sampling Date	Extraction date	Analysis date	Total # of Days	Qualifier
1	soil	Frozen	11/24/14	12/15/15	12/23/15	1 yr + 21 days	J/UJ/P ND+Det
2-10	↓	↓	11/26/14	12/15/15	12/23/15	1 yr + 19 days	J/UJ/P ND+Det

Frozen samples holding time- 1 yr from date of sampling

TECHNICAL HOLDING TIME CRITERIA

Water: Extracted within 7 days, analyzed within 40 days.
Soil: Extracted within 14 days, analyzed within 40 days.

LDC #: 36266A2b

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

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

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

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

(Y) N N/A Was a continuing calibration standard analyzed at least once every 12 hours of sample analysis for each instrument?

(Y) N N/A Were percent differences (%D) and relative response factors (RRF) within method criteria for all CCC's and SPCC's ?

Y (N) N/A Were all %D and RRFs within the validation criteria of ≤20 %D and ≥0.05 RRF ?

#	Date	Standard ID	Compound	Finding %D (Limit: ≤20.0%)	Finding RRF (Limit: ≥0.05)	Associated Samples	Qualifications
+	12/23/15	CCV	A	21.5		All	J det/A
	1513						all Det

LDC Report# 36266A2c

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: DeNovo 8th Avenue

LDC Report Date: May 6, 2016

Parameters: Polynuclear Aromatic Hydrocarbons

Validation Level: Stage 2B

Laboratory: Analytical Resources, Inc.

Sample Delivery Group (SDG): ARX9

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
EB-20-15-17	ARX9P	Soil	12/05/14
EB-20-18-20	ARX9Q	Soil	12/05/14
EMW-22D-12.5-14.5	ARX9U	Soil	11/24/14
EMW-22D-12.5-14.5DL	ARX9UDL	Soil	11/24/14

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Final Quality Assurance Project Plan, Remedial Investigation, Crowley Marine Services 8th Avenue S. Site, Seattle, Washington (October 2012) and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines (CLPNFG) for Superfund Organic Methods Data Review (June 2008). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Polynuclear Aromatic Hydrocarbons (PAHs) by Environmental Protection Agency (EPA) SW 846 Method 8270D in Selected Ion Monitoring (SIM) mode

All sample results were subjected to Stage 2B data validation, which comprises an evaluation of quality control (QC) summary results.

The following are definitions of the data qualifiers utilized during data validation:

J (Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.

U (Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

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.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition and cooler temperatures upon receipt met validation criteria.

All technical holding time requirements for frozen samples were met with the following exceptions:

Sample	Compound	Total Tim From Sample Collection Until Extraction	Required Holding Time From Sample Collection Until Extraction	Flag	A or P
EMW-22D-12.5-14.5 EMW-22D-12.5-14.5DL	All compounds	1 year 16 days	1 year	J (all detects)	P

II. GC/MS Instrument Performance Check

A decafluorotriphenylphosphine (DFTPP) tune was performed at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration and Initial Calibration Verification

An initial calibration was performed as required by the method.

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

Average relative response factors (RRF) for all compounds were within validation criteria.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 30.0% for all compounds.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

The percent differences (%D) were less than or equal to 20.0% for all compounds.

All of the continuing calibration relative response factors (RRF) were within validation criteria.

V. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks.

VI. Field Blanks

No field blanks were identified in this SDG.

VII. Surrogates

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

VIII. 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.

IX. Laboratory Control Samples

Laboratory control samples (LCS) were analyzed as required by the method. Percent recoveries (%R) were within QC limits.

X. Field Duplicates

No field duplicates were identified in this SDG.

XI. Internal Standards

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

XII. Compound Quantitation

All compound quantitations met validation criteria with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
EMW-22D-12.5-14.5	Naphthalene Phenanthrene Fluoranthene Pyrene	Sample result exceeded calibration range.	Reported result should be within calibration range.	J (all detects) J (all detects) J (all detects) J (all detects)	A

Raw data were not reviewed for Stage 2B validation.

XIII. Target Compound Identifications

Raw data were not reviewed for Stage 2B validation.

XIV. System Performance

Raw data were not reviewed for Stage 2B validation.

XV. Overall Assessment of Data

The analysis was conducted within all specifications of the method.

In the case where more than one result was reported for an individual sample, the least technically acceptable results were deemed unusable as follows:

Sample	Compound	Flag	A or P
EMW-22D-12.5-14.5	Naphthalene Phenanthrene Fluoranthene Pyrene	R R R R	A
EMW-22D-12.5-14.5DL	All compounds except Naphthalene Phenanthrene Fluoranthene Pyrene	R	A

Due to holding time exceedance, data were qualified as estimated in one sample.

The quality control criteria reviewed, other than those discussed above, were met and are considered acceptable. Sample results that were found to be rejected (R) are unusable for all purposes. Sample results that were found to be estimated (J) are usable for limited purposes only. Based upon the data validation all other results are considered valid and usable for all purposes.

DeNovo 8th Avenue
Polynuclear Aromatic Hydrocarbons - Data Qualification Summary - SDG ARX9

Sample	Compound	Flag	A or P	Reason
EMW-22D-12.5-14.5	All compounds except Naphthalene Phenanthrene Fluoranthene Pyrene	J (all detects)	P	Technical holding time
EMW-22D-12.5-14.5DL	Naphthalene Phenanthrene Fluoranthene Pyrene	J (all detects) J (all detects) J (all detects) J (all detects)	P	Technical holding time
EMW-22D-12.5-14.5	Naphthalene Phenanthrene Fluoranthene Pyrene	R R R R	A	Overall assessment of data
EMW-22D-12.5-14.5DL	All compounds except Naphthalene Phenanthrene Fluoranthene Pyrene	R	A	Overall assessment of data

DeNovo 8th Avenue
Polynuclear Aromatic Hydrocarbons - Laboratory Blank Data Qualification Summary - SDG ARX9

No Sample Data Qualified in this SDG

LDC #: 36266A2c **VALIDATION COMPLETENESS WORKSHEET** Date: 5/4/16
SDG #: ARX9 Stage 2B Page: 1 of 1
Laboratory: Analytical Resources, Inc. Reviewer: EF
2nd Reviewer: CW

METHOD: GC/MS Polynuclear Aromatic Hydrocarbons (EPA SW 846 Method 8270D-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.	Sample receipt/Technical holding times	A / SW	
II.	GC/MS Instrument performance check	A	
III.	Initial calibration/ICV	A / A	%RSD ≤ 20 ICV ≤ 30
IV.	Continuing calibration	A	CCV ≤ 20
V.	Laboratory Blanks	A	
VI.	Field blanks	N	
VII.	Surrogate spikes	A	
VIII.	Matrix spike/Matrix spike duplicates	N	CS
IX.	Laboratory control samples	A	LCS
X.	Field duplicates	N	
XI.	Internal standards	A	
XII.	Compound quantitation RL/LOQ/LODs	SW	
XIII.	Target compound identification	N	
XIV.	System performance	N	
XV.	Overall assessment of data	SW	

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; SB=Source blank; OTHER:

	Client ID	Lab ID	Matrix	Date
1	EB-20-15-17	ARX9P	Soil	12/05/14
2	EB-20-18-20	ARX9Q	Soil	12/05/14
3	EMW-22D-12.5-14.5	ARX9U	Soil	11/24/14
4	EMW-22D-12.5-14.5DL	ARX9UDL	Soil	11/24/14
5				
6				
7				
8				

Notes:

	MB-121015						

VALIDATION FINDINGS WORKSHEET

METHOD: GC/MS SVOA

A. Phenol	AA. 2-Chloronaphthalene	AAA. Butylbenzylphthalate	AAAA. Dibenzothiophene	A1.
B. Bis (2-chloroethyl) ether	BB. 2-Nitroaniline	BBB. 3,3'-Dichlorobenzidine	BBBB. Benzo(a)fluoranthene	B1.
C. 2-Chlorophenol	CC. Dimethylphthalate	CCC. Benzo(a)anthracene	CCCC. Benzo(b)fluorene	C1.
D. 1,3-Dichlorobenzene	DD. Acenaphthylene	DDD. Chrysene	DDDD. cis/trans-Decalin	D1.
E. 1,4-Dichlorobenzene	EE. 2,6-Dinitrotoluene	EEE. Bis(2-ethylhexyl)phthalate	EEEE. Biphenyl	E1.
F. 1,2-Dichlorobenzene	FF. 3-Nitroaniline	FFF. Di-n-octylphthalate	FFFF. Retene	F1.
G. 2-Methylphenol	GG. Acenaphthene	GGG. Benzo(b)fluoranthene	GGGG. C30-Hopane	G1.
H. 2,2'-Oxybis(1-chloropropane)	HH. 2,4-Dinitrophenol	HHH. Benzo(k)fluoranthene	HHHH. 1-Methylphenanthrene	H1.
I. 4-Methylphenol	II. 4-Nitrophenol	III. Benzo(a)pyrene	IIII. 1,4-Dioxane	I1.
J. N-Nitroso-di-n-propylamine	JJ. Dibenzofuran	JJJ. Indeno(1,2,3-cd)pyrene	JJJJ. Acetophenone	J1.
K. Hexachloroethane	KK. 2,4-Dinitrotoluene	KKK. Dibenz(a,h)anthracene	KKKK. Atrazine	K1.
L. Nitrobenzene	LL. Diethylphthalate	LLL. Benzo(g,h,i)perylene	LLLL. Benzaldehyde	L1.
M. Isophorone	MM. 4-Chlorophenyl-phenyl ether	MMM. Bis(2-Chloroisopropyl)ether	MMMM. Caprolactam	M1.
N. 2-Nitrophenol	NN. Fluorene	NNN. Aniline	NNNN. 2,6-Dichlorophenol	N1.
O. 2,4-Dimethylphenol	OO. 4-Nitroaniline	OOO. N-Nitrosodimethylamine	OOOO. 2,6-Dinitrotoluene	O1.
P. Bis(2-chloroethoxy)methane	PP. 4,6-Dinitro-2-methylphenol	PPP. Benzoic Acid	PPPP. 3-Methylphenol	P1.
Q. 2,4-Dichlorophenol	QQ. N-Nitrosodiphenylamine	QQQ. Benzyl alcohol	QQQQ. 3&4 Methylphenol	Q1.
R. 1,2,4-Trichlorobenzene	RR. 4-Bromophenyl-phenylether	RRR. Pyridine	RRRR. 4-Dimethyldibenzothiphene (4MDT)	R1.
S. Naphthalene	SS. Hexachlorobenzene	SSS. Benzidine	SSSS. 2/3-Dimethyldibenzothiophene (4MDT)	S1.
T. 4-Chloroaniline	TT. Pentachlorophenol	TTT. 1-Methylnaphthalene	TTTT. 1-Methyldibenzothiophene (1MDT)	T1.
U. Hexachlorobutadiene	UU. Phenanthrene	UUU.Benzo(b)thiophene	UUUU.	U1.
V. 4-Chloro-3-methylphenol	VV. Anthracene	VVV.Benzonaphthothiophene	VVVV.	V1.
W. 2-Methylnaphthalene	WW. Carbazole	WWW.Benzo(e)pyrene	WWWW.	W1.
X. Hexachlorocyclopentadiene	XX. Di-n-butylphthalate	XXX. 2,6-Dimethylnaphthalene	XXXX.	X1.
Y. 2,4,6-Trichlorophenol	YY. Fluoranthene	YYY. 2,3,5-Trimethylnaphthalene	YYYY.	Y1.
Z. 2,4,5-Trichlorophenol	ZZ. Pyrene	ZZZ. Perylene	ZZZZ.	Z1.

LDC #: 36266A2C

VALIDATION FINDINGS WORKSHEET
Technical Holding Times

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

All circled dates have exceeded the technical holding times.
Y N N/A Were all cooler temperatures within validation criteria?

METHOD : GC/MA BNA SW846 METHOD 8270D

Sample ID	Matrix	Preserved	Sampling Date	Extraction date	Analysis date	Total # of Days	Qualifier
3,4	SOIL	Frozen	11/24/14	12/10/15	12/18/15	16+ 1yr.	J/UJ/P all Det

TECHNICAL HOLDING TIME CRITERIA

Water: Extracted within 7 days, analyzed within 40 days.
Soil: Extracted within 14 days, analyzed within 40 days.

LDC #: 36266A2C

VALIDATION FINDINGS WORKSHEET
Compound Quantitation and CRQLs

Reviewer: FT
2nd Reviewer: AC

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

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 ion and relative response factor (RRF) used to quantitate the compound?

Y N N/A Were compound quantitation and CRQLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?

#	Sample ID	Compound	Finding	Qualifications
	3	S, UU, YY, ZZ	x'd cal Range	Jdet /A

Comments: See sample calculation verification worksheet for recalculations

LDC #: 36266A2C

VALIDATION FINDINGS WORKSHEET
Overall Assessment of Data

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

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

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".
All available information pertaining to the data were reviewed using professional judgement to compliment the determination of the overall quality of the data.

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

#	Sample ID	Compound	Finding	Qualifications
	3	S, UU, YY, ZZ	x'd cal Range	R/A
	4	all except above	diluted	R/A

Comments:

LDC Report# 36266A3b

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: DeNovo 8th Avenue

LDC Report Date: May 9, 2016

Parameters: Polychlorinated Biphenyls

Validation Level: Stage 2B

Laboratory: Analytical Resources, Inc.

Sample Delivery Group (SDG): ARX9

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
EMW-21D-15-15.4	ARX9D	Soil	12/03/14
EMW-21D-17-17.7	ARX9E	Soil	12/03/14
EB-20-15-17	ARX9P	Soil	12/05/14
EB-20-18-20	ARX9Q	Soil	12/05/14
EB-20-18-20MS	ARX9QMS	Soil	12/05/14
EB-20-18-20MSD	ARX9QMSD	Soil	12/05/14

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Final Quality Assurance Project Plan, Remedial Investigation, Crowley Marine Services 8th Avenue S. Site, Seattle, Washington (October 2012) and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines (CLPNFG) for Superfund Organic Methods Data Review (June 2008). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Polychlorinated Biphenyls (PCBs) by Environmental Protection Agency (EPA) SW 846 Method 8082A

All sample results were subjected to Stage 2B data validation, which comprises an evaluation of quality control (QC) summary results.

The following are definitions of the data qualifiers utilized during data validation:

J (Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.

U (Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

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.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition and cooler temperatures upon receipt met validation criteria.

All technical holding time requirements for frozen samples were met.

II. Initial Calibration and Initial Calibration Verification

An initial calibration was performed as required by the method.

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

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 20.0% for all compounds with the following exceptions:

Date	Standard	Column	Compound	%D	Associated Samples	Flag	A or P
12/18/15	ICV	ZB 5	Aroclor-1254	26.5	EMW-21D-15-15.4 EMW-21D-17-17.7	J (all detects)	A
12/18/15	ICV	ZB 5	Aroclor-1254	26.5	EB-20-15-17 EB-20-18-20	NA	-

III. Continuing Calibration

Continuing calibration was performed at required frequencies.

The percent differences (%D) were less than or equal to 20.0% for all compounds with the following exceptions:

Date	Standard	Column	Compound	%D	Associated Samples	Affected Compounds	Flag	A or P
12/22/15 (16:53)	CCV	ZB 35	Aroclor-1260	20.7	EMW-21D-15-15.4 EMW-21D-17-17.7	Aroclor-1254 Aroclor-1260	J (all detects) J (all detects)	A
12/22/15 (16:53)	CCV	ZB 35	Aroclor-1260	20.7	EB-20-15-17 EB-20-18-20	Aroclor-1254 Aroclor-1260	-	-
12/22/15 (16:53)	CCV	ZB 35	Aroclor-1260	20.7	EMW-21D-15-15.4 EMW-21D-17-17.7 EB-20-15-17 EB-20-18-20	Aroclor-1242	-	-

IV. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks.

V. Field Blanks

No field blanks were identified in this SDG.

VI. Surrogates/Internal Standards

Surrogates were added to all samples as required by the method. Surrogate recoveries (%R) were not within QC limits for sample EMW-21D-17-17.7. No data were qualified for samples analyzed at greater than or equal to 5X dilution.

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

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

VIII. Laboratory Control Samples

Laboratory control samples (LCS) were analyzed as required by the method. Percent recoveries (%R) were within QC limits.

IX. Field Duplicates

No field duplicates were identified in this SDG.

X. Compound Quantitation

Raw data were not reviewed for Stage 2B validation.

XI. Target Compound Identification

Raw data were not reviewed for Stage 2B validation.

XII. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

Due to ICV and continuing calibration %D, data were qualified as estimated in two samples.

The quality control criteria reviewed, other than those discussed above, were met and are considered acceptable. Sample results that were found to be estimated (J) are usable for limited purposes only. Based upon the data validation all other results are considered valid and usable for all purposes.

DeNovo 8th Avenue
Polychlorinated Biphenyls - Data Qualification Summary - SDG ARX9

Sample	Compound	Flag	A or P	Reason
EMW-21D-15-15.4 EMW-21D-17-17.7	Aroclor-1254	J (all detects)	A	Initial calibration verification (%D)
EMW-21D-15-15.4 EMW-21D-17-17.7	Aroclor-1254 Aroclor-1260	J (all detects) J (all detects)	A	Continuing calibration (%D)

DeNovo 8th Avenue
Polychlorinated Biphenyls - Laboratory Blank Data Qualification Summary - SDG ARX9

No Sample Data Qualified in this SDG

LDC #: 36266A3b
SDG #: ARX9
Laboratory: Analytical Resources, Inc.

VALIDATION COMPLETENESS WORKSHEET
Stage 2B

Date: 5/3/16
Page: 1 of 1
Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: GC Polychlorinated Biphenyls (EPA SW846 Method 8082A)

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.	Sample receipt/Technical holding times	A/A	
II.	Initial calibration/ICV	A/SW	%RSD ≤ 20 ICV ≤ 20
III.	Continuing calibration	SW	CCV ≤ 20
IV.	Laboratory Blanks	A	
V.	Field blanks	N	
VI.	Surrogate spikes /1S	SW/A	
VII.	Matrix spike/Matrix spike duplicates	A	
VIII.	Laboratory control samples	A	LCS
IX.	Field duplicates	N	
X.	Compound quantitation/RL/LOQ/LODs	N	
XI.	Target compound identification	N	
XII.	Overall assessment of data	A	

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; SB=Source blank; OTHER:

	Client ID	Lab ID	Matrix	Date
1	EMW-21D-15-15.4	ARX9D	Soil	12/03/14
2	EMW-21D-17-17.7	ARX9E	Soil	12/03/14
3	EB-20-15-17	ARX9P	Soil	12/05/14
4	EB-20-18-20	ARX9Q	Soil	12/05/14
5	EB-20-18-20MS	ARX9QMS	Soil	12/05/14
6	EB-20-18-20MSD	ARX9QMSD	Soil	12/05/14
7				
8				
9				
10				
11				
12				
13				

Notes:

	MB - 121415						

VALIDATION FINDINGS WORKSHEET

METHOD: Pesticide/PCBs (EPA SW 846 Method 8081/8082)

A. alpha-BHC	I. Dieldrin	Q. Endrin ketone	Y. Aroclor-1242 /	GG. Chlordane
B. beta-BHC	J. 4,4'-DDE	R. Endrin aldehyde	Z. Aroclor-1248	HH. Chlordane (Technical)
C. delta-BHC	K. Endrin	S. alpha-Chlordane	AA. Aroclor-1254 /	II. Arochlor 1262
D. gamma-BHC	L. Endosulfan II	T. gamma-Chlordane	BB. Aroclor-1260 /	JJ. Aroclor 1268
E. Heptachlor	M. 4,4'-DDD	U. Toxaphene	CC. 2,4'-DDD	KK. Oxychlordane
F. Aldrin	N. Endosulfan sulfate	V. Aroclor-1016	DD. 2,4'-DDE	LL. trans-Nonachlor
G. Heptachlor epoxide	O. 4,4'-DDT	W. Aroclor-1221	EE. 2,4'-DDT	MM. cis-Nonachlor
H. Endosulfan I	P. Methoxychlor	X. Aroclor-1232	FF. Hexachlorobenzene	NN.

Notes:_____

LDC #: 36266A3b

VALIDATION FINDINGS WORKSHEET
Initial Calibration Verification

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

METHOD: ✓ GC __ HPLC

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".
What type of initial calibration verification calculation was performed? ___%D or ___%R
Y N N/A Was an initial calibration verification standard analyzed after each ICAL for each instrument?
Y N N/A Did the initial calibration verification standards meet the %D / %R validation criteria of ≤20.0% / 80-120%?

#	Date	Standard ID	Detector/ Column	Compound	%D (Limit ≤ 20.0)	Associated Samples	Qualifications
1	12/18/15	ICV	ZB 5	AA	26.5	All	J det/A qual AA only #1,2 are detect

LDC #: 36266A3b

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Reviewer: FT
2nd Reviewer: CL

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 ___%R
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 / %R validation criteria of ≤20.0% / 80-120%?
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 (Limit ≤ 20.0)	RT (limit)	Associated Samples	Qualifications
+	12/22/15	CCV	ZB35	BB	20.7		All	Jdu/A
	1653							qual Y, AA, BB
								#1,2 are detected
								for AA + BB

LDC #: 36266A3b

VALIDATION FINDINDS WORKSHEET
Surrogate Recovery

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

METHOD: ✓ **GC** ___ **HPLC**

Are surrogates required by the method? Yes____ or No____.

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

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

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

#	Sample ID	Detector/ Column	Surrogate Compound	%R (Limits)	Qualifications
	2	NS	8	133 (40-126)	no qual 10x DL
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	

	Surrogate Compound		Surrogate Compound		Surrogate Compound		Surrogate Compound		
A	Chlorobenzene (CBZ)	G	Octacosane	M	Benzo(e)Pyrene	S	1-Chloro-3-Nitrobenzene	Y	Tetrachloro-m- xylene
B	4-Bromofluorobenzene (BFB)	H	Ortho-Terphenyl	N	Terphenyl-D14	T	3,4-Dinitrotoluene	Z	2-Bromonaphthalene
C`	a,a,a-Trifluorotoluene	I	Fluorobenzene (FBZ)	O	Decachlorobiphenyl (DCB)	U	Tripentyltin	AA	Chloro-octadecane
D	Bromochlorobenene	J	n-Triacontane	P	1-methylnaphthalene	V	Tri-n-propyltin	BB	2,4-Dichlorophenylacetic acid
E	1,4-Dichlorobutane	K	Hexacosane	Q	Dichlorophenyl Acetic Acid (DCAA)	W	Tributyl Phosphate	CC	2,5-Dibromotoluene
F	1,4-Difluorobenzene (DFB)	L	Bromobenzene	R	4-Nitrophenol	X	Triphenyl Phosphate		

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: DeNovo 8th Avenue

LDC Report Date: May 9, 2016

Parameters: Metals

Validation Level: Stage 2B

Laboratory: Analytical Resources, Inc.

Sample Delivery Group (SDG): ARX9

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
EMW-21D-15-15.4	ARX9D	Soil	12/03/14
EMW-21D-17-17.7	ARX9E	Soil	12/03/14
EB-42-3-5	ARX9O	Soil	12/01/14
EMW-21D-15-15.4MS	ARX9DMS	Soil	12/03/14
EMW-21D-15-15.4DUP	ARX9DDUP	Soil	12/03/14

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Final Quality Assurance Project Plan, Remedial Investigation, Crowley Marine Services 8th Avenue S. Site, Seattle, Washington (October 2012) and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines (CLPNFG) for Inorganic Superfund Data Review (January 2010). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following methods:

Antimony, Arsenic, Barium, Beryllium, Cadmium, Chromium, Copper, Lead, Nickel, Selenium, Silver, Thallium, and Zinc by Environmental Protection Agency (EPA) Method 200.8
Mercury by EPA SW 846 Method 7471A

All sample results were subjected to Stage 2B data validation, which comprises an evaluation of quality control (QC) summary results.

The following are definitions of the data qualifiers utilized during data validation:

J (Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.

U (Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

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.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition.

All technical holding time requirements for frozen samples were met with the following exceptions:

Sample	Analyte	Total Days From Sample Collection Until Analysis	Required Holding Time (in Days) From Sample Collection Until Analysis	Flag	A or P
EMW-21D-15-15.4 EMW-21D-17-17.7	Mercury	377	28	J (all detects)	P
EB-42-3-5	Mercury	379	28	J (all detects)	P

II. ICPMS Tune

The mass calibration was within 0.1 AMU and the percent relative standard deviation (%RSD) was less than or equal to 5%.

III. Instrument Calibration

Initial and continuing calibrations were performed as required by the methods.

The initial calibration verification (ICV) and continuing calibration verification (CCV) standards were within QC limits.

IV. ICP Interference Check Sample Analysis

The frequency of interference check sample (ICS) analysis was met. All criteria were within QC limits.

V. Laboratory Blanks

Laboratory blanks were analyzed as required by the methods. No contaminants were found in the laboratory blanks with the following exceptions:

Blank ID	Analyte	Maximum Concentration	Associated Samples
PB (prep blank)	Antimony Lead Thallium	0.050 mg/Kg 0.010 mg/Kg 0.010 mg/Kg	All samples in SDG ARX9

Data qualification by the laboratory blanks was based on the maximum contaminant concentration in the laboratory blanks 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 laboratory blanks.

VI. Field Blanks

No field blanks were identified in this SDG.

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	%R (Limits)	Flag	A or P
EMW-21D-15-15.4MS (All samples in SDG ARX9)	Antimony Chromium	7.6 (75-125) 40.9 (75-125)	J (all detects) J (all detects)	A
EMW-21D-15-15.4MS (All samples in SDG ARX9)	Beryllium Thallium	129 (75-125) 132 (75-125)	J (all detects) J (all detects)	A

For EMW-21D-15-15.4MS, no data were qualified for Arsenic and Copper percent recoveries (%R) outside the QC limits since the parent sample results were greater than 4X the spike concentration.

VIII. Duplicate Sample Analysis

Duplicate (DUP) sample analysis was performed on an associated project sample. Results were within QC limits with the following exceptions:

DUP ID (Associated Samples)	Analyte	RPD (Limits)	Flag	A or P
EMW-21D-15-15.4DUP (All samples in SDG ARX9)	Cadmium Copper Zinc	72.7 (≤20) 22.5 (≤20) 35.0 (≤20)	J (all detects) J (all detects) J (all detects)	A

IX. Serial Dilution

Serial dilution was not performed for this SDG.

X. Laboratory Control Samples

Laboratory control samples (LCS) were analyzed as required by the methods. Percent recoveries (%R) were within QC limits.

XI. Field Duplicates

No field duplicates were identified in this SDG.

XII. Internal Standards (ICP-MS)

Raw data were not reviewed for Stage 2B validation.

XIII. Sample Result Verification

Raw data were not reviewed for Stage 2B validation.

XIV. Overall Assessment of Data

The analysis was conducted within all specifications of the methods. No results were rejected in this SDG.

Due to holding time exceedance, MS/MSD %R, and DUP RPD, data were qualified as estimated in three samples.

The quality control criteria reviewed, other than those discussed above, were met and are considered acceptable. Sample results that were found to be estimated (J) are usable for limited purposes only. Based upon the data validation all other results are considered valid and usable for all purposes.

DeNovo 8th Avenue
Metals - Data Qualification Summary - SDG ARX9

Sample	Analyte	Flag	A or P	Reason
EMW-21D-15-15.4 EMW-21D-17-17.7 EB-42-3-5	Mercury	J (all detects)	P	Technical holding time
EMW-21D-15-15.4 EMW-21D-17-17.7 EB-42-3-5	Antimony Chromium Beryllium Thallium	J (all detects) J (all detects) J (all detects) J (all detects)	A	Matrix spike/Matrix spike duplicate (%R)
EMW-21D-15-15.4 EMW-21D-17-17.7 EB-42-3-5	Cadmium Copper Zinc	J (all detects) J (all detects) J (all detects)	A	Duplicate sample analysis (RPD)

DeNovo 8th Avenue
Metals - Laboratory Blank Data Qualification Summary - SDG ARX9

No Sample Data Qualified in this SDG

LDC #: 36266A4a

SDG #: ARX9

Laboratory: Analytical Resources, Inc.

VALIDATION COMPLETENESS WORKSHEET

Stage 2B

Date: 5/5/16

Page: 1 of 1

Reviewer: CR

2nd Reviewer: amk

METHOD: Metals (EPA Method 200.8/EPA SW 846 Method 7471A)

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.	Sample receipt/Technical holding times	A / ~~A~~ SW	Frozen - 2yr HT for 200.8
II.	ICP/MS Tune	A	
III.	Instrument Calibration	A	
IV.	ICP Interference Check Sample (ICS) Analysis	A	
V.	Laboratory Blanks	SW	
VI.	Field Blanks	N	
VII.	Matrix Spike/Matrix Spike Duplicates	SW	
VIII.	Duplicate sample analysis	SW	
IX.	Serial Dilution	N	
X.	Laboratory control samples	A	LCS
XI.	Field Duplicates	N	
XII.	Internal Standard (ICP-MS)	N	not reviewed
XIII.	Sample Result Verification	N	
XIV	Overall Assessment of Data	A	

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; SB=Source blank; OTHER:

	Client ID	Lab ID	Matrix	Date
1	EMW-21D-15-15.4	ARX9D	Soil	12/03/14
2	EMW-21D-17-17.7	ARX9E	Soil	12/03/14
3	EB-42-3-5	ARX9O	Soil	12/01/14
4	EMW-21D-15-15.4MS	ARX9DMS	Soil	12/03/14
5	EMW-21D-15-15.4DUP	ARX9DDUP	Soil	12/03/14
6				
7				
8				
9				
10				
11				
12				

Notes:

LDC #: 36266A4a

VALIDATION FINDINGS WORKSHEET
Sample Specific Element Reference

Page: 1 of 1
Reviewer: cr
2nd reviewer: OmA

All circled elements are applicable to each sample.

Sample ID	Matrix	Target Analyte List (TAL)
1-3		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, Sn, Ti, ___
		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, Sn, Ti, ___
QC: 4,5		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, Sn, Ti, ___
		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, Sn, Ti, ___
		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, Sn, Ti, ___
		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, Sn, Ti, ___
		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, Sn, Ti, ___
		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, Sn, Ti, ___
		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, Sn, Ti, ___
		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, Sn, Ti, ___
		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, Sn, Ti, ___
		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, Sn, Ti, ___
		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, Sn, Ti, ___
		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, Sn, Ti, ___
		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, Sn, Ti, ___
		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, Sn, Ti, ___
		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, Sn, Ti, ___
		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, Sn, Ti, ___
		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, Sn, Ti, ___
		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, Sn, Ti, ___
		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, Sn, Ti, ___
		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, Sn, Ti, ___
		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, Sn, Ti, ___
		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, Sn, Ti, ___
		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, Sn, Ti, ___
		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, Sn, Ti, ___
ICP-MS		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___
GFAA		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti,

Comments: Mercury by CVAA if performed

LDC #: 36266A4

VALIDATION FINDINGS WORKSHEET
Technical Holding Times

Reviewer: CL
2nd reviewer: GMH

Were samples preserved? Y N N/A
All circled dates have exceeded the technical holding time.

METHOD:		(7471A) Mercury Holding time = 28 days					
Sample ID:	Sampling Date	Analysis Date	Total Time until Analysis (days)	Qualifier	Det/ND		
1, 2, 4, 5	12/3/14	12/15/15	377	J/R/P	Det		
3	12/1/14	12/15/15	379	J/R/P	Det		

Technical Holding Time Criteria

Mercury: 28 days
All other metals: 2 years if frozen

LDC #: 36266A4a

VALIDATION FINDINGS WORKSHEET
PB/ICB/CCB QUALIFIED SAMPLES

Reviewer: a
2nd Reviewer: AMB

METHOD: Trace metals (EPA SW 864 Method 6010B/6020/7000) Soil preparation factor applied: ____
Sample Concentration units, unless otherwise noted: mg/Kg Associated Samples: All

				Sample Identification										
Analyte	**Maximum PB[a] (mg/Kg)**	**Maximum ICB/CCB[a] (ug/L)**	**Action Level**	**No qual (>5x)**										
Sb	0.050		0.25											
Pb	0.010		0.05											
Tl	0.010		0.05											

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 #: 36266A4a

VALIDATION FINDINGS WORKSHEET
Matrix Spike

Reviewer: A
2nd Reviewer: MH

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.

LEVEL IV ONLY:

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

#	MS ID	Matrix	Analyte	MS %Recovery	Associated Samples	Qualifications
	4	s	Sb	7.6	All	J/UJ/A (Det)
			Be	129		Jdet/A (Det)
			Cr	40.9		J/UJ/A (Det)
			Tl	132		Jdet/A (Det)

Comments: 4: As, Cu >4x 4PS: Sb = 88%

LDC #: 36266A4a

VALIDATION FINDINGS WORKSHEET
Duplicate Analysis

Page: 1 of 1
Reviewer: G
2nd Reviewer: AMB

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 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 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.

#	Date	Duplicate ID	Matrix	Analyte	RPD (Limits)	Difference (Limits)	Associated Samples	Qualifications
		5	s	Cd	72.7		All	J/UJ/A (Det)
				Cu	22.5			J/UJ/A (Det)
				Zn	35.0			J/UJ/A (Det)

Comments: _____

36266A4a.wpd

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: DeNovo 8th Avenue

LDC Report Date: May 10, 2016

Parameters: Total Solids

Validation Level: Stage 2B

Laboratory: Analytical Resources, Inc.

Sample Delivery Group (SDG): ARX9

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
EMW-20D-2-4	ARX9A	Soil	11/24/14
EMW-20D-4-7	ARX9B	Soil	12/04/14
EMW-20D-10-11	ARX9C	Soil	12/04/14
EMW-21D-15-15.4	ARX9D	Soil	12/03/14
EMW-21D-17-17.7	ARX9E	Soil	12/03/14
EMW-22D-2-4	ARX9F	Soil	11/24/14
EMW-22D-12.5-14.5	ARX9G	Soil	11/24/14
DMW-6A-2-3	ARX9H	Soil	11/26/14
DMW-6A-3-3.5	ARX9I	Soil	11/26/14
DMW-6A-6.5-8	ARX9J	Soil	11/26/14
DMW-6A-8-10	ARX9K	Soil	11/26/14
DMW-6A-11-13	ARX9L	Soil	11/26/14
DMW-6A-15-17	ARX9M	Soil	11/26/14
DMW-6A-18-20	ARX9N	Soil	11/26/14
EB-42-3-5	ARX9O	Soil	12/01/14
EB-20-15-17	ARX9P	Soil	12/05/14
EB-20-18-20	ARX9Q	Soil	12/05/14
EB-30-2-4	ARX9R	Soil	12/08/14
EB-30-6-8	ARX9S	Soil	12/08/14
EB-30-16.5-18.5	ARX9T	Soil	12/08/14
EB-30-16.5-18.5DUP	ARX9TDUP	Soil	12/08/14
EB-30-16.5-18.5TRP	ARX9TTRP	Soil	12/08/14

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Final Quality Assurance Project Plan, Remedial Investigation, Crowley Marine Services 8th Avenue S. Site, Seattle, Washington (October 2012) and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines (CLPNFG) for Inorganic Superfund Data Review (January 2010). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Total Solids by Standard Method 2540G

All sample results were subjected to Stage 2B data validation, which comprises an evaluation of quality control (QC) summary results.

The following are definitions of the data qualifiers utilized during data validation:

J (Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.

U (Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

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.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition.

All technical holding time requirements for frozen samples were met.

II. Initial Calibration

All criteria for the initial calibration were met.

III. Continuing Calibration

Continuing calibration frequency and analysis criteria were met.

IV. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks.

V. Field Blanks

No field blanks were identified in this SDG.

VI. Matrix Spike/Matrix Spike Duplicates

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

VII. Triplicate Sample Analysis

Duplicate (DUP) and triplicate (TRP) sample analyses were performed on an associated project sample. Results were within QC limits.

VIII. Laboratory Control Samples

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

IX. Field Duplicates

No field duplicates were identified in this SDG.

X. Sample Result Verification

Raw data were not reviewed for Stage 2B validation.

XI. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

The quality control criteria reviewed were met and are considered acceptable. Based upon the data validation all results are considered valid and usable for all purposes.

DeNovo 8th Avenue
Total Solids - Data Qualification Summary - SDG ARX9

No Sample Data Qualified in this SDG

DeNovo 8th Avenue
Total Solids - Laboratory Blank Data Qualification Summary - SDG ARX9

No Sample Data Qualified in this SDG

LDC #: 36266A6 **VALIDATION COMPLETENESS WORKSHEET** Date: 5/5/16
SDG #: ARX9 Stage 2B Page: 1 of 2
Laboratory: Analytical Resources, Inc. Reviewer: CW
2nd Reviewer: AMH

METHOD: (Analyte) Total Solids (SM2540G)

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.	Sample receipt/Technical holding times	A/A	Frozen - no HT
II	Initial calibration	A	
III.	Calibration verification	A	
IV	Laboratory Blanks	A	
V	Field blanks	N	
VI.	Matrix Spike/Matrix Spike Duplicates	N	not required
VII.	~~Duplicate~~ Triplicate sample analysis	A	TRP
VIII.	Laboratory control samples	~~A~~ N	Not required
IX.	Field duplicates	N	
X.	Sample result verification	N	
XI	Overall assessment of data	A	

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; SB=Source blank; OTHER:

	Client ID	Lab ID	Matrix	Date
1	EMW-20D-2-4	ARX9A	Soil	11/24/14
2	EMW-20D-4-7	ARX9B	Soil	12/04/14
3	EMW-20D-10-11	ARX9C	Soil	12/04/14
4	EMW-21D-15-15.4	ARX9D	Soil	12/03/14
5	EMW-21D-17-17.7	ARX9E	Soil	12/03/14
6	EMW-22D-2-4	ARX9F	Soil	11/24/14
7	EMW-22D-12.5-14.5	ARX9G	Soil	11/24/14
8	DMW-6A-2-3	ARX9H	Soil	11/26/14
9	DMW-6A-3-3.5	ARX9I	Soil	11/26/14
10	DMW-6A-6.5-8	ARX9J	Soil	11/26/14
11	DMW-6A-8-10	ARX9K	Soil	11/26/14
12	DMW-6A-11-13	ARX9L	Soil	11/26/14
13	DMW-6A-15-17	ARX9M	Soil	11/26/14
14	DMW-6A-18-20	ARX9N	Soil	11/26/14
15	EB-42-3-5	ARX9O	Soil	12/01/14
16	EB-20-15-17	ARX9P	Soil	12/05/14
17	EB-20-18-20	ARX9Q	Soil	12/05/14

LDC #: 36266A6 **VALIDATION COMPLETENESS WORKSHEET** Date: 5/5/16
SDG #: ARX9 Stage 2B Page: 2 of 2
Laboratory: Analytical Resources, Inc. Reviewer: CL
2nd Reviewer: amy

METHOD: (Analyte) Total Solids (SM2540G)

	Client ID	Lab ID	Matrix	Date
18	EB-30-2-4	ARX9R	Soil	12/08/14
19	EB-30-6-8	ARX9S	Soil	12/08/14
20	EB-30-16.5-18.5	ARX9T	Soil	12/08/14
21	EB-30-16.5-18.5DUP	ARX9TDUP	Soil	12/08/14
22	↓ TRP	↓ TRP	↓	↓
23				
24				
25				
26				

Notes:

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: DeNovo 8th Avenue

LDC Report Date: May 9, 2016

Parameters: Total Petroleum Hydrocarbons as Extractables

Validation Level: Stage 2B

Laboratory: Analytical Resources, Inc.

Sample Delivery Group (SDG): ARX9

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
EMW-22D-12.5-14.5	ARX9G	Soil	11/24/14

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Final Quality Assurance Project Plan, Remedial Investigation, Crowley Marine Services 8th Avenue S. Site, Seattle, Washington (October 2012) and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines (CLPNFG) for Superfund Organic Methods Data Review (June 2008). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Total Petroleum Hydrocarbons (TPH) as Extractables by NWTPH-Dx

All sample results were subjected to Stage 2B data validation, which comprises an evaluation of quality control (QC) summary results.

The following are definitions of the data qualifiers utilized during data validation:

J (Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.

U (Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered not detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

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.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition and cooler temperatures upon receipt met validation criteria.

All technical holding time requirements for frozen samples were met with the following exceptions:

Sample	Compound	Total Time From Sample Collection Until Extraction	Required Holding Time From Sample Collection Until Extraction	Flag	A or P
All samples in SDG ARX9	TPH as extractables	1 year 15 days	1 year	J (all detects)	P

II. Initial Calibration and Initial Calibration Verification

An initial calibration was performed as required by the method.

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

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 15.0% for all compounds with the following exceptions:

Date	Compound	%D	Associated Samples	Flag	A or P
11/24/15	Motor oil	19.28	All samples in SDG ARX9	J (all detects)	A

III. Continuing Calibration

Continuing calibration was performed at the required frequencies.

The percent differences (%D) were less than or equal to 15.0% for all compounds.

IV. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks.

V. Field Blanks

No field blanks were identified in this SDG.

VI. Surrogates

Surrogates were added to all samples 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) sample analysis was performed on an associated project sample. Percent recoveries (%R) were not within QC limits. No data were qualified since there were no associated samples in this SDG.

VIII. Laboratory Control Samples

Laboratory control samples (LCS) were analyzed as required by the method. Percent recoveries (%R) were within QC limits.

IX. Field Duplicates

No field duplicates were identified in this SDG.

X. Compound Quantitation

Raw data were not reviewed for Stage 2B validation.

XI. Target Compound Identifications

Raw data were not reviewed for Stage 2B validation.

XII. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

Due to holding time exceedance and ICV %D, data were qualified as estimated in one sample.

The quality control criteria reviewed, other than those discussed above, were met and are considered acceptable. Sample results that were found to be estimated (J) are usable for limited purposes only. Based upon the data validation all other results are considered valid and usable for all purposes.

DeNovo 8th Avenue
Total Petroleum Hydrocarbons as Extractables - Data Qualification Summary - SDG ARX9

Sample	Compound	Flag	A or P	Reason
EMW-22D-12.5-14.5	TPH as extractables	J (all detects)	P	Technical holding time
EMW-22D-12.5-14.5	Motor oil	J (all detects)	A	Initial calibration verification (%D)

DeNovo 8th Avenue
Total Petroleum Hydrocarbons as Extractables - Laboratory Blank Data Qualification Summary - SDG ARX9

No Sample Data Qualified in this SDG

LDC #: 36266A8 **VALIDATION COMPLETENESS WORKSHEET** Date: 5/4/16

SDG #: ARX9 Stage 2B Page: 1 of 1

Laboratory: Analytical Resources, Inc. Reviewer: FZ

2nd Reviewer: AV

METHOD: GC TPH as Extractables (NWTPH-Dx)

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.	Sample receipt/Technical holding times	A /SW	
II.	Initial calibration/ICV	A /SW	%RSD ≤ 20 ICV ≤ 15
III.	Continuing calibration	A	CCV ≤ 15
IV.	Laboratory Blanks	A	
V.	Field blanks	N	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	SW	~~S~~ EB-34-8-10MS|D (%R no ASS. sample)
VIII.	Laboratory control samples	A	LCS
IX.	Field duplicates	N	
X.	Compound quantitation RL/LOQ/LODs	N	
XI.	Target compound identification	N	
XII.	Overall assessment of data	A	

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; SB=Source blank; OTHER:

	Client ID	Lab ID	Matrix	Date
1	EMW-22D-12.5-14.5	ARX9G	Soil	11/24/14
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				

Notes:

	MB - 120915						

LDC #: 36266A8

VALIDATION FINDINGS WORKSHEET
Technical Holding Times

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

All circled dates have exceeded the technical holding times.
Y / N N/A Were all cooler temperatures within validation criteria?

METHOD : ___ GC ___ HPLC

Sample ID	Matrix	Preserved	Sampling Date	Extraction date	Analysis date	Total # of Days	Qualifier
1	SOIL	frozen	11/24/14	12/9/15	12/16/15	1yr & 15days	J|UJ|P (Det)

Frozen sample holding time = 1yr. from sampling date

TECHNICAL HOLDING TIME CRITERIA

VOLATILES:	Water unpreserved:	Aromatic within 7 days, non-aromatic within 14 days of sample collection.
	Water preserved:	Both within 14 days of sample collection.
	Soils:	Both within 14 days of sample collection.
	Encores unpreserved:	Both within 48 hours of sample collection.
	Encores preserved:	Both within 14 days of sample collection.
EXTRACTABLES:		
	Water:	Extracted within 7 days, analyzed within 40 days.
	Soil:	Extracted within 14 days, analyzed within 40 days.

LDC #: 36266A8

VALIDATION FINDINGS WORKSHEET
Initial Calibration Verification

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

METHOD: ✓ **GC** __ **HPLC**

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".
What type of initial calibration verification calculation was performed? ___%D or ___%R
(Y) N N/A Was an initial calibration verification standard analyzed after each ICAL for each instrument?
Y (N) N/A Did the initial calibration verification standards meet the %D / %R validation criteria of ≤15%?

#	Date	Standard ID	Detector/ Column	Compound	%D (Limit ≤ 15.0)	Associated Samples	Qualifications
	11/24/15 15:26	ICV	/	Motor Oil	19.28	All	Jdw/A (Det)

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: DeNovo 8th Avenue

LDC Report Date: May 9, 2016

Parameters: Polychlorinated Dioxins/Dibenzofurans

Validation Level: Stage 4

Laboratory: Analytical Resources, Inc.

Sample Delivery Group (SDG): ARX9

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
EMW-20D-2-4	ARX9A	Soil	11/24/14
EMW-20D-4-7	ARX9B	Soil	12/04/14
EMW-20D-10-11	ARX9C	Soil	12/04/14
EMW-22D-2-4	ARX9F	Soil	11/24/14
DMW-6A-2-3	ARX9H	Soil	11/26/14
DMW-6A-3-3.5	ARX9I	Soil	11/26/14
EB-42-3-5	ARX9O	Soil	12/01/14
EB-30-2-4	ARX9R	Soil	12/08/14
EB-30-6-8	ARX9S	Soil	12/08/14
EB-30-16.5-18.5	ARX9T	Soil	12/08/14

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Final Quality Assurance Project Plan, Remedial Investigation, Crowley Marine Services 8th Avenue S. Site, Seattle, Washington (October 2012) and the USEPA Contract Laboratory Program (CLP) National Functional Guidelines for Chlorinated Dibenzo-p-Dioxins (CDDs) and Chlorinated Dibenzofurans (CDFs) Data Review (September 2011). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Polychlorinated Dioxins/Dibenzofurans by Environmental Protection Agency (EPA) Method 1613B

All sample results were subjected to Stage 4 data validation, which is comprised of the quality control (QC) summary forms as well as the raw data, to confirm sample quantitation and identification.

The following are definitions of the data qualifiers utilized during data validation:

J (Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.

U (Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered not detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

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.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition.

Cooler temperatures for samples EB-30-2-4, EB-30-6-8, and EB-30-16.5-18.5 were reported at 6.8°C and 9.3°C upon receipt by the laboratory. Since the samples were received the same day that they were collected, time did not allow for sufficient cooling of the samples, therefore no data were qualified.

All technical holding time requirements for frozen samples were met.

II. HRGC/HRMS Instrument Performance Check

Instrument performance was checked at the required 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%.

The static resolving power was at least 10,000 (10% valley definition).

III. Initial Calibration and Initial Calibration Verification

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

The percent relative standard deviations (%RSD) were less than or equal to 20.0% for unlabeled compounds and less than or equal to 35.0% for labeled compounds.

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

The minimum S/N ratio was greater than or equal to 10 for each unlabeled compound and labeled compound.

The percent differences (%D) of the initial calibration verification (ICV) standard were within the QC limits for unlabeled compounds and labeled compounds with the following exceptions:

Date	Compound	Concentration (Limits)	Associated Samples	Affected Compound	Flag	A or P
10/15/15	1,2,3,4,7,8-HxCDF	56.905 pg (45-56)	EMW-20D-2-4 EMW-20D-4-7 EMW-20D-10-11 DMW-6A-2-3 DMW-6A-3-3.5 EB-42-3-5 EB-30-6-8	1,2,3,4,7,8-HxCDF Total HxCDF	J (all detects) J (all detects)	P
10/15/15	1,2,3,4,7,8-HxCDF	56.905 pg (45-56)	EMW-22D-2-4 EB-30-2-4 EB-30-16.5-18.5	1,2,3,4,7,8-HxCDF	NA	-

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

All of the continuing calibration results were within the QC limits for unlabeled compounds and labeled compounds.

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

The minimum S/N ratio was greater than or equal to 10 for each unlabeled compound and labeled compound.

V. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks with the following exceptions:

Blank ID	Extraction Date	Compound	Concentration	Associated Samples
MB-122315	12/23/15	1,2,3,7,8,9-HxCDF 1,2,3,7,8,9-HxCDD 1,2,3,4,6,7,8-HpCDF 1,2,3,4,6,7,8-HpCDD OCDF OCDD Total PeCDD Total HxCDD Total HpCDD Total HxCDF Total HpCDF	0.134 pg/g 0.146 pg/g 0.154 pg/g 1.31 pg/g 0.966 pg/g 10.7 pg/g 0.0896 pg/g 1.10 pg/g 3.69 pg/g 0.135 pg/g 0.398 pg/g	All samples in SDG ARX9

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

Sample	Compound	Reported Concentration	Modified Final Concentration
EMW-22D-2-4	1,2,3,4,6,7,8-HpCDF 1,2,3,4,6,7,8-HpCDD OCDF OCDD Total PeCDD Total HxCDD Total HpCDD Total HxCDF Total HpCDF	0.333 pg/g 2.62 pg/g 0.908 pg/g 24.1 pg/g 0.258 pg/g 1.02 pg/g 5.66 pg/g 0.463 pg/g 1.11 pg/g	0.333U pg/g 2.62U pg/g 0.908U pg/g 24.1U pg/g 0.258J pg/g 1.02J pg/g 5.66J pg/g 0.463J pg/g 1.11J pg/g
DMW-6A-3-3.5	1,2,3,7,8,9-HxCDD OCDF	0.368 pg/g 3.20 pg/g	0.368U pg/g 3.20U pg/g

Sample	Compound	Reported Concentration	Modified Final Concentration
EB-30-2-4	1,2,3,4,6,7,8-HpCDF	0.364 pg/g	0.364U pg/g
	1,2,3,4,6,7,8-HpCDD	3.33 pg/g	3.33U pg/g
	OCDF	1.52 pg/g	1.52U pg/g
	OCDD	43.4 pg/g	43.4U pg/g
	Total HpCDD	6.65 pg/g	6.65J pg/g
	Total HpCDF	1.32 pg/g	1.32J pg/g
EB-30-6-8	1,2,3,7,8,9-HxCDF	0.541 pg/g	0.541U pg/g
EB-30-16.5-18.5	1,2,3,4,6,7,8-HpCDF	0.235 pg/g	0.235U pg/g
	1,2,3,4,6,7,8-HpCDD	1.97 pg/g	1.97U pg/g
	OCDF	0.962 pg/g	0.962U pg/g
	OCDD	19.1 pg/g	19.1U pg/g
	Total PeCDD	0.117 pg/g	0.117J pg/g
	Total HxCDD	0.638 pg/g	0.638J pg/g
	Total HpCDD	4.32 pg/g	4.32J pg/g

VI. Field Blanks

No field blanks were identified in this SDG.

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. Ongoing Precision Recovery

Ongoing precision recovery (OPR) samples were analyzed as required by the method. Percent recoveries (%R) were within QC limits.

IX. Field Duplicates

No field duplicates were identified in this SDG.

X. Internal Standards

All internal standard recoveries (%R) were within QC limits.

XI. Compound Quantitation

All compound quantitations were within validation criteria with the following exceptions:

Sample	Compound	Flag	A or P
All samples in SDG ARX9	All compounds reported as estimated maximum possible concentration (EMPC).	J (all detects)	A

Sample	Compound	Finding	Criteria	Flag	A or P
EMW-20D-2-4 EMW-20D-4-7 EMW-20D-10-11 DMW-6A-2-3 EB-30-6-8	OCDD	Sample result exceeded calibration range.	Reported result should be within calibration range.	J (all detects)	P
EB-42-3-5	OCDD	Sample result exceeded calibration range.	Reported result should be within calibration range.	J (all detects)	A

Sample	Compound	Finding	Flag	A or P
All samples in SDG ARX9	1,2,3,7,8-PeCDF Total PeCDF	All compounds flagged "X" due to DiPhenylEther interference	J (all detects) J (all detects)	P

XII. Target Compound Identifications

All target compound identifications met validation criteria.

XIII. System Performance

The system performance was acceptable.

XIV. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

Due to ICV concentration, results reported by the laboratory as EMPCs, results exceeding the calibration range, and diphenylether interference, data were qualified as estimated in ten samples.

Due to laboratory blank contamination, data were qualified as not detected or estimated in five samples.

The quality control criteria reviewed, other than those discussed above, were met and are considered acceptable. Sample results that were found to be estimated (J) are usable for limited purposes only. Based upon the data validation all other results are considered valid and usable for all purposes.

DeNovo 8th Avenue
Polychlorinated Dioxins/Dibenzofurans - Data Qualification Summary - SDG ARX9

Sample	Compound	Flag	A or P	Reason
EMW-20D-2-4 EMW-20D-4-7 EMW-20D-10-11 DMW-6A-2-3 DMW-6A-3-3.5 EB-42-3-5 EB-30-6-8	1,2,3,4,7,8-HxCDF Total HxCDF	J (all detects) J (all detects)	P	Initial calibration verification (concentration)
EMW-20D-2-4 EMW-20D-4-7 EMW-20D-10-11 EMW-22D-2-4 DMW-6A-2-3 DMW-6A-3-3.5 EB-42-3-5 EB-30-2-4 EB-30-6-8 EB-30-16.5-18.5	All compounds reported as estimated maximum possible concentration (EMPC).	J (all detects)	A	Compound quantitation (EMPC)
EMW-20D-2-4 EMW-20D-4-7 EMW-20D-10-11 DMW-6A-2-3 EB-30-6-8	OCDD	J (all detects)	P	Compound quantitation (exceeded range)
EB-42-3-5	OCDD	J (all detects)	A	Compound quantitation (exceeded range)
EMW-20D-2-4 EMW-20D-4-7 EMW-20D-10-11 EMW-22D-2-4 DMW-6A-2-3 DMW-6A-3-3.5 EB-42-3-5 EB-30-2-4 EB-30-6-8 EB-30-16.5-18.5	1,2,3,7,8-PeCDF Total PeCDF	J (all detects) J (all detects)	P	Compound quantitation (DiPhenylEther interference)

DeNovo 8th Avenue
Polychlorinated Dioxins/Dibenzofurans - Laboratory Blank Data Qualification Summary - SDG ARX9

Sample	Compound	Modified Final Concentration	A or P
EMW-22D-2-4	1,2,3,4,6,7,8-HpCDF 1,2,3,4,6,7,8-HpCDD OCDF OCDD Total PeCDD Total HxCDD Total HpCDD Total HxCDF Total HpCDF	0.333U pg/g 2.62U pg/g 0.908U pg/g 24.1U pg/g 0.258J pg/g 1.02J pg/g 5.66J pg/g 0.463J pg/g 1.11J pg/g	A
DMW-6A-3-3.5	1,2,3,7,8,9-HxCDD OCDF	0.368U pg/g 3.20U pg/g	A
EB-30-2-4	1,2,3,4,6,7,8-HpCDF 1,2,3,4,6,7,8-HpCDD OCDF OCDD Total HpCDD Total HpCDF	0.364U pg/g 3.33U pg/g 1.52U pg/g 43.4U pg/g 6.65J pg/g 1.32J pg/g	A
EB-30-6-8	1,2,3,7,8,9-HxCDF	0.541U pg/g	A
EB-30-16.5-18.5	1,2,3,4,6,7,8-HpCDF 1,2,3,4,6,7,8-HpCDD OCDF OCDD Total PeCDD Total HxCDD Total HpCDD	0.235U pg/g 1.97U pg/g 0.962U pg/g 19.1U pg/g 0.117J pg/g 0.638J pg/g 4.32J pg/g	A

LDC #: 36266A21 **VALIDATION COMPLETENESS WORKSHEET** Date: 05/05/16
SDG #: ARX9 Stage 4 Page: 1 of 2
Laboratory: Analytical Resources, Inc. Reviewer: JN
2nd Reviewer: OK

METHOD: HRGC/HRMS Polychlorinated Dioxins/Dibenzofurans (EPA Method 1613B)

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.	Sample receipt/Technical holding times	A / A	(#9-11 received at 6.8 & 9.3°C)
II.	HRGC/HRMS Instrument performance check	A	
III.	Initial calibration/ICV	A / SW	≤20/35 ICV QC limits
IV.	Continuing calibration	A	QC limits
V.	Laboratory Blanks	SW	
VI.	Field blanks	N	
VII.	Matrix spike/Matrix spike duplicates	N	C.S.
VIII.	Laboratory control samples	A	OPR
IX.	Field duplicates	N	
X.	Internal standards	A	
XI.	Compound quantitation RL/~~LOQ/LODs~~	SW	
XII.	Target compound identification	A	
XIII.	System performance	A	
XIV.	Overall assessment of data	A	

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; SB=Source blank; OTHER:

	Client ID	Lab ID	Matrix	Date
1	EMW-20D-2-4	ARX9A	Soil	11/24/14
2	EMW-20D-4-7	ARX9B	Soil	12/04/14
3	EMW-20D-10-11	ARX9C	Soil	12/04/14
4	EMW-22D-2-4	ARX9F	Soil	11/24/14
5	DMW-6A-2-3	ARX9H	Soil	11/26/14
6	DMW-6A-3-3.5	ARX9I	Soil	11/26/14
7	EB-42-3-5	ARX9O	Soil	12/01/14
~~8~~	~~EB-42-3-5DL~~	~~ARX9ODL~~	~~Soil~~	~~12/01/14~~
9	EB-30-2-4	ARX9R	Soil	12/08/14
10	EB-30-6-8	ARX9S	Soil	12/08/14
11	EB-30-16.5-18.5	ARX9T	Soil	12/08/14
12				
13				
14				

LDC #: 36266A21 **VALIDATION COMPLETENESS WORKSHEET** Date: 05/05/16

SDG #: ARX9 Stage 4 Page: 2 of 2

Laboratory: Analytical Resources, Inc. Reviewer: JN

2nd Reviewer: CA

METHOD: HRGC/HRMS Polychlorinated Dioxins/Dibenzofurans (EPA Method 1613B)

	Client ID	Lab ID	Matrix	Date
15				
16				

Notes:

	MB-122345						

LDC #: 36266A21

VALIDATION FINDINGS CHECKLIST

Reviewer: QV
2nd Reviewer: QV

Method: HRGC/HRMS Dioxins/Dibenzofurans (EPA Method 1613B)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	✓			
Cooler temperature criteria was met.	✓			
II. GC/MS Instrument performance check				
Was PFK exact mass 380.9760 verified?	✓			
Were the retention time windows established for all homologues?	✓			
Was the chromatographic resolution between 2,3,7,8-TCDD and peaks representing any other unlabeled TCDD isomers ≤ 25% ?	✓			
Is the static resolving power at least 10,000 (10% valley definition)?	✓			
Was the mass resolution adequately check with PFK?	✓			
Was the presence of 1,2,8,9-TCDD and 1,3,4,6,8-PeCDF verified?	✓			
III. Initial calibration				
Was the initial calibration performed at 5 concentration levels?	✓			
Were all percent relative standard deviations (%RSD) ≤ 20% for unlabeled compounds and ≤ 35% for labeled compounds ?	✓			
Did all calibration standards meet the Ion Abundance Ratio criteria?	✓			
Was the signal to noise ratio for each target compound ≥ 2.5 and for each recovery and internal standard ≥ 10?	✓			
IV. Continuing calibration				
Was a routine calibration performed at the beginning and end of each 12 hour period?	✓			
Were all the concentrations for the unlabeled compounds and labeled compounds within the QC limits (Method 1613B, Table 6)?	✓			
Did all routine calibration standards meet the Ion Abundance Ratio criteria?	✓			
V. Blanks				
Was a method blank associated with every sample in this SDG?	✓			
Was a method blank performed for each matrix and concentration?	✓			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet?	✓			
VI. Matrix spike/Matrix spike duplicates				
Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.		✓		
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			✓	
VII. Laboratory control samples				
Was an LCS analyzed for this SDG?	✓			
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	✓			

LDC #: 36266A21

VALIDATION FINDINGS CHECKLIST

Reviewer: YN
2nd Reviewer: AV

Validation Area	Yes	No	NA	Findings/Comments
VIII. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?		✓		
Were the performance evaluation (PE) samples within the acceptance limits?			✓	
IX. Internal standards				
Were internal standard recoveries within the 25-150% criteria?	✓			
Was the minimum S/N ratio of all internal standard peaks ≥ 10?	✓			
X. Target compound identification				
For 2,3,7,8 substituted congeners with associated labeled standards, were the retention times of the two quantitation peaks within -1 to 3 sec. of the RT of the labeled standard?	✓			
For 2,3,7,8 substituted congeners without associated labeled standards, were the relative retention times of the two quantitation peaks within 0.005 time units of the RRT measured in the routine calibration?	✓			
For non-2,3,7,8 substituted congeners, were the retention times of the two quantitation peaks within RT established in the performance check solution?	✓			
Did compound spectra contain all characteristic ions listed in the table attached?	✓			
Was the Ion Abundance Ratio for the two quantitation ions within criteria?		✓		
Was the signal to noise ratio for each target compound and labeled standard ≥ 2.5?	✓			
Does the maximum intensity of each specified characteristic ion coincide within ± 2 seconds (includes labeled standards)?	✓			
For PCDF identification, was any signal (S/N ≥ 2.5, at ± seconds RT) detected in the corresponding PCDPE channel?	✓			
Was an acceptable lock mass recorded and monitored?	✓			
XI. Compound quantitation/CRQLs				
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the compound?	✓			
Were compound quantitation and CRQLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XII. System performance				
System performance was found to be acceptable.	✓			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			
XIV. Field duplicates				
Field duplicate pairs were identified in this SDG.		✓		
Target compounds were detected in the field duplicates.			✓	
XV. Field blanks				
Field blanks were identified in this SDG.		✓		
Target compounds were detected in the field blanks.			✓	

VALIDATION FINDINGS WORKSHEET

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA Method 1613B)

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 #: 36266A21

VALIDATION FINDINGS WORKSHEET
Initial Calibration Verification

Page: 1 of 1
Reviewer: 9m
2nd Reviewer: ak

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA Method 1613B)

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

(Y) N N/A Was an initial calibration verification standard analyzed after each ICAL for each instrument?
Y (N) N/A Were results within the QC limits for the method?

#	Date	Standard ID	Compound	Finding (Limit: pg)	Associated Samples	Qualifications
	10/15/15	15101510	K	56.905 (45-56)	all	Jdets/P (+X)
						(1,2,3,5,6,7,10=det)

LDC #: 36266A21

VALIDATION FINDINGS WORKSHEET
Blanks

Reviewer:
2nd Reviewer:

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA Method 1613B)

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: 12/23/15 **Blank analysis date:** 01/07/16

Conc. units: pg/g **Associated samples:** all

Compound	Blank ID	Sample Identification								
	MB-122315	5x	4	6	9	10	11			
N	0.134*	0.670				0.541 /U				
E	0.146*	0.730		0.368 /U						
O	0.154*	0.770	0.333* /U		0.364* /U		0.235* /U			
F	1.31	6.55	2.62 /U		3.33 /U		1.97 /U			
Q	0.966*	4.83	0.908 /U	3.20* /U	1.52 /U		0.962 /U			
G	10.7	53.5	24.1 /U		43.4 /U		19.1 /U			
S	0.0896*	0.448	0.258* /J				0.117* /J			
T	1.10*	5.50	1.02* /J				0.638 /J			
U	3.69	18.5	5.66 /J		6.65 /J		4.32 /J			
X	0.135*	0.675	0.463* /J							
Y	0.398*	1.99	1.11* /J		1.32* /J					

*EMPC

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 #: 36266A21

VALIDATION FINDINGS WORKSHEET
Compound Quantitation and Reported RLs

Reviewer: 4th
2nd Reviewer: CL

METHOD: GC/MS Dioxins/Dibenzofurans (Method 1613B)

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 RLs were adjusted to reflect all sample dilutions and dry weight factors (if necessary).

#	Date	Compound	Finding	Associated Samples	Qualifications
			EMPC results	all	Jdets/A
		G	result > calibration range	1, 2, 3, 5, 10	Jdets/P
		G	result > calibration range	7	Jdets/A
		I	"X" flagged as DiPhenylEther interference	2	Jdets/P (+W)

Comments: See sample calculation verification worksheet for recalculations

LDC #: 36266A21

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Reviewer: On
2nd Reviewer: OL

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA Method 1613B)

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

RRF = $(A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of compound,
C_x = Concentration of compound,
S = Standard deviation of the RRFs,

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Reported Average RRF (initial)	Recalculated Average RRF (initial)	Reported RRF (CS3 std)	Recalculated RRF (CS3 std)	Reported %RSD	Recalculated %RSD
1	1510153 ICAL	10/15/15	2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)	0.83	0.83	0.82	0.82	3.2	3.5
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)	1.02	1.02	0.98	0.98	6.1	6.2
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)	0.89	0.895	0.89	0.89	3.0	3.1
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)	0.96	0.96	0.99	0.99	4.7	5.0
			OCDF (^{13}C-OCDD)	1.02	1.02	1.04	1.04	8.4	8.4
2			2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)						
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)						
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)						
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)						
			OCDF (^{13}C-OCDD)						
3			2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)						
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)						
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)						
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)						
			OCDF (^{13}C-OCDD)						

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

LDC #: 36266A>1

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Reviewer: Qm
2nd Reviewer: CL

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA Method 1613B)

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

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
$RRF = (A_x)(C_{is})/(A_{is})(C_x)$

Where: ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
A_x = Area of compound, A_{is} = Area of associated internal standard
C_x = Concentration of compound, C_{is} = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Spiked Conc (ng/mL)	Reported Conc (ng/mL)	Recalculated Conc (ng/mL)	Reported %D	Recalculated %D
1	160107O2	01/07/16	2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)	10.000	10.719	10.718	7.2	7.2
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)	10.000	10.233	10.266	2.3	2.7
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)	50.000	52.231	52.454	4.5	4.9
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)	50.000	52.466	52.711	4.9	5.4
			OCDF (^{13}C-OCDD)	100.000	106.554	106.907	6.6	6.9
2	160107I1	01/07/16	2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)	10.000	10.553	10.580	5.5	5.8
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)	10.000	10.096	10.065	1.0	0.6
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)	50.000	51.703	51.717	3.4	3.4
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)	50.000	50.932	50.931	1.9	1.9
			OCDF (^{13}C-OCDD)	100.000	105.188	105.082	5.2	5.1
3	160107Z2	01/08/16	2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)	10.000	10.786	10.748	7.9	7.5
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)	10.000	10.097	10.094	1.0	0.9
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)	50.000	51.453	51.424	2.9	2.8
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)	50.000	51.382	51.426	2.8	2.9
			OCDF (^{13}C-OCDD)	100.000	105.003	104.883	5.0	4.9

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

discrepancies due to Rounding of Sigfigs by lab.

LDC #: 36266A21

VALIDATION FINDINGS WORKSHEET
Laboratory Control Sample Results Verification

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

METHOD: GC/MS Dioxins/Dibenzofurans (EPA Method 1613B)

The percent recoveries (%R) and Relative Percent Difference (RPD) of the laboratoy control sample and laboratory control sample duplicate (if applicable) were recalculated for the compounds identified below using the following calculation:

% Recovery = 100 * SSC/SA Where: SSC = Spiked sample concentration
SA = Spike added

RPD = | LCS - LCSD | * 2/(LCS + LCSD) LCS = Laboraotry control sample percent recovery LCSD = Laboratory control sample duplicate percent recovery

LCS ID: OPR-122315

Compound	Spike Added (pg/g)		Spiked Sample Concentration (pg/g)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc	Reported	Recalc	Reported	Recalculated
2,3,7,8-TCDD	20.0	NA	23.5	NA	118	118				
1,2,3,7,8-PeCDD	100		111		111	110.5				
1,2,3,4,7,8-HxCDD	100		109		109	109				
1,2,3,4,7,8,9-HpCDF	100		113		113	113				
OCDF	200		216		108	108				

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

LDC #: 36266A21

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

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

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA Method 1613B)

Y N N/A Were all reported results recalculated and verified for all level IV samples?
N N N/A Were all recalculated results for detected target compounds agree within 10.0% of the reported results?

Concentration = $\frac{(A_x)(I_s)(DF)}{(A_{is})(RRF)(V_o)(\%S)}$

A_x = Area of the characteristic ion (EICP) for the compound to be measured

A_{is} = Area of the characteristic ion (EICP) for the specific internal standard

I_s = Amount of internal standard added in nanograms (ng)

V_o = Volume or weight of sample extract in milliliters (ml) or grams (g).

RRF = Relative Response Factor (average) from the initial calibration

Df = Dilution Factor.

%S = Percent solids, applicable to soil and solid matrices only.

Example:

Sample I.D. 1, TCDF:

Conc. = $\frac{(9.56e3+1.45e4)(2000)(1)}{(8.97e5+1.16e6)(0.827)(16.15)(0.935)}$

= 1.873275615 ≈ 1.87 pg/g

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

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: DeNovo 8th Avenue

LDC Report Date: May 6, 2016

Parameters: Semivolatiles

Validation Level: Stage 2B

Laboratory: Analytical Resources, Inc.

Sample Delivery Group (SDG): ARZ2

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
EB-53-2-4	ARZ2G	Soil	12/08/14
EB-53-5-7	ARZ2H	Soil	12/08/14
EB-53-8-10	ARZ2I	Soil	12/08/14

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Final Quality Assurance Project Plan, Remedial Investigation, Crowley Marine Services 8th Avenue S. Site, Seattle, Washington (October 2012) and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines (CLPNFG) for Superfund Organic Methods Data Review (June 2008). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Semivolatile Organic Compounds (SVOCs) by Environmental Protection Agency (EPA) SW 846 Method 8270D

All sample results were subjected to Stage 2B data validation, which comprises an evaluation of quality control (QC) summary results.

The following are definitions of the data qualifiers utilized during data validation:

J (Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.

U (Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

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.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition.

Cooler temperatures for samples in this SDG were reported at 6.8°C and 9.3°C upon receipt by the laboratory. Since the samples were received the same day that they were collected, time did not allow for sufficient cooling of the samples, therefore no data were qualified.

All technical holding time requirements for frozen samples were met with the following exceptions:

Sample	Compound	Total Time From Sample Collection Until Extraction	Required Holding Time From Sample Collection Until Extraction	Flag	A or P
All samples in SDG ARZ2	All compounds	1 year 7 days	1 year	J (all detects) UJ (all non-detects)	P

II. GC/MS Instrument Performance Check

A decafluorotriphenylphosphine (DFTPP) tune was performed at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration and Initial Calibration Verification

An initial calibration was performed as required by the method.

For compounds where average relative response factors (RRFs) were utilized, percent relative standard deviations (%RSD) were less than or equal to 20.0%.

In the case where the laboratory used a calibration curve to evaluate the compounds, all coefficients of determination (r^2) were greater than or equal to 0.990.

Average relative response factors (RRF) for all compounds were within validation criteria.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 30.0% for all compounds with the following exceptions:

Date	Compound	%D	Associated Samples	Flag	A or P
12/15/15	2,4-Dinitrophenol	63.8	All samples in SDG ARZ2	UJ (all non-detects)	A
12/15/15	Fluorene	42.3	EB-53-8-10	J (all detects)	A

Date	Compound	%D	Associated Samples	Flag	A or P
12/15/15	Fluorene	42.3	EB-53-2-4 EB-53-5-7	NA	-
12/15/15	3,3'-Dichlorobenzidine	45.6	All samples in SDG ARZ2	NA	-

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

The percent differences (%D) were less than or equal to 20.0% for all compounds with the following exceptions:

Date	Compound	%D	Associated Samples	Flag	A or P
12/23/15 (14:37)	Hexachlorocyclopentadiene 2,4-Dinitrophenol 4-Nitrophenol 4,6-Dinitro-2-methylphenol	33.6 29.7 27.8 21.2	All samples in SDG ARZ2	NA	-
12/23/15 (14:37)	4-Bromophenyl-phenyl ether	58.8	All samples in SDG ARZ2	UJ (all non-detects)	A

All of the continuing calibration relative response factors (RRF) were within validation criteria.

V. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks with the following exceptions:

Blank ID	Extraction Date	Compound	Concentration	Associated Samples
MB-121515	12/15/15	Naphthalene	15 ug/Kg	All samples in SDG ARZ2

Sample concentrations were compared to concentrations detected in the laboratory 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 laboratory blanks.

VI. Field Blanks

No field blanks were identified in this SDG.

VII. Surrogates

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

VIII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

IX. Laboratory Control Samples

Laboratory control samples (LCS) were analyzed as required by the method. Percent recoveries (%R) were within QC limits.

X. Field Duplicates

No field duplicates were identified in this SDG.

XI. Internal Standards

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

XII. Compound Quantitation

Raw data were not reviewed for Stage 2B validation.

XIII. Target Compound Identifications

Raw data were not reviewed for Stage 2B validation.

XIV. System Performance

Raw data were not reviewed for Stage 2B validation.

XV. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

Due to holding time exceedance and ICV and continuing calibration %D, data were qualified as estimated in three samples.

The quality control criteria reviewed, other than those discussed above, were met and are considered acceptable. Sample results that were found to be estimated (J) are usable for limited purposes only. Based upon the data validation all other results are considered valid and usable for all purposes.

DeNovo 8th Avenue
Semivolatiles - Data Qualification Summary - SDG ARZ2

Sample	Compound	Flag	A or P	Reason
EB-53-2-4 EB-53-5-7 EB-53-8-10	All compounds	J (all detects) UJ (all non-detects)	P	Technical holding time
EB-53-2-4 EB-53-5-7 EB-53-8-10	2,4-Dinitrophenol	UJ (all non-detects)	A	Initial calibration verification (%D)
EB-53-8-10	Fluorene	J (all detects)	A	Initial calibration verification (%D)
EB-53-2-4 EB-53-5-7 EB-53-8-10	4-Bromophenyl-phenyl ether	UJ (all non-detects)	A	Continuing calibration (%D)

DeNovo 8th Avenue
Semivolatiles - Laboratory Blank Data Qualification Summary - SDG ARZ2

No Sample Data Qualified in this SDG

LDC #: 36266B2a **VALIDATION COMPLETENESS WORKSHEET** Date: 5/6/16
SDG #: ARZ2 Stage 2B Page: 1 of 1
Laboratory: Analytical Resources, Inc. Reviewer: EJ
2nd Reviewer: CL

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

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 (cooler temp = 6.8, 9.3 not enough time to cool down)
I.	Sample receipt/Technical holding times	A / SW	
II.	GC/MS Instrument performance check	A	
III.	Initial calibration/ICV	A / SW	%RSD ≤ 20, r² ICV ≤ 30
IV.	Continuing calibration	SW	CCV ≤ 20
V.	Laboratory Blanks	SW	
VI.	Field blanks	N	
VII.	Surrogate spikes	A	
VIII.	Matrix spike/Matrix spike duplicates	A	DMW-6A-18-20MS ID
IX.	Laboratory control samples	A	LCS
X.	Field duplicates	N	
XI.	Internal standards	A	
XII.	Compound quantitation RL/LOQ/LODs	N	
XIII.	Target compound identification	N	
XIV.	System performance	N	
XV.	Overall assessment of data	A	

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; SB=Source blank; OTHER:

	Client ID	Lab ID	Matrix	Date
1	EB-53-2-4	ARZ2G	Soil	12/08/14
2	EB-53-5-7	ARZ2H	Soil	12/08/14
3	EB-53-8-10	ARZ2I	Soil	12/08/14
4				
5				
6				
7				
8				
9				

Notes:

	MB - 12/15/15						

VALIDATION FINDINGS WORKSHEET

METHOD: GC/MS SVOA

A. Phenol	AA. 2-Chloronaphthalene	AAA. Butylbenzylphthalate	AAAA. Dibenzothiophene	A1.
B. Bis (2-chloroethyl) ether	BB. 2-Nitroaniline	BBB. 3,3'-Dichlorobenzidine	BBBB. Benzo(a)fluoranthene	B1.
C. 2-Chlorophenol	CC. Dimethylphthalate	CCC. Benzo(a)anthracene	CCCC. Benzo(b)fluorene	C1.
D. 1,3-Dichlorobenzene	DD. Acenaphthylene	DDD. Chrysene	DDDD. cis/trans-Decalin	D1.
E. 1,4-Dichlorobenzene	EE. 2,6-Dinitrotoluene	EEE. Bis(2-ethylhexyl)phthalate	EEEE. Biphenyl	E1.
F. 1,2-Dichlorobenzene	FF. 3-Nitroaniline	FFF. Di-n-octylphthalate	FFFF. Retene	F1.
G. 2-Methylphenol	GG. Acenaphthene	GGG. Benzo(b)fluoranthene	GGGG. C30-Hopane	G1.
H. 2,2'-Oxybis(1-chloropropane)	HH. 2,4-Dinitrophenol	HHH. Benzo(k)fluoranthene	HHHH. 1-Methylphenanthrene	H1.
I. 4-Methylphenol	II. 4-Nitrophenol	III. Benzo(a)pyrene	IIII. 1,4-Dioxane	I1.
J. N-Nitroso-di-n-propylamine	JJ. Dibenzofuran	JJJ. Indeno(1,2,3-cd)pyrene	JJJJ. Acetophenone	J1.
K. Hexachloroethane	KK. 2,4-Dinitrotoluene	KKK. Dibenz(a,h)anthracene	KKKK. Atrazine	K1.
L. Nitrobenzene	LL. Diethylphthalate	LLL. Benzo(g,h,i)perylene	LLLL. Benzaldehyde	L1.
M. Isophorone	MM. 4-Chlorophenyl-phenyl ether	MMM. Bis(2-Chloroisopropyl)ether	MMMM. Caprolactam	M1.
N. 2-Nitrophenol	NN. Fluorene	NNN. Aniline	NNNN. 2,6-Dichlorophenol	N1.
O. 2,4-Dimethylphenol	OO. 4-Nitroaniline	OOO. N-Nitrosodimethylamine	OOOO. 2,6-Dinitrotoluene	O1.
P. Bis(2-chloroethoxy)methane	PP. 4,6-Dinitro-2-methylphenol	PPP. Benzoic Acid	PPPP. 3-Methylphenol	P1.
Q. 2,4-Dichlorophenol	QQ. N-Nitrosodiphenylamine	QQQ. Benzyl alcohol	QQQQ. 3&4 Methylphenol	Q1.
R. 1,2,4-Trichlorobenzene	RR. 4-Bromophenyl-phenylether	RRR. Pyridine	RRRR. 4-Dimethyldibenzothiphene (4MDT)	R1.
S. Naphthalene	SS. Hexachlorobenzene	SSS. Benzidine	SSSS. 2/3-Dimethyldibenzothiophene (4MDT)	S1.
T. 4-Chloroaniline	TT. Pentachlorophenol	TTT. 1-Methylnaphthalene	TTTT. 1-Methyldibenzothiophene (1MDT)	T1.
U. Hexachlorobutadiene	UU. Phenanthrene	UUU.Benzo(b)thiophene	UUUU.	U1.
V. 4-Chloro-3-methylphenol	VV. Anthracene	VVV.Benzonaphthothiophene	VVVV.	V1.
W. 2-Methylnaphthalene	WW. Carbazole	WWW.Benzo(e)pyrene	WWWW.	W1.
X. Hexachlorocyclopentadiene	XX. Di-n-butylphthalate	XXX. 2,6-Dimethylnaphthalene	XXXX.	X1.
Y. 2,4,6-Trichlorophenol	YY. Fluoranthene	YYY. 2,3,5-Trimethylnaphthalene	YYYY.	Y1.
Z. 2,4,5-Trichlorophenol	ZZ. Pyrene	ZZZ. Perylene	ZZZZ.	Z1.

LDC #: 36266B2a

VALIDATION FINDINGS WORKSHEET
Technical Holding Times

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

All circled dates have exceeded the technical holding times.
(Y) N N/A Were all cooler temperatures within validation criteria?

METHOD : GC/MA BNA SW846 METHOD 8270D

Sample ID	Matrix	Preserved	Sampling Date	Extraction date	Analysis date	Total # of Days	Qualifier
All	SOIL	Frozen	12/8/14	12/15/15	12/23/15	1yr & 7days	J/UJ/P ND+Det
Frozen	soil	sample	holding	time = 1yr	from		
			date	of sampling			

TECHNICAL HOLDING TIME CRITERIA

Water: Extracted within 7 days, analyzed within 40 days.
Soil: Extracted within 14 days, analyzed within 40 days.

LDC #: 36266B2a

VALIDATION FINDINGS WORKSHEET
Initial Calibration Verification

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

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

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

(Y) N N/A Was an initial calibration verification standard analyzed after each ICAL for each instrument?

Y (N) N/A Were all %D within the validation criteria of ≤30 %D ?

#	Date	Standard ID	Compound	Finding %D (Limit: ≤30.0%)	Associated Samples	Qualifications
-	12/15/15	ICV	HH	63.8	all	J/UJ/A ND
+			NN	42.3	↓	Jdet/A #3 Det
+			BBB	45.6	↓	Jdet/A ND

LDC #: 36266 B2a

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Reviewer: FT
2nd Reviewer: CA

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

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

(Y) N N/A Was a continuing calibration standard analyzed at least once every 12 hours of sample analysis for each instrument?

(Y) N N/A Were percent differences (%D) and relative response factors (RRF) within method criteria for all CCC's and SPCC's ?

Y (N) N/A Were all %D and RRFs within the validation criteria of ≤20 %D and ≥0.05 RRF ?

#	Date	Standard ID	Compound	Finding %D (Limit: ≤20.0%)	Finding RRF (Limit: ≥0.05)	Associated Samples	Qualifications
+	12/23/15	CCV	X	33.6		all	J dtl/A aw ND
+	1437		HH	29.7			
+			II	27.8			
+			PP	21.2			
−			RR	58.8			J/UJ/A

LDC #: 36266 B2a

VALIDATION FINDINGS WORKSHEET
Blanks

Reviewer: FT
2nd Reviewer: CL

METHOD: GC/MS BNA (EPA SW 846 Method 8270D)
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: 12/15/15 **Blank analysis date:** 12/23/15
Conc. units: ug/kg Associated Samples: All (ND)

Compound	Blank ID								
	MB-121515	5X							
S	15	75							

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

Compound	Blank ID								

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".

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: DeNovo 8th Avenue

LDC Report Date: May 6, 2016

Parameters: Semivolatiles

Validation Level: Stage 2B

Laboratory: Analytical Resources, Inc.

Sample Delivery Group (SDG): ARZ2

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
EB-53-2-4	ARZ2G	Soil	12/08/14
EB-53-5-7	ARZ2H	Soil	12/08/14
EB-53-8-10	ARZ2I	Soil	12/08/14

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Final Quality Assurance Project Plan, Remedial Investigation, Crowley Marine Services 8th Avenue S. Site, Seattle, Washington (October 2012) and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines (CLPNFG) for Superfund Organic Methods Data Review (June 2008). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Semivolatile Organic Compounds (SVOCs) by Environmental Protection Agency (EPA) SW 846 Method 8270D in Selected Ion Monitoring (SIM) mode

All sample results were subjected to Stage 2B data validation, which comprises an evaluation of quality control (QC) summary results.

The following are definitions of the data qualifiers utilized during data validation:

J (Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.

U (Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

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.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition.

Cooler temperatures for samples in this SDG were reported at 6.8°C and 9.3°C upon receipt by the laboratory. Since the samples were received the same day that they were collected, time did not allow for sufficient cooling of the samples, therefore no data were qualified.

All technical holding time requirements for frozen samples were met with the following exceptions:

Sample	Compound	Total Time From Sample Collection Until Extraction	Required Holding Time From Sample Collection Until Extraction	Flag	A or P
All samples in SDG ARZ2	All compounds	1 year 7 days	1 year	J (all detects) UJ (all non-detects)	P

II. GC/MS Instrument Performance Check

A decafluorotriphenylphosphine (DFTPP) tune was performed at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

An initial calibration was performed as required by the method.

For compounds where average relative response factors (RRFs) were utilized, percent relative standard deviations (%RSD) were less than or equal to 20.0%.

In the case where the laboratory used a calibration curve to evaluate the compounds, all coefficients of determination (r^2) were greater than or equal to 0.990.

Average relative response factors (RRF) for all compounds were within validation criteria.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

The percent differences (%D) were less than or equal to 20.0% for all compounds with the following exceptions:

Date	Compound	%D	Associated Samples	Flag	A or P
12/23/15 (15:13)	Phenol	21.5	EB-53-2-4	J (all detects)	A
12/23/15 (15:13)	Phenol	21.5	EB-53-5-7 EB-53-8-10	NA	-

All of the continuing calibration relative response factors (RRF) were within validation criteria.

V. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks.

VI. Field Blanks

No field blanks were identified in this SDG.

VII. Surrogates

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

VIII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

IX. Laboratory Control Samples

Laboratory control samples (LCS) were analyzed as required by the method. Percent recoveries (%R) were within QC limits.

X. Field Duplicates

No field duplicates were identified in this SDG.

XI. Internal Standards

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

XII. Compound Quantitation

Raw data were not reviewed for Stage 2B validation.

XIII. Target Compound Identifications

Raw data were not reviewed for Stage 2B validation.

XIV. System Performance

Raw data were not reviewed for Stage 2B validation.

XV. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

Due to holding time exceedance and continuing calibration %D, data were qualified as estimated in three samples.

The quality control criteria reviewed, other than those discussed above, were met and are considered acceptable. Sample results that were found to be estimated (J) are usable for limited purposes only. Based upon the data validation all other results are considered valid and usable for all purposes.

DeNovo 8th Avenue
Semivolatiles - Data Qualification Summary - SDG ARZ2

Sample	Compound	Flag	A or P	Reason
EB-53-2-4 EB-53-5-7 EB-53-8-10	All compounds	J (all detects) UJ (all non-detects)	P	Technical holding time
EB-53-2-4	Phenol	J (all detects)	A	Continuing calibration (%D)

DeNovo 8th Avenue
Semivolatiles - Laboratory Blank Data Qualification Summary - SDG ARZ2

No Sample Data Qualified in this SDG

LDC #: 36266B2b **VALIDATION COMPLETENESS WORKSHEET** Date: 5/4/16
SDG #: ARZ2 Stage 2B Page: 1 of 1
Laboratory: Analytical Resources, Inc. Reviewer: F
2nd Reviewer: a

METHOD: GC/MS Semivolatiles (EPA SW 846 Method 8270D-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
			cooler temp = 6.8 + 9.3 not enough time to cooldown
I.	Sample receipt/Technical holding times	A / SW	
II.	GC/MS Instrument performance check	A	
III.	Initial calibration/~~ICV~~	A / N	%D ≤ 20, r ≥ ~~CV ≤ 30~~ CV ≤ 20
IV.	Continuing calibration	SW	
V.	Laboratory Blanks	A	
VI.	Field blanks	N	
VII.	Surrogate spikes	A	
VIII.	Matrix spike/Matrix spike duplicates	A	DMW-6A-18-20MS1P
IX.	Laboratory control samples	A	LCS
X.	Field duplicates	N	
XI.	Internal standards	A	
XII.	Compound quantitation RL/LOQ/LODs	N	
XIII.	Target compound identification	N	
XIV.	System performance	N	
XV.	Overall assessment of data	A	

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; SB=Source blank; OTHER:

	Client ID	Lab ID	Matrix	Date
1	EB-53-2-4	ARZ2G	Soil	12/08/14
2	EB-53-5-7	ARZ2H	Soil	12/08/14
3	EB-53-8-10	ARZ2I	Soil	12/08/14
4				
5				
6				
7				
8				
9				

Notes:

	MB-121515						

VALIDATION FINDINGS WORKSHEET

METHOD: GC/MS SVOA

A. Phenol	AA. 2-Chloronaphthalene	AAA. Butylbenzylphthalate	AAAA. Dibenzothiophene	A1.
B. Bis (2-chloroethyl) ether	BB. 2-Nitroaniline	BBB. 3,3'-Dichlorobenzidine	BBBB. Benzo(a)fluoranthene	B1.
C. 2-Chlorophenol	CC. Dimethylphthalate	CCC. Benzo(a)anthracene	CCCC. Benzo(b)fluorene	C1.
D. 1,3-Dichlorobenzene	DD. Acenaphthylene	DDD. Chrysene	DDDD. cis/trans-Decalin	D1.
E. 1,4-Dichlorobenzene	EE. 2,6-Dinitrotoluene	EEE. Bis(2-ethylhexyl)phthalate	EEEE. Biphenyl	E1.
F. 1,2-Dichlorobenzene	FF. 3-Nitroaniline	FFF. Di-n-octylphthalate	FFFF. Retene	F1.
G. 2-Methylphenol	GG. Acenaphthene	GGG. Benzo(b)fluoranthene	GGGG. C30-Hopane	G1.
H. 2,2'-Oxybis(1-chloropropane)	HH. 2,4-Dinitrophenol	HHH. Benzo(k)fluoranthene	HHHH. 1-Methylphenanthrene	H1.
I. 4-Methylphenol	II. 4-Nitrophenol	III. Benzo(a)pyrene	IIII. 1,4-Dioxane	I1.
J. N-Nitroso-di-n-propylamine	JJ. Dibenzofuran	JJJ. Indeno(1,2,3-cd)pyrene	JJJJ. Acetophenone	J1.
K. Hexachloroethane	KK. 2,4-Dinitrotoluene	KKK. Dibenz(a,h)anthracene	KKKK. Atrazine	K1.
L. Nitrobenzene	LL. Diethylphthalate	LLL. Benzo(g,h,i)perylene	LLLL. Benzaldehyde	L1.
M. Isophorone	MM. 4-Chlorophenyl-phenyl ether	MMM. Bis(2-Chloroisopropyl)ether	MMMM. Caprolactam	M1.
N. 2-Nitrophenol	NN. Fluorene	NNN. Aniline	NNNN. 2,6-Dichlorophenol	N1.
O. 2,4-Dimethylphenol	OO. 4-Nitroaniline	OOO. N-Nitrosodimethylamine	OOOO. 2,6-Dinitrotoluene	O1.
P. Bis(2-chloroethoxy)methane	PP. 4,6-Dinitro-2-methylphenol	PPP. Benzoic Acid	PPPP. 3-Methylphenol	P1.
Q. 2,4-Dichlorophenol	QQ. N-Nitrosodiphenylamine	QQQ. Benzyl alcohol	QQQQ. 3&4 Methylphenol	Q1.
R. 1,2,4-Trichlorobenzene	RR. 4-Bromophenyl-phenylether	RRR. Pyridine	RRRR. 4-Dimethyldibenzothiphene (4MDT)	R1.
S. Naphthalene	SS. Hexachlorobenzene	SSS. Benzidine	SSSS. 2/3-Dimethyldibenzothiophene (4MDT)	S1.
T. 4-Chloroaniline	TT. Pentachlorophenol	TTT. 1-Methylnaphthalene	TTTT. 1-Methyldibenzothiophene (1MDT)	T1.
U. Hexachlorobutadiene	UU. Phenanthrene	UUU.Benzo(b)thiophene	UUUU.	U1.
V. 4-Chloro-3-methylphenol	VV. Anthracene	VVV.Benzonaphthothiophene	VVVV.	V1.
W. 2-Methylnaphthalene	WW. Carbazole	WWW.Benzo(e)pyrene	WWWW.	W1.
X. Hexachlorocyclopentadiene	XX. Di-n-butylphthalate	XXX. 2,6-Dimethylnaphthalene	XXXX.	X1.
Y. 2,4,6-Trichlorophenol	YY. Fluoranthene	YYY. 2,3,5-Trimethylnaphthalene	YYYY.	Y1.
Z. 2,4,5-Trichlorophenol	ZZ. Pyrene	ZZZ. Perylene	ZZZZ.	Z1.

LDC #: 36266B2b

VALIDATION FINDINGS WORKSHEET
Technical Holding Times

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

All circled dates have exceeded the technical holding times.
Y / N N/A Were all cooler temperatures within validation criteria?

METHOD : GC/MA BNA SW846 METHOD 8270D

Sample ID	Matrix	Preserved	Sampling Date	Extraction date	Analysis date	Total # of Days	Qualifier
All	soil	Frozen	12/8/14	12/15/15	12/23/15	1yr + 7days	J/UJ/A ND+DL
Frozen sample holding time = 1yr from sampling date							

TECHNICAL HOLDING TIME CRITERIA

Water: Extracted within 7 days, analyzed within 40 days.
Soil: Extracted within 14 days, analyzed within 40 days.

LDC #: 36266B2b

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

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

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

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

Y N N/A — Was a continuing calibration standard analyzed at least once every 12 hours of sample analysis for each instrument?

Y N N/A — Were percent differences (%D) and relative response factors (RRF) within method criteria for all CCC's and SPCC's ?

Y N N/A — Were all %D and RRFs within the validation criteria of ≤20 %D and ≥0.05 RRF ?

#	Date	Standard ID	Compound	Finding %D (Limit: ≤20.0%)	Finding RRF (Limit: ≥0.05)	Associated Samples	Qualifications
+	12/23/15	ccv	A	21.5		All	J dets /A
	1513						#1 dets

CONCAL.wpd

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: DeNovo 8th Avenue

LDC Report Date: May 9, 2016

Parameters: Polychlorinated Biphenyls

Validation Level: Stage 2B

Laboratory: Analytical Resources, Inc.

Sample Delivery Group (SDG): ARZ2

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
EB-49-3-5	ARZ2A	Soil	12/08/14
EB-49-5-7	ARZ2B	Soil	12/08/14
EB-49-8.5-10	ARZ2C	Soil	12/08/14
EB-49-11-13	ARZ2D	Soil	12/08/14
EB-49-15-17	ARZ2E	Soil	12/08/14
EB-49-18-20	ARZ2F	Soil	12/08/14
EB-53-2-4	ARZ2G	Soil	12/08/14
EB-53-5-7	ARZ2H	Soil	12/08/14
EB-53-8-10	ARZ2I	Soil	12/08/14
EB-56-2-4	ARZ2M	Soil	12/08/14
EB-56-5-7	ARZ2N	Soil	12/08/14
EB-56-8-10	ARZ2O	Soil	12/08/14
EB-56-12.5-14.5	ARZ2P	Soil	12/08/14
EB-56-16-18	ARZ2Q	Soil	12/08/14
EB-06-2-4	ARZ2R	Soil	12/08/14
EB-06-6-8	ARZ2S	Soil	12/08/14
EB-06-8-10	ARZ2T	Soil	12/08/14
EB-56-16-18MS	ARZ2QMS	Soil	12/08/14
EB-56-16-18MSD	ARZ2QMSD	Soil	12/08/14

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Final Quality Assurance Project Plan, Remedial Investigation, Crowley Marine Services 8th Avenue S. Site, Seattle, Washington (October 2012) and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines (CLPNFG) for Superfund Organic Methods Data Review (June 2008). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Polychlorinated Biphenyls (PCBs) by Environmental Protection Agency (EPA) SW 846 Method 8082A

All sample results were subjected to Stage 2B data validation, which comprises an evaluation of quality control (QC) summary results.

The following are definitions of the data qualifiers utilized during data validation:

J (Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.

U (Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

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.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition

Cooler temperatures for samples in this SDG were reported at 6.8°C, 9.3°C, 11.6°C, 8.1°C, and 10.1°C upon receipt by the laboratory. Since the samples were received the same day that they were collected, time did not allow for sufficient cooling of the samples, therefore no data were qualified.

All technical holding time requirements for frozen samples were met.

II. Initial Calibration and Initial Calibration Verification

An initial calibration was performed as required by the method.

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

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 20.0% for all compounds with the following exceptions:

Date	Standard	Column	Compound	%D	Associated Samples	Flag	A or P
12/18/15	ICV	ZB 5	Aroclor-1254	26.5	EB-49-3-5 EB-49-5-7 EB-49-15-17 EB-53-5-7 EB-53-8-10 EB-56-2-4	J (all detects)	A
12/18/15	ICV	ZB 5	Aroclor-1254	26.5	EB-49-8.5-10 EB-49-11-13 EB-49-18-20 EB-53-2-4 EB-56-5-7 EB-56-8-10 EB-56-12.5-14.5 EB-56-16-18 EB-06-2-4 EB-06-6-8 EB-06-8-10	NA	-

III. Continuing Calibration

Continuing calibration was performed at required frequencies.

The percent differences (%D) were less than or equal to 20.0% for all compounds.

IV. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks.

V. Field Blanks

No field blanks were identified in this SDG.

VI. Surrogates/Internal Standards

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

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

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

VIII. Laboratory Control Samples

Laboratory control samples (LCS) were analyzed as required by the method. Percent recoveries (%R) were within QC limits.

IX. Field Duplicates

No field duplicates were identified in this SDG.

X. Compound Quantitation

Raw data were not reviewed for Stage 2B validation.

XI. Target Compound Identification

Raw data were not reviewed for Stage 2B validation.

XII. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

Due to ICV %D, data were qualified as estimated in six samples.

The quality control criteria reviewed, other than those discussed above, were met and are considered acceptable. Sample results that were found to be estimated (J) are usable for limited purposes only. Based upon the data validation all other results are considered valid and usable for all purposes.

DeNovo 8th Avenue
Polychlorinated Biphenyls - Data Qualification Summary - SDG ARZ2

Sample	Compound	Flag	A or P	Reason
EB-49-3-5 EB-49-5-7 EB-49-15-17 EB-53-5-7 EB-53-8-10 EB-56-2-4	Aroclor-1254	J (all detects)	A	Initial calibration verification (%D)

DeNovo 8th Avenue
Polychlorinated Biphenyls - Laboratory Blank Data Qualification Summary - SDG ARZ2

No Sample Data Qualified in this SDG

LDC #: 36266B3b
SDG #: ARZ2
Laboratory: Analytical Resources, Inc.

VALIDATION COMPLETENESS WORKSHEET
Stage 2B

Date: 5/5/16
Page: 1 of 2
Reviewer: EB
2nd Reviewer: AC

METHOD: GC Polychlorinated Biphenyls (EPA SW846 Method 8082A)

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

cooler temp = 6.8, 9.3, 11.6, 8.1 + 10.1 not enough time to cool down

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A / D	
II.	Initial calibration/ICV	A / SW	
III.	Continuing calibration	A	%RSD/ICV ≤ 20 CCV ≤ 20
IV.	Laboratory Blanks	A	
V.	Field blanks	N	
VI.	Surrogate spikes / IS	A	
VII.	Matrix spike/Matrix spike duplicates	A	
VIII.	Laboratory control samples	A	LCS
IX.	Field duplicates	N	
X.	Compound quantitation/RL/LOQ/LODs	N	
XI.	Target compound identification	N	
XII.	Overall assessment of data	A	

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; SB=Source blank; OTHER:

	Client ID	Lab ID	Matrix	Date
1	EB-49-3-5	ARZ2A	Soil	12/08/14
2	EB-49-5-7	ARZ2B	Soil	12/08/14
3	EB-49-8.5-10	ARZ2C	Soil	12/08/14
4	EB-49-11-13	ARZ2D	Soil	12/08/14
5	EB-49-15-17	ARZ2E	Soil	12/08/14
6	EB-49-18-20	ARZ2F	Soil	12/08/14
7	EB-53-2-4	ARZ2G	Soil	12/08/14
8	EB-53-5-7	ARZ2H	Soil	12/08/14
9	EB-53-8-10	ARZ2I	Soil	12/08/14
10	EB-56-2-4	ARZ2M	Soil	12/08/14
11	EB-56-5-7	ARZ2N	Soil	12/08/14
12	EB-56-8-10	ARZ2O	Soil	12/08/14
13	EB-56-12.5-14.5	ARZ2P	Soil	12/08/14
14	EB-56-16-18	ARZ2Q	Soil	12/08/14
15	EB-06-2-4	ARZ2R	Soil	12/08/14
16	EB-06-6-8	ARZ2S	Soil	12/08/14
17	EB-06-8-10	ARZ2T	Soil	12/08/14

LDC #: 36266B3b

SDG #: ARZ2

Laboratory: Analytical Resources, Inc.

VALIDATION COMPLETENESS WORKSHEET

Stage 2B

Date: 5/5/16

Reviewer: FT

2nd Reviewer: a

METHOD: GC Polychlorinated Biphenyls (EPA SW846 Method 8082A)

	Client ID	Lab ID	Matrix	Date
18	EB-56-16-18MS	ARZ2QMS	Soil	12/08/14
19	EB-56-16-18MSD	ARZ2QMSD	Soil	12/08/14
20				
21				
22				
23				
24				

Notes:

	MB - 121515						

LDC #: 36266B3h

VALIDATION FINDINGS WORKSHEET
Initial Calibration Verification

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

METHOD: ✓ GC __ HPLC

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".
What type of initial calibration verification calculation was performed? __%D or __%R
Y N N/A Was an initial calibration verification standard analyzed after each ICAL for each instrument?
Y N N/A Did the initial calibration verification standards meet the %D / %R validation criteria of ≤20.0% / 80-120%?

#	Date	Standard ID	Detector/ Column	Compound	%D (Limit ≤ 20.0)	Associated Samples	Qualifications
+	12/18/15	ICV	ZB5	AA	26.5	All	Jdet /A qual AA only 1,2,5,8→10 are detect

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: DeNovo 8th Avenue

LDC Report Date: May 10, 2016

Parameters: Total Solids

Validation Level: Stage 2B

Laboratory: Analytical Resources, Inc.

Sample Delivery Group (SDG): ARZ2

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
EB-49-3-5	ARZ2A	Soil	12/08/14
EB-49-5-7	ARZ2B	Soil	12/08/14
EB-49-8.5-10	ARZ2C	Soil	12/08/14
EB-49-11-13	ARZ2D	Soil	12/08/14
EB-49-15-17	ARZ2E	Soil	12/08/14
EB-49-18-20	ARZ2F	Soil	12/08/14
EB-53-2-4	ARZ2G	Soil	12/08/14
EB-53-5-7	ARZ2H	Soil	12/08/14
EB-53-8-10	ARZ2I	Soil	12/08/14
EB-55-3-5	ARZ2J	Soil	12/08/14
EB-55-5-7	ARZ2K	Soil	12/08/14
EB-55-8-10	ARZ2L	Soil	12/08/14
EB-56-2-4	ARZ2M	Soil	12/08/14
EB-56-5-7	ARZ2N	Soil	12/08/14
EB-56-8-10	ARZ2O	Soil	12/08/14
EB-56-12.5-14.5	ARZ2P	Soil	12/08/14
EB-56-16-18	ARZ2Q	Soil	12/08/14
EB-06-2-4	ARZ2R	Soil	12/08/14
EB-06-6-8	ARZ2S	Soil	12/08/14
EB-06-8-10	ARZ2T	Soil	12/08/14
EB-49-18-20DUP	ARZ2FDUP	Soil	12/08/14
EB-49-18-20TRP	ARZ2FTRP	Soil	12/08/14

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Final Quality Assurance Project Plan, Remedial Investigation, Crowley Marine Services 8th Avenue S. Site, Seattle, Washington (October 2012) and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines (CLPNFG) for Inorganic Superfund Data Review (January 2010). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Total Solids by Standard Method 2540G

All sample results were subjected to Stage 2B data validation, which comprises an evaluation of quality control (QC) summary results.

The following are definitions of the data qualifiers utilized during data validation:

J (Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.

U (Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

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.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition.

All technical holding time requirements for frozen samples were met.

II. Initial Calibration

All criteria for the initial calibration were met.

III. Continuing Calibration

Continuing calibration frequency and analysis criteria were met.

IV. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks.

V. Field Blanks

No field blanks were identified in this SDG.

VI. Matrix Spike/Matrix Spike Duplicates

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

VII. Triplicate Sample Analysis

Duplicate (DUP) and triplicate (TRP) sample analyses were performed on an associated project sample. Results were within QC limits.

VIII. Laboratory Control Samples

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

IX. Field Duplicates

No field duplicates were identified in this SDG.

X. Sample Result Verification

Raw data were not reviewed for Stage 2B validation.

XI. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

The quality control criteria reviewed were met and are considered acceptable. Based upon the data validation all results are considered valid and usable for all purposes.

DeNovo 8th Avenue
Total Solids - Data Qualification Summary - SDG ARZ2

No Sample Data Qualified in this SDG

DeNovo 8th Avenue
Total Solids - Laboratory Blank Data Qualification Summary - SDG ARZ2

No Sample Data Qualified in this SDG

LDC #: 36266B6 **VALIDATION COMPLETENESS WORKSHEET** Date: 6/5/16
SDG #: ARZ2 Stage 2B Page: 1 of 2
Laboratory: Analytical Resources, Inc. Reviewer: a
2nd Reviewer: amH

METHOD: (Analyte) Total Solids (SM2540G)

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.	Sample receipt/Technical holding times	A/A	Frozen - no HT
II	Initial calibration	A	
III.	Calibration verification	A	
IV	Laboratory Blanks	A	
V	Field blanks	N	
VI.	Matrix Spike/Matrix Spike Duplicates	N	not required
VII.	~~Duplicate~~ Triplicate sample analysis	A	TRP
VIII.	Laboratory control samples	N	not required
IX.	Field duplicates	N	
X.	Sample result verification	N	
XI	Overall assessment of data	A	

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; SB=Source blank; OTHER:

	Client ID	Lab ID	Matrix	Date
1	EB-49-3-5	ARZ2A	Soil	12/08/14
2	EB-49-5-7	ARZ2B	Soil	12/08/14
3	EB-49-8.5-10	ARZ2C	Soil	12/08/14
4	EB-49-11-13	ARZ2D	Soil	12/08/14
5	EB-49-15-17	ARZ2E	Soil	12/08/14
6	EB-49-18-20	ARZ2F	Soil	12/08/14
7	EB-53-2-4	ARZ2G	Soil	12/08/14
8	EB-53-5-7	ARZ2H	Soil	12/08/14
9	EB-53-8-10	ARZ2I	Soil	12/08/14
10	EB-55-3-5	ARZ2J	Soil	12/08/14
11	EB-55-5-7	ARZ2K	Soil	12/08/14
12	EB-55-8-10	ARZ2L	Soil	12/08/14
13	EB-56-2-4	ARZ2M	Soil	12/08/14
14	EB-56-5-7	ARZ2N	Soil	12/08/14
15	EB-56-8-10	ARZ2O	Soil	12/08/14
16	EB-56-12.5-14.5	ARZ2P	Soil	12/08/14
17	EB-56-16-18	ARZ2Q	Soil	12/08/14

LDC #: 36266B6 **VALIDATION COMPLETENESS WORKSHEET** Date: 5/5/16
SDG #: ARZ2 Stage 2B Page: 2 of 2
Laboratory: Analytical Resources, Inc. Reviewer: CR
2nd Reviewer: gmM

METHOD: (Analyte) Total Solids (SM2540G)

	Client ID	Lab ID	Matrix	Date
18	EB-06-2-4	ARZ2R	Soil	12/08/14
19	EB-06-6-8	ARZ2S	Soil	12/08/14
20	EB-06-8-10	ARZ2T	Soil	12/08/14
21	EB-49-18-20DUP	ARZ2FDUP	Soil	12/08/14
22	J TRP	J TRP	J	J
23				
24				
25				
26				

Notes:

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: DeNovo 8th Avenue

LDC Report Date: May 9, 2016

Parameters: Polychlorinated Dioxins/Dibenzofurans

Validation Level: Stage 4

Laboratory: Analytical Resources, Inc.

Sample Delivery Group (SDG): ARZ2

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
EB-53-2-4	ARZ2G	Soil	12/08/14
EB-53-5-7	ARZ2H	Soil	12/08/14
EB-53-8-10	ARZ2I	Soil	12/08/14
EB-55-3-5	ARZ2J	Soil	12/08/14
EB-55-5-7	ARZ2K	Soil	12/08/14
EB-55-8-10	ARZ2L	Soil	12/08/14

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Final Quality Assurance Project Plan, Remedial Investigation, Crowley Marine Services 8th Avenue S. Site, Seattle, Washington (October 2012) and the USEPA Contract Laboratory Program (CLP) National Functional Guidelines for Chlorinated Dibenzo-p-Dioxins (CDDs) and Chlorinated Dibenzofurans (CDFs) Data Review (September 2011). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Polychlorinated Dioxins/Dibenzofurans by Environmental Protection Agency (EPA) Method 1613B

All sample results were subjected to Stage 4 data validation, which is comprised of the quality control (QC) summary forms as well as the raw data, to confirm sample quantitation and identification.

The following are definitions of the data qualifiers utilized during data validation:

J (Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.

U (Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered not detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

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.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition.

Cooler temperatures for samples in this SDG were reported at 6.8°C and 9.3°C upon receipt by the laboratory. Since the samples were received the same day that they were collected, time did not allow for sufficient cooling of the samples, therefore no data were qualified.

All technical holding time requirements for frozen samples were met.

II. HRGC/HRMS Instrument Performance Check

Instrument performance was checked at the required 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%.

The static resolving power was at least 10,000 (10% valley definition).

III. Initial Calibration and Initial Calibration Verification

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

The percent relative standard deviations (%RSD) were less than or equal to 20.0% for unlabeled compounds and less than or equal to 35.0% for labeled compounds.

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

The minimum S/N ratio was greater than or equal to 10 for each unlabeled compound and labeled compound.

The percent differences (%D) of the initial calibration verification (ICV) standard were within the QC limits for unlabeled compounds and labeled compounds with the following exceptions:

Date	Compound	Concentration (Limits)	Associated Samples	Affected Compound	Flag	A or P
10/15/15	1,2,3,4,7,8-HxCDF	56.905 pg (45-56)	EB-53-2-4 EB-53-5-7 EB-53-8-10 EB-55-5-7 EB-55-8-10	1,2,3,4,7,8-HxCDF Total HxCDF	J (all detects) J (all detects)	P
10/15/15	1,2,3,4,7,8-HxCDF	56.905 pg (45-56)	EB-55-3-5	1,2,3,4,7,8-HxCDF	NA	-

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

All of the continuing calibration results were within the QC limits for unlabeled compounds and labeled compounds.

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

The minimum S/N ratio was greater than or equal to 10 for each unlabeled compound and labeled compound.

V. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks with the following exceptions:

Blank ID	Extraction Date	Compound	Concentration	Associated Samples
MB-020216	02/02/16	1,2,3,7,8-PeCDF	0.0400 pg/g	All samples in SDG ARZ2
		1,2,3,4,7,8-HxCDF	0.0560 pg/g	
		1,2,3,6,7,8-HxCDF	0.0360 pg/g	
		1,2,3,7,8,9-HxCDF	0.0580 pg/g	
		1,2,3,6,7,8-HxCDD	0.0440 pg/g	
		1,2,3,7,8,9-HxCDD	0.108 pg/g	
		1,2,3,4,6,7,8-HpCDF	0.268 pg/g	
		1,2,3,4,7,8,9-HpCDF	0.0320 pg/g	
		1,2,3,4,6,7,8-HpCDD	1.42 pg/g	
		OCDF	1.11 pg/g	
		OCDD	16.3 pg/g	
		Total TCDD	0.193 pg/g	
		Total PeCDD	0.303 pg/g	
		Total HxCDD	0.921 pg/g	
		Total HpCDD	3.18 pg/g	
		Total PeCDF	0.0406 pg/g	
		Total HxCDF	0.151 pg/g	
		Total HpCDF	0.631 pg/g	

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

Sample	Compound	Reported Concentration	Modified Final Concentration
EB-53-2-4	1,2,3,7,8-PeCDF	0.0690 pg/g	0.0690U pg/g
	1,2,3,4,7,8-HxCDF	0.0473 pg/g	0.0473U pg/g
	1,2,3,6,7,8-HxCDF	0.0552 pg/g	0.0552U pg/g
	1,2,3,7,8,9-HxCDF	0.126 pg/g	0.126U pg/g
	1,2,3,6,7,8-HxCDD	0.126 pg/g	0.126U pg/g
	1,2,3,7,8,9-HxCDD	0.136 pg/g	0.136U pg/g
	1,2,3,4,6,7,8-HpCDF	0.422 pg/g	0.422U pg/g
	1,2,3,4,7,8,9-HpCDF	0.0690 pg/g	0.0690U pg/g
	1,2,3,4,6,7,8-HpCDD	2.74 pg/g	2.74U pg/g
	OCDF	1.49 pg/g	1.49U pg/g
	OCDD	32.4 pg/g	32.4U pg/g
	Total TCDD	0.446 pg/g	0.446J pg/g
	Total PeCDD	0.256 pg/g	0.256J pg/g
	Total HxCDD	1.12 pg/g	1.12J pg/g
	Total HpCDD	5.79 pg/g	5.79J pg/g
	Total HxCDF	0.573 pg/g	0.573J pg/g
	Total HpCDF	1.43 pg/g	1.43J pg/g
EB-53-5-7	1,2,3,7,8-PeCDF	0.198 pg/g	0.198U pg/g
	1,2,3,7,8,9-HxCDF	0.242 pg/g	0.242U pg/g
EB-55-3-5	1,2,3,7,8,9-HxCDD	0.124 pg/g	0.124U pg/g
	1,2,3,4,6,7,8-HpCDF	0.243 pg/g	0.243U pg/g
	1,2,3,4,6,7,8-HpCDD	1.41 pg/g	1.41U pg/g
	OCDF	0.586 pg/g	0.586U pg/g
	OCDD	9.15 pg/g	9.15U pg/g
	Total HxCDD	1.72 pg/g	1.72J pg/g
	Total HpCDD	3.67 pg/g	3.67J pg/g
	Total HpCDF	0.460 pg/g	0.460J pg/g
EB-55-5-7	1,2,3,4,7,8-HxCDF	0.0737 pg/g	0.0737U pg/g
	1,2,3,6,7,8-HxCDF	1.02 pg/g	1.02U pg/g
	1,2,3,7,8,9-HxCDF	0.0876 pg/g	0.0876U pg/g
	1,2,3,6,7,8-HxCDD	0.141 pg/g	0.141U pg/g
	1,2,3,7,8,9-HxCDD	0.149 pg/g	0.149U pg/g
	1,2,3,4,6,7,8-HpCDF	0.369 pg/g	0.369U pg/g
	1,2,3,4,6,7,8-HpCDD	1.95 pg/g	1.95U pg/g
	OCDF	0.825 pg/g	0.825U pg/g
	OCDD	14.9 pg/g	14.9U pg/g
	Total TCDD	0.660 pg/g	0.660J pg/g
	Total PeCDD	0.791 pg/g	0.791J pg/g
	Total HxCDD	1.89 pg/g	1.89J pg/g
	Total HpCDD	4.42 pg/g	4.42J pg/g
	Total HpCDF	0.797 pg/g	0.797J pg/g
EB-55-8-10	1,2,3,7,8-PeCDF	0.0903 pg/g	0.0903U pg/g
	1,2,3,4,7,8-HxCDF	0.0569 pg/g	0.0569U pg/g
	1,2,3,6,7,8-HxCDF	0.0471 pg/g	0.0471U pg/g
	1,2,3,7,8,9-HxCDF	0.0608 pg/g	0.0608U pg/g
	1,2,3,6,7,8-HxCDD	0.0903 pg/g	0.0903U pg/g
	1,2,3,7,8,9-HxCDD	0.210 pg/g	0.210U pg/g
	1,2,3,4,6,7,8-HpCDF	0.210 pg/g	0.210U pg/g
	1,2,3,4,6,7,8-HpCDD	1.79 pg/g	1.79U pg/g
	OCDF	0.665 pg/g	0.665U pg/g
	OCDD	15.9 pg/g	15.9U pg/g
	Total PeCDD	0.800 pg/g	0.800J pg/g
	Total HxCDD	1.88 pg/g	1.88J pg/g
	Total HpCDD	4.45 pg/g	4.45J pg/g
	Total HxCDF	0.165 pg/g	0.165J pg/g
	Total HpCDF	0.428 pg/g	0.428J pg/g

VI. Field Blanks

No field blanks were identified in this SDG.

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. Ongoing Precision Recovery

Ongoing precision recovery (OPR) samples were analyzed as required by the method. Percent recoveries (%R) were within QC limits.

IX. Field Duplicates

No field duplicates were identified in this SDG.

X. Internal Standards

All internal standard recoveries (%R) were within QC limits.

XI. Compound Quantitation

All compound quantitations were within validation criteria with the following exceptions:

Sample	Compound	Flag	A or P
All samples in SDG ARZ2	All compounds reported as estimated maximum possible concentration (EMPC).	J (all detects)	A

Sample	Compound	Finding	Criteria	Flag	A or P
EB-53-8-10	OCDD	Sample result exceeded calibration range.	Reported result should be within calibration range.	J (all detects)	P

Sample	Compound	Finding	Flag	A or P
EB-53-8-10	1,2,3,7,8-PeCDF Total PeCDF	All compounds flagged "X" due to DiPhenylEther interference	J (all detects) J (all detects)	P

XII. Target Compound Identifications

All target compound identifications met validation criteria.

XIII. System Performance

The system performance was acceptable.

XIV. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

Due to ICV concentration, results reported by the laboratory as EMPCs, results exceeding the calibration range, and diphenylether interference, data were qualified as estimated in six samples.

Due to laboratory blank contamination, data were qualified as not detected or estimated in five samples.

The quality control criteria reviewed, other than those discussed above, were met and are considered acceptable. Sample results that were found to be estimated (J) are usable for limited purposes only. Based upon the data validation all other results are considered valid and usable for all purposes.

DeNovo 8th Avenue
Polychlorinated Dioxins/Dibenzofurans - Data Qualification Summary - SDG ARZ2

Sample	Compound	Flag	A or P	Reason
EB-53-2-4 EB-53-5-7 EB-53-8-10 EB-55-5-7 EB-55-8-10	1,2,3,4,7,8-HxCDF Total HxCDF	J (all detects) J (all detects)	P	Initial calibration verification (concentration)
EB-53-2-4 EB-53-5-7 EB-53-8-10 EB-55-3-5 EB-55-5-7 EB-55-8-10	All compounds reported as estimated maximum possible concentration (EMPC).	J (all detects)	A	Compound quantitation (EMPC)
EB-53-8-10	OCDD	J (all detects)	P	Compound quantitation (exceeded range)
EB-53-8-10	1,2,3,7,8-PeCDF Total PeCDF	J (all detects) J (all detects)	P	Compound quantitation (DiPhenylEther interference)

DeNovo 8th Avenue
Polychlorinated Dioxins/Dibenzofurans - Laboratory Blank Data Qualification Summary - SDG ARZ2

Sample	Compound	Modified Final Concentration	A or P
EB-53-2-4	1,2,3,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 1,2,3,7,8,9-HxCDF 1,2,3,6,7,8-HxCDD 1,2,3,7,8,9-HxCDD 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF 1,2,3,4,6,7,8-HpCDD OCDF OCDD Total TCDD Total PeCDD Total HxCDD Total HpCDD Total HxCDF Total HpCDF	0.0690U pg/g 0.0473U pg/g 0.0552U pg/g 0.126U pg/g 0.126U pg/g 0.136U pg/g 0.422U pg/g 0.0690U pg/g 2.74U pg/g 1.49U pg/g 32.4U pg/g 0.446J pg/g 0.256J pg/g 1.12J pg/g 5.79J pg/g 0.573J pg/g 1.43J pg/g	A
EB-53-5-7	1,2,3,7,8-PeCDF 1,2,3,7,8,9-HxCDF	0.198U pg/g 0.242U pg/g	A

Sample	Compound	Modified Final Concentration	A or P
EB-55-3-5	1,2,3,7,8,9-HxCDD	0.124U pg/g	A
	1,2,3,4,6,7,8-HpCDF	0.243U pg/g	
	1,2,3,4,6,7,8-HpCDD	1.41U pg/g	
	OCDF	0.586U pg/g	
	OCDD	9.15U pg/g	
	Total HxCDD	1.72J pg/g	
	Total HpCDD	3.67J pg/g	
	Total HpCDF	0.460J pg/g	
EB-55-5-7	1,2,3,4,7,8-HxCDF	0.0737U pg/g	A
	1,2,3,6,7,8-HxCDF	1.02U pg/g	
	1,2,3,7,8,9-HxCDF	0.0876U pg/g	
	1,2,3,6,7,8-HxCDD	0.141U pg/g	
	1,2,3,7,8,9-HxCDD	0.149U pg/g	
	1,2,3,4,6,7,8-HpCDF	0.369U pg/g	
	1,2,3,4,6,7,8-HpCDD	1.95U pg/g	
	OCDF	0.825U pg/g	
	OCDD	14.9U pg/g	
	Total TCDD	0.660J pg/g	
	Total PeCDD	0.791J pg/g	
	Total HxCDD	1.89J pg/g	
	Total HpCDD	4.42J pg/g	
	Total HpCDF	0.797J pg/g	
EB-55-8-10	1,2,3,7,8-PeCDF	0.0903U pg/g	A
	1,2,3,4,7,8-HxCDF	0.0569U pg/g	
	1,2,3,6,7,8-HxCDF	0.0471U pg/g	
	1,2,3,7,8,9-HxCDF	0.0608U pg/g	
	1,2,3,6,7,8-HxCDD	0.0903U pg/g	
	1,2,3,7,8,9-HxCDD	0.210U pg/g	
	1,2,3,4,6,7,8-HpCDF	0.210U pg/g	
	1,2,3,4,6,7,8-HpCDD	1.79U pg/g	
	OCDF	0.665U pg/g	
	OCDD	15.9U pg/g	
	Total PeCDD	0.800J pg/g	
	Total HxCDD	1.88J pg/g	
	Total HpCDD	4.45J pg/g	
	Total HxCDF	0.165J pg/g	
	Total HpCDF	0.428J pg/g	

LDC #: 36266B21 **VALIDATION COMPLETENESS WORKSHEET** Date: 05/05/16
SDG #: ARZ2 Stage 4 Page: 1 of 1
Laboratory: Analytical Resources, Inc. Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: HRGC/HRMS Polychlorinated Dioxins/Dibenzofurans (EPA Method 1613B)

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.	Sample receipt/Technical holding times	A / A	(Samples received at 6.8 & 9.3°C)
II.	HRGC/HRMS Instrument performance check	A	
III.	Initial calibration/ICV	A / SW	≤ 20/35 ICV QC limits
IV.	Continuing calibration	A	QC limits
V.	Laboratory Blanks	SW	
VI.	Field blanks	N	
VII.	Matrix spike/Matrix spike duplicates	N	C.S.
VIII.	Laboratory control samples	A	OPR
IX.	Field duplicates	N	
X.	Internal standards	A	
XI.	Compound quantitation RL/~~LOQ/LODs~~	SW	
XII.	Target compound identification	A	
XIII.	System performance	A	
XIV.	Overall assessment of data	A	

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; SB=Source blank; OTHER:

	Client ID	Lab ID	Matrix	Date
1	EB-53-2-4	ARZ2G	Soil	12/08/14
2	EB-53-5-7	ARZ2H	Soil	12/08/14
3	EB-53-8-10	ARZ2I	Soil	12/08/14
4	EB-55-3-5	ARZ2J	Soil	12/08/14
5	EB-55-5-7	ARZ2K	Soil	12/08/14
6	EB-55-8-10	ARZ2L	Soil	12/08/14
7				
8				
9				
10				
11				

Notes:

	MB-020216						

LDC #: 36266B21

VALIDATION FINDINGS CHECKLIST

Reviewer:
2nd Reviewer:

Method: HRGC/HRMS Dioxins/Dibenzofurans (EPA Method 1613B)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	✓			
Cooler temperature criteria was met.	✓			
II. GC/MS Instrument performance check				
Was PFK exact mass 380.9760 verified?	✓			
Were the retention time windows established for all homologues?	✓			
Was the chromatographic resolution between 2,3,7,8-TCDD and peaks representing any other unlabeled TCDD isomers ≤ 25% ?	✓			
Is the static resolving power at least 10,000 (10% valley definition)?	✓			
Was the mass resolution adequately check with PFK?	✓			
Was the presence of 1,2,8,9-TCDD and 1,3,4,6,8-PeCDF verified?	✓			
III. Initial calibration				
Was the initial calibration performed at 5 concentration levels?	✓			
Were all percent relative standard deviations (%RSD) ≤ 20% for unlabeled compounds and ≤ 35% for labeled compounds ?	✓			
Did all calibration standards meet the Ion Abundance Ratio criteria?	✓			
Was the signal to noise ratio for each target compound ≥ 2.5 and for each recovery and internal standard ≥ 10?	✓			
IV. Continuing calibration				
Was a routine calibration performed at the beginning and end of each 12 hour period?	✓			
Were all the concentrations for the unlabeled compounds and labeled compounds within the QC limits (Method 1613B, Table 6)?	✓			
Did all routine calibration standards meet the Ion Abundance Ratio criteria?	✓			
V. Blanks				
Was a method blank associated with every sample in this SDG?	✓			
Was a method blank performed for each matrix and concentration?	✓			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet?	✓			
VI. Matrix spike/Matrix spike duplicates				
Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.		✓		
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			✓	
VII. Laboratory control samples				
Was an LCS analyzed for this SDG?	✓			
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	✓			

LDC #: 36266B21

VALIDATION FINDINGS CHECKLIST

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

Validation Area	Yes	No	NA	Findings/Comments
VIII. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?		✓		
Were the performance evaluation (PE) samples within the acceptance limits?			✓	
IX. Internal standards				
Were internal standard recoveries within the 25-150% criteria?	✓			
Was the minimum S/N ratio of all internal standard peaks > 10?	✓			
X. Target compound identification				
For 2,3,7,8 substituted congeners with associated labeled standards, were the retention times of the two quantitation peaks within -1 to 3 sec. of the RT of the labeled standard?	✓			
For 2,3,7,8 substituted congeners without associated labeled standards, were the relative retention times of the two quantitation peaks within 0.005 time units of the RRT measured in the routine calibration?	✓			
For non-2,3,7,8 substituted congeners, were the retention times of the two quantitation peaks within RT established in the performance check solution?	✓			
Did compound spectra contain all characteristic ions listed in the table attached?	✓			
Was the Ion Abundance Ratio for the two quantitation ions within criteria?		✓		
Was the signal to noise ratio for each target compound and labeled standard ≥ 2.5?	✓			
Does the maximum intensity of each specified characteristic ion coincide within ± 2 seconds (includes labeled standards)?	✓			
For PCDF identification, was any signal (S/N ≥ 2.5, at ± seconds RT) detected in the corresponding PCDPE channel?	✓			
Was an acceptable lock mass recorded and monitored?	✓			
XI. Compound quantitation/CRQLs				
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the compound?	✓			
Were compound quantitation and CRQLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XII. System performance				
System performance was found to be acceptable.	✓			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			
XIV. Field duplicates				
Field duplicate pairs were identified in this SDG.		✓		
Target compounds were detected in the field duplicates.			✓	
XV. Field blanks				
Field blanks were identified in this SDG.		✓		
Target compounds were detected in the field blanks.			✓	

VALIDATION FINDINGS WORKSHEET

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA Method 1613B)

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 #: 36266B21

VALIDATION FINDINGS WORKSHEET
Initial Calibration Verification

Page: 1 of 1
Reviewer: m
2nd Reviewer: a

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA Method 1613B)

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

Y N N/A Was an initial calibration verification standard analyzed after each ICAL for each instrument?
Y N N/A Were results within the QC limits for the method?

#	Date	Standard ID	Compound	Finding (Limit: pg)	Associated Samples	Qualifications
	10/15/15	15101510	K	56.905 (45-56)	all	Jdets/P (+X) (1-3,5-6 = det)

LDC #: 36266B21

VALIDATION FINDINGS WORKSHEET
Blanks

Reviewer:
2nd Reviewer:

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA Method 1613B)

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: 02/02/16 **Blank analysis date:** 02/04/16

Conc. units: pg/g **Associated samples:** all

Compound	Blank ID	Sample Identification								
	MB-020216	5x	1	2	3	4	5	6		
I	0.0400	0.200	0.0690 /U	0.198* /U				0.0903* /U		
K	0.0560	0.280	0.0473* /U				0.0737* /U	0.0569* /U		
L	0.0360*	0.180	0.0552* /U				0.102* /U	0.0471* /U		
N	0.0580	0.290	0.126* /U	0.242* /U			0.0876* /U	0.0608* /U		
D	0.0440*	0.220	0.126 /U				0.141 /U	0.0903 /U		
E	0.108*	0.540	0.136 /U			0.124 /U	0.149 /U	0.210 /U		
O	0.268	1.34	0.422 /U			0.243 /U	0.369 /U	0.210 /U		
P	0.0320*	0.160	0.0690* /U							
F	1.42	7.10	2.74 /U			1.41 /U	1.95 /U	1.79 /U		
Q	1.11	5.55	1.49 /U			0.586* /U	0.825 /U	0.665* /U		
G	16.3	81.5	32.4 /U			9.15 /U	14.9 /U	15.9 /U		
R	0.193*	0.965	0.446 /J				0.660* /J			
S	0.303*	1.52	0.256* /J				0.791* /J	0.800* /J		
T	0.921*	4.61	1.12* /J			1.72* /J	1.89* /J	1.88 /J		
U	3.18	15.9	5.79 /J			3.67* /J	4.42 /J	4.45 /J		
W	0.0406	0.203								
X	0.151*	0.755	0.573* /J					0.165* /J		
Y	0.631*	3.16	1.43* /J			0.460 /J	0.797* /J	0.428 /J		

*EMPC

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 #: 36266B21

VALIDATION FINDINGS WORKSHEET
Compound Quantitation and Reported RLs

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

METHOD: GC/MS Dioxins/Dibenzofurans (Method 1613B)

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 RLs were adjusted to reflect all sample dilutions and dry weight factors (if necessary).

#	Date	Compound	Finding	Associated Samples	Qualifications
			EMPC results	all	Jdets/A
		G	result > calibration range	3	Jdets/P
		I	"X" flagged as DiPhenylEther interference	3	Jdets/P (+W)

Comments: See sample calculation verification worksheet for recalculations

LDC #: 36266B21

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

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

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA Method 1613B)

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

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of compound,
C_x = Concentration of compound,
S = Standard deviation of the RRFs,

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Reported Average RRF (initial)	Recalculated Average RRF (initial)	Reported RRF (CS3 std)	Recalculated RRF (CS3 std)	Reported %RSD	Recalculated %RSD
1	1510153 ICAL	10/15/15	2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)	0.83	0.83	0.82	0.82	3.2	3.5
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)	1.02	1.02	0.98	0.98	6.1	6.2
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)	0.89	0.895	0.89	0.89	3.0	3.1
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)	0.96	0.96	0.99	0.99	4.7	5.0
			OCDF (^{13}C-OCDD)	1.02	1.02	1.04	1.04	8.4	8.4
2			2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)						
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)						
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)						
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)						
			OCDF (^{13}C-OCDD)						
3			2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)						
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)						
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)						
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)						
			OCDF (^{13}C-OCDD)						

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

LDC #: 36266B21

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

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

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA Method 1613B)

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

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
$RRF = (A_x)(C_{is})/(A_{is})(C_x)$

Where: ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
A_x = Area of compound, A_{is} = Area of associated internal standard
C_x = Concentration of compound, C_{is} = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Spiked Conc (ng/mL)	Reported Conc (ng/mL)	Recalculated Conc (ng/mL)	Reported %D	Recalculated %D
1	16020402	02/04/16	2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)	10.000	10.413	10.396	4.1	4.0
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)	10.000	10.130	10.118	1.3	1.2
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)	50.000	52.167	52.297	4.3	4.6
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)	50.000	52.434	52.423	4.9	4.8
			OCDF (^{13}C-OCDD)	100.000	107.558	107.631	7.6	7.6
2			2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)					
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)					
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)					
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)					
			OCDF (^{13}C-OCDD)					
3			2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)					
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)					
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)					
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)					
			OCDF (^{13}C-OCDD)					

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

LDC #: 36266B21

VALIDATION FINDINGS WORKSHEET
Laboratory Control Sample Results Verification

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

METHOD: GC/MS Dioxins/Dibenzofurans (EPA Method 1613B)

The percent recoveries (%R) and Relative Percent Difference (RPD) of the laboratoy control sample and laboratory control sample duplicate (if applicable) were recalculated for the compounds identified below using the following calculation:

% Recovery = 100 * SSC/SA Where: SSC = Spiked sample concentration
SA = Spike added

RPD = | LCS - LCSD | * 2/(LCS + LCSD) LCS = Laboraotry control sample percent recovery LCSD = Laboratory control sample duplicate percent recovery

LCS ID: OPR-020216

Compound	Spike Added (pg/g)		Spiked Sample Concentration (pg/g)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc	Reported	Recalc	Reported	Recalculated
2,3,7,8-TCDD	20.0	NA	23.6	NA	118	118				
1,2,3,7,8-PeCDD	100		112		112	112				
1,2,3,4,7,8-HxCDD	100		109		109	109				
1,2,3,4,7,8,9-HpCDF	100		116		116	116.5				
OCDF	200		224		112	112				

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

LDC #: 36266B3

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

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

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA Method 1613B)

(Y) N N/A Were all reported results recalculated and verified for all level IV samples?
(Y) N N/A Were all recalculated results for detected target compounds agree within 10.0% of the reported results?

Concentration = $\frac{(A_x)(I_s)(DF)}{(A_{is})(RRF)(V_o)(\%S)}$

A_x = Area of the characteristic ion (EICP) for the compound to be measured

A_{is} = Area of the characteristic ion (EICP) for the specific internal standard

I_s = Amount of internal standard added in nanograms (ng)

V_o = Volume or weight of sample extract in milliliters (ml) or grams (g).

RRF = Relative Response Factor (average) from the initial calibration

Df = Dilution Factor.

%S = Percent solids, applicable to soil and solid matrices only.

Example:

Sample I.D. 1, PeCDD:

Conc. = $\frac{(4.99e2+2.77e2)(2000)(1)}{(1.10e6+6.93e5)(0.939)(11.29)(0.898)}$

= 0.090923376 ≈ 0.0909 pg/kg

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

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: DeNovo 8th Avenue

LDC Report Date: May 9, 2016

Parameters: Semivolatiles

Validation Level: Stage 2B

Laboratory: Analytical Resources, Inc.

Sample Delivery Group (SDG): ARZ6

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
EB-12-2-4	ARZ6Q	Soil	12/04/14
EB-12-5-7	ARZ6R	Soil	12/04/14
EB-12-8-10	ARZ6S	Soil	12/04/14
EB-12-15-17	ARZ6T	Soil	12/04/14

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Final Quality Assurance Project Plan, Remedial Investigation, Crowley Marine Services 8th Avenue S. Site, Seattle, Washington (October 2012) and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines (CLPNFG) for Superfund Organic Methods Data Review (June 2008). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Semivolatile Organic Compounds (SVOCs) by Environmental Protection Agency (EPA) SW 846 Method 8270D

All sample results were subjected to Stage 2B data validation, which comprises an evaluation of quality control (QC) summary results.

The following are definitions of the data qualifiers utilized during data validation:

J (Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.

U (Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

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.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition and cooler temperatures upon receipt met validation criteria.

All technical holding time requirements for frozen samples were met with the following exceptions:

Sample	Compound	Total Time From Sample Collection Until Extraction	Required Holding Time From Sample Collection Until Extraction	Flag	A or P
All samples in SDG ARZ6	All compounds	1 year 11 days	1 year	J (all detects) UJ (all non-detects)	P

II. GC/MS Instrument Performance Check

A decafluorotriphenylphosphine (DFTPP) tune was performed at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration and Initial Calibration Verification

An initial calibration was performed as required by the method.

For compounds where average relative response factors (RRFs) were utilized, percent relative standard deviations (%RSD) were less than or equal to 20.0%.

In the case where the laboratory used a calibration curve to evaluate the compounds, all coefficients of determination (r^2) were greater than or equal to 0.990.

Average relative response factors (RRF) for all compounds were within validation criteria.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 30.0% for all compounds with the following exceptions:

Date	Compound	%D	Associated Samples	Flag	A or P
12/15/15	2,4-Dinitrophenol	63.8	All samples in SDG ARZ6	UJ (all non-detects)	A
12/15/15	Fluorene	42.3	EB-12-8-10 EB-12-15-17	J (all detects)	A
12/15/15	Fluorene	42.3	EB-12-2-4 EB-12-5-7	NA	-
12/15/15	3,3'-Dichlorobenzidine	45.6	All samples in SDG ARZ6	NA	-

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

The percent differences (%D) were less than or equal to 20.0% for all compounds with the following exceptions:

Date	Compound	%D	Associated Samples	Flag	A or P
12/23/15 (14:37)	Hexachlorocyclopentadiene 2,4-Dinitrophenol 4-Nitrophenol 4,6-Dinitro-2-methylphenol	33.6 29.7 27.8 21.2	All samples in SDG ARZ6	NA	-
12/23/15 (14:37)	4-Bromophenyl-phenyl ether	58.8	All samples in SDG ARZ6	UJ (all non-detects)	A

All of the continuing calibration relative response factors (RRF) were within validation criteria.

V. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks with the following exceptions:

Blank ID	Extraction Date	Compound	Concentration	Associated Samples
MB-121515	12/15/15	Naphthalene	15 ug/Kg	All samples in SDG ARZ6

Sample concentrations were compared to concentrations detected in the laboratory 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 laboratory blanks with the following exceptions:

Sample	Compound	Reported Concentration	Modified Final Concentration
EB-12-8-10 (3X)	Naphthalene	170 ug/Kg	170U ug/Kg
EB-12-15-17	Naphthalene	42 ug/Kg	42U ug/Kg

VI. Field Blanks

No field blanks were identified in this SDG.

VII. Surrogates

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

VIII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

IX. Laboratory Control Samples

Laboratory control samples (LCS) were analyzed as required by the method. Percent recoveries (%R) were within QC limits.

X. Field Duplicates

No field duplicates were identified in this SDG.

XI. Internal Standards

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

XII. Compound Quantitation

Raw data were not reviewed for Stage 2B validation.

XIII. Target Compound Identifications

Raw data were not reviewed for Stage 2B validation.

XIV. System Performance

Raw data were not reviewed for Stage 2B validation.

XV. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

Due to holding time exceedance and ICV and continuing calibration %D, data were qualified as estimated in four samples.

Due to laboratory blank contamination, data were qualified as not detected in two samples.

The quality control criteria reviewed, other than those discussed above, were met and are considered acceptable. Sample results that were found to be estimated (J) are usable for limited purposes only. Based upon the data validation all other results are considered valid and usable for all purposes.

DeNovo 8th Avenue
Semivolatiles - Data Qualification Summary - SDG ARZ6

Sample	Compound	Flag	A or P	Reason
EB-12-2-4 EB-12-5-7 EB-12-8-10 EB-12-15-17	All compounds	J (all detects) UJ (all non-detects)	P	Technical holding time
EB-12-2-4 EB-12-5-7 EB-12-8-10 EB-12-15-17	2,4-Dinitrophenol	UJ (all non-detects)	A	Initial calibration verification (%D)
EB-12-8-10 EB-12-15-17	Fluorene	J (all detects)	A	Initial calibration verification (%D)
EB-12-2-4 EB-12-5-7 EB-12-8-10 EB-12-15-17	4-Bromophenyl-phenyl ether	UJ (all non-detects)	A	Continuing calibration (%D)

DeNovo 8th Avenue
Semivolatiles - Laboratory Blank Data Qualification Summary - SDG ARZ6

Sample	Compound	Modified Final Concentration	A or P
EB-12-8-10 (3X)	Naphthalene	170U ug/Kg	A
EB-12-15-17	Naphthalene	42U ug/Kg	A

LDC #: 36266C2a **VALIDATION COMPLETENESS WORKSHEET** Date: 5/5/16
SDG #: ARZ6 Stage 2B Page: 1 of 1
Laboratory: Analytical Resources, Inc. Reviewer: F
2nd Reviewer: G

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

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.	Sample receipt/Technical holding times	A / SW	
II.	GC/MS Instrument performance check	A	
III.	Initial calibration/ICV	A / SW	%D ≤ 20, r² ICV ≤ 30
IV.	Continuing calibration	SW	CCV ≤ 20
V.	Laboratory Blanks	SW	
VI.	Field blanks	N	
VII.	Surrogate spikes	A	
VIII.	Matrix spike/Matrix spike duplicates	A	DMW-6A-18-20 MS ID
IX.	Laboratory control samples	A	LCS
X.	Field duplicates	N	
XI.	Internal standards	A	
XII.	Compound quantitation RL/LOQ/LODs	N	
XIII.	Target compound identification	N	
XIV.	System performance	N	
XV.	Overall assessment of data	A	

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; SB=Source blank; OTHER:

	Client ID	Lab ID	Matrix	Date
1	EB-12-2-4	ARZ6-Q	Soil	12/04/14
2	EB-12-5-7	ARZ6-R	Soil	12/04/14
3	EB-12-8-10	ARZ6-S	Soil	12/04/14
4	EB-12-15-17	ARZ6-T	Soil	12/04/14
5		(no data)		
6				
7				
8				
9				

Notes:

	MB-121515						

VALIDATION FINDINGS WORKSHEET

METHOD: GC/MS SVOA

A. Phenol	AA. 2-Chloronaphthalene	AAA. Butylbenzylphthalate	AAAA. Dibenzothiophene	A1.
B. Bis (2-chloroethyl) ether	BB. 2-Nitroaniline	BBB. 3,3'-Dichlorobenzidine	BBBB. Benzo(a)fluoranthene	B1.
C. 2-Chlorophenol	CC. Dimethylphthalate	CCC. Benzo(a)anthracene	CCCC. Benzo(b)fluorene	C1.
D. 1,3-Dichlorobenzene	DD. Acenaphthylene	DDD. Chrysene	DDDD. cis/trans-Decalin	D1.
E. 1,4-Dichlorobenzene	EE. 2,6-Dinitrotoluene	EEE. Bis(2-ethylhexyl)phthalate	EEEE. Biphenyl	E1.
F. 1,2-Dichlorobenzene	FF. 3-Nitroaniline	FFF. Di-n-octylphthalate	FFFF. Retene	F1.
G. 2-Methylphenol	GG. Acenaphthene	GGG. Benzo(b)fluoranthene	GGGG. C30-Hopane	G1.
H. 2,2'-Oxybis(1-chloropropane)	HH. 2,4-Dinitrophenol	HHH. Benzo(k)fluoranthene	HHHH. 1-Methylphenanthrene	H1.
I. 4-Methylphenol	II. 4-Nitrophenol	III. Benzo(a)pyrene	IIII. 1,4-Dioxane	I1.
J. N-Nitroso-di-n-propylamine	JJ. Dibenzofuran	JJJ. Indeno(1,2,3-cd)pyrene	JJJJ. Acetophenone	J1.
K. Hexachloroethane	KK. 2,4-Dinitrotoluene	KKK. Dibenz(a,h)anthracene	KKKK. Atrazine	K1.
L. Nitrobenzene	LL. Diethylphthalate	LLL. Benzo(g,h,i)perylene	LLLL. Benzaldehyde	L1.
M. Isophorone	MM. 4-Chlorophenyl-phenyl ether	MMM. Bis(2-Chloroisopropyl)ether	MMMM. Caprolactam	M1.
N. 2-Nitrophenol	NN. Fluorene	NNN. Aniline	NNNN. 2,6-Dichlorophenol	N1.
O. 2,4-Dimethylphenol	OO. 4-Nitroaniline	OOO. N-Nitrosodimethylamine	OOOO. 2,6-Dinitrotoluene	O1.
P. Bis(2-chloroethoxy)methane	PP. 4,6-Dinitro-2-methylphenol	PPP. Benzoic Acid	PPPP. 3-Methylphenol	P1.
Q. 2,4-Dichlorophenol	QQ. N-Nitrosodiphenylamine	QQQ. Benzyl alcohol	QQQQ. 3&4 Methylphenol	Q1.
R. 1,2,4-Trichlorobenzene	RR. 4-Bromophenyl-phenylether	RRR. Pyridine	RRRR. 4-Dimethyldibenzothiphene (4MDT)	R1.
S. Naphthalene	SS. Hexachlorobenzene	SSS. Benzidine	SSSS. 2/3-Dimethyldibenzothiophene (4MDT)	S1.
T. 4-Chloroaniline	TT. Pentachlorophenol	TTT. 1-Methylnaphthalene	TTTT. 1-Methyldibenzothiophene (1MDT)	T1.
U. Hexachlorobutadiene	UU. Phenanthrene	UUU.Benzo(b)thiophene	UUUU.	U1.
V. 4-Chloro-3-methylphenol	VV. Anthracene	VVV.Benzonaphthothiophene	VVVV.	V1.
W. 2-Methylnaphthalene	WW. Carbazole	WWW.Benzo(e)pyrene	WWWW.	W1.
X. Hexachlorocyclopentadiene	XX. Di-n-butylphthalate	XXX. 2,6-Dimethylnaphthalene	XXXX.	X1.
Y. 2,4,6-Trichlorophenol	YY. Fluoranthene	YYY. 2,3,5-Trimethylnaphthalene	YYYY.	Y1.
Z. 2,4,5-Trichlorophenol	ZZ. Pyrene	ZZZ. Perylene	ZZZZ.	Z1.

LDC #: 36266C2a

VALIDATION FINDINGS WORKSHEET
Technical Holding Times

Reviewer: FJ
2nd Reviewer: [signature]

All circled dates have exceeded the technical holding times.
(Y) N N/A Were all cooler temperatures within validation criteria?

METHOD : GC/MA BNA SW846 METHOD 8270D

Sample ID	Matrix	Preserved	Sampling Date	Extraction date	Analysis date	Total # of Days	Qualifier
All	soil	Frozen	12/4/14	12/15/15	12/24/15	1yr + 11 days	J/UJ/P NDet
Frozen sample holding time = 1yr from sampling date							

TECHNICAL HOLDING TIME CRITERIA

Water: Extracted within 7 days, analyzed within 40 days.
Soil: Extracted within 14 days, analyzed within 40 days.

LDC #: 36266C2a

VALIDATION FINDINGS WORKSHEET
Initial Calibration Verification

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

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

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

(Y) N N/A Was an initial calibration verification standard analyzed after each ICAL for each instrument?

Y (N) N/A Were all %D within the validation criteria of ≤30 %D ?

#	Date	Standard ID	Compound	Finding %D (Limit: ≤30.0%)	Associated Samples	Qualifications
→	12/15/15	ICV	HH	63.8		J/UJ/A ND
↑			NN	47.3		J det/A #3,4 Det
↑			BBB	45.6		↓ ND

LDC #: 36266 C2a

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Reviewer: FT
2nd Reviewer: AR

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

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

Y N N/A Was a continuing calibration standard analyzed at least once every 12 hours of sample analysis for each instrument?

Y N N/A Were percent differences (%D) and relative response factors (RRF) within method criteria for all CCC's and SPCC's ?

Y N N/A Were all %D and RRFs within the validation criteria of ≤20 %D and ≥0.05 RRF ?

#	Date	Standard ID	Compound	Finding %D (Limit: <20.0%)	Finding RRF (Limit: >0.05)	Associated Samples	Qualifications
+	12/23/15	CCV	X	33.6		All	J(all D)/A all ND
+	1437		HH	29.7			
+			II	27.8			
+			PP	21.2			
-			RR	58.8			J(all D)/A

CONCAL.wpd

LDC #: 36266C2a

VALIDATION FINDINGS WORKSHEET
Blanks

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

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

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: 12/15/15 **Blank analysis date:** 12/23/15
Conc. units: ug/kg Associated Samples: All

Compound	Blank ID								
	MB-121515	5 X		3 (3X)	4				
5	15	75		170 U	42 U				

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

Compound	Blank ID								

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".

LDC Report# 36266C2b

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: DeNovo 8th Avenue

LDC Report Date: May 9, 2016

Parameters: Semivolatiles

Validation Level: Stage 2B

Laboratory: Analytical Resources, Inc.

Sample Delivery Group (SDG): ARZ6

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
EB-12-2-4	ARZ6Q	Soil	12/04/14
EB-12-5-7	ARZ6R	Soil	12/04/14
EB-12-8-10	ARZ6S	Soil	12/04/14
EB-12-15-17	ARZ6T	Soil	12/04/14

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Final Quality Assurance Project Plan, Remedial Investigation, Crowley Marine Services 8th Avenue S. Site, Seattle, Washington (October 2012) and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines (CLPNFG) for Superfund Organic Methods Data Review (June 2008). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Semivolatile Organic Compounds (SVOCs) by Environmental Protection Agency (EPA) SW 846 Method 8270D in Selected Ion Monitoring (SIM) mode

All sample results were subjected to Stage 2B data validation, which comprises an evaluation of quality control (QC) summary results.

The following are definitions of the data qualifiers utilized during data validation:

J (Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.

U (Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

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.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition and cooler temperatures upon receipt met validation criteria.

All technical holding time requirements for frozen samples were met with the following exceptions:

Sample	Compound	Total Time From Sample Collection Until Extraction	Required Holding Time From Sample Collection Until Extraction	Flag	A or P
EMW-22D-12.5-14.5	All compounds	1 year 11 days	1 year	J (all detects) UJ (all non-detects)	P

II. GC/MS Instrument Performance Check

A decafluorotriphenylphosphine (DFTPP) tune was performed at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

An initial calibration was performed as required by the method.

For compounds where average relative response factors (RRFs) were utilized, percent relative standard deviations (%RSD) were less than or equal to 20.0%.

In the case where the laboratory used a calibration curve to evaluate the compounds, all coefficients of determination (r^2) were greater than or equal to 0.990.

Average relative response factors (RRF) for all compounds were within validation criteria.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

The percent differences (%D) were less than or equal to 20.0% for all compounds with the following exceptions:

Date	Compound	%D	Associated Samples	Flag	A or P
12/23/15 (15:13)	Phenol	21.5	EB-12-2-4 EB-12-5-7 EB-12-15-17	J (all detects)	A

Date	Compound	%D	Associated Samples	Flag	A or P
12/23/15 (15:13)	Phenol	21.5	EB-12-8-10	NA	-

All of the continuing calibration relative response factors (RRF) were within validation criteria.

V. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks.

VI. Field Blanks

No field blanks were identified in this SDG.

VII. Surrogates

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

VIII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

IX. Laboratory Control Samples

Laboratory control samples (LCS) were analyzed as required by the method. Percent recoveries (%R) were within QC limits.

X. Field Duplicates

No field duplicates were identified in this SDG.

XI. Internal Standards

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

XII. Compound Quantitation

Raw data were not reviewed for Stage 2B validation.

XIII. Target Compound Identifications

Raw data were not reviewed for Stage 2B validation.

XIV. System Performance

Raw data were not reviewed for Stage 2B validation.

XV. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

Due to holding time exceedance and continuing calibration %D, data were qualified as estimated in four samples.

The quality control criteria reviewed, other than those discussed above, were met and are considered acceptable. Sample results that were found to be estimated (J) are usable for limited purposes only. Based upon the data validation all other results are considered valid and usable for all purposes.

DeNovo 8th Avenue
Semivolatiles - Data Qualification Summary - SDG ARZ6

Sample	Compound	Flag	A or P	Reason
EB-12-2-4 EB-12-5-7 EB-12-8-10 EB-12-15-17	All compounds	J (all detects) UJ (all non-detects)	P	Technical holding time
EB-12-2-4 EB-12-5-7 EB-12-15-17	Phenol	J (all detects)	A	Continuing calibration (%D)

DeNovo 8th Avenue
Semivolatiles - Laboratory Blank Data Qualification Summary - SDG ARZ6

No Sample Data Qualified in this SDG

LDC #: 36266C2b

SDG #: ARZ6

Laboratory: Analytical Resources, Inc.

VALIDATION COMPLETENESS WORKSHEET

Stage 2B

Date: 5/4/14

Page: 1 of 1

Reviewer: FT

2nd Reviewer: [signature]

METHOD: GC/MS Semivolatiles (EPA SW 846 Method 8270D-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.	Sample receipt/Technical holding times	A / SW	
II.	GC/MS Instrument performance check	A	FT
III.	Initial calibration ~~ICV~~	A / N	% RSD ≤ 20, 1 ~~ICV ≤ 30~~
IV.	Continuing calibration	SW	CCV ≤ 20
V.	Laboratory Blanks	A	
VI.	Field blanks	N	
VII.	Surrogate spikes	A	
VIII.	Matrix spike/Matrix spike duplicates	A	DMW-6A-18-20 MS/D
IX.	Laboratory control samples	A	LCS
X.	Field duplicates	N	
XI.	Internal standards	A	
XII.	Compound quantitation RL/LOQ/LODs	N	
XIII.	Target compound identification	N	
XIV.	System performance	N	
XV.	Overall assessment of data	A	

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; SB=Source blank; OTHER:

	Client ID	Lab ID	Matrix	Date
1	EB-12-2-4	ARZ6Q	Soil	12/04/14
2	EB-12-5-7	ARZ6R	Soil	12/04/14
3	EB-12-8-10	ARZ6S	Soil	12/04/14
4	EB-12-15-17	ARZ6T	Soil	12/04/14
5				
6				
7				
8				
9				

Notes:

	MB - 121515						

VALIDATION FINDINGS WORKSHEET

METHOD: GC/MS SVOA

A. Phenol	AA. 2-Chloronaphthalene	AAA. Butylbenzylphthalate	AAAA. Dibenzothiophene	A1.
B. Bis (2-chloroethyl) ether	BB. 2-Nitroaniline	BBB. 3,3'-Dichlorobenzidine	BBBB. Benzo(a)fluoranthene	B1.
C. 2-Chlorophenol	CC. Dimethylphthalate	CCC. Benzo(a)anthracene	CCCC. Benzo(b)fluorene	C1.
D. 1,3-Dichlorobenzene	DD. Acenaphthylene	DDD. Chrysene	DDDD. cis/trans-Decalin	D1.
E. 1,4-Dichlorobenzene	EE. 2,6-Dinitrotoluene	EEE. Bis(2-ethylhexyl)phthalate	EEEE. Biphenyl	E1.
F. 1,2-Dichlorobenzene	FF. 3-Nitroaniline	FFF. Di-n-octylphthalate	FFFF. Retene	F1.
G. 2-Methylphenol	GG. Acenaphthene	GGG. Benzo(b)fluoranthene	GGGG. C30-Hopane	G1.
H. 2,2'-Oxybis(1-chloropropane)	HH. 2,4-Dinitrophenol	HHH. Benzo(k)fluoranthene	HHHH. 1-Methylphenanthrene	H1.
I. 4-Methylphenol	II. 4-Nitrophenol	III. Benzo(a)pyrene	IIII. 1,4-Dioxane	I1.
J. N-Nitroso-di-n-propylamine	JJ. Dibenzofuran	JJJ. Indeno(1,2,3-cd)pyrene	JJJJ. Acetophenone	J1.
K. Hexachloroethane	KK. 2,4-Dinitrotoluene	KKK. Dibenz(a,h)anthracene	KKKK. Atrazine	K1.
L. Nitrobenzene	LL. Diethylphthalate	LLL. Benzo(g,h,i)perylene	LLLL. Benzaldehyde	L1.
M. Isophorone	MM. 4-Chlorophenyl-phenyl ether	MMM. Bis(2-Chloroisopropyl)ether	MMMM. Caprolactam	M1.
N. 2-Nitrophenol	NN. Fluorene	NNN. Aniline	NNNN. 2,6-Dichlorophenol	N1.
O. 2,4-Dimethylphenol	OO. 4-Nitroaniline	OOO. N-Nitrosodimethylamine	OOOO. 2,6-Dinitrotoluene	O1.
P. Bis(2-chloroethoxy)methane	PP. 4,6-Dinitro-2-methylphenol	PPP. Benzoic Acid	PPPP. 3-Methylphenol	P1.
Q. 2,4-Dichlorophenol	QQ. N-Nitrosodiphenylamine	QQQ. Benzyl alcohol	QQQQ. 3&4 Methylphenol	Q1.
R. 1,2,4-Trichlorobenzene	RR. 4-Bromophenyl-phenylether	RRR. Pyridine	RRRR. 4-Dimethyldibenzothiphene (4MDT)	R1.
S. Naphthalene	SS. Hexachlorobenzene	SSS. Benzidine	SSSS. 2/3-Dimethyldibenzothiophene (4MDT)	S1.
T. 4-Chloroaniline	TT. Pentachlorophenol	TTT. 1-Methylnaphthalene	TTTT. 1-Methyldibenzothiophene (1MDT)	T1.
U. Hexachlorobutadiene	UU. Phenanthrene	UUU.Benzo(b)thiophene	UUUU.	U1.
V. 4-Chloro-3-methylphenol	VV. Anthracene	VVV.Benzonaphthothiophene	VVVV.	V1.
W. 2-Methylnaphthalene	WW. Carbazole	WWW.Benzo(e)pyrene	WWWW.	W1.
X. Hexachlorocyclopentadiene	XX. Di-n-butylphthalate	XXX. 2,6-Dimethylnaphthalene	XXXX.	X1.
Y. 2,4,6-Trichlorophenol	YY. Fluoranthene	YYY. 2,3,5-Trimethylnaphthalene	YYYY.	Y1.
Z. 2,4,5-Trichlorophenol	ZZ. Pyrene	ZZZ. Perylene	ZZZZ.	Z1.

LDC #: 36266c2b

VALIDATION FINDINGS WORKSHEET
Technical Holding Times

Reviewer: PR
2nd Reviewer: [illegible]

All circled dates have exceeded the technical holding times.
(Y) N N/A Were all cooler temperatures within validation criteria?

METHOD : GC/MA BNA SW846 METHOD 8270D

Sample ID	Matrix	Preserved	Sampling Date	Extraction date	Analysis date	Total # of Days	Qualifier
All	Soil	Frozen sample	12/4/14	12/15/15	12/24/15	1 yr + 11 days	J/UJ/A ND+Det
Frozen sample holding Time =				1 yr from date of sampling			

TECHNICAL HOLDING TIME CRITERIA

Water: Extracted within 7 days, analyzed within 40 days.
Soil: Extracted within 14 days, analyzed within 40 days.

LDC #: 36266C2b

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

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

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

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

(Y) N N/A Was a continuing calibration standard analyzed at least once every 12 hours of sample analysis for each instrument?

(Y) N N/A Were percent differences (%D) and relative response factors (RRF) within method criteria for all CCC's and SPCC's ?

Y (N) N/A Were all %D and RRFs within the validation criteria of ≤20 %D and ≥0.05 RRF ?

#	Date	Standard ID	Compound	Finding %D (Limit: ≤20.0%)	Finding RRF (Limit: ≥0.05)	Associated Samples	Qualifications
+	12/23/15	CCV	A	21.5		All	J/UJ/A
	1513						1,2,4 Det

CONCAL.wpd

LDC Report# 36266C2c

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: DeNovo 8th Avenue

LDC Report Date: May 9, 2016

Parameters: Polynuclear Aromatic Hydrocarbons

Validation Level: Stage 2B

Laboratory: Analytical Resources, Inc.

Sample Delivery Group (SDG): ARZ6

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
EB-34-18.5-20	ARZ6G	Soil	12/09/14
EB-35-2-4	ARZ6H	Soil	12/09/14

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Final Quality Assurance Project Plan, Remedial Investigation, Crowley Marine Services 8th Avenue S. Site, Seattle, Washington (October 2012) and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines (CLPNFG) for Superfund Organic Methods Data Review (June 2008). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Polynuclear Aromatic Hydrocarbons (PAHs) by Environmental Protection Agency (EPA) SW 846 Method 8270D in Selected Ion Monitoring (SIM) mode

All sample results were subjected to Stage 2B data validation, which comprises an evaluation of quality control (QC) summary results.

The following are definitions of the data qualifiers utilized during data validation:

J (Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.

U (Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

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.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition.

Cooler temperatures for samples in this SDG were reported at 11.6°C, 8.1°C, and 10.1°C upon receipt by the laboratory. Since the samples were received the same day that they were collected, time did not allow for sufficient cooling of the samples, therefore no data were qualified.

All technical holding time requirements were met with the following exceptions:

Sample	Compound	Total Time From Sample Collection Until Extraction	Required Holding Time From Sample Collection Until Extraction	Flag	A or P
All samples in SDG ARZ6	All compounds	1 year 1 day	1 year	J (all detects) UJ (all non-detects)	P

II. GC/MS Instrument Performance Check

A decafluorotriphenylphosphine (DFTPP) tune was performed at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration and Initial Calibration Verification

An initial calibration was performed as required by the method.

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

Average relative response factors (RRF) for all compounds were within validation criteria.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 30.0% for all compounds.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

The percent differences (%D) were less than or equal to 20.0% for all compounds.

All of the continuing calibration relative response factors (RRF) were within validation criteria.

V. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks.

VI. Field Blanks

No field blanks were identified in this SDG.

VII. Surrogates

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

VIII. 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.

IX. Laboratory Control Samples

Laboratory control samples (LCS) were analyzed as required by the method. Percent recoveries (%R) were within QC limits.

X. Field Duplicates

No field duplicates were identified in this SDG.

XI. Internal Standards

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

XII. Compound Quantitation

Raw data were not reviewed for Stage 2B validation.

XIII. Target Compound Identifications

Raw data were not reviewed for Stage 2B validation.

XIV. System Performance

Raw data were not reviewed for Stage 2B validation.

XV. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

Due to holding time exceedance, data were qualified as estimated in two samples.

The quality control criteria reviewed, other than those discussed above, were met and are considered acceptable. Sample results that were found to be estimated (J) are usable for limited purposes only. Based upon the data validation all other results are considered valid and usable for all purposes.

DeNovo 8th Avenue
Polynuclear Aromatic Hydrocarbons - Data Qualification Summary - SDG ARZ6

Sample	Compound	Flag	A or P	Reason
EB-34-18.5-20 EB-35-2-4	All compounds	J (all detects)	P	Technical holding time

DeNovo 8th Avenue
Polynuclear Aromatic Hydrocarbons - Laboratory Blank Data Qualification Summary - SDG ARZ6

No Sample Data Qualified in this SDG

LDC #: 36266C2c **VALIDATION COMPLETENESS WORKSHEET** Date: 5/5/16
SDG #: ARZ6 Stage 2B Page: 1 of 1
Laboratory: Analytical Resources, Inc. Reviewer: [illegible]
2nd Reviewer: [illegible]

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

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

cooler temp = 11.6, 8.1, 10.1 not enough time to cool down

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A / SW	
II.	GC/MS Instrument performance check	A	
III.	Initial calibration/ICV	A / A	%D ≤ 20 ICV ≤ 30
IV.	Continuing calibration	A	CCV ≤ 20
V.	Laboratory Blanks	A	
VI.	Field blanks	N	
VII.	Surrogate spikes	A	
VIII.	Matrix spike/Matrix spike duplicates	N	MS
IX.	Laboratory control samples	A	LCS
X.	Field duplicates	N	
XI.	Internal standards	A	
XII.	Compound quantitation RL/LOQ/LODs	N	
XIII.	Target compound identification	N	
XIV.	System performance	N	
XV.	Overall assessment of data	A	

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; SB=Source blank; OTHER:

	Client ID	Lab ID	Matrix	Date
1	EB-34-18.5-20	ARZ6-G	Soil	12/09/14
2	EB-35-2-4	ARZ6-H	Soil	12/09/14
3				
4				
5				
6				
7				
8				

Notes:

	MB 121015						

VALIDATION FINDINGS WORKSHEET

METHOD: GC/MS SVOA

A. Phenol	AA. 2-Chloronaphthalene	AAA. Butylbenzylphthalate	AAAA. Dibenzothiophene	A1.
B. Bis (2-chloroethyl) ether	BB. 2-Nitroaniline	BBB. 3,3'-Dichlorobenzidine	BBBB. Benzo(a)fluoranthene	B1.
C. 2-Chlorophenol	CC. Dimethylphthalate	CCC. Benzo(a)anthracene	CCCC. Benzo(b)fluorene	C1.
D. 1,3-Dichlorobenzene	DD. Acenaphthylene	DDD. Chrysene	DDDD. cis/trans-Decalin	D1.
E. 1,4-Dichlorobenzene	EE. 2,6-Dinitrotoluene	EEE. Bis(2-ethylhexyl)phthalate	EEEE. Biphenyl	E1.
F. 1,2-Dichlorobenzene	FF. 3-Nitroaniline	FFF. Di-n-octylphthalate	FFFF. Retene	F1.
G. 2-Methylphenol	GG. Acenaphthene	GGG. Benzo(b)fluoranthene	GGGG. C30-Hopane	G1.
H. 2,2'-Oxybis(1-chloropropane)	HH. 2,4-Dinitrophenol	HHH. Benzo(k)fluoranthene	HHHH. 1-Methylphenanthrene	H1.
I. 4-Methylphenol	II. 4-Nitrophenol	III. Benzo(a)pyrene	IIII. 1,4-Dioxane	I1.
J. N-Nitroso-di-n-propylamine	JJ. Dibenzofuran	JJJ. Indeno(1,2,3-cd)pyrene	JJJJ. Acetophenone	J1.
K. Hexachloroethane	KK. 2,4-Dinitrotoluene	KKK. Dibenz(a,h)anthracene	KKKK. Atrazine	K1.
L. Nitrobenzene	LL. Diethylphthalate	LLL. Benzo(g,h,i)perylene	LLLL. Benzaldehyde	L1.
M. Isophorone	MM. 4-Chlorophenyl-phenyl ether	MMM. Bis(2-Chloroisopropyl)ether	MMMM. Caprolactam	M1.
N. 2-Nitrophenol	NN. Fluorene	NNN. Aniline	NNNN. 2,6-Dichlorophenol	N1.
O. 2,4-Dimethylphenol	OO. 4-Nitroaniline	OOO. N-Nitrosodimethylamine	OOOO. 2,6-Dinitrotoluene	O1.
P. Bis(2-chloroethoxy)methane	PP. 4,6-Dinitro-2-methylphenol	PPP. Benzoic Acid	PPPP. 3-Methylphenol	P1.
Q. 2,4-Dichlorophenol	QQ. N-Nitrosodiphenylamine	QQQ. Benzyl alcohol	QQQQ. 3&4 Methylphenol	Q1.
R. 1,2,4-Trichlorobenzene	RR. 4-Bromophenyl-phenylether	RRR. Pyridine	RRRR. 4-Dimethyldibenzothiphene (4MDT)	R1.
S. Naphthalene	SS. Hexachlorobenzene	SSS. Benzidine	SSSS. 2/3-Dimethyldibenzothiophene (4MDT)	S1.
T. 4-Chloroaniline	TT. Pentachlorophenol	TTT. 1-Methylnaphthalene	TTTT. 1-Methyldibenzothiophene (1MDT)	T1.
U. Hexachlorobutadiene	UU. Phenanthrene	UUU.Benzo(b)thiophene	UUUU.	U1.
V. 4-Chloro-3-methylphenol	VV. Anthracene	VVV.Benzonaphthothiophene	VVVV.	V1.
W. 2-Methylnaphthalene	WW. Carbazole	WWW.Benzo(e)pyrene	WWWW.	W1.
X. Hexachlorocyclopentadiene	XX. Di-n-butylphthalate	XXX. 2,6-Dimethylnaphthalene	XXXX.	X1.
Y. 2,4,6-Trichlorophenol	YY. Fluoranthene	YYY. 2,3,5-Trimethylnaphthalene	YYYY.	Y1.
Z. 2,4,5-Trichlorophenol	ZZ. Pyrene	ZZZ. Perylene	ZZZZ.	Z1.

LDC #: 36266C2c

VALIDATION FINDINGS WORKSHEET
Technical Holding Times

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

All circled dates have exceeded the technical holding times.
Y (N) N/A Were all cooler temperatures within validation criteria?

METHOD : GC/MA BNA SW846 METHOD 8270D

Sample ID	Matrix	Preserved	Sampling Date	Extraction date	Analysis date	Total # of Days	Qualifier
All	Soil	Frozen	12/9/14	12/10/15	12/18/15	1yr + 1 day	J/UJ/P ND+RL
Frozen sample holding Time = 1 yr from sampling date							

TECHNICAL HOLDING TIME CRITERIA

Water: Extracted within 7 days, analyzed within 40 days.
Soil: Extracted within 14 days, analyzed within 40 days.

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: DeNovo 8th Avenue

LDC Report Date: May 9, 2016

Parameters: Polychlorinated Biphenyls

Validation Level: Stage 2B

Laboratory: Analytical Resources, Inc.

Sample Delivery Group (SDG): ARZ6

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
EB-06-12-14	ARZ6A	Soil	12/09/14
EB-06-15-17	ARZ6B	Soil	12/09/14
EB-34-18.5-20	ARZ6G	Soil	12/09/14
EB-35-2-4	ARZ6H	Soil	12/09/14
EB-06-15-17MS	ARZ6BMS	Soil	12/09/14
EB-06-15-17MSD	ARZ6BMSD	Soil	12/09/14

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Final Quality Assurance Project Plan, Remedial Investigation, Crowley Marine Services 8th Avenue S. Site, Seattle, Washington (October 2012) and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines (CLPNFG) for Superfund Organic Methods Data Review (June 2008). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Polychlorinated Biphenyls (PCBs) by Environmental Protection Agency (EPA) SW 846 Method 8082A

All sample results were subjected to Stage 2B data validation, which comprises an evaluation of quality control (QC) summary results.

The following are definitions of the data qualifiers utilized during data validation:

J (Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.

U (Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

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.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition

Cooler temperatures for samples in this SDG were reported at 11.6°C, 8.1°C, and 10.1°C upon receipt by the laboratory. Since the samples were received the same day that they were collected, time did not allow for sufficient cooling of the samples, therefore no data were qualified.

All technical holding time requirements for frozen samples were met.

II. Initial Calibration and Initial Calibration Verification

An initial calibration was performed as required by the method.

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

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 20.0% for all compounds with the following exceptions:

Date	Standard	Column	Compound	%D	Associated Samples	Flag	A or P
12/18/15	ICV	ZB 5	Aroclor-1254	26.5	All samples in SDG ARZ6	NA	-

III. Continuing Calibration

Continuing calibration was performed at required frequencies.

The percent differences (%D) were less than or equal to 20.0% for all compounds.

IV. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks.

V. Field Blanks

No field blanks were identified in this SDG.

VI. Surrogates/Internal Standards

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

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

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

VIII. Laboratory Control Samples

Laboratory control samples (LCS) were analyzed as required by the method. Percent recoveries (%R) were within QC limits.

IX. Field Duplicates

No field duplicates were identified in this SDG.

X. Compound Quantitation

Raw data were not reviewed for Stage 2B validation.

XI. Target Compound Identification

Raw data were not reviewed for Stage 2B validation.

XII. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

The quality control criteria reviewed were met and are considered acceptable. Based upon the data validation all results are considered valid and usable for all purposes.

DeNovo 8th Avenue
Polychlorinated Biphenyls - Data Qualification Summary - SDG ARZ6

No Sample Data Qualified in this SDG

DeNovo 8th Avenue
Polychlorinated Biphenyls - Laboratory Blank Data Qualification Summary - SDG ARZ6

No Sample Data Qualified in this SDG

LDC #: 36266C3b

SDG #: ARZ6

Laboratory: Analytical Resources, Inc.

VALIDATION COMPLETENESS WORKSHEET

Stage 2B

Date: 5/5/16

Page: 1 of 1

Reviewer: FJ

2nd Reviewer: JL

METHOD: GC Polychlorinated Biphenyls (EPA SW846 Method 8082A)

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

cooler Temp = 11.6, 8.1, 10.1 (#1, 2, 5, 6 F7) not enough time to cool down

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A / A	
II.	Initial calibration/ICV	A SW	%D RSD / ICV ≤ 20
III.	Continuing calibration	A	CCV ≤ 20
IV.	Laboratory Blanks	A	
V.	Field blanks	N	
VI.	Surrogate spikes / IS	A	
VII.	Matrix spike/Matrix spike duplicates	A	
VIII.	Laboratory control samples	A	LCS
IX.	Field duplicates	N	
X.	Compound quantitation/RL/LOQ/LODs	N	
XI.	Target compound identification	N	
XII	Overall assessment of data	A	

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; SB=Source blank; OTHER:

	Client ID	Lab ID	Matrix	Date
1	EB-06-12-14	ARZ6-A	Soil	12/09/14
2	EB-06-15-17	ARZ6-B	Soil	12/09/14
3	EB-34-18.5-20	ARZ6-G	Soil	12/09/14
4	EB-35-2-4	ARZ6-H	Soil	12/09/14
5	EB-06-15-17MS	ARZ6-BMS	Soil	12/09/14
6	EB-06-15-17MSD	ARZ6-BMSD	Soil	12/09/14
7				
8				
9				
10				
11				
12				
13				

Notes:

	MB - 121615						

VALIDATION FINDINGS WORKSHEET

METHOD: Pesticide/PCBs (EPA SW 846 Method 8081/8082)

A. alpha-BHC	I. Dieldrin	Q. Endrin ketone	Y. Aroclor-1242	GG. Chlordane
B. beta-BHC	J. 4,4'-DDE	R. Endrin aldehyde	Z. Aroclor-1248	HH. Chlordane (Technical)
C. delta-BHC	K. Endrin	S. alpha-Chlordane	AA. Aroclor-1254	II. Arochlor 1262
D. gamma-BHC	L. Endosulfan II	T. gamma-Chlordane	BB. Aroclor-1260	JJ. Aroclor 1268
E. Heptachlor	M. 4,4'-DDD	U. Toxaphene	CC. 2,4'-DDD	KK. Oxychlordane
F. Aldrin	N. Endosulfan sulfate	V. Aroclor-1016	DD. 2,4'-DDE	LL. trans-Nonachlor
G. Heptachlor epoxide	O. 4,4'-DDT	W. Aroclor-1221	EE. 2,4'-DDT	MM. cis-Nonachlor
H. Endosulfan I	P. Methoxychlor	X. Aroclor-1232	FF. Hexachlorobenzene	NN.

Notes:_____

LDC #: 36266C3b

VALIDATION FINDINGS WORKSHEET
Initial Calibration Verification

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

METHOD: √ **GC** __ **HPLC**

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".
What type of initial calibration verification calculation was performed? __%D or __%R
Y N N/A Was an initial calibration verification standard analyzed after each ICAL for each instrument?
Y N N/A Did the initial calibration verification standards meet the %D / %R validation criteria of ≤20.0% / 80-120%?

#	Date	Standard ID	Detector/ Column	Compound	%D (Limit ≤ 20.0)	Associated Samples	Qualifications
+	12/18/15	ICV	ZB5	AA	26.5	All	J det /A qual AA only (ND)

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: DeNovo 8th Avenue

LDC Report Date: May 9, 2016

Parameters: Metals

Validation Level: Stage 2B

Laboratory: Analytical Resources, Inc.

Sample Delivery Group (SDG): ARZ6

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
EB-34-18.5-20	ARZ6G	Soil	12/09/14
EB-35-2-4	ARZ6H	Soil	12/09/14

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Final Quality Assurance Project Plan, Remedial Investigation, Crowley Marine Services 8th Avenue S. Site, Seattle, Washington (October 2012) and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines (CLPNFG) for Inorganic Superfund Data Review (January 2010). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following methods:

Antimony, Arsenic, Barium, Beryllium, Cadmium, Chromium, Copper, Lead, Nickel, Selenium, Silver, Thallium, and Zinc by Environmental Protection Agency (EPA) Method 200.8
Mercury by EPA SW 846 Method 7471A

All sample results were subjected to Stage 2B data validation, which comprises an evaluation of quality control (QC) summary results.

The following are definitions of the data qualifiers utilized during data validation:

J (Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.

U (Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

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.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition.

All technical holding time requirements for frozen samples were met with the following exceptions:

Sample	Analyte	Total Days From Sample Collection Until Analysis	Required Holding Time (in Days) From Sample Collection Until Analysis	Flag	A or P
All samples in SDG ARZ6	Mercury	371	28	J (all detects)	P

II. ICPMS Tune

The mass calibration was within 0.1 AMU and the percent relative standard deviation (%RSD) was less than or equal to 5%.

III. Instrument Calibration

Initial and continuing calibrations were performed as required by the methods.

The initial calibration verification (ICV) and continuing calibration verification (CCV) standards were within QC limits.

IV. ICP Interference Check Sample Analysis

The frequency of interference check sample (ICS) analysis was met. All criteria were within QC limits.

V. Laboratory Blanks

Laboratory blanks were analyzed as required by the methods. No contaminants were found in the laboratory blanks with the following exceptions:

Blank ID	Analyte	Maximum Concentration	Associated Samples
PB (prep blank)	Antimony Lead Thallium	0.050 mg/Kg 0.010 mg/Kg 0.010 mg/Kg	All samples in SDG ARZ6

Data qualification by the laboratory blanks was based on the maximum contaminant concentration in the laboratory blanks 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 laboratory blanks with the following exceptions:

Sample	Analyte	Reported Concentration	Modified Final Concentration
EB-35-2-4	Antimony	0.047 mg/Kg	0.047U mg/Kg

VI. Field Blanks

No field blanks were identified in this SDG.

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	%R (Limits)	Flag	A or P
EMW-21D-15-15.4MS (All samples in SDG ARZ6)	Antimony Chromium	7.6 (75-125) 40.9 (75-125)	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	A
EMW-21D-15-15.4MS (All samples in SDG ARZ6)	Beryllium Thallium	129 (75-125) 132 (75-125)	J (all detects) J (all detects)	A

For EMW-21D-15-15.4MS, although the percent recoveries were severely low for Antimony, the associated sample results were qualified as estimated (J/UJ) since the post spike recoveries were within the QC limits for this analyte.

For EMW-21D-15-15.4MS, no data were qualified for Arsenic and Copper percent recoveries (%R) outside the QC limits since the parent sample results were greater than 4X the spike concentration.

VIII. Duplicate Sample Analysis

Duplicate (DUP) sample analysis was performed on an associated project sample. Results were within QC limits with the following exceptions:

DUP ID (Associated Samples)	Analyte	RPD (Limits)	Flag	A or P
EMW-21D-15-15.4DUP (All samples in SDG ARZ6)	Cadmium Copper Zinc	72.7 (≤20) 22.5 (≤20) 35.0 (≤20)	J (all detects) J (all detects) J (all detects)	A

IX. Serial Dilution

Serial dilution was not performed for this SDG.

X. Laboratory Control Samples

Laboratory control samples (LCS) were analyzed as required by the methods. Percent recoveries (%R) were within QC limits.

XI. Field Duplicates

No field duplicates were identified in this SDG.

XII. Internal Standards (ICP-MS)

Raw data were not reviewed for Stage 2B validation.

XIII. Sample Result Verification

Raw data were not reviewed for Stage 2B validation.

XIV. Overall Assessment of Data

The analysis was conducted within all specifications of the methods. No results were rejected in this SDG.

Due to holding time exceedance, MS/MSD %R, and DUP RPD, data were qualified as estimated in two samples.

Due to laboratory blank contamination, data were qualified as not detected in one sample.

The quality control criteria reviewed, other than those discussed above, were met and are considered acceptable. Sample results that were found to be estimated (J) are usable for limited purposes only. Based upon the data validation all other results are considered valid and usable for all purposes.

DeNovo 8th Avenue
Metals - Data Qualification Summary - SDG ARZ6

Sample	Analyte	Flag	A or P	Reason
EB-34-18.5-20 EB-35-2-4	Mercury	J (all detects)	P	Technical holding time
EB-34-18.5-20 EB-35-2-4	Antimony Chromium	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	A	Matrix spike/Matrix spike duplicate (%R)
EB-34-18.5-20 EB-35-2-4	Beryllium Thallium	J (all detects) J (all detects)	A	Matrix spike/Matrix spike duplicate (%R)
EB-34-18.5-20 EB-35-2-4	Cadmium Copper Zinc	J (all detects) J (all detects) J (all detects)	A	Duplicate sample analysis (RPD)

DeNovo 8th Avenue
Metals - Laboratory Blank Data Qualification Summary - SDG ARZ6

Sample	Analyte	Modified Final Concentration	A or P
EB-35-2-4	Antimony	0.047U mg/Kg	A

LDC #: 36266C4a
SDG #: ARZ6
Laboratory: Analytical Resources, Inc.

VALIDATION COMPLETENESS WORKSHEET
Stage 2B

Date: 5/5/16
Page: 1 of 1
Reviewer: ar
2nd Reviewer: amA

METHOD: Metals (EPA Method 200.8/EPA SW 846 Method 7471A)

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.	Sample receipt/Technical holding times	A /SW	frozen - 2yrs for 200.8
II.	ICP/MS Tune	A	
III.	Instrument Calibration	A	
IV.	ICP Interference Check Sample (ICS) Analysis	A	
V.	Laboratory Blanks	SW	
VI.	Field Blanks	N	
VII.	Matrix Spike/Matrix Spike Duplicates	SW	MS (ARZ9)
VIII.	Duplicate sample analysis	SW	Dup
IX.	Serial Dilution	N	
X.	Laboratory control samples	A	LCS
XI.	Field Duplicates	N	
XII.	Internal Standard (ICP-MS)	N	not reviewed
XIII.	Sample Result Verification	N	
XIV	Overall Assessment of Data	A	

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; SB=Source blank; OTHER:

	Client ID	Lab ID	Matrix	Date
1	EB-34-18.5-20	ARZ6G	Soil	12/09/14
2	EB-35-2-4	ARZ6H	Soil	12/09/14
3		no dash		
4				
5				
6				
7				
8				
9				
10				
11				
12				

Notes:

LDC #: 36266C4a

VALIDATION FINDINGS WORKSHEET
Sample Specific Element Reference

Page: 1 of 1
Reviewer: CR
2nd reviewer: GMB

All circled elements are applicable to each sample.

Sample ID	Matrix	Target Analyte List (TAL)
1,2		Al, [✓ Sb, As, Ba, Be, Cd], Ca, [✓ Cr], Co, [✓ Cu], Fe, [✓ Pb], Mg, Mn, [✓ Hg, Ni], K, [✓ Se, Ag], Na, [✓ Tl], V, [✓ Zn], Mo, B, Sn, Ti, ___ ___
		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, Sn, Ti, ___ ___
		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, Sn, Ti, ___ ___
		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, Sn, Ti, ___ ___
		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, Sn, Ti, ___ ___
		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, Sn, Ti, ___ ___
		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, Sn, Ti, ___ ___
		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, Sn, Ti, ___ ___
		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, Sn, Ti, ___ ___
		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, Sn, Ti, ___ ___
		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, Sn, Ti, ___ ___
		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, Sn, Ti, ___ ___
		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, Sn, Ti, ___ ___
		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, Sn, Ti, ___ ___
		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, Sn, Ti, ___ ___
		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, Sn, Ti, ___ ___
		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, Sn, Ti, ___ ___
		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, Sn, Ti, ___ ___
		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, Sn, Ti, ___ ___
		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, Sn, Ti, ___ ___
		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, Sn, Ti, ___ ___
		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, Sn, Ti, ___ ___
		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, Sn, Ti, ___ ___
		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, Sn, Ti, ___ ___
		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, Sn, Ti, ___ ___
		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, Sn, Ti, ___ ___
ICP-MS		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
GFAA		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti,

Comments: Mercury by CVAA if performed

LDC #: 35266C4a

VALIDATION FINDINGS WORKSHEET
Technical Holding Times

Reviewer: A
2nd reviewer: mH

Were samples preserved? Y N N/A
All circled dates have exceeded the technical holding time.

METHOD:		(7471A) Mercury Holding time = 28 days					
Sample ID:	Sampling Date	Analysis Date	Total Time until Analysis (days)	Qualifier	Det/ND		
All	12/9/14	12/15/15	371	J/R/P	Det		

Technical Holding Time Criteria

Mercury: 28 days
All other metals: 2 years if frozen

LDC #: 36266C4a

VALIDATION FINDINGS WORKSHEET
PB/ICB/CCB QUALIFIED SAMPLES

Reviewer: CA
2nd Reviewer: 9m 6

METHOD: Trace metals (EPA SW 864 Method 6010B/6020/7000) Soil preparation factor applied: ____
Sample Concentration units, unless otherwise noted: mg/Kg Associated Samples: All

				Sample Identification										
Analyte	**Maximum PB[a] (mg/Kg)**	**Maximum ICB/CCB[a] (ug/L)**	**Action Level**	**2**										
Sb	0.050		0.25	0.047										
Pb	0.010		0.05											
Tl	0.010		0.05											

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 #: 36266C4a

VALIDATION FINDINGS WORKSHEET
Matrix Spike

Page: 1 of 1
Reviewer: CA
2nd Reviewer: mb

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.

LEVEL IV ONLY:

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

#	MS ID	Matrix	Analyte	MS %Recovery	Associated Samples	Qualifications
	EMW-21D-15-15.4MS	s	Sb	7.6	All	J/UJ/A (ND/Det)*
			Be	129		Jdet/A (Det)
			Cr	40.9		J/UJ/A (Det)
			Tl	132		Jdet/A (Det)

Comments: 4: As, Cu >4x *4PS: Sb = 88%

LDC #: 36266C4a

VALIDATION FINDINGS WORKSHEET
Duplicate Analysis

Page: 1 of 1
Reviewer: a
2nd Reviewer: amA

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 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 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.

#	Date	Duplicate ID	Matrix	Analyte	RPD (Limits)	Difference (Limits)	Associated Samples	Qualifications
		EMW-21D-15-15.4DUP	s	Cd	72.7		All	J/UJ/A (Det)
				Cu	22.5			J/UJ/A (Det)
				Zn	35.0			J/UJ/A (Det)

Comments: _____

36266C4a.wpd

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: DeNovo 8th Avenue

LDC Report Date: May 10, 2016

Parameters: Total Solids

Validation Level: Stage 2B

Laboratory: Analytical Resources, Inc.

Sample Delivery Group (SDG): ARZ6

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
EB-06-12-14	ARZ6A	Soil	12/09/14
EB-06-15-17	ARZ6B	Soil	12/09/14
EB-34-3.5-5	ARZ6C	Soil	12/09/14
EB-34-8-10	ARZ6D	Soil	12/09/14
EB-34-11-13	ARZ6E	Soil	12/09/14
EB-34-15-17	ARZ6F	Soil	12/09/14
EB-34-18.5-20	ARZ6G	Soil	12/09/14
EB-35-2-4	ARZ6H	Soil	12/09/14
EB-25-2-4	ARZ6I	Soil	12/02/14
EB-25-5.5-7.5	ARZ6J	Soil	12/02/14
EB-25-10.5-12.5	ARZ6K	Soil	12/02/14
EB-22-2-4	ARZ6L	Soil	12/03/14
EB-22-6-8	ARZ6M	Soil	12/03/14
EB-22-8-10	ARZ6N	Soil	12/03/14
EB-22-11-13	ARZ6O	Soil	12/03/14
EB-22-15-17	ARZ6P	Soil	12/03/14
EB-12-2-4	ARZ6Q	Soil	12/04/14
EB-12-5-7	ARZ6R	Soil	12/04/14
EB-12-8-10	ARZ6S	Soil	12/04/14
EB-12-15-17	ARZ6T	Soil	12/04/14
EB-12-15-17DUP	ARZ6TDUP	Soil	12/04/14
EB-12-15-17TRP	ARZ6TTRP	Soil	12/04/14

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Final Quality Assurance Project Plan, Remedial Investigation, Crowley Marine Services 8th Avenue S. Site, Seattle, Washington (October 2012) and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines (CLPNFG) for Inorganic Superfund Data Review (January 2010). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Total Solids by Standard Method 2540G

All sample results were subjected to Stage 2B data validation, which comprises an evaluation of quality control (QC) summary results.

The following are definitions of the data qualifiers utilized during data validation:

J (Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.

U (Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

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.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition.

All technical holding time requirements for frozen samples were met.

II. Initial Calibration

All criteria for the initial calibration were met.

III. Continuing Calibration

Continuing calibration frequency and analysis criteria were met.

IV. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks.

V. Field Blanks

No field blanks were identified in this SDG.

VI. Matrix Spike/Matrix Spike Duplicates

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

VII. Triplicate Sample Analysis

Duplicate (DUP) and triplicate (TRP) sample analyses were performed on an associated project sample. Results were within QC limits.

VIII. Laboratory Control Samples

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

IX. Field Duplicates

No field duplicates were identified in this SDG.

X. Sample Result Verification

Raw data were not reviewed for Stage 2B validation.

XI. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

The quality control criteria reviewed were met and are considered acceptable. Based upon the data validation all results are considered valid and usable for all purposes.

DeNovo 8th Avenue
Total Solids - Data Qualification Summary - SDG ARZ6

No Sample Data Qualified in this SDG

DeNovo 8th Avenue
Total Solids - Laboratory Blank Data Qualification Summary - SDG ARZ6

No Sample Data Qualified in this SDG

LDC #: 36266C6 **VALIDATION COMPLETENESS WORKSHEET** Date: 5/5/16
SDG #: ARZ6 Stage 2B Page: 1 of 2
Laboratory: Analytical Resources, Inc. Reviewer: a
2nd Reviewer: gmg

METHOD: (Analyte) Total Solids (SM2540G)

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.	Sample receipt/Technical holding times	A/A	Frozen - no HT
II	Initial calibration	A	
III.	Calibration verification	A	
IV	Laboratory Blanks	A	
V	Field blanks	N	
VI.	Matrix Spike/Matrix Spike Duplicates	N	not required
VII.	~~Triplicate~~ Duplicate sample analysis	A	IRP
VIII.	Laboratory control samples	N	not required
IX.	Field duplicates	N	
X.	Sample result verification	N	
XI	Overall assessment of data	A	

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; SB=Source blank; OTHER:

	Client ID	Lab ID	Matrix	Date
1	EB-06-12-14	ARZ6A	Soil	12/09/14
2	EB-06-15-17	ARZ6B	Soil	12/09/14
3	EB-34-3.5-5	ARZ6C	Soil	12/09/14
4	EB-34-8-10	ARZ6D	Soil	12/09/14
5	EB-34-11-13	ARZ6E	Soil	12/09/14
6	EB-34-15-17	ARZ6F	Soil	12/09/14
7	EB-34-18.5-20	ARZ6G	Soil	12/09/14
8	EB-35-2-4	ARZ6H	Soil	12/09/14
9	EB-25-2-4	ARZ6I	Soil	12/02/14
10	EB-25-5.5-7.5	ARZ6J	Soil	12/02/14
11	EB-25-10.5-12.5	ARZ6K	Soil	12/02/14
12	EB-22-2-4	ARZ6L	Soil	12/03/14
13	EB-22-6-8	ARZ6M	Soil	12/03/14
14	EB-22-8-10	ARZ6N	Soil	12/03/14
15	EB-22-11-13	ARZ6O	Soil	12/03/14
16	EB-22-15-17	ARZ6P	Soil	12/03/14
17	EB-12-2-4	ARZ6Q	Soil	12/04/14

LDC #: 36266C6 **VALIDATION COMPLETENESS WORKSHEET** Date: 5/5/16
SDG #: ARZ6 Stage 2B Page: 2 of 2
Laboratory: Analytical Resources, Inc. Reviewer: a
2nd Reviewer: gm

METHOD: (Analyte) Total Solids (SM2540G)

	Client ID	Lab ID	Matrix	Date
18	EB-12-5-7	ARZ6R	Soil	12/04/14
19	EB-12-8-10	ARZ6S	Soil	12/04/14
20	EB-12-15-17	ARZ6T	Soil	12/04/14
21	EB-12-15-17DUP	ARZ6TDUP	Soil	12/04/14
22	↓ TRP	↓ TRP	↓	↓
23				
24				
25				
26				

Notes:

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: DeNovo 8th Avenue

LDC Report Date: May 9, 2016

Parameters: Total Petroleum Hydrocarbons as Extractables

Validation Level: Stage 2B

Laboratory: Analytical Resources, Inc.

Sample Delivery Group (SDG): ARZ6

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
EB-34-8-10	ARZ6D	Soil	12/09/14
EB-34-11-13	ARZ6E	Soil	12/09/14
EB-34-15-17	ARZ6F	Soil	12/09/14
EB-12-5-7	ARZ6R	Soil	12/04/14
EB-34-8-10MS	ARZ6DMS	Soil	12/09/14
EB-34-8-10MSD	ARZ6DMSD	Soil	12/09/14

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Final Quality Assurance Project Plan, Remedial Investigation, Crowley Marine Services 8th Avenue S. Site, Seattle, Washington (October 2012) and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines (CLPNFG) for Superfund Organic Methods Data Review (June 2008). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Total Petroleum Hydrocarbons (TPH) as Extractables by NWTPH-Dx

All sample results were subjected to Stage 2B data validation, which comprises an evaluation of quality control (QC) summary results.

The following are definitions of the data qualifiers utilized during data validation:

J (Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.

U (Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered not detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

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.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition.

Cooler temperatures for samples in this SDG were reported at 11.6°C, 8.1°C, and 10.1°C upon receipt by the laboratory. Since the samples were received the same day that they were collected, time did not allow for sufficient cooling of the samples, therefore no data were qualified.

All technical holding time requirements for frozen samples were met with the following exceptions:

Sample	Compound	Total Time From Sample Collection Until Extraction	Required Holding Time From Sample Collection Until Extraction	Flag	A or P
EB-12-5-7	TPH as extractables	1 year 13 days	1 year	J (all detects)	P

II. Initial Calibration and Initial Calibration Verification

An initial calibration was performed as required by the method.

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

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 15.0% for all compounds with the following exceptions:

Date	Compound	%D	Associated Samples	Flag	A or P
11/24/15	Motor oil	19.28	All samples in SDG ARZ6	J (all detects)	A

III. Continuing Calibration

Continuing calibration was performed at the required frequencies.

The percent differences (%D) were less than or equal to 15.0% for all compounds.

IV. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks.

V. Field Blanks

No field blanks were identified in this SDG.

VI. Surrogates

Surrogates were added to all samples 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) sample analysis was performed on an associated project sample. For EB-34-8-10MS/MSD, no data were qualified for percent recoveries (%R) outside the QC limits since the MS/MSD was analyzed at greater than or equal to a 5X dilution. Relative percent differences (RPD) were within QC limits.

VIII. Laboratory Control Samples

Laboratory control samples (LCS) were analyzed as required by the method. Percent recoveries (%R) were within QC limits.

IX. Field Duplicates

No field duplicates were identified in this SDG.

X. Compound Quantitation

Raw data were not reviewed for Stage 2B validation.

XI. Target Compound Identifications

Raw data were not reviewed for Stage 2B validation.

XII. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

Due to holding time exceedance and ICV %D, data were qualified as estimated in four samples.

The quality control criteria reviewed, other than those discussed above, were met and are considered acceptable. Sample results that were found to be estimated (J) are usable for limited purposes only. Based upon the data validation all other results are considered valid and usable for all purposes.

DeNovo 8th Avenue
Total Petroleum Hydrocarbons as Extractables - Data Qualification Summary - SDG ARZ6

Sample	Compound	Flag	A or P	Reason
EB-12-5-7	TPH as extractables	J (all detects)	P	Technical holding time
EB-34-8-10 EB-34-11-13 EB-34-15-17 EB-12-5-7	Motor oil	J (all detects)	A	Initial calibration verification (%D)

DeNovo 8th Avenue
Total Petroleum Hydrocarbons as Extractables - Laboratory Blank Data Qualification Summary - SDG ARZ6

No Sample Data Qualified in this SDG

LDC #: 36266C8 **VALIDATION COMPLETENESS WORKSHEET** Date: 5/4/16
SDG #: ARZ6 Stage 2B Page: 1 of 1
Laboratory: Analytical Resources, Inc. Reviewer:
2nd Reviewer:

METHOD: GC TPH as Extractables (NWTPH-Dx)

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

cooler temp = 11.6, 8.1, 10.1 (1-3, 5, 6)

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A SW	
II.	Initial calibration/ICV	A SW	%RSD ≤ 20 ICV ≤ 15
III.	Continuing calibration	A	CCV ≤ 15
IV.	Laboratory Blanks	A	
V.	Field blanks	N	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	SW	
VIII.	Laboratory control samples	A	LCS
IX.	Field duplicates	N	
X.	Compound quantitation RL/LOQ/LODs	N	
XI.	Target compound identification	N	
XII.	Overall assessment of data	A	

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; SB=Source blank; OTHER:

	Client ID	Lab ID	Matrix	Date
1	EB-34-8-10	ARZ6-D	Soil	12/09/14
2	EB-34-11-13	ARZ6-E	Soil	12/09/14
3	EB-34-15-17	ARZ6-F	Soil	12/09/14
4	EB-12-5-7	ARZ6-R	Soil	12/04/14
5	EB-34-8-10MS	ARZ6-DMS	Soil	12/09/14
6	EB-34-8-10MSD	ARZ6-DMSD	Soil	12/09/14
7				
8				
9				
10				
11				
12				

Notes:

1	MB-121715						
2	MB-120915						

LDC #: 36266C ✓

VALIDATION FINDINGS WORKSHEET
Technical Holding Times

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

All circled dates have exceeded the technical holding times.
Y / N N/A Were all cooler temperatures within validation criteria?

METHOD : ✓ GC ___ HPLC

Sample ID	Matrix	Preserved	Sampling Date	Extraction date	Analysis date	Total # of Days	Qualifier
4	SOIL	Frozen	12/4/14	12/17/15	12/18/15	1 yr + 13 days	J/UJ/P Det
Frozen sample holding time = 1 yr from date of sampling							

TECHNICAL HOLDING TIME CRITERIA

VOLATILES:	Water unpreserved:	Aromatic within 7 days, non-aromatic within 14 days of sample collection.
	Water preserved:	Both within 14 days of sample collection.
	Soils:	Both within 14 days of sample collection.
	Encores unpreserved:	Both within 48 hours of sample collection.
	Encores preserved:	Both within 14 days of sample collection.
EXTRACTABLES:		
	Water:	Extracted within 7 days, analyzed within 40 days.
	Soil:	Extracted within 14 days, analyzed within 40 days.

LDC #: 36266C8

VALIDATION FINDINGS WORKSHEET
Initial Calibration Verification

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

METHOD: ___ GC ___ HPLC

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".
What type of initial calibration verification calculation was performed? ___%D or ___%R
Y N N/A Was an initial calibration verification standard analyzed after each ICAL for each instrument?
Y N N/A Did the initial calibration verification standards meet the %D / %R validation criteria of ~~≤20.0% / 80-120%~~? 15%

#	Date	Standard ID	Detector/ Column	Compound	%D (Limit ≤ ~~20.0~~ 15)	Associated Samples	Qualifications
+	11/24/15 15:26	ICV		Motor Oil	19.28	All	Jdet/A all Det

LDC #: 36266C8

VALIDATION FINDINGS WORKSHEET

Matrix Spike/Matrix Spike Duplicates

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

METHOD: ✓ GC __ HPLC

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

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

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

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

#	MS/MSD ID	Compound	MS %R (Limits)	MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
	5+6	Diesel	%R (outside	limit)	( )	#1	no qual 10×DL
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
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			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: DeNovo 8th Avenue

LDC Report Date: May 9, 2016

Parameters: Polychlorinated Dioxins/Dibenzofurans

Validation Level: Stage 4

Laboratory: Analytical Resources, Inc.

Sample Delivery Group (SDG): ARZ6

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
EB-34-3.5-5	ARZ6C	Soil	12/09/14
EB-25-2-4	ARZ6I	Soil	12/02/14
EB-25-5.5-7.5	ARZ6J	Soil	12/02/14
EB-25-10.5-12.5	ARZ6K	Soil	12/02/14
EB-22-2-4	ARZ6L	Soil	12/03/14
EB-22-6-8	ARZ6M	Soil	12/03/14
EB-22-8-10	ARZ6N	Soil	12/03/14
EB-22-11-13	ARZ6O	Soil	12/03/14
EB-22-15-17	ARZ6P	Soil	12/03/14
EB-12-8-10	ARZ6S	Soil	12/04/14

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Final Quality Assurance Project Plan, Remedial Investigation, Crowley Marine Services 8th Avenue S. Site, Seattle, Washington (October 2012) and the USEPA Contract Laboratory Program (CLP) National Functional Guidelines for Chlorinated Dibenzo-p-Dioxins (CDDs) and Chlorinated Dibenzofurans (CDFs) Data Review (September 2011). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Polychlorinated Dioxins/Dibenzofurans by Environmental Protection Agency (EPA) Method 1613B

All sample results were subjected to Stage 4 data validation, which is comprised of the quality control (QC) summary forms as well as the raw data, to confirm sample quantitation and identification.

The following are definitions of the data qualifiers utilized during data validation:

J (Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.

U (Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered not detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

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.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition.

Cooler temperatures for samples in this SDG were reported at 8.1°C upon receipt by the laboratory. Since the samples were received the same day that they were collected, time did not allow for sufficient cooling of the samples, therefore no data were qualified.

All technical holding time requirements for frozen samples were met.

II. HRGC/HRMS Instrument Performance Check

Instrument performance was checked at the required 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%.

The static resolving power was at least 10,000 (10% valley definition).

III. Initial Calibration and Initial Calibration Verification

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

The percent relative standard deviations (%RSD) were less than or equal to 20.0% for unlabeled compounds and less than or equal to 35.0% for labeled compounds.

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

The minimum S/N ratio was greater than or equal to 10 for each unlabeled compound and labeled compound.

The percent differences (%D) of the initial calibration verification (ICV) standard were within the QC limits for unlabeled compounds and labeled compounds with the following exceptions:

Date	Compound	Concentration (Limits)	Associated Samples	Affected Compound	Flag	A or P
10/15/15	1,2,3,4,7,8-HxCDF	56.905 pg (45-56)	EB-34-3.5-5 EB-25-2-4 EB-25-5.5-7.5 EB-22-2-4 EB-12-8-10	1,2,3,4,7,8-HxCDF Total HxCDF	J (all detects) J (all detects)	P
10/15/15	1,2,3,4,7,8-HxCDF	56.905 pg (45-56)	EB-25-10.5-12.5 EB-22-6-8 EB-22-8-10 EB-22-11-13 EB-22-15-17	1,2,3,4,7,8-HxCDF	NA	-

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

All of the continuing calibration results were within the QC limits for unlabeled compounds and labeled compounds.

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

The minimum S/N ratio was greater than or equal to 10 for each unlabeled compound and labeled compound.

V. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks with the following exceptions:

Blank ID	Extraction Date	Compound	Concentration	Associated Samples
MB-020216	02/02/16	1,2,3,7,8-PeCDF	0.0400 pg/g	All samples in SDG ARZ6
		1,2,3,4,7,8-HxCDF	0.0560 pg/g	
		1,2,3,6,7,8-HxCDF	0.0360 pg/g	
		1,2,3,7,8,9-HxCDF	0.0580 pg/g	
		1,2,3,6,7,8-HxCDD	0.0440 pg/g	
		1,2,3,7,8,9-HxCDD	0.108 pg/g	
		1,2,3,4,6,7,8-HpCDF	0.268 pg/g	
		1,2,3,4,7,8,9-HpCDF	0.0320 pg/g	
		1,2,3,4,6,7,8-HpCDD	1.42 pg/g	
		OCDF	1.11 pg/g	
		OCDD	16.3 pg/g	
		Total TCDD	0.193 pg/g	
		Total PeCDD	0.303 pg/g	
		Total HxCDD	0.921 pg/g	
		Total HpCDD	3.18 pg/g	
		Total PeCDF	0.0406 pg/g	
		Total HxCDF	0.151 pg/g	
		Total HpCDF	0.631 pg/g	

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

Sample	Compound	Reported Concentration	Modified Final Concentration
EB-25-2-4	1,2,3,4,7,8-HxCDF	0.0279 pg/g	0.0279U pg/g
	1,2,3,7,8,9-HxCDF	0.0398 pg/g	0.0398U pg/g
	1,2,3,4,6,7,8-HpCDF	0.165 pg/g	0.165U pg/g
	1,2,3,4,6,7,8-HpCDD	1.49 pg/g	1.49U pg/g
	OCDF	0.452 pg/g	0.452U pg/g
	OCDD	12.7 pg/g	12.7U pg/g
	Total TCDD	0.560 pg/g	0.560J pg/g
	Total HxCDD	0.626 pg/g	0.626J pg/g
	Total HpCDD	3.41 pg/g	3.41J pg/g
	Total PeCDF	0.0594 pg/g	0.0594J pg/g
	Total HxCDF	0.281 pg/g	0.281J pg/g
	Total HpCDF	0.396 pg/g	0.396J pg/g
EB-25-5.5-7.5	1,2,3,4,7,8-HxCDF	0.0278 pg/g	0.0278U pg/g
	1,2,3,7,8,9-HxCDD	0.0775 pg/g	0.0775U pg/g
	1,2,3,4,6,7,8-HpCDF	0.155 pg/g	0.155U pg/g
	1,2,3,4,6,7,8-HpCDD	1.52 pg/g	1.52U pg/g
	OCDF	0.437 pg/g	0.437U pg/g
	OCDD	13.4 pg/g	13.4U pg/g
	Total TCDD	0.249 pg/g	0.249J pg/g
	Total PeCDD	0.153 pg/g	0.153J pg/g
	Total HxCDD	1.25 pg/g	1.25J pg/g
	Total HpCDD	4.41 pg/g	4.41J pg/g
	Total HxCDF	0.0993 pg/g	0.0993J pg/g
	Total HpCDF	0.363 pg/g	0.363J pg/g
EB-25-10.5-12.5	1,2,3,7,8-PeCDF	0.0677 pg/g	0.0677U pg/g
	1,2,3,7,8,9-HxCDF	0.0863 pg/g	0.0863U pg/g
	1,2,3,7,8,9-HxCDD	0.364 pg/g	0.364U pg/g
	1,2,3,4,6,7,8-HpCDF	0.201 pg/g	0.201U pg/g
	1,2,3,4,6,7,8-HpCDD	4.55 pg/g	4.55U pg/g
	OCDF	0.679 pg/g	0.679U pg/g
	OCDD	38.3 pg/g	38.3U pg/g
	Total PeCDD	1.20 pg/g	1.20J pg/g
	Total HxCDD	4.53 pg/g	4.53J pg/g
	Total HpCDD	13.0 pg/g	13.0J pg/g
	Total PeCDF	0.103 pg/g	0.103J pg/g
	Total HxCDF	0.0859 pg/g	0.0859J pg/g
	Total HpCDF	0.433 pg/g	0.433J pg/g
EB-22-2-4	1,2,3,6,7,8-HxCDF	0.178 pg/g	0.178U pg/g
	1,2,3,7,8,9-HxCDF	0.113 pg/g	0.113U pg/g
	1,2,3,7,8,9-HxCDD	0.526 pg/g	0.526U pg/g
	OCDF	2.90 pg/g	2.90U pg/g
EB-22-6-8	1,2,3,7,8-PeCDF	0.0378 pg/g	0.0378U pg/g
	1,2,3,7,8,9-HxCDF	0.0757 pg/g	0.0757U pg/g
	1,2,3,6,7,8-HxCDD	0.0697 pg/g	0.0697U pg/g
	1,2,3,7,8,9-HxCDD	0.183 pg/g	0.183U pg/g
	1,2,3,4,6,7,8-HpCDF	0.0956 pg/g	0.0956U pg/g
	1,2,3,4,6,7,8-HpCDD	1.48 pg/g	1.48U pg/g
	OCDF	0.251 pg/g	0.251U pg/g
	OCDD	11.9 pg/g	11.9U pg/g
	Total TCDD	0.495 pg/g	0.495J pg/g
	Total PeCDD	0.687 pg/g	0.687J pg/g
	Total HxCDD	2.01 pg/g	2.01J pg/g
	Total HpCDD	3.82 pg/g	3.82J pg/g
	Total PeCDF	0.0758 pg/g	0.0758J pg/g
	Total HxCDF	0.105 pg/g	0.105J pg/g
	Total HpCDF	0.195 pg/g	0.195J pg/g

Sample	Compound	Reported Concentration	Modified Final Concentration
EB-22-8-10	1,2,3,7,8-PeCDF	0.0377 pg/g	0.0377U pg/g
	1,2,3,6,7,8-HxCDF	0.0178 pg/g	0.0178U pg/g
	1,2,3,7,8,9-HxCDF	0.0476 pg/g	0.0476U pg/g
	1,2,3,6,7,8-HxCDD	0.0813 pg/g	0.0813U pg/g
	1,2,3,7,8,9-HxCDD	0.139 pg/g	0.139U pg/g
	1,2,3,4,6,7,8-HpCDF	0.0872 pg/g	0.0872U pg/g
	1,2,3,4,6,7,8-HpCDD	1.01 pg/g	1.01U pg/g
	OCDF	0.448 pg/g	0.448U pg/g
	OCDD	9.69 pg/g	9.69U pg/g
	Total TCDD	0.350 pg/g	0.350J pg/g
	Total PeCDD	0.0916 pg/g	0.0916J pg/g
	Total HxCDD	0.992 pg/g	0.992J pg/g
	Total HpCDD	2.36 pg/g	2.36J pg/g
	Total PeCDF	0.0381 pg/g	0.0381J pg/g
	Total HxCDF	0.0654 pg/g	0.0654J pg/g
	Total HpCDF	0.227 pg/g	0.227J pg/g
EB-22-11-13	1,2,3,7,8-PeCDF	0.0648 pg/g	0.0648U pg/g
	1,2,3,7,8,9-HxCDF	0.0667 pg/g	0.0667U pg/g
	1,2,3,6,7,8-HxCDD	0.0805 pg/g	0.0805U pg/g
	1,2,3,7,8,9-HxCDD	0.161 pg/g	0.161U pg/g
	1,2,3,4,6,7,8-HpCDF	0.112 pg/g	0.112U pg/g
	1,2,3,4,6,7,8-HpCDD	1.72 pg/g	1.72U pg/g
	OCDF	0.387 pg/g	0.387U pg/g
	OCDD	13.5 pg/g	13.5U pg/g
	Total TCDD	0.821 pg/g	0.821J pg/g
	Total PeCDD	0.699 pg/g	0.699J pg/g
	Total HxCDD	2.11 pg/g	2.11J pg/g
	Total HpCDD	4.36 pg/g	4.36J pg/g
	Total PeCDF	0.130 pg/g	0.130J pg/g
	Total HxCDF	0.0661 pg/g	0.0661J pg/g
	Total HpCDF	0.201 pg/g	0.201J pg/g
EB-22-15-17	1,2,3,7,8,9-HxCDF	0.0511 pg/g	0.0511U pg/g
	1,2,3,7,8,9-HxCDD	0.0964 pg/g	0.0964U pg/g
	1,2,3,4,6,7,8-HpCDF	0.220 pg/g	0.220U pg/g
	1,2,3,4,6,7,8-HpCDD	1.79 pg/g	1.79U pg/g
	OCDF	0.586 pg/g	0.586U pg/g
	OCDD	15.1 pg/g	15.1U pg/g
	Total TCDD	0.451 pg/g	0.451J pg/g
	Total PeCDD	0.279 pg/g	0.279J pg/g
	Total HxCDD	1.44 pg/g	1.44J pg/g
	Total HpCDD	4.39 pg/g	4.39J pg/g
	Total HxCDF	0.0511 pg/g	0.0511J pg/g
	Total HpCDF	0.440 pg/g	0.440J pg/g

VI. Field Blanks

No field blanks were identified in this SDG.

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. Ongoing Precision Recovery

Ongoing precision recovery (OPR) samples were analyzed as required by the method. Percent recoveries (%R) were within QC limits.

IX. Field Duplicates

No field duplicates were identified in this SDG.

X. Internal Standards

All internal standard recoveries (%R) were within QC limits.

XI. Compound Quantitation

All compound quantitations were within validation criteria with the following exceptions:

Sample	Compound	Flag	A or P
All samples in SDG ARZ6	All compounds reported as estimated maximum possible concentration (EMPC).	J (all detects)	A

XII. Target Compound Identifications

All target compound identifications met validation criteria.

XIII. System Performance

The system performance was acceptable.

XIV. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

Due to ICV concentration and results reported by the laboratory as EMPCs data were qualified as estimated in ten samples.

Due to laboratory blank contamination, data were qualified as not detected or estimated in eight samples.

The quality control criteria reviewed, other than those discussed above, were met and are considered acceptable. Sample results that were found to be estimated (J) are usable for limited purposes only. Based upon the data validation all other results are considered valid and usable for all purposes.

DeNovo 8th Avenue
Polychlorinated Dioxins/Dibenzofurans - Data Qualification Summary - SDG ARZ6

Sample	Compound	Flag	A or P	Reason
EB-34-3.5-5 EB-25-2-4 EB-25-5.5-7.5 EB-22-2-4 EB-12-8-10	1,2,3,4,7,8-HxCDF Total HxCDF	J (all detects) J (all detects)	P	Initial calibration verification (concentration)
EB-34-3.5-5 EB-25-2-4 EB-25-5.5-7.5 EB-25-10.5-12.5 EB-22-2-4 EB-22-6-8 EB-22-8-10 EB-22-11-13 EB-22-15-17 EB-12-8-10	All compounds reported as estimated maximum possible concentration (EMPC).	J (all detects)	A	Compound quantitation (EMPC)

DeNovo 8th Avenue
Polychlorinated Dioxins/Dibenzofurans - Laboratory Blank Data Qualification Summary - SDG ARZ6

Sample	Compound	Modified Final Concentration	A or P
EB-25-2-4	1,2,3,4,7,8-HxCDF 1,2,3,7,8,9-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,6,7,8-HpCDD OCDF OCDD Total TCDD Total HxCDD Total HpCDD Total PeCDF Total HxCDF Total HpCDF	0.0279U pg/g 0.0398U pg/g 0.165U pg/g 1.49U pg/g 0.452U pg/g 12.7U pg/g 0.560J pg/g 0.626J pg/g 3.41J pg/g 0.0594J pg/g 0.281J pg/g 0.396J pg/g	A
EB-25-5.5-7.5	1,2,3,4,7,8-HxCDF 1,2,3,7,8,9-HxCDD 1,2,3,4,6,7,8-HpCDF 1,2,3,4,6,7,8-HpCDD OCDF OCDD Total TCDD Total PeCDD Total HxCDD Total HpCDD Total HxCDF Total HpCDF	0.0278U pg/g 0.0775U pg/g 0.155U pg/g 1.52U pg/g 0.437U pg/g 13.4U pg/g 0.249J pg/g 0.153J pg/g 1.25J pg/g 4.41J pg/g 0.0993J pg/g 0.363J pg/g	A

Sample	Compound	Modified Final Concentration	A or P
EB-25-10.5-12.5	1,2,3,7,8-PeCDF 1,2,3,7,8,9-HxCDF 1,2,3,7,8,9-HxCDD 1,2,3,4,6,7,8-HpCDF 1,2,3,4,6,7,8-HpCDD OCDF OCDD Total PeCDD Total HxCDD Total HpCDD Total PeCDF Total HxCDF Total HpCDF	0.0677U pg/g 0.0863U pg/g 0.364U pg/g 0.201U pg/g 4.55U pg/g 0.679U pg/g 38.3U pg/g 1.20J pg/g 4.53J pg/g 13.0J pg/g 0.103J pg/g 0.0859J pg/g 0.433J pg/g	A
EB-22-2-4	1,2,3,6,7,8-HxCDF 1,2,3,7,8,9-HxCDF 1,2,3,7,8,9-HxCDD OCDF	0.178U pg/g 0.113U pg/g 0.526U pg/g 2.90U pg/g	A
EB-22-6-8	1,2,3,7,8-PeCDF 1,2,3,7,8,9-HxCDF 1,2,3,6,7,8-HxCDD 1,2,3,7,8,9-HxCDD 1,2,3,4,6,7,8-HpCDF 1,2,3,4,6,7,8-HpCDD OCDF OCDD Total TCDD Total PeCDD Total HxCDD Total HpCDD Total PeCDF Total HxCDF Total HpCDF	0.0378U pg/g 0.0757U pg/g 0.0697U pg/g 0.183U pg/g 0.0956U pg/g 1.48U pg/g 0.251U pg/g 11.9U pg/g 0.495J pg/g 0.687J pg/g 2.01J pg/g 3.82J pg/g 0.0758J pg/g 0.105J pg/g 0.195J pg/g	A
EB-22-8-10	1,2,3,7,8-PeCDF 1,2,3,6,7,8-HxCDF 1,2,3,7,8,9-HxCDF 1,2,3,6,7,8-HxCDD 1,2,3,7,8,9-HxCDD 1,2,3,4,6,7,8-HpCDF 1,2,3,4,6,7,8-HpCDD OCDF OCDD Total TCDD Total PeCDD Total HxCDD Total HpCDD Total PeCDF Total HxCDF Total HpCDF	0.0377U pg/g 0.0178U pg/g 0.0476U pg/g 0.0813U pg/g 0.139U pg/g 0.0872U pg/g 1.01U pg/g 0.448U pg/g 9.69U pg/g 0.350J pg/g 0.0916J pg/g 0.992J pg/g 2.36J pg/g 0.0381J pg/g 0.0654J pg/g 0.227J pg/g	A

Sample	Compound	Modified Final Concentration	A or P
EB-22-11-13	1,2,3,7,8-PeCDF	0.0648U pg/g	A
	1,2,3,7,8,9-HxCDF	0.0667U pg/g	
	1,2,3,6,7,8-HxCDD	0.0805U pg/g	
	1,2,3,7,8,9-HxCDD	0.161U pg/g	
	1,2,3,4,6,7,8-HpCDF	0.112U pg/g	
	1,2,3,4,6,7,8-HpCDD	1.72U pg/g	
	OCDF	0.387U pg/g	
	OCDD	13.5U pg/g	
	Total TCDD	0.821J pg/g	
	Total PeCDD	0.699J pg/g	
	Total HxCDD	2.11J pg/g	
	Total HpCDD	4.36J pg/g	
	Total PeCDF	0.130J pg/g	
	Total HxCDF	0.0661J pg/g	
	Total HpCDF	0.201J pg/g	
EB-22-15-17	1,2,3,7,8,9-HxCDF	0.0511U pg/g	A
	1,2,3,7,8,9-HxCDD	0.0964U pg/g	
	1,2,3,4,6,7,8-HpCDF	0.220U pg/g	
	1,2,3,4,6,7,8-HpCDD	1.79U pg/g	
	OCDF	0.586U pg/g	
	OCDD	15.1U pg/g	
	Total TCDD	0.451J pg/g	
	Total PeCDD	0.279J pg/g	
	Total HxCDD	1.44J pg/g	
	Total HpCDD	4.39J pg/g	
	Total HxCDF	0.0511J pg/g	
	Total HpCDF	0.440J pg/g	

LDC #: 36266C21 **VALIDATION COMPLETENESS WORKSHEET** Date: 05/05/16
SDG #: ARZ6 Stage 4 Page: 1 of 2
Laboratory: Analytical Resources, Inc. Reviewer: YM
2nd Reviewer: [illegible]

METHOD: HRGC/HRMS Polychlorinated Dioxins/Dibenzofurans (EPA Method 1613B)

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.	Sample receipt/Technical holding times	A / A	(#1 received at 8.1°C)
II.	HRGC/HRMS Instrument performance check	A	
III.	Initial calibration/ICV	A / SW	≤20/35 ICV QC limits
IV.	Continuing calibration	A	QC limits
V.	Laboratory Blanks	SW	
VI.	Field blanks	N	
VII.	Matrix spike/Matrix spike duplicates	N	C-S.
VIII.	Laboratory control samples	A	OPR
IX.	Field duplicates	N	
X.	Internal standards	A	
XI.	Compound quantitation RL/~~LOQ/LODs~~	SW	
XII.	Target compound identification	A	
XIII.	System performance	A	
XIV.	Overall assessment of data	A	

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; SB=Source blank; OTHER:

	Client ID	Lab ID	Matrix	Date
1	EB-34-3.5-5	ARZ6-C	Soil	12/09/14
2	EB-25-2-4	ARZ6-I	Soil	12/02/14
3	EB-25-5.5-7.5	ARZ6-J	Soil	12/02/14
4	EB-25-10.5-12.5	ARZ6-K	Soil	12/02/14
5	EB-22-2-4	ARZ6-L	Soil	12/03/14
6	EB-22-6-8	ARZ6-M	Soil	12/03/14
7	EB-22-8-10	ARZ6-N	Soil	12/03/14
8	EB-22-11-13	ARZ6-O	Soil	12/03/14
9	EB-22-15-17	ARZ6-P	Soil	12/03/14
10	EB-12-8-10	ARZ6-S	Soil	12/04/14
11				
12				
13				
14				

LDC #: 36266C21 **VALIDATION COMPLETENESS WORKSHEET** Date: 05/05/16

SDG #: ARZ6 Stage 4 Page: 2 of 2

Laboratory: Analytical Resources, Inc. Reviewer:

2nd Reviewer:

METHOD: HRGC/HRMS Polychlorinated Dioxins/Dibenzofurans (EPA Method 1613B)

	Client ID	Lab ID	Matrix	Date
15				

Notes:

	MB-020216						

LDC #: 36266C21

VALIDATION FINDINGS CHECKLIST

Reviewer: SM
2nd Reviewer: AV

Method: HRGC/HRMS Dioxins/Dibenzofurans (EPA Method 1613B)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	✓			
Cooler temperature criteria was met.	✓			
II. GC/MS Instrument performance check				
Was PFK exact mass 380.9760 verified?	✓			
Were the retention time windows established for all homologues?	✓			
Was the chromatographic resolution between 2,3,7,8-TCDD and peaks representing any other unlabeled TCDD isomers ≤ 25% ?	✓			
Is the static resolving power at least 10,000 (10% valley definition)?	✓			
Was the mass resolution adequately check with PFK?	✓			
Was the presence of 1,2,8,9-TCDD and 1,3,4,6,8-PeCDF verified?	✓			
III. Initial calibration				
Was the initial calibration performed at 5 concentration levels?	✓			
Were all percent relative standard deviations (%RSD) ≤ 20% for unlabeled compounds and ≤ 35% for labeled compounds ?	✓			
Did all calibration standards meet the Ion Abundance Ratio criteria?	✓			
Was the signal to noise ratio for each target compound ≥ 2.5 and for each recovery and internal standard ≥ 10?	✓			
IV. Continuing calibration				
Was a routine calibration performed at the beginning and end of each 12 hour period?	✓			
Were all the concentrations for the unlabeled compounds and labeled compounds within the QC limits (Method 1613B, Table 6)?	✓			
Did all routine calibration standards meet the Ion Abundance Ratio criteria?	✓			
V. Blanks				
Was a method blank associated with every sample in this SDG?	✓			
Was a method blank performed for each matrix and concentration?	✓			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet?	✓			
VI. Matrix spike/Matrix spike duplicates				
Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.		✓		
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			✓	
VII. Laboratory control samples				
Was an LCS analyzed for this SDG?	✓			
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	✓			

LDC #: 36266C21

VALIDATION FINDINGS CHECKLIST

Reviewer:
2nd Reviewer:

Validation Area	Yes	No	NA	Findings/Comments
VIII. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?		✓		
Were the performance evaluation (PE) samples within the acceptance limits?			✓	
IX. Internal standards				
Were internal standard recoveries within the 25-150% criteria?	✓			
Was the minimum S/N ratio of all internal standard peaks ≥ 10?	✓			
X. Target compound identification				
For 2,3,7,8 substituted congeners with associated labeled standards, were the retention times of the two quantitation peaks within -1 to 3 sec. of the RT of the labeled standard?	✓			
For 2,3,7,8 substituted congeners without associated labeled standards, were the relative retention times of the two quantitation peaks within 0.005 time units of the RRT measured in the routine calibration?	✓			
For non-2,3,7,8 substituted congeners, were the retention times of the two quantitation peaks within RT established in the performance check solution?	✓			
Did compound spectra contain all characteristic ions listed in the table attached?	✓			
Was the Ion Abundance Ratio for the two quantitation ions within criteria?		✓		
Was the signal to noise ratio for each target compound and labeled standard ≥ 2.5?	✓			
Does the maximum intensity of each specified characteristic ion coincide within ± 2 seconds (includes labeled standards)?	✓			
For PCDF identification, was any signal (S/N ≥ 2.5, at ± seconds RT) detected in the corresponding PCDPE channel?		✓		
Was an acceptable lock mass recorded and monitored?	✓			
XI. Compound quantitation/CRQLs				
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the compound?	✓			
Were compound quantitation and CRQLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XII. System performance				
System performance was found to be acceptable.	✓			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			
XIV. Field duplicates				
Field duplicate pairs were identified in this SDG.		✓		
Target compounds were detected in the field duplicates.			✓	
XV. Field blanks				
Field blanks were identified in this SDG.		✓		
Target compounds were detected in the field blanks.			✓	

VALIDATION FINDINGS WORKSHEET

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA Method 1613B)

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 #: 36266C21

VALIDATION FINDINGS WORKSHEET
Initial Calibration Verification

Reviewer: 9m
2nd Reviewer: CL

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA Method 1613B)

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

Y N N/A Was an initial calibration verification standard analyzed after each ICAL for each instrument?

Y N N/A Were results within the QC limits for the method?

#	Date	Standard ID	Compound	Finding (Limit: pg)	Associated Samples	Qualifications
	10/15/15	15101510	K	56.905 (45-56)	all	Jdets/P (+X) (1-3,5,10=det)

LDC #: 36266C21

VALIDATION FINDINGS WORKSHEET
Blanks

Reviewer: SM
2nd Reviewer: AL

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA Method 1613B)

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: 02/02/16 **Blank analysis date:** 02/04/16
Conc. units: pg/g **Associated samples:** all

Compound	Blank ID	Sample Identification								
	MB-020216	5x	2	3	4	5	6	7	8	9
I	0.0400	0.200			0.0677* /U		0.0378 /U	0.0377* /U	0.0648 /U	
K	0.0560	0.280	0.0279* /U	0.0278 /U						
L	0.0360*	0.180				0.178* /U		0.0178* /U		
N	0.0580	0.290	0.0398 /U		0.0863* /U	0.113* /U	0.0757 /U	0.0476* /U	0.0667* /U	0.0511* /U
D	0.0440*	0.220					0.0697* /U	0.0813 /U	0.0805* /U	
E	0.108*	0.540		0.0775* /U	0.364 /U	0.526 /U	0.183 /U	0.139* /U	0.161 /U	0.0964* /U
O	0.268	1.34	0.165* /U	0.155* /U	0.201* /U		0.0956* /U	0.0872* /U	0.112* /U	0.220* /U
P	0.0320*	0.160								
F	1.42	7.10	1.49 /U	1.52* /U	4.55 /U		1.48 /U	1.01 /U	1.72 /U	1.79 /U
Q	1.11	5.55	0.452* /U	0.437 /U	0.679 /U	2.90 /U	0.251 /U	0.448* /U	0.387 /U	0.586 /U
G	16.3	81.5	12.7 /U	13.4 /U	38.3 /U		11.9 /U	9.69 /U	13.5 /U	15.1 /U
R	0.193*	0.965	0.560* /J	0.249 /J			0.495* /J	0.350 /J	0.821* /J	0.451* /J
S	0.303*	1.52		0.153* /J	1.20* /J		0.687* /J	0.0916* /J	0.699* /J	0.279* /J
T	0.921*	4.61	0.626* /J	1.25* /J	4.53* /J		2.01* /J	0.992* /J	2.11* /J	1.44* /J
U	3.18	15.9	3.41* /J	4.41* /J	13.0 /J		3.82 /J	2.36 /J	4.36* /J	4.39 /J
W	0.0406	0.203	0.0594* /J		0.103* /J		0.0758 /J	0.0381* /J	0.130* /J	
X	0.151*	0.755	0.281* /J	0.0993* /J	0.0859* /J		0.105 /J	0.0654* /J	0.0661* /J	0.0511* /J
Y	0.631*	3.16	0.396* /J	0.363* /J	0.433* /J		0.195* /J	0.227* /J	0.201* /J	0.440* /J

*EMPC

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 #: 36266c21

VALIDATION FINDINGS WORKSHEET
Compound Quantitation and Reported RLs

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

METHOD: GC/MS Dioxins/Dibenzofurans (Method 1613B)

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 RLs were adjusted to reflect all sample dilutions and dry weight factors (if necessary).

#	Date	Compound	Finding	Associated Samples	Qualifications
			EMPC results	all	Jdets/A

Comments: See sample calculation verification worksheet for recalculations

LDC #: 36246C21

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Reviewer: AW
2nd Reviewer: AL

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA Method 1613B)

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

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of compound,
C_x = Concentration of compound,
S = Standard deviation of the RRFs,

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Reported Average RRF (initial)	Recalculated Average RRF (initial)	Reported RRF (CS3 std)	Recalculated RRF (CS3 std)	Reported %RSD	Recalculated %RSD
1	1510153 ICAL	10/15/15	2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)	0.83	0.83	0.82	0.82	3.2	3.5
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)	1.02	1.02	0.98	0.98	6.1	6.2
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)	0.89	0.895	0.89	0.89	3.0	3.1
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)	0.96	0.96	0.99	0.99	4.7	5.0
			OCDF (^{13}C-OCDD)	1.02	1.02	1.04	1.04	8.4	8.4
2			2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)						
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)						
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)						
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)						
			OCDF (^{13}C-OCDD)						
3			2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)						
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)						
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)						
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)						
			OCDF (^{13}C-OCDD)						

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

LDC #: 36266C21

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

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

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA Method 1613B)

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

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
$RRF = (A_x)(C_{is})/(A_{is})(C_x)$

Where: ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
A_x = Area of compound, A_{is} = Area of associated internal standard
C_x = Concentration of compound, C_{is} = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Spiked Conc (ng/mL)	Reported Conc (ng/mL)	Recalculated Conc (ng/mL)	Reported %D	Recalculated %D
1	16020402	02/04/16	2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)	10.000	10.413	10.394	4.1	3.9
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)	10.000	10.130	10.118	1.3	1.2
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)	50.000	52.167	52.297	4.3	4.6
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)	50.000	52.434	52.423	4.9	4.8
			OCDF (^{13}C-OCDD)	100.000	107.558	107.631	7.6	7.6
2	16020902	02/09/16	2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)	10.000	10.314	10.283	3.1	2.8
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)	10.000	10.157	10.163	1.6	1.6
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)	50.000	52.232	52.295	4.5	4.6
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)	50.000	52.288	52.253	4.6	4.5
			OCDF (^{13}C-OCDD)	100.000	106.946	107.228	6.9	7.2
3			2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)					
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)					
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)					
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)					
			OCDF (^{13}C-OCDD)					

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

LDC #: 36266C21

VALIDATION FINDINGS WORKSHEET
Laboratory Control Sample Results Verification

Reviewer: ON
2nd Reviewer: CL

METHOD: GC/MS Dioxins/Dibenzofurans (EPA Method 1613B)

The percent recoveries (%R) and Relative Percent Difference (RPD) of the laboratoy control sample and laboratory control sample duplicate (if applicable) were recalculated for the compounds identified below using the following calculation:

% Recovery = 100 * SSC/SA Where: SSC = Spiked sample concentration
SA = Spike added

RPD = | LCS - LCSD | * 2/(LCS + LCSD) LCS = Laboraotry control sample percent recovery LCSD = Laboratory control sample duplicate percent recovery

LCS ID: OPR-020216

Compound	Spike Added (pg/g)		Spiked Sample Concentration (pg/g)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc	Reported	Recalc	Reported	Recalculated
2,3,7,8-TCDD	20.0	NA	23.6	NA	118	118				
1,2,3,7,8-PeCDD	100		112		112	112				
1,2,3,4,7,8-HxCDD	100		109		109	109				
1,2,3,4,7,8,9-HpCDF	100		116		116	116.5				
OCDF	200		224		112	112				

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

LDC #: 36266C31

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

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

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA Method 1613B)

Y N N/A Were all reported results recalculated and verified for all level IV samples?
Y N N/A Were all recalculated results for detected target compounds agree within 10.0% of the reported results?

Concentration = $\frac{(A_x)(I_s)(DF)}{(A_{is})(RRF)(V_o)(\%S)}$

A_x = Area of the characteristic ion (EICP) for the compound to be measured

A_{is} = Area of the characteristic ion (EICP) for the specific internal standard

I_s = Amount of internal standard added in nanograms (ng)

V_o = Volume or weight of sample extract in milliliters (ml) or grams (g).

RRF = Relative Response Factor (average) from the initial calibration

Df = Dilution Factor.

%S = Percent solids, applicable to soil and solid matrices only.

Example:

Sample I.D. 1, TCDF:

Conc. = $\frac{(5.69e3+)(7.24e3)(2000)(1)}{(1.74e5+2.24e5)(0.827)(14.10)(0.711)}$

= 7.83702488 ≈ 7.84 pg/g

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

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: DeNovo 8th Avenue

LDC Report Date: May 6, 2016

Parameters: Semivolatiles

Validation Level: Stage 2B

Laboratory: Analytical Resources, Inc.

Sample Delivery Group (SDG): ARZ8

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
EB-12-18-20	ARZ8A	Soil	12/04/14
EB-27-2.5-4.5	ARZ8B	Soil	12/04/14
EB-31-18-20	ARZ8C	Soil	12/04/14
EB-13-2-4	ARZ8J	Soil	12/05/14
EB-13-8-10	ARZ8K	Soil	12/05/14
EB-13-11-13	ARZ8L	Soil	12/05/14
EB-13-16-18	ARZ8M	Soil	12/05/14
EB-12-18-20MS	ARZ8AMS	Soil	12/04/14
EB-12-18-20MSD	ARZ8AMSD	Soil	12/04/14

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Final Quality Assurance Project Plan, Remedial Investigation, Crowley Marine Services 8th Avenue S. Site, Seattle, Washington (October 2012) and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines (CLPNFG) for Superfund Organic Methods Data Review (June 2008). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Semivolatile Organic Compounds (SVOCs) by Environmental Protection Agency (EPA) SW 846 Method 8270D

All sample results were subjected to Stage 2B data validation, which comprises an evaluation of quality control (QC) summary results.

The following are definitions of the data qualifiers utilized during data validation:

J (Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.

U (Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

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.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition.

Cooler temperatures for samples EB-13-2-4, EB-13-8-10, EB-13-11-13, and EB-13-16-18 were reported at 6.9°C and 8.4°C upon receipt by the laboratory. Since the samples were received the same day that they were collected, time did not allow for sufficient cooling of the samples, therefore no data were qualified.

All technical holding time requirements for frozen samples were met with the following exceptions:

Sample	Compound	Total Time From Sample Collection Until Extraction	Required Holding Time From Sample Collection Until Extraction	Flag	A or P
EB-12-18-20 EB-27-2.5-4.5 EB-31-18-20	All compounds	1 year 12 days	1 year	J (all detects) UJ (all non-detects)	P
EB-13-2-4 EB-13-8-10 EB-13-11-13 EB-13-16-18	All compounds	1 year 11 days	1 year	J (all detects) UJ (all non-detects)	P

II. GC/MS Instrument Performance Check

A decafluorotriphenylphosphine (DFTPP) tune was performed at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration and Initial Calibration Verification

An initial calibration was performed as required by the method.

For compounds where average relative response factors (RRFs) were utilized, percent relative standard deviations (%RSD) were less than or equal to 20.0%.

In the case where the laboratory used a calibration curve to evaluate the compounds, all coefficients of determination (r^2) were greater than or equal to 0.990.

Average relative response factors (RRF) for all compounds were within validation criteria.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 30.0% for all compounds with the following exceptions:

Date	Compound	%D	Associated Samples	Flag	A or P
12/15/15	2,4-Dinitrophenol	63.8	All samples in SDG ARZ8	UJ (all non-detects)	A
12/15/15	Fluorene	42.3	EB-27-2.5-4.5 EB-31-18-20	J (all detects)	A
12/15/15	Fluorene	42.3	EB-12-18-20 EB-13-2-4 EB-13-8-10 EB-13-11-13 EB-13-16-18	NA	-
12/15/15	3,3'-Dichlorobenzidine	45.6	All samples in SDG ARZ8	NA	-

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

The percent differences (%D) were less than or equal to 20.0% for all compounds with the following exceptions:

Date	Compound	%D	Associated Samples	Flag	A or P
12/28/15	Hexachlorocyclopentadiene 2-Nitroaniline 2,4-Dinitrophenol 4-Nitrophenol	32.4 20.6 36.4 31.7	All samples in SDG ARZ8	NA	-

All of the continuing calibration relative response factors (RRF) were within validation criteria.

V. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks.

VI. Field Blanks

No field blanks were identified in this SDG.

VII. Surrogates

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

VIII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Compound	MS (%R) (Limits)	MSD (%R) (Limits)	Flag	A or P
EB-12-18-20MS/MSD (EB-12-18-20)	4-Chloroaniline 3,3'-Dichlorobenzidine	0 (11-120) 0 (10-120)	2.9 (11-120) 0 (10-120)	R (all non-detects) R (all non-detects)	A
EB-12-18-20MS/MSD (EB-12-18-20)	3-Nitroaniline 4-Nitroaniline	17.1 (22-120) 22.5 (24-125)	18.4 (22-120) 10.6 (24-125)	UJ (all non-detects) UJ (all non-detects)	A

Relative percent differences (RPD) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Compound	RPD (Limits)	Flag	A or P
EB-12-18-20MS/MSD (EB-12-18-20)	4-Chloroaniline	200 (≤30)	NA	-

IX. Laboratory Control Samples

Laboratory control samples (LCS) were analyzed as required by the method. Percent recoveries (%R) were within QC limits.

X. Field Duplicates

No field duplicates were identified in this SDG.

XI. Internal Standards

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

XII. Compound Quantitation

Raw data were not reviewed for Stage 2B validation.

XIII. Target Compound Identifications

Raw data were not reviewed for Stage 2B validation.

XIV. System Performance

Raw data were not reviewed for Stage 2B validation.

XV. Overall Assessment of Data

The analysis was conducted within all specifications of the method.

Due to MS/MSD %R, data were rejected in one sample.

Due to holding time exceedance, ICV %D, and MS/MSD %R, data were qualified as estimated in seven samples.

The quality control criteria reviewed, other than those discussed above, were met and are considered acceptable. Sample results that were found to be rejected (R) are unusable for all purposes. Sample results that were found to be estimated (J) are usable for limited purposes only. Based upon the data validation all other results are considered valid and usable for all purposes.

DeNovo 8th Avenue
Semivolatiles - Data Qualification Summary - SDG ARZ8

Sample	Compound	Flag	A or P	Reason
EB-12-18-20 EB-27-2.5-4.5 EB-31-18-20 EB-13-2-4 EB-13-8-10 EB-13-11-13 EB-13-16-18	All compounds	J (all detects) UJ (all non-detects)	P	Technical holding time
EB-12-18-20 EB-27-2.5-4.5 EB-31-18-20 EB-13-2-4 EB-13-8-10 EB-13-11-13 EB-13-16-18	2,4-Dinitrophenol	UJ (all non-detects)	A	Initial calibration verification (%D)
EB-27-2.5-4.5 EB-31-18-20	Fluorene	J (all detects)	A	Initial calibration verification (%D)
EB-12-18-20	4-Chloroaniline 3,3'-Dichlorobenzidine	R (all non-detects) R (all non-detects)	A	Matrix spike/Matrix spike duplicate (%R)
EB-12-18-20	3-Nitroaniline 4-Nitroaniline	UJ (all non-detects) UJ (all non-detects)	A	Matrix spike/Matrix spike duplicate (%R)

DeNovo 8th Avenue
Semivolatiles - Laboratory Blank Data Qualification Summary - SDG ARZ8

No Sample Data Qualified in this SDG

LDC #: 36266D2a **VALIDATION COMPLETENESS WORKSHEET** Date: 5/5/16
SDG #: ARZ8 Stage 2B Page: 1 of 1
Laboratory: Analytical Resources, Inc. Reviewer:
2nd Reviewer:

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

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

cooler temp = 6.9 & 8.4 (4→7) not enough time to cool down

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A / SW	
II.	GC/MS Instrument performance check	A	
III.	Initial calibration/ICV	A / SW	% RSD ≤ 20, r² ICV ≤ 30
IV.	Continuing calibration	SW	CCV ≤ 20
V.	Laboratory Blanks	A	
VI.	Field blanks	N	
VII.	Surrogate spikes	A	
VIII.	Matrix spike/Matrix spike duplicates	SW	
IX.	Laboratory control samples	A	LCS
X.	Field duplicates	N	
XI.	Internal standards	A	
XII.	Compound quantitation RL/LOQ/LODs	N	
XIII.	Target compound identification	N	
XIV.	System performance	N	
XV.	Overall assessment of data	A	

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; SB=Source blank; OTHER:

	Client ID	Lab ID	Matrix	Date
1	EB-12-18-20	ARZ8A	Soil	12/04/14
2	EB-27-2.5-4.5	ARZ8B	Soil	12/04/14
3	EB-31-18-20	ARZ8C	Soil	12/04/14
4	EB-13-2-4	ARZ8J	Soil	12/05/14
5	EB-13-8-10	ARZ8K	Soil	12/05/14
6	EB-13-11-13	ARZ8L	Soil	12/05/14
7	EB-13-16-18	ARZ8M	Soil	12/05/14
8	EB-12-18-20MS	ARZ8AMS	Soil	12/04/14
9	EB-12-18-20MSD	ARZ8AMSD	Soil	12/04/14
10				
11				
12	MB 121615			
13				

VALIDATION FINDINGS WORKSHEET

METHOD: GC/MS SVOA

A. Phenol	AA. 2-Chloronaphthalene	AAA. Butylbenzylphthalate	AAAA. Dibenzothiophene	A1.
B. Bis (2-chloroethyl) ether	BB. 2-Nitroaniline	BBB. 3,3'-Dichlorobenzidine	BBBB. Benzo(a)fluoranthene	B1.
C. 2-Chlorophenol	CC. Dimethylphthalate	CCC. Benzo(a)anthracene	CCCC. Benzo(b)fluorene	C1.
D. 1,3-Dichlorobenzene	DD. Acenaphthylene	DDD. Chrysene	DDDD. cis/trans-Decalin	D1.
E. 1,4-Dichlorobenzene	EE. 2,6-Dinitrotoluene	EEE. Bis(2-ethylhexyl)phthalate	EEEE. Biphenyl	E1.
F. 1,2-Dichlorobenzene	FF. 3-Nitroaniline	FFF. Di-n-octylphthalate	FFFF. Retene	F1.
G. 2-Methylphenol	GG. Acenaphthene	GGG. Benzo(b)fluoranthene	GGGG. C30-Hopane	G1.
H. 2,2'-Oxybis(1-chloropropane)	HH. 2,4-Dinitrophenol	HHH. Benzo(k)fluoranthene	HHHH. 1-Methylphenanthrene	H1.
I. 4-Methylphenol	II. 4-Nitrophenol	III. Benzo(a)pyrene	IIII. 1,4-Dioxane	I1.
J. N-Nitroso-di-n-propylamine	JJ. Dibenzofuran	JJJ. Indeno(1,2,3-cd)pyrene	JJJJ. Acetophenone	J1.
K. Hexachloroethane	KK. 2,4-Dinitrotoluene	KKK. Dibenz(a,h)anthracene	KKKK. Atrazine	K1.
L. Nitrobenzene	LL. Diethylphthalate	LLL. Benzo(g,h,i)perylene	LLLL. Benzaldehyde	L1.
M. Isophorone	MM. 4-Chlorophenyl-phenyl ether	MMM. Bis(2-Chloroisopropyl)ether	MMMM. Caprolactam	M1.
N. 2-Nitrophenol	NN. Fluorene	NNN. Aniline	NNNN. 2,6-Dichlorophenol	N1.
O. 2,4-Dimethylphenol	OO. 4-Nitroaniline	OOO. N-Nitrosodimethylamine	OOOO. 2,6-Dinitrotoluene	O1.
P. Bis(2-chloroethoxy)methane	PP. 4,6-Dinitro-2-methylphenol	PPP. Benzoic Acid	PPPP. 3-Methylphenol	P1.
Q. 2,4-Dichlorophenol	QQ. N-Nitrosodiphenylamine	QQQ. Benzyl alcohol	QQQQ. 3&4 Methylphenol	Q1.
R. 1,2,4-Trichlorobenzene	RR. 4-Bromophenyl-phenylether	RRR. Pyridine	RRRR. 4-Dimethyldibenzothiphene (4MDT)	R1.
S. Naphthalene	SS. Hexachlorobenzene	SSS. Benzidine	SSSS. 2/3-Dimethyldibenzothiophene (4MDT)	S1.
T. 4-Chloroaniline	TT. Pentachlorophenol	TTT. 1-Methylnaphthalene	TTTT. 1-Methyldibenzothiophene (1MDT)	T1.
U. Hexachlorobutadiene	UU. Phenanthrene	UUU.Benzo(b)thiophene	UUUU.	U1.
V. 4-Chloro-3-methylphenol	VV. Anthracene	VVV.Benzonaphthothiophene	VVVV.	V1.
W. 2-Methylnaphthalene	WW. Carbazole	WWW.Benzo(e)pyrene	WWWW.	W1.
X. Hexachlorocyclopentadiene	XX. Di-n-butylphthalate	XXX. 2,6-Dimethylnaphthalene	XXXX.	X1.
Y. 2,4,6-Trichlorophenol	YY. Fluoranthene	YYY. 2,3,5-Trimethylnaphthalene	YYYY.	Y1.
Z. 2,4,5-Trichlorophenol	ZZ. Pyrene	ZZZ. Perylene	ZZZZ.	Z1.

LDC #: 36266D2a

VALIDATION FINDINGS WORKSHEET
Technical Holding Times

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

All circled dates have exceeded the technical holding times.
Y N N/A Were all cooler temperatures within validation criteria?

METHOD : GC/MA BNA SW846 METHOD 8270D

Sample ID	Matrix	Preserved	Sampling Date	Extraction date	Analysis date	Total # of Days	Qualifier
1→3, 8, 9	SOIL	Frozen	12/4/14	12/16/15	12/8/15	1yr + 12 days	J/UJ/P ND+Rt
4→7	SOIL	Frozen	12/5/14	↓	↓	1yr + 11 days	J/UJ/P ND+Rt
Frozen	Sample	holding time = 1 yr from sampling date					

TECHNICAL HOLDING TIME CRITERIA

Water: Extracted within 7 days, analyzed within 40 days.
Soil: Extracted within 14 days, analyzed within 40 days.

LDC #: 36266D2a

VALIDATION FINDINGS WORKSHEET
Initial Calibration Verification

Reviewer: FT
2nd Reviewer: a2

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

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

Y N N/A Was an initial calibration verification standard analyzed after each ICAL for each instrument?

Y N N/A Were all %D within the validation criteria of ≤30 %D ?

#	Date	Standard ID	Compound	Finding %D (Limit: ≤30.0%)	Associated Samples	Qualifications
-	12/15/15	ICV	HH	63.8	All	J/UJ/A (ND)
+			NN	42.3	↓	J/UJ/A 2, 3 (Det)
+			BBB	45.6	↓	↓ ND

LDC #: 36266D2a

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Page: 1 of 1
Reviewer: FT
2nd Reviewer: 02

METHOD: GC/MS BNA (EPA SW 846 Method 8270D)
Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y (N) N/A Was a continuing calibration standard analyzed at least once every 12 hours of sample analysis for each instrument?
Y (N) N/A Were percent differences (%D) and relative response factors (RRF) within method criteria for all CCC's and SPCC's ?
Y (N) N/A Were all %D and RRFs within the validation criteria of ≤20 %D and ≥0.05 RRF ?

#	Date	Standard ID	Compound	Finding %D (Limit: ≤20.0%)	Finding RRF (Limit: ≥0.05)	Associated Samples	Qualifications
+	12/28/15	CCV	X	32.4		All	J det/A all ND
+	1447		BB	20.6			
+			HH	36.4			
+			II	31.7			

LDC #: 36266D2a

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

Reviewer: FT
2nd Reviewer: [illegible]

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

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?

#	MS/MSD ID	Compound	MS %R (Limits)	MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
	8 + 9	T	0 (11-120)	2.9 (11-120)	( )	#1	J/UJ/A F7 all ND
		FF	17.1 (22-120)	18.4 (22-120)	( )		J/UJ/A
		θθ	22.5 (24-125)	10.6 (24-125)			↓
		BBB	0 (10-120)	0 (10-120)	( )		J/R/A
		T	( )	( )	200 (30)	↓	J dit/A
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
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			( )	( )	( )		

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: DeNovo 8th Avenue

LDC Report Date: May 6, 2016

Parameters: Semivolatiles

Validation Level: Stage 2B

Laboratory: Analytical Resources, Inc.

Sample Delivery Group (SDG): ARZ8

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
EB-12-18-20	ARZ8A	Soil	12/04/14
EB-27-2.5-4.5	ARZ8B	Soil	12/04/14
EB-31-18-20	ARZ8C	Soil	12/04/14
EB-13-2-4	ARZ8J	Soil	12/05/14
EB-13-8-10	ARZ8K	Soil	12/05/14
EB-13-11-13	ARZ8L	Soil	12/05/14
EB-13-16-18	ARZ8M	Soil	12/05/14
EB-12-18-20MS	ARZ8AMS	Soil	12/04/14
EB-12-18-20MSD	ARZ8AMSD	Soil	12/04/14

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Final Quality Assurance Project Plan, Remedial Investigation, Crowley Marine Services 8th Avenue S. Site, Seattle, Washington (October 2012) and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines (CLPNFG) for Superfund Organic Methods Data Review (June 2008). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Semivolatile Organic Compounds (SVOCs) by Environmental Protection Agency (EPA) SW 846 Method 8270D in Selected Ion Monitoring (SIM) mode

All sample results were subjected to Stage 2B data validation, which comprises an evaluation of quality control (QC) summary results.

The following are definitions of the data qualifiers utilized during data validation:

J (Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.

U (Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

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.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition.

Cooler temperatures for samples EB-13-2-4, EB-13-8-10, EB-13-11-13, and EB-13-16-18 were reported at 6.9°C and 8.4°C upon receipt by the laboratory. Since the samples were received the same day that they were collected, time did not allow for sufficient cooling of the samples, therefore no data were qualified.

All technical holding time requirements for frozen samples were met with the following exceptions:

Sample	Compound	Total Time From Sample Collection Until Extraction	Required Holding Time From Sample Collection Until Extraction	Flag	A or P
EB-12-18-20 EB-27-2.5-4.5 EB-31-18-20	All compounds	1 year 12 days	1 year	J (all detects) UJ (all non-detects)	P
EB-13-2-4 EB-13-8-10 EB-13-11-13 EB-13-16-18	All compounds	1 year 11 days	1 year	J (all detects) UJ (all non-detects)	P

II. GC/MS Instrument Performance Check

A decafluorotriphenylphosphine (DFTPP) tune was performed at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

An initial calibration was performed as required by the method.

For compounds where average relative response factors (RRFs) were utilized, percent relative standard deviations (%RSD) were less than or equal to 20.0%.

In the case where the laboratory used a calibration curve to evaluate the compounds, all coefficients of determination (r^2) were greater than or equal to 0.990.

Average relative response factors (RRF) for all compounds were within validation criteria.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

The percent differences (%D) were less than or equal to 20.0% for all compounds.

All of the continuing calibration relative response factors (RRF) were within validation criteria.

V. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks.

VI. Field Blanks

No field blanks were identified in this SDG.

VII. Surrogates

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

VIII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

IX. Laboratory Control Samples

Laboratory control samples (LCS) were analyzed as required by the method. Percent recoveries (%R) were within QC limits.

X. Field Duplicates

No field duplicates were identified in this SDG.

XI. Internal Standards

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

XII. Compound Quantitation

Raw data were not reviewed for Stage 2B validation.

XIII. Target Compound Identifications

Raw data were not reviewed for Stage 2B validation.

XIV. System Performance

Raw data were not reviewed for Stage 2B validation.

XV. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

Due to holding time exceedance, data were qualified as estimated in seven samples.

The quality control criteria reviewed, other than those discussed above, were met and are considered acceptable. Sample results that were found to be estimated (J) are usable for limited purposes only. Based upon the data validation all other results are considered valid and usable for all purposes.

DeNovo 8th Avenue
Semivolatiles - Data Qualification Summary - SDG ARZ8

Sample	Compound	Flag	A or P	Reason
EB-12-18-20 EB-27-2.5-4.5 EB-31-18-20 EB-13-2-4 EB-13-8-10 EB-13-11-13 EB-13-16-18	All compounds	J (all detects) UJ (all non-detects)	P	Technical holding time

DeNovo 8th Avenue
Semivolatiles - Laboratory Blank Data Qualification Summary - SDG ARZ8

No Sample Data Qualified in this SDG

LDC #: 36266D2b **VALIDATION COMPLETENESS WORKSHEET** Date: 5/5/16
SDG #: ARZ8 Stage 2B Page: 1 of 1
Laboratory: Analytical Resources, Inc. Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: GC/MS Semivolatiles (EPA SW 846 Method 8270D-SIM)

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

cooler temp = 6.9 + 8.4 (4→7) not enough time to cool down

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A SW	
II.	GC/MS Instrument performance check	A	
III.	Initial calibration~~/ICV~~	A/N	% RSD ≤ 20, r ≥
IV.	Continuing calibration	A	CCV ≤ 20
V.	Laboratory Blanks	A	
VI.	Field blanks	N	
VII.	Surrogate spikes	A	
VIII.	Matrix spike/Matrix spike duplicates	A	
IX.	Laboratory control samples	A	LCS
X.	Field duplicates	N	
XI.	Internal standards	A	
XII.	Compound quantitation RL/LOQ/LODs	N	
XIII.	Target compound identification	N	
XIV.	System performance	N	
XV.	Overall assessment of data	A	

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; SB=Source blank; OTHER:

	Client ID	Lab ID	Matrix	Date
1	EB-12-18-20	ARZ8A	Soil	12/04/14
2	EB-27-2.5-4.5	ARZ8B	Soil	12/04/14
3	EB-31-18-20	ARZ8C	Soil	12/04/14
4	EB-13-2-4	ARZ8J	Soil	12/05/14
5	EB-13-8-10	ARZ8K	Soil	12/05/14
6	EB-13-11-13	ARZ8L	Soil	12/05/14
7	EB-13-16-18	ARZ8M	Soil	12/05/14
8	EB-12-18-20MS	ARZ8AMS	Soil	12/04/14
9	EB-12-18-20MSD	ARZ8AMSD	Soil	12/04/14
10				
11	MB 121615			
12				
13				

LDC #: 36266D2b

VALIDATION FINDINGS WORKSHEET
Technical Holding Times

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

All circled dates have exceeded the technical holding times.
Y N N/A Were all cooler temperatures within validation criteria?

METHOD : GC/MA BNA SW846 METHOD 8270D

Sample ID	Matrix	Preserved	Sampling Date	Extraction date	Analysis date	Total # of Days	Qualifier
1-3, 8, 9	SOIL	FROZEN	12/4/14	12/16/15	12/28/15	1 yr + 12 days	J/UJ/P
4-7	↓	↓	12/5/15	12/16/15	↓	1 yr + 11 days	J/UJ/P
Frozen sample holding time = 1 yr from date of sampling							

TECHNICAL HOLDING TIME CRITERIA

Water: Extracted within 7 days, analyzed within 40 days.
Soil: Extracted within 14 days, analyzed within 40 days.

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: DeNovo 8th Avenue

LDC Report Date: May 6, 2016

Parameters: Polynuclear Aromatic Hydrocarbons

Validation Level: Stage 2B

Laboratory: Analytical Resources, Inc.

Sample Delivery Group (SDG): ARZ8

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
EB-20-2-4	ARZ8O	Soil	12/05/14
EB-20-5-7	ARZ8P	Soil	12/05/14
EB-20-8-10	ARZ8Q	Soil	12/05/14
EB-20-11-13	ARZ8R	Soil	12/05/14
EB-35-8.5-10	ARZ8T	Soil	12/09/14
EB-27-2.5-4.5	ARZ8U	Soil	12/04/14
EB-27-2.5-4.5DL	ARZ8UDL	Soil	12/04/14
EB-31-18-20	ARZ8V	Soil	12/04/14
EB-31-18-20DL	ARZ8VDL	Soil	12/04/14
EB-27-2.5-4.5MS	ARZ8UMS	Soil	12/04/14
EB-27-2.5-4.5MSD	ARZ8UMSD	Soil	12/04/14

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Final Quality Assurance Project Plan, Remedial Investigation, Crowley Marine Services 8th Avenue S. Site, Seattle, Washington (October 2012) and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines (CLPNFG) for Superfund Organic Methods Data Review (June 2008). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Polynuclear Aromatic Hydrocarbons (PAHs) by Environmental Protection Agency (EPA) SW 846 Method 8270D in Selected Ion Monitoring (SIM) mode

All sample results were subjected to Stage 2B data validation, which comprises an evaluation of quality control (QC) summary results.

The following are definitions of the data qualifiers utilized during data validation:

J (Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.

U (Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

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.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition.

Cooler temperatures for samples EB-20-2-4, EB-20-5-7, EB-20-8-10, and EB-20-11-13 were reported at 6.9°C and 8.4°C and for sample EB-35-8.5-10 were reported at 11.6°C, 8.1°C, and 10.1°C upon receipt by the laboratory. Since the samples were received the same day that they were collected, time did not allow for sufficient cooling of the samples, therefore no data were qualified.

All technical holding time requirements for frozen samples were met with the following exceptions:

Sample	Compound	Total Time From Sample Collection Until Extraction	Required Holding Time From Sample Collection Until Extraction	Flag	A or P
EB-20-2-4 EB-20-5-7 EB-20-8-10 EB-20-11-13	All compounds	1 year 10 days	1 year	J (all detects) UJ (all non-detects)	P
EB-35-8.5-10	All compounds	1 year 6 days	1 year	J (all detects) UJ (all non-detects)	P
EB-27-2.5-4.5 EB-27-2.5-4.5DL EB-31-18-20 EB-31-18-20DL	All compounds	1 year 11 days	1 year	J (all detects) UJ (all non-detects)	P

II. GC/MS Instrument Performance Check

A decafluorotriphenylphosphine (DFTPP) tune was performed at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration and Initial Calibration Verification

An initial calibration was performed as required by the method.

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

Average relative response factors (RRF) for all compounds were within validation criteria.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 30.0% for all compounds.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

The percent differences (%D) were less than or equal to 20.0% for all compounds.

All of the continuing calibration relative response factors (RRF) were within validation criteria.

V. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks.

VI. Field Blanks

No field blanks were identified in this SDG.

VII. Surrogates

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

VIII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Compound	MS (%R) (Limits)	MSD (%R) (Limits)	Flag	A or P
EB-27-2.5-4.5MS/MSD (EB-27-2.5-4.5 EB-27-2.5-4.5DL)	Naphthalene	31.0 (36-120)	33.2 (36-120)	J (all detects)	A
	2-Methylnaphthalene	31.2 (35-120)	-	J (all detects)	
	Fluorene	21.4 (41-120)	29.9 (41-120)	J (all detects)	
	Fluoranthene	-	12.8 (46-120)	J (all detects)	
	Pyrene	-	8.5 (49-120)	J (all detects)	
EB-27-2.5-4.5MS/MSD (EB-27-2.5-4.5 EB-27-2.5-4.5DL)	Chrysene	131 (48-120)	-	J (all detects)	A

Relative percent differences (RPD) were within QC limits.

IX. Laboratory Control Samples

Laboratory control samples (LCS) were analyzed as required by the method. Percent recoveries (%R) were within QC limits.

X. Field Duplicates

No field duplicates were identified in this SDG.

XI. Internal Standards

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

XII. Compound Quantitation

All compound quantitations met validation criteria with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
EB-27-2.5-4.5 EB-31-18-20	Anthracene	Sample result exceeded calibration range.	Reported result should be within calibration range.	J (all detects)	A

Raw data were not reviewed for Stage 2B validation.

XIII. Target Compound Identifications

Raw data were not reviewed for Stage 2B validation.

XIV. System Performance

Raw data were not reviewed for Stage 2B validation.

XV. Overall Assessment of Data

The analysis was conducted within all specifications of the method.

In the case where more than one result was reported for an individual sample, the least technically acceptable results were deemed unusable as follows:

Sample	Compound	Flag	A or P
EB-27-2.5-4.5 EB-31-18-20	Anthracene	R	A
EB-27-2.5-4.5DL EB-31-18-20DL	All compounds except Anthracene	R	A

Due to holding time exceedance and MS/MSD %R, data were qualified as estimated in seven samples.

The quality control criteria reviewed, other than those discussed above, were met and are considered acceptable. Sample results that were found to be rejected (R) are unusable for all purposes. Sample results that were found to be estimated (J) are usable for limited purposes only. Based upon the data validation all other results are considered valid and usable for all purposes.

DeNovo 8th Avenue
Polynuclear Aromatic Hydrocarbons - Data Qualification Summary - SDG ARZ8

Sample	Compound	Flag	A or P	Reason
EB-20-2-4 EB-20-5-7 EB-20-8-10 EB-20-11-13 EB-35-8.5-10	All compounds	J (all detects) UJ (all non-detects)	P	Technical holding time
EB-27-2.5-4.5 EB-31-18-20	All compounds except Anthracene	J (all detects) UJ (all non-detects)	P	Technical holding time
EB-27-2.5-4.5DL EB-31-18-20DL	Anthracene	J (all detects) UJ (all non-detects)	P	Technical holding time
EB-27-2.5-4.5	Naphthalene 2-Methylnaphthalene Fluorene Fluoranthene Pyrene Chrysene	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	A	Matrix spike/Matrix spike duplicate (%R)
EB-27-2.5-4.5 EB-31-18-20	Anthracene	R	A	Overall assessment of data
EB-27-2.5-4.5DL EB-31-18-20DL	All compounds except Anthracene	R	A	Overall assessment of data

DeNovo 8th Avenue
Polynuclear Aromatic Hydrocarbons - Laboratory Blank Data Qualification Summary - SDG ARZ8

No Sample Data Qualified in this SDG

LDC #: 36266D2c **VALIDATION COMPLETENESS WORKSHEET** Date: 5/5/16
SDG #: ARZ8 Stage 2B Page: 1 of 1
Laboratory: Analytical Resources, Inc. Reviewer: EJ
2nd Reviewer: AV

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

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

cooler temp = 6.9 +8.4 (1+4)
= 11.6, 8.1, 10.1 (5)

	Validation Area		Comments not enough time to cool down
I.	Sample receipt/Technical holding times	A SW	
II.	GC/MS Instrument performance check	A	
III.	Initial calibration/ICV	A / A	%RSD ≤ 20 ICV ≤ 30
IV.	Continuing calibration	A	CCV ≤ 20
V.	Laboratory Blanks	A	
VI.	Field blanks	N	
VII.	Surrogate spikes	A	
VIII.	Matrix spike/Matrix spike duplicates	SW	
IX.	Laboratory control samples	A	LCS
X.	Field duplicates	N	
XI.	Internal standards	A	
XII.	Compound quantitation RL/LOQ/LODs	SW	
XIII.	Target compound identification	N	
XIV.	System performance	N	
XV.	Overall assessment of data	SW	

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; SB=Source blank; OTHER:

	Client ID	Lab ID	Matrix	Date
1	EB-20-2-4	ARZ8O	Soil	12/05/14
2	EB-20-5-7	ARZ8P	Soil	12/05/14
3	EB-20-8-10	ARZ8Q	Soil	12/05/14
4	EB-20-11-13	ARZ8R	Soil	12/05/14
5	EB-35-8.5-10	ARZ8T	Soil	12/09/14
6	EB-27-2.5-4.5	ARZ8U	Soil	12/04/14
7	EB-27-2.5-4.5DL	ARZ8UDL	Soil	12/04/14
8	EB-31-18-20	ARZ8V	Soil	12/04/14
9	EB-31-18-20DL	ARZ8VDL	Soil	12/04/14
10	# 6 MS	ARZ8U MS	↓	12/4/14
11	# 6 MSD	ARZ8U MSD	↓	↓
12	MB - 121515			
13				

VALIDATION FINDINGS WORKSHEET

METHOD: GC/MS SVOA

A. Phenol	AA. 2-Chloronaphthalene	AAA. Butylbenzylphthalate	AAAA. Dibenzothiophene	A1.
B. Bis (2-chloroethyl) ether	BB. 2-Nitroaniline	BBB. 3,3'-Dichlorobenzidine	BBBB. Benzo(a)fluoranthene	B1.
C. 2-Chlorophenol	CC. Dimethylphthalate	CCC. Benzo(a)anthracene	CCCC. Benzo(b)fluorene	C1.
D. 1,3-Dichlorobenzene	DD. Acenaphthylene	DDD. Chrysene	DDDD. cis/trans-Decalin	D1.
E. 1,4-Dichlorobenzene	EE. 2,6-Dinitrotoluene	EEE. Bis(2-ethylhexyl)phthalate	EEEE. Biphenyl	E1.
F. 1,2-Dichlorobenzene	FF. 3-Nitroaniline	FFF. Di-n-octylphthalate	FFFF. Retene	F1.
G. 2-Methylphenol	GG. Acenaphthene	GGG. Benzo(b)fluoranthene	GGGG. C30-Hopane	G1.
H. 2,2'-Oxybis(1-chloropropane)	HH. 2,4-Dinitrophenol	HHH. Benzo(k)fluoranthene	HHHH. 1-Methylphenanthrene	H1.
I. 4-Methylphenol	II. 4-Nitrophenol	III. Benzo(a)pyrene	IIII. 1,4-Dioxane	I1.
J. N-Nitroso-di-n-propylamine	JJ. Dibenzofuran	JJJ. Indeno(1,2,3-cd)pyrene	JJJJ. Acetophenone	J1.
K. Hexachloroethane	KK. 2,4-Dinitrotoluene	KKK. Dibenz(a,h)anthracene	KKKK. Atrazine	K1.
L. Nitrobenzene	LL. Diethylphthalate	LLL. Benzo(g,h,i)perylene	LLLL. Benzaldehyde	L1.
M. Isophorone	MM. 4-Chlorophenyl-phenyl ether	MMM. Bis(2-Chloroisopropyl)ether	MMMM. Caprolactam	M1.
N. 2-Nitrophenol	NN. Fluorene	NNN. Aniline	NNNN. 2,6-Dichlorophenol	N1.
O. 2,4-Dimethylphenol	OO. 4-Nitroaniline	OOO. N-Nitrosodimethylamine	OOOO. 2,6-Dinitrotoluene	O1.
P. Bis(2-chloroethoxy)methane	PP. 4,6-Dinitro-2-methylphenol	PPP. Benzoic Acid	PPPP. 3-Methylphenol	P1.
Q. 2,4-Dichlorophenol	QQ. N-Nitrosodiphenylamine	QQQ. Benzyl alcohol	QQQQ. 3&4 Methylphenol	Q1.
R. 1,2,4-Trichlorobenzene	RR. 4-Bromophenyl-phenylether	RRR. Pyridine	RRRR. 4-Dimethyldibenzothiphene (4MDT)	R1.
S. Naphthalene	SS. Hexachlorobenzene	SSS. Benzidine	SSSS. 2/3-Dimethyldibenzothiophene (4MDT)	S1.
T. 4-Chloroaniline	TT. Pentachlorophenol	TTT. 1-Methylnaphthalene	TTTT. 1-Methyldibenzothiophene (1MDT)	T1.
U. Hexachlorobutadiene	UU. Phenanthrene	UUU.Benzo(b)thiophene	UUUU.	U1.
V. 4-Chloro-3-methylphenol	VV. Anthracene	VVV.Benzonaphthothiophene	VVVV.	V1.
W. 2-Methylnaphthalene	WW. Carbazole	WWW.Benzo(e)pyrene	WWWW.	W1.
X. Hexachlorocyclopentadiene	XX. Di-n-butylphthalate	XXX. 2,6-Dimethylnaphthalene	XXXX.	X1.
Y. 2,4,6-Trichlorophenol	YY. Fluoranthene	YYY. 2,3,5-Trimethylnaphthalene	YYYY.	Y1.
Z. 2,4,5-Trichlorophenol	ZZ. Pyrene	ZZZ. Perylene	ZZZZ.	Z1.

LDC #: 36266D2C

VALIDATION FINDINGS WORKSHEET
Technical Holding Times

Page: 1 of 1
Reviewer: F2
2nd Reviewer: CA

All circled dates have exceeded the technical holding times.
Y N N/A Were all cooler temperatures within validation criteria?

METHOD : GC/MA BNA SW846 METHOD 8270D

Sample ID	Matrix	Preserved	Sampling Date	Extraction date	Analysis date	Total # of Days	Qualifier
1 → 4	Soil	Frozen	12/5/14	12/15/15	12/18 - 19/15	1yr + 10 days	J/UJ/P (ND+Det)
5	↓	↓	12/9/14	↓	↓	1yr + 6days	J/UJ/P (ND+Det)
6 → 11	↓	↓	12/4/14	12/15/15	↓	1yr + 11days	J/UJ/P (ND+Det)

Frozen sample holding Time = 1 yr from sampling date

TECHNICAL HOLDING TIME CRITERIA

Water: Extracted within 7 days, analyzed within 40 days.
Soil: Extracted within 14 days, analyzed within 40 days.

LDC #: 36266P2C

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

Reviewer: FT
2nd Reviewer: CA

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

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?

#	MS/MSD ID	Compound	MS %R (Limits)	MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
	10 + 11	S	31.0 (36-120)	33.2 (36-120)	( )	6, 7	J/UJ/A all Det
		W	31.2 (35-120)	( )	( )		↓
		NN	21.4 (41-120)	29.9 (41-120)			↓
		UU	0 (46-120)	0 (46-120)	( )		no qual parent > 4X
		VV	0 (36-120)	0 (36-120)	( )		↓
		YY	( )	12.8 (46-120)	( )		J/UJ/A
		ZZ	( )	8.5 (49-120)	( )		↓
		DDD	131 (48-120)	( )	( )		J det/A
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		

LDC #: 36266 D2C

VALIDATION FINDINGS WORKSHEET
Compound Quantitation and CRQLs

Reviewer: FT
2nd Reviewer: [illegible]

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

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 ion and relative response factor (RRF) used to quantitate the compound?

Y N N/A Were compound quantitation and CRQLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?

#	Sample ID	Compound	Finding	Qualifications
	6, 8	VV	exceeded cal Range	Jdet /A

Comments: See sample calculation verification worksheet for recalculations

LDC #: 36266D2C

VALIDATION FINDINGS WORKSHEET
Overall Assessment of Data

Reviewer: FT
2nd Reviewer: CL

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

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".
All available information pertaining to the data were reviewed using professional judgement to compliment the determination of the overall quality of the data.

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

#	Sample ID	Compound	Finding	Qualifications
	6, 8	VV	exceeded cal Rang	R/A
	7, 9	all except VV	diluted	R/A

Comments: _____

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: DeNovo 8th Avenue

LDC Report Date: May 9, 2016

Parameters: Polychlorinated Biphenyls

Validation Level: Stage 2B

Laboratory: Analytical Resources, Inc.

Sample Delivery Group (SDG): ARZ8

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
EB-27-2.5-4.5	ARZ8B	Soil	12/04/14
EB-31-18-20	ARZ8C	Soil	12/04/14
EB-03-3-5	ARZ8D	Soil	12/05/14
EB-07-2-4	ARZ8E	Soil	12/05/14
EB-07-5-7	ARZ8F	Soil	12/05/14
EB-07-8-10	ARZ8G	Soil	12/05/14
EB-07-11-13	ARZ8H	Soil	12/05/14
EB-07-15.5-17.5	ARZ8I	Soil	12/05/14
EB-20-2-4	ARZ8O	Soil	12/05/14
EB-20-5-7	ARZ8P	Soil	12/05/14
EB-20-8-10	ARZ8Q	Soil	12/05/14
EB-20-11-13	ARZ8R	Soil	12/05/14
EB-35-8.5-10	ARZ8T	Soil	12/09/14

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Final Quality Assurance Project Plan, Remedial Investigation, Crowley Marine Services 8th Avenue S. Site, Seattle, Washington (October 2012) and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines (CLPNFG) for Superfund Organic Methods Data Review (June 2008). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Polychlorinated Biphenyls (PCBs) by Environmental Protection Agency (EPA) SW 846 Method 8082A

All sample results were subjected to Stage 2B data validation, which comprises an evaluation of quality control (QC) summary results.

The following are definitions of the data qualifiers utilized during data validation:

J (Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.

U (Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

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.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition

Cooler temperatures for samples EB-03-3-5, EB-07-2-4, EB-07-5-7, EB-07-8-10, EB-07-11-13, EB-07-15.5-17.5, EB-20-2-4, EB-20-5-7, EB-20-8-10, and EB-20-11-13 were reported at 6.9°C and 8.4°C and for sample EB-35-8.5-10 were reported at 11.6°C, 8.1°C, and 10.1°C upon receipt by the laboratory. Since the samples were received the same day that they were collected, time did not allow for sufficient cooling of the samples, therefore no data were qualified.

All technical holding time requirements for frozen samples were met.

II. Initial Calibration and Initial Calibration Verification

An initial calibration was performed as required by the method.

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

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 20.0% for all compounds with the following exceptions:

Date	Standard	Column	Compound	%D	Associated Samples	Flag	A or P
12/18/15	ICV	ZB 5	Aroclor-1254	26.5	EB-27-2.5-4.5 EB-31-18-20	J (all detects)	A
12/18/15	ICV	ZB 5	Aroclor-1254	26.5	EB-03-3-5 EB-07-2-4 EB-07-5-7 EB-07-8-10 EB-07-11-13 EB-07-15.5-17.5 EB-20-2-4 EB-20-5-7 EB-20-8-10 EB-20-11-13 EB-35-8.5-10	NA	-

III. Continuing Calibration

Continuing calibration was performed at required frequencies.

The percent differences (%D) were less than or equal to 20.0% for all compounds with the following exceptions:

Date	Standard	Column	Compound	%D	Associated Samples	Affected Compounds	Flag	A or P
12/22/15 (16:53)	CCV	ZB 35	Aroclor-1260	20.7	EB-27-2.5-4.5 EB-31-18-20	Aroclor-1254 Aroclor-1260	J (all detects) J (all detects)	A
12/22/15 (16:53)	CCV	ZB 35	Aroclor-1260	20.7	EB-27-2.5-4.5 EB-31-18-20	Aroclor-1242	-	-

IV. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks.

V. Field Blanks

No field blanks were identified in this SDG.

VI. Surrogates/Internal Standards

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

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

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

VIII. Laboratory Control Samples

Laboratory control samples (LCS) were analyzed as required by the method. Percent recoveries (%R) were within QC limits.

IX. Field Duplicates

No field duplicates were identified in this SDG.

X. Compound Quantitation

Raw data were not reviewed for Stage 2B validation.

XI. Target Compound Identification

Raw data were not reviewed for Stage 2B validation.

XII. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

Due to ICV and continuing calibration %D, data were qualified as estimated in two samples.

The quality control criteria reviewed, other than those discussed above, were met and are considered acceptable. Sample results that were found to be estimated (J) are usable for limited purposes only. Based upon the data validation all other results are considered valid and usable for all purposes.

DeNovo 8th Avenue
Polychlorinated Biphenyls - Data Qualification Summary - SDG ARZ8

Sample	Compound	Flag	A or P	Reason
EB-27-2.5-4.5 EB-31-18-20	Aroclor-1254	J (all detects)	A	Initial calibration verification (%D)
EB-27-2.5-4.5 EB-31-18-20	Aroclor-1254 Aroclor-1260	J (all detects) J (all detects)	A	Continuing calibration (%D)

DeNovo 8th Avenue
Polychlorinated Biphenyls - Laboratory Blank Data Qualification Summary - SDG ARZ8

No Sample Data Qualified in this SDG

LDC #: 36266D3b

SDG #: ARZ8

Laboratory: Analytical Resources, Inc.

VALIDATION COMPLETENESS WORKSHEET

Stage 2B

Date: 5/5/16

Page: 1 of 1

Reviewer: [illegible]

2nd Reviewer: [illegible]

METHOD: GC Polychlorinated Biphenyls (EPA SW846 Method 8082A)

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

11.6, 8.1, 10.1 (#13)
cooler temp 6.9 & 8.4 (3 → 12)
not enough time to cool down

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A / Δ	
II.	Initial calibration/ICV	Δ SW	% RSD / ICV ≤ 20
III.	Continuing calibration	SW	CCV ≤ 20
IV.	Laboratory Blanks	Δ	
V.	Field blanks	N	
VI.	Surrogate spikes /13	A	
VII.	Matrix spike/Matrix spike duplicates	Δ	EB-20-18-20 MS/D
VIII.	Laboratory control samples	A	LCS
IX.	Field duplicates	N	
X.	Compound quantitation/RL/LOQ/LODs	N	
XI.	Target compound identification	N	
XII	Overall assessment of data	Δ	

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; SB=Source blank; OTHER:

	Client ID	Lab ID	Matrix	Date
1	EB-27-2.5-4.5	ARZ8B	Soil	12/04/14
2	EB-31-18-20	ARZ8C	Soil	12/04/14
3	EB-03-3-5	ARZ8D	Soil	12/05/14
4	EB-07-2-4	ARZ8E	Soil	12/05/14
5	EB-07-5-7	ARZ8F	Soil	12/05/14
6	EB-07-8-10	ARZ8G	Soil	12/05/14
7	EB-07-11-13	ARZ8H	Soil	12/05/14
8	EB-07-15.5-17.5	ARZ8I	Soil	12/05/14
9	EB-20-2-4	ARZ8O	Soil	12/05/14
10	EB-20-5-7	ARZ8P	Soil	12/05/14
11	EB-20-8-10	ARZ8Q	Soil	12/05/14
12	EB-20-11-13	ARZ8R	Soil	12/05/14
13	EB-35-8.5-10	ARZ8T	Soil	12/09/14
14				
15				
16	MB 121415			
17				

VALIDATION FINDINGS WORKSHEET

METHOD: Pesticide/PCBs (EPA SW 846 Method 8081/8082)

A. alpha-BHC	I. Dieldrin	Q. Endrin ketone	Y. Aroclor-1242	GG. Chlordane
B. beta-BHC	J. 4,4'-DDE	R. Endrin aldehyde	Z. Aroclor-1248	HH. Chlordane (Technical)
C. delta-BHC	K. Endrin	S. alpha-Chlordane	AA. Aroclor-1254	II. Arochlor 1262
D. gamma-BHC	L. Endosulfan II	T. gamma-Chlordane	BB. Aroclor-1260	JJ. Aroclor 1268
E. Heptachlor	M. 4,4'-DDD	U. Toxaphene	CC. 2,4'-DDD	KK. Oxychlordane
F. Aldrin	N. Endosulfan sulfate	V. Aroclor-1016	DD. 2,4'-DDE	LL. trans-Nonachlor
G. Heptachlor epoxide	O. 4,4'-DDT	W. Aroclor-1221	EE. 2,4'-DDT	MM. cis-Nonachlor
H. Endosulfan I	P. Methoxychlor	X. Aroclor-1232	FF. Hexachlorobenzene	NN.

Notes:_____

LDC #: 36266D3b

VALIDATION FINDINGS WORKSHEET
Initial Calibration Verification

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

METHOD: ✓ GC __ HPLC

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".
What type of initial calibration verification calculation was performed? ___%D or ___%R
Y N N/A Was an initial calibration verification standard analyzed after each ICAL for each instrument?
Y N N/A Did the initial calibration verification standards meet the %D / %R validation criteria of ≤20.0% / 80-120%?

#	Date	Standard ID	Detector/ Column	Compound	%D (Limit ≤ 20.0)	Associated Samples	Qualifications
+	12/8/15	ICV	ZB5	AA	26.5	All	J det/A qual AA only 1,2 Det J

LDC #: 36266D3b

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

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

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 ___%R
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 / %R validation criteria of ≤20.0% / 80-120%?
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 (Limit ≤ 20.0)	RT (limit)	Associated Samples	Qualifications
+	12/22/15	CCV	ZB35	BB	20.7		1, 2, MB 121415	J dtt/A
	1653							qual Y, AA, BB
								1 & 2 dtt for AA & BB

CONCAL_r1.wpd

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: DeNovo 8th Avenue

LDC Report Date: May 10, 2016

Parameters: Metals

Validation Level: Stage 2B

Laboratory: Analytical Resources, Inc.

Sample Delivery Group (SDG): ARZ8

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
EB-27-2.5-4.5	ARZ8B	Soil	12/04/14
EB-31-18-20	ARZ8C	Soil	12/04/14
EB-35-8.5-10	ARZ8T	Soil	12/09/14

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Final Quality Assurance Project Plan, Remedial Investigation, Crowley Marine Services 8th Avenue S. Site, Seattle, Washington (October 2012) and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines (CLPNFG) for Inorganic Superfund Data Review (January 2010). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following methods:

Antimony, Arsenic, Barium, Beryllium, Cadmium, Chromium, Copper, Lead, Nickel, Selenium, Silver, Thallium, and Zinc by Environmental Protection Agency (EPA) Method 200.8
Mercury by EPA SW 846 Method 7471A

All sample results were subjected to Stage 2B data validation, which comprises an evaluation of quality control (QC) summary results.

The following are definitions of the data qualifiers utilized during data validation:

J (Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.

U (Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

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.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition.

All technical holding time requirements for frozen samples were met with the following exceptions:

Sample	Analyte	Total Days From Sample Collection Until Analysis	Required Holding Time (in Days) From Sample Collection Until Analysis	Flag	A or P
EB-27-2.5-4.5 EB-31-18-20	Mercury	376	28	J (all detects)	P
EB-35-8.5-10	Mercury	371	28	J (all detects)	P

II. ICPMS Tune

The mass calibration was within 0.1 AMU and the percent relative standard deviation (%RSD) was less than or equal to 5%.

III. Instrument Calibration

Initial and continuing calibrations were performed as required by the methods.

The initial calibration verification (ICV) and continuing calibration verification (CCV) standards were within QC limits.

IV. ICP Interference Check Sample Analysis

The frequency of interference check sample (ICS) analysis was met. All criteria were within QC limits.

V. Laboratory Blanks

Laboratory blanks were analyzed as required by the methods. No contaminants were found in the laboratory blanks with the following exceptions:

Blank ID	Analyte	Maximum Concentration	Associated Samples
PB (prep blank)	Antimony Lead Thallium	0.050 mg/Kg 0.010 mg/Kg 0.010 mg/Kg	All samples in SDG ARZ8

Data qualification by the laboratory blanks was based on the maximum contaminant concentration in the laboratory blanks 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 laboratory blanks with the following exceptions:

Sample	Analyte	Reported Concentration	Modified Final Concentration
EB-31-18-20	Antimony Thallium	0.025 mg/Kg 0.050 mg/Kg	0.025U mg/Kg 0.050U mg/Kg
EB-35-8.5-10	Antimony	0.026 mg/Kg	0.026U mg/Kg

VI. Field Blanks

No field blanks were identified in this SDG.

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	%R (Limits)	Flag	A or P
EMW-21D-15-15.4MS (All samples in SDG ARZ8)	Antimony Chromium	7.6 (75-125) 40.9 (75-125)	J (all detects) J (all detects)	A
EMW-21D-15-15.4MS (All samples in SDG ARZ8)	Beryllium Thallium	129 (75-125) 132 (75-125)	J (all detects) J (all detects)	A

For EMW-21D-15-15.4MS, no data were qualified for Arsenic and Copper percent recoveries (%R) outside the QC limits since the parent sample results were greater than 4X the spike concentration.

VIII. Duplicate Sample Analysis

Duplicate (DUP) sample analysis was performed on an associated project sample. Results were within QC limits with the following exceptions:

DUP ID (Associated Samples)	Analyte	RPD (Limits)	Flag	A or P
EMW-21D-15-15.4DUP (All samples in SDG ARZ8)	Cadmium Copper Zinc	72.7 (≤20) 22.5 (≤20) 35.0 (≤20)	J (all detects) J (all detects) J (all detects)	A

IX. Serial Dilution

Serial dilution was not performed for this SDG.

X. Laboratory Control Samples

Laboratory control samples (LCS) were analyzed as required by the methods. Percent recoveries (%R) were within QC limits.

XI. Field Duplicates

No field duplicates were identified in this SDG.

XII. Internal Standards (ICP-MS)

Raw data were not reviewed for Stage 2B validation.

XIII. Sample Result Verification

Raw data were not reviewed for Stage 2B validation.

XIV. Overall Assessment of Data

The analysis was conducted within all specifications of the methods. No results were rejected in this SDG.

Due to holding time exceedance, MS/MSD %R, and DUP RPD, data were qualified as estimated in three samples.

Due to laboratory blank contamination, data were qualified as not detected in two samples.

The quality control criteria reviewed, other than those discussed above, were met and are considered acceptable. Sample results that were found to be estimated (J) are usable for limited purposes only. Based upon the data validation all other results are considered valid and usable for all purposes.

DeNovo 8th Avenue
Metals - Data Qualification Summary - SDG ARZ8

Sample	Analyte	Flag	A or P	Reason
EB-27-2.5-4.5 EB-31-18-20 EB-35-8.5-10	Mercury	J (all detects)	P	Technical holding time
EB-27-2.5-4.5 EB-31-18-20 EB-35-8.5-10	Antimony Chromium Beryllium Thallium	J (all detects) J (all detects) J (all detects) J (all detects)	A	Matrix spike/Matrix spike duplicate (%R)
EB-27-2.5-4.5 EB-31-18-20 EB-35-8.5-10	Cadmium Copper Zinc	J (all detects) J (all detects) J (all detects)	A	Duplicate sample analysis (RPD)

DeNovo 8th Avenue
Metals - Laboratory Blank Data Qualification Summary - SDG ARZ8

Sample	Analyte	Modified Final Concentration	A or P
EB-31-18-20	Antimony Thallium	0.025U mg/Kg 0.050U mg/Kg	A
EB-35-8.5-10	Antimony	0.026U mg/Kg	A

LDC #: 36266D4a

SDG #: ARZ8

Laboratory: Analytical Resources, Inc.

VALIDATION COMPLETENESS WORKSHEET

Stage 2B

Date: 5/5/16

Page: 1 of 1

Reviewer: AL

2nd Reviewer: MH

METHOD: Metals (EPA Method 200.8/EPA SW 846 Method 7471A)

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.	Sample receipt/Technical holding times	A SW	Frozen 200.8-2yrs
II.	ICP/MS Tune	A	
III.	Instrument Calibration	A	
IV.	ICP Interference Check Sample (ICS) Analysis	A	
V.	Laboratory Blanks	SW	
VI.	Field Blanks	N	
VII.	Matrix Spike/Matrix Spike Duplicates	SW	MS (ARZ9)
VIII.	Duplicate sample analysis	SW	Dup ↓
IX.	Serial Dilution	N	
X.	Laboratory control samples	A	LCS
XI.	Field Duplicates	N	
XII.	Internal Standard (ICP-MS)	N	
XIII.	Sample Result Verification	N	
XIV	Overall Assessment of Data	A	

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; SB=Source blank; OTHER:

	Client ID	Lab ID	Matrix	Date
1	EB-27-2.5-4.5	ARZ8B	Soil	12/04/14
2	EB-31-18-20	ARZ8C	Soil	12/04/14
3	EB-35-8.5-10	ARZ8T	Soil	12/09/14
4				
5				
6				
7				
8				
9				
10				
11				
12				

Notes:

LDC #: 36266D4a

VALIDATION FINDINGS WORKSHEET
Sample Specific Element Reference

Page: 1 of 1
Reviewer:
2nd reviewer:

All circled elements are applicable to each sample.

Sample ID	Matrix	Target Analyte List (TAL)
1-3		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, Sn, Ti, ___
		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, Sn, Ti, ___
		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, Sn, Ti, ___
		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, Sn, Ti, ___
		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, Sn, Ti, ___
		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, Sn, Ti, ___
		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, Sn, Ti, ___
		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, Sn, Ti, ___
		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, Sn, Ti, ___
		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, Sn, Ti, ___
		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, Sn, Ti, ___
		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, Sn, Ti, ___
		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, Sn, Ti, ___
		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, Sn, Ti, ___
		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, Sn, Ti, ___
		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, Sn, Ti, ___
		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, Sn, Ti, ___
		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, Sn, Ti, ___
		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, Sn, Ti, ___
		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, Sn, Ti, ___
		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, Sn, Ti, ___
		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, Sn, Ti, ___
		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, Sn, Ti, ___
		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, Sn, Ti, ___
		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, Sn, Ti, ___
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, Sn, Ti, ___
ICP-MS		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___
GFAA		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti,

Comments: Mercury by CVAA if performed

LDC #: 36266D4a

VALIDATION FINDINGS WORKSHEET
Technical Holding Times

Reviewer:
2nd reviewer:

Were samples preserved? Y N N/A
All circled dates have exceeded the technical holding time.

METHOD:		(7471A) Mercury Holding time = 28 days					
Sample ID:	Sampling Date	Analysis Date	Total Time until Analysis (days)	Qualifier	Det/ND		
1, 2	12/4/14	12/15/15	376	J/R/P	Det		
3	12/9/14	12/15/15	371	J/R/P	Det		

Technical Holding Time Criteria

Mercury: 28 days
All other metals: 2 years if frozen

LDC #: 36266D4a

VALIDATION FINDINGS WORKSHEET
PB/ICB/CCB QUALIFIED SAMPLES

Reviewer:
2nd Reviewer:

METHOD: Trace metals (EPA SW 864 Method 6010B/6020/7000) Soil preparation factor applied:____
Sample Concentration units, unless otherwise noted: mg/Kg Associated Samples: All

				Sample Identification										
Analyte	Maximum PB[a] (mg/Kg)	Maximum ICB/CCB[a] (ug/l)	Action Level	2	3									
Sb	0.050		0.25	0.025	0.026									
Pb	0.010		0.05											
Tl	0.010		0.05	0.050										

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 #: 36266D4a

VALIDATION FINDINGS WORKSHEET
Matrix Spike

Page: 1 of 1
Reviewer: CA
2nd Reviewer: amg

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.

LEVEL IV ONLY:

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

#	MS ID	Matrix	Analyte	MS %Recovery	Associated Samples	Qualifications
	EMW-21D-15-15.4MS	s	Sb	7.6	All	J/UJ/A (Det)
			Be	129		Jdet/A (Det)
			Cr	40.9		J/UJ/A (Det)
			Tl	132		Jdet/A (Det)

Comments: 4: As, Cu >4x 4PS: Sb = 88%

LDC #: 36266D4a

VALIDATION FINDINGS WORKSHEET
Duplicate Analysis

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

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 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 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.

#	Date	Duplicate ID	Matrix	Analyte	RPD (Limits)	Difference (Limits)	Associated Samples	Qualifications
		EMW-21D-15-15.4DUP	s	Cd	72.7		All	J/UJ/A (Det)
				Cu	22.5			J/UJ/A (Det)
				Zn	35.0			J/UJ/A (Det)

Comments:

36266D4a.wpd

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: DeNovo 8th Avenue

LDC Report Date: May 10, 2016

Parameters: Total Solids

Validation Level: Stage 2B

Laboratory: Analytical Resources, Inc.

Sample Delivery Group (SDG): ARZ8

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
EB-12-18-20	ARZ8A	Soil	12/04/14
EB-27-2.5-4.5	ARZ8B	Soil	12/04/14
EB-31-18-20	ARZ8C	Soil	12/04/14
EB-03-3-5	ARZ8D	Soil	12/05/14
EB-07-2-4	ARZ8E	Soil	12/05/14
EB-07-5-7	ARZ8F	Soil	12/05/14
EB-07-8-10	ARZ8G	Soil	12/05/14
EB-07-11-13	ARZ8H	Soil	12/05/14
EB-07-15.5-17.5	ARZ8I	Soil	12/05/14
EB-13-2-4	ARZ8J	Soil	12/05/14
EB-13-8-10	ARZ8K	Soil	12/05/14
EB-13-11-13	ARZ8L	Soil	12/05/14
EB-13-16-18	ARZ8M	Soil	12/05/14
EB-20-2-4	ARZ8O	Soil	12/05/14
EB-20-5-7	ARZ8P	Soil	12/05/14
EB-20-8-10	ARZ8Q	Soil	12/05/14
EB-20-11-13	ARZ8R	Soil	12/05/14
EB-35-8.5-10	ARZ8T	Soil	12/09/14
EB-12-18-20DUP	ARZ8ADUP	Soil	12/04/14
EB-12-18-20TRP	ARZ8ATRP	Soil	12/04/14

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Final Quality Assurance Project Plan, Remedial Investigation, Crowley Marine Services 8th Avenue S. Site, Seattle, Washington (October 2012) and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines (CLPNFG) for Inorganic Superfund Data Review (January 2010). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Total Solids by Standard Method 2540G

All sample results were subjected to Stage 2B data validation, which comprises an evaluation of quality control (QC) summary results.

The following are definitions of the data qualifiers utilized during data validation:

J (Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.

U (Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

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.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition.

All technical holding time requirements for frozen samples were met.

II. Initial Calibration

All criteria for the initial calibration were met.

III. Continuing Calibration

Continuing calibration frequency and analysis criteria were met.

IV. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks.

V. Field Blanks

No field blanks were identified in this SDG.

VI. Matrix Spike/Matrix Spike Duplicates

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

VII. Triplicate Sample Analysis

Duplicate (DUP) and triplicate (TRP) sample analyses were performed on an associated project sample. Results were within QC limits.

VIII. Laboratory Control Samples

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

IX. Field Duplicates

No field duplicates were identified in this SDG.

X. Sample Result Verification

Raw data were not reviewed for Stage 2B validation.

XI. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

The quality control criteria reviewed were met and are considered acceptable. Based upon the data validation all results are considered valid and usable for all purposes.

DeNovo 8th Avenue
Total Solids - Data Qualification Summary - SDG ARZ8

No Sample Data Qualified in this SDG

DeNovo 8th Avenue
Total Solids - Laboratory Blank Data Qualification Summary - SDG ARZ8

No Sample Data Qualified in this SDG

LDC #: 36266D6 **VALIDATION COMPLETENESS WORKSHEET** Date: 5/5/16
SDG #: ARZ8 Stage 2B Page: 1 of 2
Laboratory: Analytical Resources, Inc. Reviewer: CV
2nd Reviewer: MH

METHOD: (Analyte) Total Solids (SM2540G)

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.	Sample receipt/Technical holding times	A/A	Frozen- no HT
II	Initial calibration	A	
III.	Calibration verification	A	
IV	Laboratory Blanks	A	
V	Field blanks	N	
VI.	Matrix Spike/Matrix Spike Duplicates	N	not required
VII.	Duplicate sample analysis	A	TRP Triplicate
VIII.	Laboratory control samples	N	not required
IX.	Field duplicates	N	
X.	Sample result verification	N	
XI	Overall assessment of data	A	

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
SB=Source blank
OTHER:

	Client ID	Lab ID	Matrix	Date
1	EB-12-18-20	ARZ8A	Soil	12/04/14
2	EB-27-2.5-4.5	ARZ8B	Soil	12/04/14
3	EB-31-18-20	ARZ8C	Soil	12/04/14
4	EB-03-3-5	ARZ8D	Soil	12/05/14
5	EB-07-2-4	ARZ8E	Soil	12/05/14
6	EB-07-5-7	ARZ8F	Soil	12/05/14
7	EB-07-8-10	ARZ8G	Soil	12/05/14
8	EB-07-11-13	ARZ8H	Soil	12/05/14
9	EB-07-15.5-17.5	ARZ8I	Soil	12/05/14
10	EB-13-2-4	ARZ8J	Soil	12/05/14
11	EB-13-8-10	ARZ8K	Soil	12/05/14
12	EB-13-11-13	ARZ8L	Soil	12/05/14
13	EB-13-16-18	ARZ8M	Soil	12/05/14
14	EB-20-2-4	ARZ8O	Soil	12/05/14
15	EB-20-5-7	ARZ8P	Soil	12/05/14
16	EB-20-8-10	ARZ8Q	Soil	12/05/14
17	EB-20-11-13	ARZ8R	Soil	12/05/14

LDC #: 36266D6 **VALIDATION COMPLETENESS WORKSHEET** Date: 5/5/16
SDG #: ARZ8 Stage 2B Page: 2 of 2
Laboratory: Analytical Resources, Inc. Reviewer: CR
2nd Reviewer: MG

METHOD: (Analyte) Total Solids (SM2540G)

	Client ID	Lab ID	Matrix	Date
18	EB-35-8.5-10	ARZ8T	Soil	12/09/14
19	EB-12-18-20DUP	ARZ8ADUP	Soil	12/04/14
20	J JRP	J JRP	J	J
21				
22				
23				
24				

Notes:

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: DeNovo 8th Avenue

LDC Report Date: May 9, 2016

Parameters: Total Petroleum Hydrocarbons as Extractables

Validation Level: Stage 2B

Laboratory: Analytical Resources, Inc.

Sample Delivery Group (SDG): ARZ8

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
EB-31-18-20	ARZ8C	Soil	12/04/14

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Final Quality Assurance Project Plan, Remedial Investigation, Crowley Marine Services 8th Avenue S. Site, Seattle, Washington (October 2012) and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines (CLPNFG) for Superfund Organic Methods Data Review (June 2008). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Total Petroleum Hydrocarbons (TPH) as Extractables by NWTPH-Dx

All sample results were subjected to Stage 2B data validation, which comprises an evaluation of quality control (QC) summary results.

The following are definitions of the data qualifiers utilized during data validation:

J (Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.

U (Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered not detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

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.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition and cooler temperatures upon receipt met validation criteria.

All technical holding time requirements for frozen samples were met with the following exceptions:

Sample	Compound	Total Time From Sample Collection Until Extraction	Required Holding Time From Sample Collection Until Extraction	Flag	A or P
All samples in SDG ARZ8	TPH as extractables	1 year 5 days	1 year	UJ (all non-detects)	P

II. Initial Calibration and Initial Calibration Verification

An initial calibration was performed as required by the method.

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

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 15.0% for all compounds with the following exceptions:

Date	Compound	%D	Associated Samples	Flag	A or P
11/24/15	Motor oil	19.28	All samples in SDG ARZ8	NA	-

III. Continuing Calibration

Continuing calibration was performed at the required frequencies.

The percent differences (%D) were less than or equal to 15.0% for all compounds.

IV. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks.

V. Field Blanks

No field blanks were identified in this SDG.

VI. Surrogates

Surrogates were added to all samples 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) sample analysis was performed on an associated project sample. Percent recoveries (%R) and relative percent differences (RPD) were not within QC limits. No data were qualified since there were no associated samples in this SDG.

VIII. Laboratory Control Samples

Laboratory control samples (LCS) were analyzed as required by the method. Percent recoveries (%R) were within QC limits.

IX. Field Duplicates

No field duplicates were identified in this SDG.

X. Compound Quantitation

Raw data were not reviewed for Stage 2B validation.

XI. Target Compound Identifications

Raw data were not reviewed for Stage 2B validation.

XII. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

Due to holding time exceedance, data were qualified as estimated in one sample.

The quality control criteria reviewed, other than those discussed above, were met and are considered acceptable. Sample results that were found to be estimated (J) are usable for limited purposes only. Based upon the data validation all other results are considered valid and usable for all purposes.

DeNovo 8th Avenue
Total Petroleum Hydrocarbons as Extractables - Data Qualification Summary - SDG ARZ8

Sample	Compound	Flag	A or P	Reason
EB-31-18-20	TPH as extractables	UJ (all non-detects)	P	Technical holding time

DeNovo 8th Avenue
Total Petroleum Hydrocarbons as Extractables - Laboratory Blank Data Qualification Summary - SDG ARZ8

No Sample Data Qualified in this SDG

LDC #: 36266D8 **VALIDATION COMPLETENESS WORKSHEET** Date: 5/5/16

SDG #: ARZ8 Stage 2B Page: 1 of 1

Laboratory: Analytical Resources, Inc. Reviewer: EF

2nd Reviewer: AV

METHOD: GC TPH as Extractables (NWTPH-Dx)

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.	Sample receipt/Technical holding times	A / SW	
II.	Initial calibration/ICV	A / SW	%D PSD ≤ 20 ICV ≤ 15
III.	Continuing calibration	A	CCV ≤ 15
IV.	Laboratory Blanks	A	
V.	Field blanks	N	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	SW	~~MS~~ EB-34-8-10 MS/D (%R NO Assoc sample)
VIII.	Laboratory control samples	A	LCS
IX.	Field duplicates	N	
X.	Compound quantitation RL/LOQ/LODs	N	
XI.	Target compound identification	N	
XII.	Overall assessment of data	A	

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; SB=Source blank; OTHER:

	Client ID	Lab ID	Matrix	Date
1	EB-31-18-20	ARZ8C	Soil	12/04/14
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				

Notes:

	MB - 120915						

LDC #: 362668 ✓

VALIDATION FINDINGS WORKSHEET
Technical Holding Times

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

All circled dates have exceeded the technical holding times.
(Y) N N/A Were all cooler temperatures within validation criteria?

METHOD : ✓ GC ___ HPLC

Sample ID	Matrix	Preserved	Sampling Date	Extraction date	Analysis date	Total # of Days	Qualifier
1	SOIL	Frozen	12/4/14	12/9/15	12/16/15	1yr + 5 days	J/UJ/P (ND)
Frozen sample holding time = 1 yr from date of sampling							

TECHNICAL HOLDING TIME CRITERIA

VOLATILES:	Water unpreserved:	Aromatic within 7 days, non-aromatic within 14 days of sample collection.
	Water preserved:	Both within 14 days of sample collection.
	Soils:	Both within 14 days of sample collection.
	Encores unpreserved:	Both within 48 hours of sample collection.
	Encores preserved:	Both within 14 days of sample collection.
EXTRACTABLES:		
	Water:	Extracted within 7 days, analyzed within 40 days.
	Soil:	Extracted within 14 days, analyzed within 40 days.

LDC #: 36266 D8

VALIDATION FINDINGS WORKSHEET
Initial Calibration Verification

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

METHOD: ✓ GC __ HPLC

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".
What type of initial calibration verification calculation was performed? ___%D or ___%R
Y N N/A Was an initial calibration verification standard analyzed after each ICAL for each instrument?
Y N N/A Did the initial calibration verification standards meet the %D / %R validation criteria of ≤20.0% / 80-120%?

#	Date	Standard ID	Detector/ Column	Compound	%D (Limit ≤ 20.0)	Associated Samples	Qualifications
	11/24/15 15:26	ICV		Motor Oil	19.28	all	J (all / A (ND)

ICV-gc.wpd

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: DeNovo 8th Avenue

LDC Report Date: May 9, 2016

Parameters: Polychlorinated Dioxins/Dibenzofurans

Validation Level: Stage 4

Laboratory: Analytical Resources, Inc.

Sample Delivery Group (SDG): ARZ8

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
EB-31-18-20	ARZ8C	Soil	12/04/14
EB-07-2-4	ARZ8E	Soil	12/05/14
EB-13-2-4	ARZ8J	Soil	12/05/14
EB-13-8-10	ARZ8K	Soil	12/05/14
EB-13-11-13	ARZ8L	Soil	12/05/14
EB-13-16-18	ARZ8M	Soil	12/05/14

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Final Quality Assurance Project Plan, Remedial Investigation, Crowley Marine Services 8th Avenue S. Site, Seattle, Washington (October 2012) and the USEPA Contract Laboratory Program (CLP) National Functional Guidelines for Chlorinated Dibenzo-p-Dioxins (CDDs) and Chlorinated Dibenzofurans (CDFs) Data Review (September 2011). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Polychlorinated Dioxins/Dibenzofurans by Environmental Protection Agency (EPA) Method 1613B

All sample results were subjected to Stage 4 data validation, which is comprised of the quality control (QC) summary forms as well as the raw data, to confirm sample quantitation and identification.

The following are definitions of the data qualifiers utilized during data validation:

J (Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.

U (Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered not detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

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.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition.

Cooler temperatures for samples in this SDG were reported at 6.9°C and 8.4°C upon receipt by the laboratory. Since the samples were received the same day that they were collected, time did not allow for sufficient cooling of the samples, therefore no data were qualified.

All technical holding time requirements for frozen samples were met.

II. HRGC/HRMS Instrument Performance Check

Instrument performance was checked at the required 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%.

The static resolving power was at least 10,000 (10% valley definition).

III. Initial Calibration and Initial Calibration Verification

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

The percent relative standard deviations (%RSD) were less than or equal to 20.0% for unlabeled compounds and less than or equal to 35.0% for labeled compounds.

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

The minimum S/N ratio was greater than or equal to 10 for each unlabeled compound and labeled compound.

The percent differences (%D) of the initial calibration verification (ICV) standard were within the QC limits for unlabeled compounds and labeled compounds with the following exceptions:

Date	Compound	Concentration (Limits)	Associated Samples	Affected Compound	Flag	A or P
10/15/15	1,2,3,4,7,8-HxCDF	56.905 pg (45-56)	EB-07-2-4	1,2,3,4,7,8-HxCDF Total HxCDF	J (all detects) J (all detects)	P
10/15/15	1,2,3,4,7,8-HxCDF	56.905 pg (45-56)	EB-31-18-20 EB-13-2-4 EB-13-8-10 EB-13-11-13 EB-13-16-18	1,2,3,4,7,8-HxCDF	NA	-

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

All of the continuing calibration results were within the QC limits for unlabeled compounds and labeled compounds.

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

The minimum S/N ratio was greater than or equal to 10 for each unlabeled compound and labeled compound.

V. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks with the following exceptions:

Blank ID	Extraction Date	Compound	Concentration	Associated Samples
MB-122815	12/28/15	1,2,3,7,8,9-HxCDF 1,2,3,7,8,9-HxCDD 1,2,3,4,6,7,8-HpCDD OCDD Total HxCDD Total HpCDD Total HxCDF Total HpCDF	0.0720 pg/g 0.0820 pg/g 1.18 pg/g 7.10 pg/g 0.991 pg/g 3.17 pg/g 0.0712 pg/g 0.207 pg/g	All samples in SDG ARZ8

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

Sample	Compound	Reported Concentration	Modified Final Concentration
EB-31-18-20	1,2,3,4,6,7,8-HpCDD OCDD Total HxCDD Total HpCDD	2.65 pg/g 25.7 pg/g 1.43 pg/g 5.67 pg/g	2.65U pg/g 25.7U pg/g 1.43J pg/g 5.67J pg/g
EB-07-2-4	1,2,3,7,8,9-HxCDF Total HxCDD	0.202 pg/g 4.89 pg/g	0.202U pg/g 4.89J pg/g
EB-13-2-4	Total HxCDD	1.52 pg/g	1.52J pg/g

Sample	Compound	Reported Concentration	Modified Final Concentration
EB-13-8-10	1,2,3,7,8,9-HxCDD	0.173 pg/g	0.173U pg/g
	1,2,3,4,6,7,8-HpCDD	2.11 pg/g	2.11U pg/g
	OCDD	20.8 pg/g	20.8U pg/g
	Total HxCDD	1.61 pg/g	1.61J pg/g
	Total HpCDD	5.18 pg/g	5.18J pg/g
	Total HpCDF	0.633 pg/g	0.633J pg/g
EB-13-11-13	1,2,3,4,6,7,8-HpCDD	1.49 pg/g	1.49U pg/g
	OCDD	11.4 pg/g	11.4U pg/g
	Total HxCDD	1.51 pg/g	1.51J pg/g
	Total HpCDD	4.08 pg/g	4.08J pg/g
	Total HpCDF	0.370 pg/g	0.370J pg/g
EB-13-16-18	1,2,3,7,8,9-HxCDF	0.0626 pg/g	0.0626U pg/g
	1,2,3,7,8,9-HxCDD	0.102 pg/g	0.102U pg/g
	1,2,3,4,6,7,8-HpCDD	1.15 pg/g	1.15U pg/g
	OCDD	9.92 pg/g	9.92U pg/g
	Total HxCDD	0.965 pg/g	0.965J pg/g
	Total HpCDD	2.83 pg/g	2.83J pg/g
	Total HxCDF	0.0634 pg/g	0.0634J pg/g
	Total HpCDF	0.156 pg/g	0.156J pg/g

VI. Field Blanks

No field blanks were identified in this SDG.

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. Ongoing Precision Recovery

Ongoing precision recovery (OPR) samples were analyzed as required by the method. Percent recoveries (%R) were within QC limits.

IX. Field Duplicates

No field duplicates were identified in this SDG.

X. Internal Standards

All internal standard recoveries (%R) were within QC limits.

XI. Compound Quantitation

All compound quantitations were within validation criteria with the following exceptions:

Sample	Compound	Flag	A or P
All samples in SDG ARZ8	All compounds reported as estimated maximum possible concentration (EMPC).	J (all detects)	A

XII. Target Compound Identifications

All target compound identifications met validation criteria.

XIII. System Performance

The system performance was acceptable.

XIV. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

Due to ICV concentration and results reported by the laboratory as EMPCs data were qualified as estimated in six samples.

Due to laboratory blank contamination, data were qualified as not detected or estimated in six samples.

The quality control criteria reviewed, other than those discussed above, were met and are considered acceptable. Sample results that were found to be estimated (J) are usable for limited purposes only. Based upon the data validation all other results are considered valid and usable for all purposes.

DeNovo 8th Avenue
Polychlorinated Dioxins/Dibenzofurans - Data Qualification Summary - SDG ARZ8

Sample	Compound	Flag	A or P	Reason
EB-07-2-4	1,2,3,4,7,8-HxCDF Total HxCDF	J (all detects) J (all detects)	P	Initial calibration verification (concentration)
EB-31-18-20 EB-07-2-4 EB-13-2-4 EB-13-8-10 EB-13-11-13 EB-13-16-18	All compounds reported as estimated maximum possible concentration (EMPC).	J (all detects)	A	Compound quantitation (EMPC)

DeNovo 8th Avenue
Polychlorinated Dioxins/Dibenzofurans - Laboratory Blank Data Qualification Summary - SDG ARZ8

Sample	Compound	Modified Final Concentration	A or P
EB-31-18-20	1,2,3,4,6,7,8-HpCDD OCDD Total HxCDD Total HpCDD	2.65U pg/g 25.7U pg/g 1.43J pg/g 5.67J pg/g	A
EB-07-2-4	1,2,3,7,8,9-HxCDF Total HxCDD	0.202U pg/g 4.89J pg/g	A
EB-13-2-4	Total HxCDD	1.52J pg/g	A
EB-13-8-10	1,2,3,7,8,9-HxCDD 1,2,3,4,6,7,8-HpCDD OCDD Total HxCDD Total HpCDD Total HpCDF	0.173U pg/g 2.11U pg/g 20.8U pg/g 1.61J pg/g 5.18J pg/g 0.633J pg/g	A
EB-13-11-13	1,2,3,4,6,7,8-HpCDD OCDD Total HxCDD Total HpCDD Total HpCDF	1.49U pg/g 11.4U pg/g 1.51J pg/g 4.08J pg/g 0.370J pg/g	A
EB-13-16-18	1,2,3,7,8,9-HxCDF 1,2,3,7,8,9-HxCDD 1,2,3,4,6,7,8-HpCDD OCDD Total HxCDD Total HpCDD Total HxCDF Total HpCDF	0.0626U pg/g 0.102U pg/g 1.15U pg/g 9.92U pg/g 0.965J pg/g 2.83J pg/g 0.0634J pg/g 0.156J pg/g	A

LDC #: 36266D21 **VALIDATION COMPLETENESS WORKSHEET** Date: 05/05/16
SDG #: ARZ8 Stage 4 Page: 1 of 1
Laboratory: Analytical Resources, Inc. Reviewer:
2nd Reviewer:

METHOD: HRGC/HRMS Polychlorinated Dioxins/Dibenzofurans (EPA Method 1613B)

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.	Sample receipt/Technical holding times	A / A	(#2-6 Received @ 6.9/8.4°C)
II.	HRGC/HRMS Instrument performance check	A	
III.	Initial calibration/ICV	A/SW	≤ 20/35 ICV QC limits
IV.	Continuing calibration	A	QC limits
V.	Laboratory Blanks	SW	
VI.	Field blanks	N	
VII.	Matrix spike/Matrix spike duplicates	N	C.S.
VIII.	Laboratory control samples	A	OPR
IX.	Field duplicates	N	
X.	Internal standards	A	
XI.	Compound quantitation RL/~~LOQ/LODs~~	SW	
XII.	Target compound identification	A	
XIII.	System performance	A	
XIV.	Overall assessment of data	A	

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

	Client ID	Lab ID	Matrix	Date
1	EB-31-18-20	ARZ8C	Soil	12/04/14
2	EB-07-2-4	ARZ8E	Soil	12/05/14
3	EB-13-2-4	ARZ8J	Soil	12/05/14
4	EB-13-8-10	ARZ8K	Soil	12/05/14
5	EB-13-11-13	ARZ8L	Soil	12/05/14
6	EB-13-16-18	ARZ8M	Soil	12/05/14
7				
8				
9				
10				
11				

Notes:

	MB-122815						

LDC #: 36266D21

VALIDATION FINDINGS CHECKLIST

Page: 1 of 2
Reviewer: TM
2nd Reviewer: AV

Method: HRGC/HRMS Dioxins/Dibenzofurans (EPA Method 1613B)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	✓			
Cooler temperature criteria was met.	✓			
II. GC/MS Instrument performance check				
Was PFK exact mass 380.9760 verified?	✓			
Were the retention time windows established for all homologues?	✓			
Was the chromatographic resolution between 2,3,7,8-TCDD and peaks representing any other unlabeled TCDD isomers ≤ 25% ?	✓			
Is the static resolving power at least 10,000 (10% valley definition)?	✓			
Was the mass resolution adequately check with PFK?	✓			
Was the presence of 1,2,8,9-TCDD and 1,3,4,6,8-PeCDF verified?	✓			
III. Initial calibration				
Was the initial calibration performed at 5 concentration levels?	✓			
Were all percent relative standard deviations (%RSD) ≤ 20% for unlabeled compounds and ≤ 35% for labeled compounds ?	✓			
Did all calibration standards meet the Ion Abundance Ratio criteria?	✓			
Was the signal to noise ratio for each target compound ≥ 2.5 and for each recovery and internal standard ≥ 10?	✓			
IV. Continuing calibration				
Was a routine calibration performed at the beginning and end of each 12 hour period?	✓			
Were all the concentrations for the unlabeled compounds and labeled compounds within the QC limits (Method 1613B, Table 6)?	✓			
Did all routine calibration standards meet the Ion Abundance Ratio criteria?	✓			
V. Blanks				
Was a method blank associated with every sample in this SDG?	✓			
Was a method blank performed for each matrix and concentration?	✓			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet?	✓			
VI. Matrix spike/Matrix spike duplicates				
Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.		✓		
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			✓	
VII. Laboratory control samples				
Was an LCS analyzed for this SDG?	✓			
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	✓			

LDC #: 36216D21

VALIDATION FINDINGS CHECKLIST

Reviewer: SR
2nd Reviewer: AV

Validation Area	Yes	No	NA	Findings/Comments
VIII. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?		✓		
Were the performance evaluation (PE) samples within the acceptance limits?			✓	
IX. Internal standards				
Were internal standard recoveries within the 25-150% criteria?	✓			
Was the minimum S/N ratio of all internal standard peaks ≥ 10?	✓			
X. Target compound identification				
For 2,3,7,8 substituted congeners with associated labeled standards, were the retention times of the two quantitation peaks within -1 to 3 sec. of the RT of the labeled standard?	✓			
For 2,3,7,8 substituted congeners without associated labeled standards, were the relative retention times of the two quantitation peaks within 0.005 time units of the RRT measured in the routine calibration?	✓			
For non-2,3,7,8 substituted congeners, were the retention times of the two quantitation peaks within RT established in the performance check solution?	✓			
Did compound spectra contain all characteristic ions listed in the table attached?	✓			
Was the Ion Abundance Ratio for the two quantitation ions within criteria?		✓		
Was the signal to noise ratio for each target compound and labeled standard ≥ 2.5?	✓			
Does the maximum intensity of each specified characteristic ion coincide within ± 2 seconds (includes labeled standards)?	✓			
For PCDF identification, was any signal (S/N ≥ 2.5, at ± seconds RT) detected in the corresponding PCDPE channel?		✓		
Was an acceptable lock mass recorded and monitored?	✓			
XI. Compound quantitation/CRQLs				
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the compound?	✓			
Were compound quantitation and CRQLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XII. System performance				
System performance was found to be acceptable.	✓			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			
XIV. Field duplicates				
Field duplicate pairs were identified in this SDG.		✓		
Target compounds were detected in the field duplicates.			✓	
XV. Field blanks				
Field blanks were identified in this SDG.		✓		
Target compounds were detected in the field blanks.			✓	

VALIDATION FINDINGS WORKSHEET

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA Method 1613B)

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 #: 36266D2I

VALIDATION FINDINGS WORKSHEET
Initial Calibration Verification

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

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA Method 1613B)

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

(Y) N N/A Was an initial calibration verification standard analyzed after each ICAL for each instrument?

Y (N) N/A Were results within the QC limits for the method?

#	Date	Standard ID	Compound	Finding (Limit: pg)	Associated Samples	Qualifications
	10/15/15	15101510	K	56.905 (45-56)	all	Jdets/P (+X) (2=det)

LDC #: 36266D21

VALIDATION FINDINGS WORKSHEET
Blanks

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

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA Method 1613B)

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: 12/28/15 **Blank analysis date:** 01/05/16

Conc. units: pg/g **Associated samples:** all

Compound	Blank ID	Sample Identification								
	MB-122815	5x	1	2	3	4	5	6		
N	0.0720*	0.360		0.202* /U				0.0626* /U		
E	0.0820*	0.410				0.173* /U		0.102* /U		
F	1.18	5.90	2.65 /U			2.11 /U	1.49* /U	1.15 /U		
G	7.10	35.5	25.7 /U			20.8 /U	11.4 /U	9.92 /U		
T	0.991*	4.96	1.43* /J	4.89* /J	1.52* /J	1.61* /J	1.51* /J	0.965* /J		
U	3.17	15.9	5.67 /J			5.18 /J	4.08* /J	2.83 /J		
X	0.0712*	0.356						0.0634* /J		
Y	0.207*	1.04				0.633* /J	0.370* /J	0.156* /J		

*EMPC

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 #: 36216D21

VALIDATION FINDINGS WORKSHEET
Compound Quantitation and Reported RLs

Reviewer: 4th
2nd Reviewer: CL

METHOD: GC/MS Dioxins/Dibenzofurans (Method 1613B)

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 RLs were adjusted to reflect all sample dilutions and dry weight factors (if necessary).

#	Date	Compound	Finding	Associated Samples	Qualifications
			EMPC results	all	Jdets/A

Comments: See sample calculation verification worksheet for recalculations

LDC #: 36246D21

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Reviewer:
2nd Reviewer:

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA Method 1613B)

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

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of compound,
C_x = Concentration of compound,
S = Standard deviation of the RRFs,

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Reported Average RRF (initial)	Recalculated Average RRF (initial)	Reported RRF (CS3 std)	Recalculated RRF (CS3 std)	Reported %RSD	Recalculated %RSD
1	1510153 ICAL	10/15/15	2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)	0.83	0.83	0.82	0.82	3.2	3.5
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)	1.02	1.02	0.98	0.98	6.1	6.2
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)	0.89	0.895	0.89	0.89	3.0	3.1
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)	0.96	0.96	0.99	0.99	4.7	5.0
			OCDF (^{13}C-OCDD)	1.02	1.02	1.04	1.04	8.4	8.4
2			2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)						
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)						
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)						
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)						
			OCDF (^{13}C-OCDD)						
3			2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)						
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)						
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)						
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)						
			OCDF (^{13}C-OCDD)						

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

LDC #: 39266D21

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

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

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA Method 1613B)

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

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
$RRF = (A_x)(C_{is})/(A_{is})(C_x)$

Where: ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
A_x = Area of compound, A_{is} = Area of associated internal standard
C_x = Concentration of compound, C_{is} = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Spiked Conc (ng/mL)	Reported Conc (ng/mL)	Recalculated Conc (ng/mL)	Reported %D	Recalculated %D
1	16010502	01/05/16	2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)	10.000	10.115	10.099	1.2	1.0
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)	10.000	10.038	10.039	0.4	0.4
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)	50.000	50.675	50.654	1.4	1.3
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)	50.000	50.654	50.697	1.3	1.4
			OCDF (^{13}C-OCDD)	100.000	97.457	97.432	2.5	2.6
2			2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)					
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)					
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)					
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)					
			OCDF (^{13}C-OCDD)					
3			2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)					
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)					
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)					
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)					
			OCDF (^{13}C-OCDD)					

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

LDC #: 36216B24

VALIDATION FINDINGS WORKSHEET
Laboratory Control Sample Results Verification

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

METHOD: GC/MS Dioxins/Dibenzofurans (EPA Method 1613B)

The percent recoveries (%R) and Relative Percent Difference (RPD) of the laboratoy control sample and laboratory control sample duplicate (if applicable) were recalculated for the compounds identified below using the following calculation:

% Recovery = 100 * SSC/SA Where: SSC = Spiked sample concentration
SA = Spike added

RPD = I LCS - LCSD I * 2/(LCS + LCSD) LCS = Laboraotry control sample percent recovery LCSD = Laboratory control sample duplicate percent recovery

LCS ID: OPR-122815

Compound	Spike Added (pg/g)		Spiked Sample Concentration (pg/g)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc	Reported	Recalc	Reported	Recalculated
2,3,7,8-TCDD	20.0	NA	22.6	NA	113	113				
1,2,3,7,8-PeCDD	100		110		110	110				
1,2,3,4,7,8-HxCDD	100		109		109	109				
1,2,3,4,7,8,9-HpCDF	100		109		109	109				
OCDF	200		172		86.0	86.0				

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

LDC #: 36266D21

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

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

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA Method 1613B)

(Y) N N/A Were all reported results recalculated and verified for all level IV samples?
(Y) N N/A Were all recalculated results for detected target compounds agree within 10.0% of the reported results?

Concentration = $\frac{(A_x)(I_s)(DF)}{(A_{is})(RRF)(V_o)(\%S)}$

A_x = Area of the characteristic ion (EICP) for the compound to be measured

A_{is} = Area of the characteristic ion (EICP) for the specific internal standard

I_s = Amount of internal standard added in nanograms (ng)

V_o = Volume or weight of sample extract in milliliters (ml) or grams (g).

RRF = Relative Response Factor (average) from the initial calibration

Df = Dilution Factor.

%S = Percent solids, applicable to soil and solid matrices only.

Example:

Sample I.D. 1, OCDF:

Conc. = $\frac{(2.18e3 + 2.96e3)(4000)(1)}{(6.41e5 + 7.25e5)(1.023)(12.89)(0.788)}$

= 1.448497141 ≃ 1.45 pg/g

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

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: DeNovo 8th Avenue

LDC Report Date: May 9, 2016

Parameters: Polynuclear Aromatic Hydrocarbons

Validation Level: Stage 2B

Laboratory: Analytical Resources, Inc.

Sample Delivery Group (SDG): ARZ9

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
EB-35-10-12	ARZ9A	Soil	12/09/14
EB-35-15-17	ARZ9B	Soil	12/09/14
EB-35-15-17MS	ARZ9BMS	Soil	12/09/14
EB-35-15-17MSD	ARZ9BMSD	Soil	12/09/14

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Final Quality Assurance Project Plan, Remedial Investigation, Crowley Marine Services 8th Avenue S. Site, Seattle, Washington (October 2012) and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines (CLPNFG) for Superfund Organic Methods Data Review (June 2008). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Polynuclear Aromatic Hydrocarbons (PAHs) by Environmental Protection Agency (EPA) SW 846 Method 8270D in Selected Ion Monitoring (SIM) mode

All sample results were subjected to Stage 2B data validation, which comprises an evaluation of quality control (QC) summary results.

The following are definitions of the data qualifiers utilized during data validation:

J (Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.

U (Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

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.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition.

Cooler temperatures for samples in this SDG were reported at 11.6°C, 8.1°C, and 10.1°C upon receipt by the laboratory. Since the samples were received the same day that they were collected, time did not allow for sufficient cooling of the samples, therefore no data were qualified.

All technical holding time requirements for frozen samples were met with the following exceptions:

Sample	Compound	Total Time From Sample Collection Until Extraction	Required Holding Time From Sample Collection Until Extraction	Flag	A or P
All samples in SDG ARZ9	All compounds	1 year 1 day	1 year	J (all detects) UJ (all non-detects)	P

II. GC/MS Instrument Performance Check

A decafluorotriphenylphosphine (DFTPP) tune was performed at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration and Initial Calibration Verification

An initial calibration was performed as required by the method.

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

Average relative response factors (RRF) for all compounds were within validation criteria.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 30.0% for all compounds.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.
The percent differences (%D) were less than or equal to 20.0% for all compounds.

All of the continuing calibration relative response factors (RRF) were within validation criteria.

V. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks.

VI. Field Blanks

No field blanks were identified in this SDG.

VII. Surrogates

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

VIII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Compound	MS (%R) (Limits)	MSD (%R) (Limits)	Flag	A or P
EB-35-15-17MS/MSD (EB-35-15-17)	Naphthalene	-	33.1 (36-120)	J (all detects) UJ (all non-detects)	A
	1-Methylnaphthalene	38.9 (39-120)	38.5 (39-120)	J (all detects) UJ (all non-detects)	

Relative percent differences (RPD) were within QC limits.

IX. Laboratory Control Samples

Laboratory control samples (LCS) were analyzed as required by the method. Percent recoveries (%R) were within QC limits.

X. Field Duplicates

No field duplicates were identified in this SDG.

XI. Internal Standards

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

XII. Compound Quantitation

Raw data were not reviewed for Stage 2B validation.

XIII. Target Compound Identifications

Raw data were not reviewed for Stage 2B validation.

XIV. System Performance

Raw data were not reviewed for Stage 2B validation.

XV. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

Due to holding time exceedance and MS/MSD %R, data were qualified as estimated in two samples.

The quality control criteria reviewed, other than those discussed above, were met and are considered acceptable. Sample results that were found to be estimated (J) are usable for limited purposes only. Based upon the data validation all other results are considered valid and usable for all purposes.

DeNovo 8th Avenue
Polynuclear Aromatic Hydrocarbons - Data Qualification Summary - SDG ARZ9

Sample	Compound	Flag	A or P	Reason
EB-35-10-12 EB-35-15-17	All compounds	J (all detects) UJ (all non-detects)	P	Technical holding time
EB-35-15-17	Naphthalene 1-Methylnaphthalene	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	A	Matrix spike/Matrix spike duplicate (%R)

DeNovo 8th Avenue
Polynuclear Aromatic Hydrocarbons - Laboratory Blank Data Qualification Summary - SDG ARZ9

No Sample Data Qualified in this SDG

LDC #: 36266E2c **VALIDATION COMPLETENESS WORKSHEET** Date: 5/5/16
SDG #: ARZ9 Stage 2B Page: 1 of 1
Laboratory: Analytical Resources, Inc. Reviewer: D
2nd Reviewer: D

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

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

cooler temp = 11.6, 8.1 10.1 not enough time to cool down

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A / A	
II.	GC/MS Instrument performance check	A	
III.	Initial calibration/ICV	A / A	%D RSD ≤ 20 ICV ≤ 30
IV.	Continuing calibration	A	CCV ≤ 20
V.	Laboratory Blanks	A	
VI.	Field blanks	N	
VII.	Surrogate spikes	A	
VIII.	Matrix spike/Matrix spike duplicates	SW	
IX.	Laboratory control samples	A	LCS
X.	Field duplicates	N	
XI.	Internal standards	A	
XII.	Compound quantitation RL/LOQ/LODs	N	
XIII.	Target compound identification	N	
XIV.	System performance	N	
XV.	Overall assessment of data	A	

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; SB=Source blank; OTHER:

	Client ID	Lab ID	Matrix	Date
1	EB-35-10-12	ARZ9A	Soil	12/09/14
2	EB-35-15-17	ARZ9B	Soil	12/09/14
3	EB-35-15-17MS	ARZ9BMS	Soil	12/09/14
4	EB-35-15-17MSD	ARZ9BMSD	Soil	12/09/14
5				
6				
7				
8				

Notes:

	MB - 121016						

VALIDATION FINDINGS WORKSHEET

METHOD: GC/MS SVOA

A. Phenol	AA. 2-Chloronaphthalene	AAA. Butylbenzylphthalate	AAAA. Dibenzothiophene	A1.
B. Bis (2-chloroethyl) ether	BB. 2-Nitroaniline	BBB. 3,3'-Dichlorobenzidine	BBBB. Benzo(a)fluoranthene	B1.
C. 2-Chlorophenol	CC. Dimethylphthalate	CCC. Benzo(a)anthracene	CCCC. Benzo(b)fluorene	C1.
D. 1,3-Dichlorobenzene	DD. Acenaphthylene	DDD. Chrysene	DDDD. cis/trans-Decalin	D1.
E. 1,4-Dichlorobenzene	EE. 2,6-Dinitrotoluene	EEE. Bis(2-ethylhexyl)phthalate	EEEE. Biphenyl	E1.
F. 1,2-Dichlorobenzene	FF. 3-Nitroaniline	FFF. Di-n-octylphthalate	FFFF. Retene	F1.
G. 2-Methylphenol	GG. Acenaphthene	GGG. Benzo(b)fluoranthene	GGGG. C30-Hopane	G1.
H. 2,2'-Oxybis(1-chloropropane)	HH. 2,4-Dinitrophenol	HHH. Benzo(k)fluoranthene	HHHH. 1-Methylphenanthrene	H1.
I. 4-Methylphenol	II. 4-Nitrophenol	III. Benzo(a)pyrene	IIII. 1,4-Dioxane	I1.
J. N-Nitroso-di-n-propylamine	JJ. Dibenzofuran	JJJ. Indeno(1,2,3-cd)pyrene	JJJJ. Acetophenone	J1.
K. Hexachloroethane	KK. 2,4-Dinitrotoluene	KKK. Dibenz(a,h)anthracene	KKKK. Atrazine	K1.
L. Nitrobenzene	LL. Diethylphthalate	LLL. Benzo(g,h,i)perylene	LLLL. Benzaldehyde	L1.
M. Isophorone	MM. 4-Chlorophenyl-phenyl ether	MMM. Bis(2-Chloroisopropyl)ether	MMMM. Caprolactam	M1.
N. 2-Nitrophenol	NN. Fluorene	NNN. Aniline	NNNN. 2,6-Dichlorophenol	N1.
O. 2,4-Dimethylphenol	OO. 4-Nitroaniline	OOO. N-Nitrosodimethylamine	OOOO. 2,6-Dinitrotoluene	O1.
P. Bis(2-chloroethoxy)methane	PP. 4,6-Dinitro-2-methylphenol	PPP. Benzoic Acid	PPPP. 3-Methylphenol	P1.
Q. 2,4-Dichlorophenol	QQ. N-Nitrosodiphenylamine	QQQ. Benzyl alcohol	QQQQ. 3&4 Methylphenol	Q1.
R. 1,2,4-Trichlorobenzene	RR. 4-Bromophenyl-phenylether	RRR. Pyridine	RRRR. 4-Dimethyldibenzothiphene (4MDT)	R1.
S. Naphthalene	SS. Hexachlorobenzene	SSS. Benzidine	SSSS. 2/3-Dimethyldibenzothiophene (4MDT)	S1.
T. 4-Chloroaniline	TT. Pentachlorophenol	TTT. 1-Methylnaphthalene	TTTT. 1-Methyldibenzothiophene (1MDT)	T1.
U. Hexachlorobutadiene	UU. Phenanthrene	UUU.Benzo(b)thiophene	UUUU.	U1.
V. 4-Chloro-3-methylphenol	VV. Anthracene	VVV.Benzonaphthothiophene	VVVV.	V1.
W. 2-Methylnaphthalene	WW. Carbazole	WWW.Benzo(e)pyrene	WWWW.	W1.
X. Hexachlorocyclopentadiene	XX. Di-n-butylphthalate	XXX. 2,6-Dimethylnaphthalene	XXXX.	X1.
Y. 2,4,6-Trichlorophenol	YY. Fluoranthene	YYY. 2,3,5-Trimethylnaphthalene	YYYY.	Y1.
Z. 2,4,5-Trichlorophenol	ZZ. Pyrene	ZZZ. Perylene	ZZZZ.	Z1.

LDC #: 36266E2C

VALIDATION FINDINGS WORKSHEET
Technical Holding Times

Reviewer: D
2nd Reviewer: C

All circled dates have exceeded the technical holding times.
Y (N) N/A Were all cooler temperatures within validation criteria?

METHOD : GC/MA BNA SW846 METHOD 8270D

Sample ID	Matrix	Preserved	Sampling Date	Extraction date	Analysis date	Total # of Days	Qualifier
All	8012	Frozen	12/9/14	12/10/15	12/18/15	1yr + 1day	J/UJ/P ND+RL
Frozen sample holding time = 1 yr from sampling date							

TECHNICAL HOLDING TIME CRITERIA

Water: Extracted within 7 days, analyzed within 40 days.
Soil: Extracted within 14 days, analyzed within 40 days.

LDC #: 36266E2c

VALIDATION FINDINGS WORKSHEET

Matrix Spike/Matrix Spike Duplicates

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

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

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?

#	MS/MSD ID	Compound	MS %R (Limits)	MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
	3+4	S	( )	33.1 (36-120)	( )	2	J/UJ/A ND + Det
		TTT	38.9 (39-120)	38.5 (39-120)	( )	↓	↓ ↓
			( )	( )			
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
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			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: DeNovo 8th Avenue

LDC Report Date: May 9, 2016

Parameters: Polychlorinated Biphenyls

Validation Level: Stage 2B

Laboratory: Analytical Resources, Inc.

Sample Delivery Group (SDG): ARZ9

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
EB-35-10-12	ARZ9A	Soil	12/09/14
EB-35-15-17	ARZ9B	Soil	12/09/14

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Final Quality Assurance Project Plan, Remedial Investigation, Crowley Marine Services 8th Avenue S. Site, Seattle, Washington (October 2012) and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines (CLPNFG) for Superfund Organic Methods Data Review (June 2008). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Polychlorinated Biphenyls (PCBs) by Environmental Protection Agency (EPA) SW 846 Method 8082A

All sample results were subjected to Stage 2B data validation, which comprises an evaluation of quality control (QC) summary results.

The following are definitions of the data qualifiers utilized during data validation:

J (Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.

U (Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

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.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition

Cooler temperatures for samples in this SDG were reported at 11.6°C, 8.1°C, and 10.1°C upon receipt by the laboratory. Since the samples were received the same day that they were collected, time did not allow for sufficient cooling of the samples, therefore no data were qualified.

All technical holding time requirements for frozen samples were met.

II. Initial Calibration and Initial Calibration Verification

An initial calibration was performed as required by the method.

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

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 20.0% for all compounds with the following exceptions:

Date	Standard	Column	Compound	%D	Associated Samples	Flag	A or P
12/18/15	ICV	ZB 5	Aroclor-1254	26.5	EB-35-10-12	J (all detects)	A
12/18/15	ICV	ZB 5	Aroclor-1254	26.5	EB-35-15-17	NA	-

III. Continuing Calibration

Continuing calibration was performed at required frequencies.

The percent differences (%D) were less than or equal to 20.0% for all compounds.

IV. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks.

V. Field Blanks

No field blanks were identified in this SDG.

VI. Surrogates/Internal Standards

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

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

VII. Matrix Spike/Matrix Spike Duplicates

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

Laboratory control samples (LCS) were analyzed as required by the method. Percent recoveries (%R) were within QC limits.

IX. Field Duplicates

No field duplicates were identified in this SDG.

X. Compound Quantitation

Raw data were not reviewed for Stage 2B validation.

XI. Target Compound Identification

Raw data were not reviewed for Stage 2B validation.

XII. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

Due to ICV %D, data were qualified as estimated in one sample.

The quality control criteria reviewed, other than those discussed above, were met and are considered acceptable. Sample results that were found to be estimated (J) are usable for limited purposes only. Based upon the data validation all other results are considered valid and usable for all purposes.

DeNovo 8th Avenue
Polychlorinated Biphenyls - Data Qualification Summary - SDG ARZ9

Sample	Compound	Flag	A or P	Reason
EB-35-10-12	Aroclor-1254	J (all detects)	A	Initial calibration verification (%D)

DeNovo 8th Avenue
Polychlorinated Biphenyls - Laboratory Blank Data Qualification Summary - SDG ARZ9

No Sample Data Qualified in this SDG

LDC #: 36266E3b
SDG #: ARZ9
Laboratory: Analytical Resources, Inc.

VALIDATION COMPLETENESS WORKSHEET
Stage 2B

Date: 5/5/16
Page: 1 of 1
Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: GC Polychlorinated Biphenyls (EPA SW846 Method 8082A)

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

cooler temp = 11.6, 8.1, 10.1 not enough time to cool down

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A/A	
II.	Initial calibration/ICV	A/SW	%D RSD / ICV ≤ 20
III.	Continuing calibration	SW	CCV ≤ 20
IV.	Laboratory Blanks	A	
V.	Field blanks	N	
VI.	Surrogate spikes / IS	A	
VII.	Matrix spike/Matrix spike duplicates	N	CS
VIII.	Laboratory control samples	A	LCS
IX.	Field duplicates	N	
X.	Compound quantitation/RL/LOQ/LODs	N	
XI.	Target compound identification	N	
XII.	Overall assessment of data	A	

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; SB=Source blank; OTHER:

	Client ID	Lab ID	Matrix	Date
1	EB-35-10-12	ARZ9A	Soil	12/09/14
2	EB-35-15-17	ARZ9B	Soil	12/09/14
3				
4				
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13				

Notes:

	MB 121415						

LDC #: 36266E3b

VALIDATION FINDINGS WORKSHEET
Initial Calibration Verification

Reviewer: FT
2nd Reviewer: CL

METHOD: ✓ GC __ HPLC

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".
What type of initial calibration verification calculation was performed? __%D or __%R
Y N N/A Was an initial calibration verification standard analyzed after each ICAL for each instrument?
Y N N/A Did the initial calibration verification standards meet the %D / %R validation criteria of ≤20.0% / 80-120%?

#	Date	Standard ID	Detector/ Column	Compound	%D (Limit ≤ 20.0)	Associated Samples	Qualifications
+	12/18/15	ICV	ZB5	AA	26.5	All	J det /A qual AA only #1 det

LDC #: 36266E3b

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Page: 1 of
Reviewer: FT
2nd Reviewer:

METHOD: GC __ HPLC

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".
What type of continuing calibration calculation was performed? __%D or __%R
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 / %R validation criteria of ≤20.0% / 80-120%?
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 (Limit ≤ 20.0)	RT (limit)	Associated Samples	Qualifications
+	12/22/15 1653	CCV	ZB 35	BB	20.7		MB 121415	J det/A ND qual Y, AA, BB (ND)

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: DeNovo 8th Avenue

LDC Report Date: May 10, 2016

Parameters: Metals

Validation Level: Stage 2B

Laboratory: Analytical Resources, Inc.

Sample Delivery Group (SDG): ARZ9

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
EB-35-10-12	ARZ9A	Soil	12/09/14
EB-35-15-17	ARZ9B	Soil	12/09/14

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Final Quality Assurance Project Plan, Remedial Investigation, Crowley Marine Services 8th Avenue S. Site, Seattle, Washington (October 2012) and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines (CLPNFG) for Inorganic Superfund Data Review (January 2010). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following methods:

Antimony, Arsenic, Barium, Beryllium, Cadmium, Chromium, Copper, Lead, Nickel, Selenium, Silver, Thallium, and Zinc by Environmental Protection Agency (EPA) Method 200.8
Mercury by EPA SW 846 Method 7471A

All sample results were subjected to Stage 2B data validation, which comprises an evaluation of quality control (QC) summary results.

The following are definitions of the data qualifiers utilized during data validation:

J (Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.

U (Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

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.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition.

All technical holding time requirements for frozen samples were met with the following exceptions:

Sample	Analyte	Total Days From Sample Collection Until Analysis	Required Holding Time (in Days) From Sample Collection Until Analysis	Flag	A or P
All samples in SDG ARZ9	Mercury	371	28	J (all detects)	P

II. ICPMS Tune

The mass calibration was within 0.1 AMU and the percent relative standard deviation (%RSD) was less than or equal to 5%.

III. Instrument Calibration

Initial and continuing calibrations were performed as required by the methods.

The initial calibration verification (ICV) and continuing calibration verification (CCV) standards were within QC limits.

IV. ICP Interference Check Sample Analysis

The frequency of interference check sample (ICS) analysis was met. All criteria were within QC limits.

V. Laboratory Blanks

Laboratory blanks were analyzed as required by the methods. No contaminants were found in the laboratory blanks with the following exceptions:

Blank ID	Analyte	Maximum Concentration	Associated Samples
PB (prep blank)	Antimony Lead Thallium	0.050 mg/Kg 0.010 mg/Kg 0.010 mg/Kg	All samples in SDG ARZ9

Data qualification by the laboratory blanks was based on the maximum contaminant concentration in the laboratory blanks 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 laboratory blanks with the following exceptions:

Sample	Analyte	Reported Concentration	Modified Final Concentration
EB-35-10-12	Antimony	0.133 mg/Kg	0.133U mg/Kg
EB-35-15-17	Thallium	0.034 mg/Kg	0.034U mg/Kg

VI. Field Blanks

No field blanks were identified in this SDG.

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	%R (Limits)	Flag	A or P
EMW-21D-15-15.4MS (All samples in SDG ARZ9)	Antimony Chromium	7.6 (75-125) 40.9 (75-125)	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	A
EMW-21D-15-15.4MS (All samples in SDG ARZ9)	Beryllium Thallium	129 (75-125) 132 (75-125)	J (all detects) J (all detects)	A

For EMW-21D-15-15.4MS, although the percent recoveries were severely low for Antimony, the associated sample results were qualified as estimated (J/UJ) since the post spike recoveries were within the QC limits for this analyte.

For EMW-21D-15-15.4MS, no data were qualified for Arsenic and Copper percent recoveries (%R) outside the QC limits since the parent sample results were greater than 4X the spike concentration.

VIII. Duplicate Sample Analysis

Duplicate (DUP) sample analysis was performed on an associated project sample. Results were within QC limits with the following exceptions:

DUP ID (Associated Samples)	Analyte	RPD (Limits)	Flag	A or P
EMW-21D-15-15.4DUP (All samples in SDG ARZ9)	Cadmium Copper Zinc	72.7 (≤20) 22.5 (≤20) 35.0 (≤20)	J (all detects) J (all detects) J (all detects)	A

IX. Serial Dilution

Serial dilution was not performed for this SDG.

X. Laboratory Control Samples

Laboratory control samples (LCS) were analyzed as required by the methods. Percent recoveries (%R) were within QC limits.

XI. Field Duplicates

No field duplicates were identified in this SDG.

XII. Internal Standards (ICP-MS)

Raw data were not reviewed for Stage 2B validation.

XIII. Sample Result Verification

Raw data were not reviewed for Stage 2B validation.

XIV. Overall Assessment of Data

The analysis was conducted within all specifications of the methods. No results were rejected in this SDG.

Due to holding time exceedance, MS/MSD %R, and DUP RPD, data were qualified as estimated in two samples.

Due to laboratory blank contamination, data were qualified as not detected in two samples.

The quality control criteria reviewed, other than those discussed above, were met and are considered acceptable. Sample results that were found to be estimated (J) are usable for limited purposes only. Based upon the data validation all other results are considered valid and usable for all purposes.

DeNovo 8th Avenue
Metals - Data Qualification Summary - SDG ARZ9

Sample	Analyte	Flag	A or P	Reason
EB-35-10-12 EB-35-15-17	Mercury	J (all detects)	P	Technical holding time
EB-35-10-12 EB-35-15-17	Antimony Chromium	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	A	Matrix spike/Matrix spike duplicate (%R)
EB-35-10-12 EB-35-15-17	Beryllium Thallium	J (all detects) J (all detects)	A	Matrix spike/Matrix spike duplicate (%R)
EB-35-10-12 EB-35-15-17	Cadmium Copper Zinc	J (all detects) J (all detects) J (all detects)	A	Duplicate sample analysis (RPD)

DeNovo 8th Avenue
Metals - Laboratory Blank Data Qualification Summary - SDG ARZ9

Sample	Analyte	Modified Final Concentration	A or P
EB-35-10-12	Antimony	0.133U mg/Kg	A
EB-35-15-17	Thallium	0.034U mg/Kg	A

LDC #: 36266E4a
SDG #: ARZ9
Laboratory: Analytical Resources, Inc.

VALIDATION COMPLETENESS WORKSHEET
Stage 2B

Date: 5/5/16
Page: 1 of 1
Reviewer: G
2nd Reviewer: [illegible]

METHOD: Metals (EPA Method 200.8/EPA SW 846 Method 7471A)

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.	Sample receipt/Technical holding times	A SW	Frozen - 200.8: 28 Zgr HT
II.	ICP/MS Tune	A	
III.	Instrument Calibration	A	
IV.	ICP Interference Check Sample (ICS) Analysis	A	
V.	Laboratory Blanks	SW	
VI.	Field Blanks	N	
VII.	Matrix Spike/Matrix Spike Duplicates	SW	MS (ARZ9)
VIII.	Duplicate sample analysis	SW	DUP J
IX.	Serial Dilution	N	
X.	Laboratory control samples	A	LCS
XI.	Field Duplicates	N	
XII.	Internal Standard (ICP-MS)	N	
XIII.	Sample Result Verification	N	
XIV	Overall Assessment of Data	A	

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; SB=Source blank; OTHER:

	Client ID	Lab ID	Matrix	Date
1	EB-35-10-12	ARZ9A	Soil	12/09/14
2	EB-35-15-17	ARZ9B	Soil	12/09/14
3				
4				
5				
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10				
11				
12				

Notes:

LDC #: 36266E4a

VALIDATION FINDINGS WORKSHEET
Sample Specific Element Reference

Page: 1 of 1
Reviewer:
2nd reviewer:

All circled elements are applicable to each sample.

Sample ID	Matrix	Target Analyte List (TAL)
1,2		Al, [✓ Sb, As, Ba, Be, Cd], Ca, [✓ Cr], Co, [✓ Cu], Fe, [✓ Pb], Mg, Mn, [✓ Hg, Ni], K, [✓ Se, Ag], Na, [✓ Tl], V, [✓ Zn], Mo, B, Sn, Ti, ___
		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, Sn, Ti, ___
		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, Sn, Ti, ___
		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, Sn, Ti, ___
		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, Sn, Ti, ___
		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, Sn, Ti, ___
		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, Sn, Ti, ___
		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, Sn, Ti, ___
		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, Sn, Ti, ___
		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, Sn, Ti, ___
		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, Sn, Ti, ___
		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, Sn, Ti, ___
		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, Sn, Ti, ___
		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, Sn, Ti, ___
		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, Sn, Ti, ___
		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, Sn, Ti, ___
		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, Sn, Ti, ___
		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, Sn, Ti, ___
		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, Sn, Ti, ___
		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, Sn, Ti, ___
		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, Sn, Ti, ___
		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, Sn, Ti, ___
		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, Sn, Ti, ___
		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, Sn, Ti, ___
		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, Sn, Ti, ___

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, Sn, Ti, ___
ICP-MS		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___
GFAA		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti

Comments: Mercury by CVAA if performed

LDC #: 36266E4a

VALIDATION FINDINGS WORKSHEET
Technical Holding Times

Reviewer: A
2nd reviewer: amb

Were samples preserved? Y N N/A
All circled dates have exceeded the technical holding time.

METHOD:		(7471A) Mercury Holding time = 28 days					
Sample ID:	Sampling Date	Analysis Date	Total Time until Analysis (days)	Qualifier	Det/ND		
All	12/9/14	12/15/15	371	J/R/P	Det		

Technical Holding Time Criteria

Mercury: 28 days
All other metals: 2 years if frozen

LDC #: 36266E4a

VALIDATION FINDINGS WORKSHEET
PB/ICB/CCB QUALIFIED SAMPLES

Reviewer: AH
2nd Reviewer: SM

METHOD: Trace metals (EPA SW 864 Method 6010B/6020/7000) Soil preparation factor applied: ____
Sample Concentration units, unless otherwise noted: mg/Kg Associated Samples: All

				Sample Identification										
Analyte	**Maximum PB[a] (mg/Kg)**	**Maximum ICB/CCB[a] (ug/L)**	**Action Level**	1	2									
Sb	0.050		0.25	0.133										
Pb	0.010		0.05											
Tl	0.010		0.05		0.034									

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 #: 36266E4a

VALIDATION FINDINGS WORKSHEET
Matrix Spike

Reviewer: G
2nd Reviewer: GMY

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.

LEVEL IV ONLY:

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

#	MS ID	Matrix	Analyte	MS %Recovery	Associated Samples	Qualifications
	EMW-21D-15-15.4MS	s	Sb	7.6	All	J/UJ/A (Det/ND) *
			Be	129		Jdet/A (Det)
			Cr	40.9		J/UJ/A (Det)
			Tl	132		Jdet/A (Det)

Comments: 4: As, Cu >4x 4PS: Sb = 88% *

LDC #: 36266E4a

VALIDATION FINDINGS WORKSHEET
Duplicate Analysis

Page: 1 of 1
Reviewer: SV
2nd Reviewer: amb

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 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 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.

#	Date	Duplicate ID	Matrix	Analyte	RPD (Limits)	Difference (Limits)	Associated Samples	Qualifications
		EMW-21D-15-15.4DUP	s	Cd	72.7		All	J/UJ/A (Det)
				Cu	22.5			J/UJ/A (Det)
				Zn	35.0			J/UJ/A (Det)

Comments:

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: DeNovo 8th Avenue

LDC Report Date: May 10, 2016

Parameters: Total Solids

Validation Level: Stage 2B

Laboratory: Analytical Resources, Inc.

Sample Delivery Group (SDG): ARZ9

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
EB-35-10-12	ARZ9A	Soil	12/09/14
EB-35-15-17	ARZ9B	Soil	12/09/14
EB-35-10-12DUP	ARZ9ADUP	Soil	12/09/14
EB-35-10-12TRP	ARZ9ATRP	Soil	12/09/14

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Final Quality Assurance Project Plan, Remedial Investigation, Crowley Marine Services 8th Avenue S. Site, Seattle, Washington (October 2012) and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines (CLPNFG) for Inorganic Superfund Data Review (January 2010). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Total Solids by Standard Method 2540G

All sample results were subjected to Stage 2B data validation, which comprises an evaluation of quality control (QC) summary results.

The following are definitions of the data qualifiers utilized during data validation:

J (Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.

U (Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

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.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition.

All technical holding time requirements for frozen samples were met.

II. Initial Calibration

All criteria for the initial calibration were met.

III. Continuing Calibration

Continuing calibration frequency and analysis criteria were met.

IV. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks.

V. Field Blanks

No field blanks were identified in this SDG.

VI. Matrix Spike/Matrix Spike Duplicates

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

VII. Triplicate Sample Analysis

Duplicate (DUP) and triplicate (TRP) sample analyses were performed on an associated project sample. Results were within QC limits.

VIII. Laboratory Control Samples

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

IX. Field Duplicates

No field duplicates were identified in this SDG.

X. Sample Result Verification

Raw data were not reviewed for Stage 2B validation.

XI. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

The quality control criteria reviewed were met and are considered acceptable. Based upon the data validation all results are considered valid and usable for all purposes.

DeNovo 8th Avenue
Total Solids - Data Qualification Summary - SDG ARZ9

No Sample Data Qualified in this SDG

DeNovo 8th Avenue
Total Solids - Laboratory Blank Data Qualification Summary - SDG ARZ9

No Sample Data Qualified in this SDG

LDC #: 36266E6 **VALIDATION COMPLETENESS WORKSHEET** Date: 5/5/16

SDG #: ARZ9 Stage 2B Page: 1 of 1

Laboratory: Analytical Resources, Inc. Reviewer: G

2nd Reviewer:

METHOD: (Analyte) Total Solids (SM2540G)

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.	Sample receipt/Technical holding times	A / A	FROZEN, NO HT
II	Initial calibration	A	
III.	Calibration verification	A	
IV	Laboratory Blanks	A	
V	Field blanks	N	
VI.	Matrix Spike/Matrix Spike Duplicates	N	not required
VII.	~~Duplicate~~ Triplicate sample analysis	A	TRP
VIII.	Laboratory control samples	N	not required
IX.	Field duplicates	N	
X.	Sample result verification	N	
XI	Overall assessment of data	A	

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; SB=Source blank; OTHER:

	Client ID	Lab ID	Matrix	Date
1	EB-35-10-12	ARZ9A	Soil	12/09/14
2	EB-35-15-17	ARZ9B	Soil	12/09/14
3	EB-35-10-12DUP	ARZ9ADUP	Soil	12/09/14
4	" TRP	" TRP	"	"
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				

Notes:

The attached zipped file contains two files:

File	Format	Description	
1) Readme_DeNovo_051216.doc	MS Word 2003	A "Readme" file (this document).	
2) LDC36266_ARX9,ARZ2,ARZ6,ARZ8,ARZ9.xlsx	MS Excel 2007	A spreadsheet for the following SDG(s):	
		ARX9	36266A
		ARZ2	36266B
		ARZ6	36266C
		ARZ8	36266D
		ARZ9	36266E

No discrepancies were observed between the hardcopy data packages and the electronic data deliverables during EDD population of validation qualifiers. A 100% verification of the EDD was not performed.

Please contact Christina Rink at (760) 827-1100 if you have any questions regarding this electronic data submittal.

LDC #: 76266

EDD POPULATION COMPLETENESS WORKSHEET

Anchor

Date: 5.12.16

2nd Reviewer:

The LDC job number listed above was entered by ___.

	EDD Process	Y/N	Init	Comments/Action
I.	EDD Completeness	-		
Ia.	- All methods present?	✓	W	
Ib.	- All samples present/match report?	✓	W	
Ic.	- All reported analytes present?	✓	W	
Id	-10% verification of EDD?	✓	W	
II.	EDD Preparation/Entry	-		
IIa.	- QC Level applied? (EPAStage2B or EPAStage4)	✓	W	
IIb.	- Laboratory EMPC qualified results qualified (J with reason code 23)?	✓	W	
III.	Reasonableness Checks	-		
IIIa.	- Do all qualified ND results have ND qualifier (i.e. UJ)?	✓	W	
IIIb.	- Do all qualified detect results have detect qualifier (i.e. J)?	✓	W	
IIIc.	- If reason codes used, do all qualified results have reason code field populated, and vice versa?	✓	W	
IIId.	- Do blank concentrations in report match EDD, where data was qualified due to blank?	✓	W	
IIIe.	- Were any results reported above calibration range? If so, were results qualified appropriately?	✓/✓	W	
IIIf.	- Are all results marked reportable "Yes" unless rejected for overall assessment in the data validation report?	N	W	
IIIg.	-Are there any lab "R" qualified data? / Are the entry columns blank for these results?	N/N	W	
IIIh.	- Is the detect flag set to "N" for all "U" qualified blank results?	✓	W	

Notes: *see readme

APPENDIX J

SUMMARY OF DERIVATION PROCESS FOR IDENTIFICATION OF INDICATOR HAZARDOUS SUBSTANCES

Memorandum

Date: July 10, 2019

Subject: Derivation of COPCs, COCs, and IHSs, 8th Avenue Terminals, Inc. Site

This memorandum describes the process that SLR used to derive the chemicals of potential concern (COPCs), chemicals of concern (COCs), and indicator hazardous substances (IHSs) for the 8th Avenue Terminals, Inc. site (the Site). Site-specific screening levels (SLs) were developed in Section 6 of the Remedial Investigation (RI) Report for soil, groundwater (including seeps), and sediments. Catch basin solids sample analytical results were compared to sediment screening levels, and stormwater sample analytical results were compared to groundwater screening levels (most of the groundwater screening levels were based on protection of surface water or sediment). The chemical concentrations for each of these media were compared to the SLs for the purpose of defining the nature and extent of contamination at the Site. Chemicals that were present at concentrations exceeding media-specific SLs with detected results or undetected results (the method reporting limit [MRL] exceeds the SL) in one or more samples were identified as COPCs. For each of the COPCs associated with each medium, statistical analyses were conducted to identify COCs.

Based on the list of COCs, and consistent with WAC 173-340-708, IHSs were identified for soil and groundwater as a subset of the COCs. The IHSs, which were used to focus the evaluation of the nature and extent of the soil and groundwater contamination at the Site, were selected based on the following factors (WAC 173-340-703):

- The toxicological characteristics of the hazardous substance that influence its ability to adversely affect human health or the environment
- The chemical and physical characteristics that govern the hazardous substance's persistence and mobility
- Natural background concentrations, thoroughness of testing, frequency of detection, and degradation by-products

In addition, the selected IHSs represented each major analytical group of the COCs and had the largest contaminant distributions for each major analytical group.

The IHSs were used in Section 7 of the Draft Final RI Report to evaluate the nature and extent of the contamination at the Site.

A detailed multi-tier derivation process to derive the COPCs, COCs, and IHSs was conducted as follows:

1. RI data with a representative number of samples for soil, groundwater (including seeps), surface sediment (including intertidal), subsurface sediment, stormwater, and catch basin solids were compared to applicable SLs. Pre-RI soil and catch basin solids data were also compared to the SLs.

2. For each medium, conducted statistical analysis of the data for each chemical to define the following:
    a. Frequency of detection
    b. Number of detects and non-detects (MRLs) that are > SL
    c. Number of different locations with at least one detected concentration greater than the SL
    d. Percentage of samples containing a detected concentration greater than the SL
    e. Location with greatest detected concentration
    f. Greatest detected concentration
    g. Maximum exceedance factor (i.e., greatest detected concentration/SL)

3. Derived COPCs:
    a. Chemicals with any exceedance of the SL by a detected concentration and/or a non-detected MRL were retained as COPCs.

4. Derived COCs:
    a. COPCs with a maximum exceedance factor of >10 were retained as COCs.
    b. For soil, sediment, and catch basin solids, COPCs were retained as COCs if the maximum exceedance factor is >2, the number of locations

containing detected concentrations greater than the SL are >5%, and the total percentage of detected concentrations greater than the SL are >5%.

c. The soil COCs were also retained as groundwater COCs.
d. For groundwater and stormwater, COPCs were retained as COCs if the maximum exceedance factor is >2, the number of locations containing detected concentrations greater than the SL are >2, and the total percentage of detected concentrations greater than the SL are >5%.

5. Derived IHSs:
    a. The derivation of the IHSs was a qualitative screening step based on the list of COCs from Step 4, and was only performed for soil and groundwater. It included the evaluation and analysis of combined parameters and criteria, such as co-location of various COCs; levels of toxicity, persistence, and mobility of COCs; lateral extents of COCs; COC presence in various media; natural background concentrations; and overall, best professional judgement. At least one COC per major analytical group was selected as a representative indicator (e.g., total carcinogenic polycyclic aromatic hydrocarbons toxicity equivalent [total cPAH TEQ] for the PAH group).

The attached Table J-1 presents the selected IHSs by medium. The statistical derivation of the COPCs and COCs is presented in the attached Tables J-2 through J-7.

TABLES

Table J-1
Summary of Indicator Hazardous Substances
8th Avenue Terminals, Inc. Site

Chemical	Soil	Groundwater
Arsenic	X	X[a]
Copper	X	X[a]
Lead	X	
Selenium	X	
Vinyl Chloride	X	X
Total cPAHs TEQ	X	X
Total Dioxins/Furans TEQ	X	
Total PCBs	X	X
GRO	X	
Total Semi-Volatile Petroleum Hydrocarbons (DRO + ORO)	X	
Total Number of IHSs	10	5

Notes:

[a] = Indicator metals in the dissolved fraction

COC = Chemical of concern

cPAH = Carcinogenic polycyclic aromatic hydrocarbon

IHS = Indicator hazardous substance

PCB = Polychlorinated biphenyl

TEQ = Toxicity equivalent

DRO = Diesel-range organics

ORO = Oil-range organics

GRO= Gasoline-range organics

Table J-2
Soil Data Statistical Results
8th Avenue Terminals, Inc. Site

Chemical	Screening Level (SL) Value (mg/kg)	Cas. No.	Number of Analyses	Number of Non-detects over SL	Number of Detections	Number of Detections over SL	Chemical Retained as COPC?	Total Percent Detected	Total Percent of Samples with Detections over SL	Highest Detected Concentration (mg/kg)	Location of Highest Detected Concentration	Depth of Highest Concentration (feet)	Number of Different Locations Analyzed	Number of Different Locations with Detections over SL	Total Percent of Different Locations with SL Exceedances	Exceedance Factor for Highest Concentration	Chemical Retained as COC Based on Statistical Analysis?	Chemical Identified as Groundwater COC?	Chemical Retained as Soil COC?	Chemical Retained as Indicator Hazardous Substance?
alpha-Endosulfan	480	959-98-8	8	0	1	0	No	12.50%	0.00%	0.0177	SS4	0.5	8	NA	0.00%	0.00004	No	No	No	NA
beta-Endosulfan	480	33213-65-9	8	0	0	0	No	0.00%	0.00%	NA	NA	NA	8	NA	0.00%	NA	No	No	No	NA
1,1,1,2-Tetrachloroethane	38	630-20-6	269	0	0	0	No	0.00%	0.00%	NA	NA	NA	113	NA	0.00%	NA	No	No	No	NA
1,1,1-Trichloroethane	160,000	71-55-6	354	0	1	0	No	0.28%	0.00%	0.0012	EB-22	8	145	NA	0.00%	0.00000001	No	No	No	NA
1,1,2,2-Tetrachloroethane	5	79-34-5	302	0	0	0	No	0.00%	0.00%	NA	NA	NA	126	NA	0.00%	NA	No	No	No	NA
1,1,2-Trichloroethane	18	79-00-5	354	0	1	0	No	0.28%	0.00%	0.0012	EB-22	8	145	NA	0.00%	0.0001	No	No	No	NA
1,1-Dichloroethane	175	75-34-3	352	0	3	0	No	0.85%	0.00%	0.0012	EB-22	8	144	NA	0.00%	0.00001	No	No	No	NA
1,1-Dichloroethene	4,000	75-35-4	349	0	1	0	No	0.29%	0.00%	0.204	FB-2	8	143	NA	0.00%	0.0001	No	No	No	NA
1,2,3-Trichloropropane	0.03	96-18-4	269	23	0	0	Yes	0.00%	0.00%	NA	NA	NA	113	NA	0.00%	NA	No	No	No	NA
1,2,4-Trichlorobenzene	34	120-82-1	574	1	6	0	Yes	1.05%	0.00%	0.023	EMW-20D	10	133	NA	0.00%	0.0007	No	No	No	NA
1,2,4-Trimethylbenzene	800	95-63-6	269	0	18	0	No	6.69%	0.00%	25	EB-51	7.5	113	NA	0.00%	0.03	No	No	No	NA
1,2-Dibromo-3-Chloropropane	1.3	96-12-8	269	0	0	0	No	0.00%	0.00%	NA	NA	NA	113	NA	0.00%	NA	No	No	No	NA
1,2-Dichlorobenzene	7,200	95-50-1	576	0	6	0	No	1.04%	0.00%	0.057	EB-34	3.5	135	NA	0.00%	0.00001	No	No	No	NA
1,2-Dichloroethane	11	107-06-2	362	0	1	0	No	0.28%	0.00%	0.0012	EB-22	8	145	NA	0.00%	0.0001	No	No	No	NA
1,2-Dichloropropane	27	78-87-5	306	0	0	0	No	0.00%	0.00%	NA	NA	NA	130	NA	0.00%	NA	No	No	No	NA
1,3,5-Trimethylbenzene	800	108-67-8	269	0	16	0	No	5.95%	0.00%	4.3	EB-51	7.5	113	NA	0.00%	0.005	No	No	No	NA
1,4-Dichlorobenzene	185	106-46-7	574	0	4	0	No	0.70%	0.00%	0.79	DB12	11.5	133	NA	0.00%	0.004	No	No	No	NA
1-Methylnaphthalene	34	90-12-0	222	0	67	3	Yes	30.18%	1.35%	160	EB-34	8	88	2	2.60%	4.6	No	No	No	NA
2,4,5-Trichlorophenol	8,000	95-95-4	370	0	1	0	No	0.27%	0.00%	0.075	HC13	2.5	126	NA	0.00%	0.00001	No	No	No	NA
2,4,6-Trichlorophenol	80	88-06-2	370	2	1	0	Yes	0.27%	0.00%	0.075	HC13	2.5	126	NA	0.00%	0.0009	No	No	No	NA
2,4-Dichlorophenol	240	120-83-2	329	0	1	0	No	0.30%	0.00%	0.075	HC13	2.5	126	NA	0.00%	0.0003	No	No	No	NA
2,4-Dimethylphenol	1,600	105-67-9	339	0	15	0	No	4.42%	0.00%	43	DB11	8	133	NA	0.00%	0.03	No	No	No	NA
2,4-Dinitrophenol	160	51-28-5	328	2	1	0	Yes	0.30%	0.00%	0.37	HC13	2.5	126	NA	0.00%	0.0023	No	No	No	NA
2,4-Dinitrotoluene	3.2	121-14-2	305	7	0	0	Yes	0.00%	0.00%	NA	NA	NA	120	NA	0.00%	NA	No	No	No	NA
2,6-Dinitrotoluene	0.67	606-20-2	305	23	0	0	Yes	0.00%	0.00%	NA	NA	NA	120	NA	0.00%	NA	No	No	No	NA
2-Chlorophenol	400	95-57-8	329	0	2	0	No	0.61%	0.00%	0.09	DB6	13	126	NA	0.00%	0.0002	No	No	No	NA
2-Chlorotoluene	1,600	95-49-8	269	0	5	0	No	1.86%	0.00%	0.14	IAB-24	5	113	NA	0.00%	0.0001	No	No	No	NA
2-Hexanone	400	591-78-6	284	0	1	0	No	0.35%	0.00%	0.0011	DB7	6	119	NA	0.00%	0.000003	No	No	No	NA
2-Methylnaphthalene	320	91-57-6	462	0	168	2	Yes	36.36%	0.43%	940	DB11	8	164	2	1.22%	2.9	No	No	No	NA
2-Nitroaniline	800	88-74-4	305	0	0	0	No	0.00%	0.00%	NA	NA	NA	120	NA	0.00%	NA	No	No	No	NA
3,3'-Dichlorobenzidine	2.2	91-94-1	169	6	0	0	Yes	0.00%	0.00%	NA	NA	NA	74	NA	0.00%	NA	No	No	No	NA
3-Methylphenol and 4-Methylphenol coelution	8,000	108-39-4	235	0	7	0	No	2.98%	0.00%	0.48	IAB-10	5	97	NA	0.00%	0.0001	No	No	No	NA
4,4'-DDD	1	72-54-8	8	0	0	0	No	0.00%	0.00%	NA	NA	NA	8	NA	0.00%	NA	No	No	No	NA
4,4'-DDE	1	72-55-9	8	0	0	0	No	0.00%	0.00%	NA	NA	NA	8	NA	0.00%	NA	No	No	No	NA
4,4'-DDT	1	50-29-3	8	0	0	0	No	0.00%	0.00%	NA	NA	NA	8	NA	0.00%	NA	No	No	No	NA
4-Chloroaniline	5	106-47-8	304	37	0	0	Yes	0.00%	0.00%	NA	NA	NA	120	NA	0.00%	NA	No	No	No	NA
Acenaphthene	4,800	83-32-9	466	0	188	0	No	40.34%	0.00%	860	DB11	8	165	NA	0.00%	0.18	No	Yes	Yes	No
Acetone	72,000	67-64-1	354	0	119	0	No	33.62%	0.00%	86	DB2	7	145	NA	0.00%	0.0012	No	No	No	NA
Acrolein	40	107-02-8	116	0	0	0	No	0.00%	0.00%	NA	NA	NA	56	NA	0.00%	NA	No	No	No	NA
Acrylonitrile	1.9	107-13-1	138	0	1	0	No	0.72%	0.00%	0.0042	IAB-29	5	67	NA	0.00%	0.0023	No	No	No	NA
Aldrin	0.06	309-00-2	8	0	0	0	No	0.00%	0.00%	NA	NA	NA	8	NA	0.00%	NA	No	No	No	NA
alpha-BHC	0.16	319-84-6	8	0	0	0	No	0.00%	0.00%	NA	NA	NA	8	NA	0.00%	NA	No	No	No	NA
Anthracene	24,000	120-12-7	464	0	237	0	No	51.08%	0.00%	910	DB6	4.5	165	NA	0.00%	0.04	No	No	No	NA
Antimony	32	7440-36-0	344	0	189	22	Yes	54.94%	6.40%	2,170	EB-38	4.5	132	18	15.15%	68	Yes	No	Yes	No
Arsenic	7.3	7440-38-2	519	2	451	129	Yes	86.90%	24.86%	6,000	IAB-20	5	198	89	44.95%	822	Yes	Yes	Yes	Yes
Benzene	18	71-43-2	364	0	36	0	No	9.89%	0.00%	0.018	IAB-17	5	153	NA	0.00%	0.0010	No	No	No	NA
Benzo(a)pyrene	0.19	50-32-8	475	3	254	107	Yes	53.47%	22.53%	320	EMW-10S	4.5	165	70	42.42%	1,707	Yes	Yes	Yes	No
Benzoic Acid	320,000	65-85-0	326	0	46	0	No	14.11%	0.00%	0.94	HC13	2.5	131	NA	0.00%	0.000003	No	No	No	NA
Benzyl Alcohol	8,000	100-51-6	306	0	49	0	No	16.01%	0.00%	0.072	EMW-6S	9.5	120	NA	0.00%	0.00001	No	No	No	NA
beta-BHC	0.56	319-85-7	8	0	0	0	No	0.00%	0.00%	NA	NA	NA	8	NA	0.00%	NA	No	No	No	NA
Bis(2-chloro-1-methylethyl) ether	14	108-60-1	141	0	0	0	No	0.00%	0.00%	NA	NA	NA	63	NA	0.00%	NA	No	No	No	NA
Bis(2-Chloroethyl)Ether	0.91	111-44-4	305	11	0	0	Yes	0.00%	0.00%	NA	NA	NA	120	NA	0.00%	NA	No	No	No	NA
Bromobenzene	640	108-86-1	269	0	0	0	No	0.00%	0.00%	NA	NA	NA	113	NA	0.00%	NA	No	No	No	NA
Bromoform	127	75-25-2	306	0	0	0	No	0.00%	0.00%	NA	NA	NA	130	NA	0.00%	NA	No	No	No	NA
Bromomethane	112	74-83-9	306	0	1	0	No	0.33%	0.00%	0.0014	EB-31	12.5	130	NA	0.00%	0.00001	No	No	No	NA
Butyl benzyl phthalate	526	85-68-7	1	0	0	0	No	0.00%	0.00%	NA	NA	NA	1	NA	0.00%	NA	No	No	No	NA
Cadmium	36	7440-43-9	434	0	242	0	No	55.76%	0.00%	8.1	IAB-20	5	169	NA	0.00%	0.23	No	No	No	NA
Carbon Disulfide	8,000	75-15-0	155	0	21	0	No	13.55%	0.00%	0.065	DB11	8	75	NA	0.00%	0.000008	No	No	No	NA
Carbon Tetrachloride	14	56-23-5	354	0	1	0	No	0.28%	0.00%	0.0012	EB-22	8	145	NA	0.00%	0.0001	No	No	No	NA
CFC-11	24,000	75-69-4	304	0	0	0	No	0.00%	0.00%	NA	NA	NA	128	NA	0.00%	NA	No	No	No	NA

Table J-2
Soil Data Statistical Results
8th Avenue Terminals, Inc. Site

Chemical	Screening Level (SL) Value (mg/kg)	Cas. No.	Number of Analyses	Number of Non-detects over SL	Number of Detections	Number of Detections over SL	Chemical Retained as COPC?	Total Percent Detected	Total Percent of Samples with Detections over SL	Highest Detected Concentration (mg/kg)	Location of Highest Detected Concentration	Depth of Highest Concentration (feet)	Number of Different Locations Analyzed	Number of Different Locations with Detections over SL	Total Percent of Different Locations with SL Exceedances	Exceedance Factor for Highest Concentration	Chemical Retained as COC Based on Statistical Analysis?	Chemical Identified as Groundwater COC?	Chemical Retained as Soil COC?	Chemical Retained as Indicator Hazardous Substance?
CFC-113	2,400,000	76-13-1	171	0	0	0	No	0.00%	0.00%	NA	NA	NA	80	NA	0.00%	NA	No	No	No	NA
CFC-12	16,000	75-71-8	253	0	0	0	No	0.00%	0.00%	NA	NA	NA	108	NA	0.00%	NA	No	No	No	NA
Chlorobenzene	1,600	108-90-7	352	0	8	0	No	2.27%	0.00%	0.097	DB6	7	143	NA	0.00%	0.0001	No	No	No	NA
Chlorodibromomethane	12	124-48-1	306	0	0	0	No	0.00%	0.00%	NA	NA	NA	130	NA	0.00%	NA	No	No	No	NA
Chloroform	32	67-66-3	352	0	9	0	No	2.56%	0.00%	0.0019	EB-11	8	143	NA	0.00%	0.0001	No	No	No	NA
Chromium	135	7440-47-3	434	0	427	3	Yes	98.39%	0.69%	220	IAB-20	5	169	3	1.78%	1.6	No	No	No	NA
Chromium, Hexavalent	240	18540-29-9	2	0	0	0	No	0.00%	0.00%	NA	NA	NA	2	NA	0.00%	NA	No	No	No	NA
Cis-1,2-Dichloroethene	160	156-59-2	306	0	3	0	No	0.98%	0.00%	0.031	FB-5	11	130	NA	0.00%	0.00019	No	No	No	NA
Cis-1,3-Dichloropropene	10	10061-01-5	306	0	0	0	No	0.00%	0.00%	NA	NA	NA	130	NA	0.00%	NA	No	No	No	NA
cis-Chlordane	2.9	5103-71-9	8	0	0	0	No	0.00%	0.00%	NA	NA	NA	8	NA	0.00%	NA	No	No	No	NA
Copper	550	7440-50-8	415	0	409	12	Yes	98.55%	2.89%	3,710	EB-42	3	158	11	6.96%	6.7	No	Yes	Yes	Yes
Cumene	8,000	98-82-8	269	0	3	0	No	1.12%	0.00%	0.77	EB-51	7.5	113	NA	0.00%	0.0001	No	No	No	NA
Di(2-ethylhexyl) phthalate	71	117-81-7	354	1	76	0	Yes	21.47%	0.00%	20	EB-51	9	137	NA	0.00%	0.28	No	No	No	NA
Dibenzofuran	80	132-64-9	391	0	109	5	Yes	27.88%	1.28%	390	DB11	8	143	4	2.80%	4.9	No	No	No	NA
Dibromomethane	800	74-95-3	269	0	0	0	No	0.00%	0.00%	NA	NA	NA	113	NA	0.00%	NA	No	No	No	NA
Dibutylphthalate	8,000	84-74-2	335	0	9	0	No	2.69%	0.00%	0.54	CMW-4	5	130	NA	0.00%	0.0001	No	No	No	NA
Dichlorobromomethane	16	75-27-4	306	0	0	0	No	0.00%	0.00%	NA	NA	NA	130	NA	0.00%	NA	No	No	No	NA
Dieldrin	0.06	60-57-1	8	0	0	0	No	0.00%	0.00%	NA	NA	NA	8	NA	0.00%	NA	No	No	No	NA
Diesel Range Organics	2,000	68334-30-5	343	0	149	9	Yes	43.44%	2.62%	23000	EMW-10S	4.5	138	9	5.07%	12	Yes	No	Yes	No
Total Semi-Volatile Petroleum Hydrocarbons (Diesel + Oil)	2,000	68334-30-5	681	0	285	19	Yes	41.85%	2.79%	23,000	EMW-10S	4.5	138	7	5.07%	12	Yes	No	Yes	Yes
Diethyl phthalate	64,000	84-66-2	335	0	16	0	No	4.78%	0.00%	4.3	SLR5	3	130	NA	0.00%	0.0001	No	No	No	NA
Di-N-Octyl Phthalate	800	117-84-0	335	0	2	0	No	0.60%	0.00%	0.34	CMW-4	5	130	NA	0.00%	0.0004	No	No	No	NA
Endrin	0.4	72-20-8	8	0	0	0	No	0.00%	0.00%	NA	NA	NA	8	NA	0.00%	NA	No	No	No	NA
Ethylbenzene	8,000	100-41-4	370	0	24	0	No	6.49%	0.00%	7.8	DB2	9.5	153	NA	0.00%	0.001	No	No	No	NA
Ethylene dibromide	0.5	106-93-4	279	0	0	0	No	0.00%	0.00%	NA	NA	NA	115	NA	0.00%	NA	No	No	No	NA
Fluoranthene	3,200	206-44-0	484	0	303	0	No	62.60%	0.00%	1,500	EMW-10S	5	172	NA	0.00%	NA	No	No	No	NA
Fluorene	3,200	86-73-7	484	0	187	0	No	38.64%	0.00%	630	DB11	8	172	NA	0.00%	0.20	No	Yes	Yes	No
gamma-Chlordane	2.9	5566-34-7	8	0	0	0	No	0.00%	0.00%	NA	NA	NA	8	NA	0.00%	NA	No	No	No	NA
Gasoline Range Organics	30	86290-81-5	109	0	25	3	Yes	22.94%	2.75%	1,400	EB-51	7.5	49	2	4.08%	47	Yes	No	Yes	Yes
Heavy Fuel Oil	2,000	NA	16	0	10	2	Yes	62.50%	12.50%	16,000	TP1	9.5	12	2	16.67%	8	Yes	No	Yes	No
Heptachlor Epoxide	0.11	1024-57-3	8	0	0	0	No	0.00%	0.00%	NA	NA	NA	8	NA	0.00%	NA	No	No	No	NA
Heptachlor	0.22	76-44-8	8	0	0	0	No	0.00%	0.00%	NA	NA	NA	8	NA	0.00%	NA	No	No	No	NA
Hexachlorobenzene	0.63	118-74-1	305	13	0	0	Yes	0.00%	0.00%	NA	NA	NA	120	NA	0.00%	NA	No	No	No	NA
Hexachlorobutadiene	13	87-68-3	574	1	3	0	Yes	0.52%	0.00%	0.019	EB-11	3	133	NA	0.00%	0.001	No	No	No	NA
Hexachlorocyclopentadiene	480	77-47-4	305	0	0	0	No	0.00%	0.00%	NA	NA	NA	120	NA	0.00%	NA	No	No	No	NA
Hexachloroethane	25	67-72-1	305	1	0	0	Yes	0.00%	0.00%	NA	NA	NA	120	NA	0.00%	NA	No	No	No	NA
Isophorone	1,053	78-59-1	305	0	0	0	No	0.00%	0.00%	NA	NA	NA	120	NA	0.00%	NA	No	No	No	NA
Lead	220	7439-92-1	468	0	424	25	Yes	90.60%	5.34%	3,700	IAB-20	5	185	23	12.43%	16.82	Yes	No	Yes	Yes
Lindane	0.91	58-89-9	8	0	0	0	No	0.00%	0.00%	NA	NA	NA	8	NA	0.00%	NA	No	No	No	NA
Lube Oil	2,000	NA	231	0	125	7	Yes	54.11%	3.03%	19000	EMW-10S	4.5	97	7	6.19%	9.5	No	No	No	NA
m, p-Xylene	16,000	179601-23-1	255	0	10	0	No	3.92%	0.00%	2.6	EB-51	7.5	103	NA	0.00%	0.0002	No	No	No	NA
Mercury	9	7439-97-6	375	0	319	0	No	85.07%	0.00%	0.72	IAB-20	5	150	NA	0.00%	0.08	No	No	No	NA
Methyl ethyl ketone	48,000	78-93-3	308	0	56	0	No	18.18%	0.00%	0.069	IAB-30	7	132	NA	0.00%	0.000001	No	No	No	NA
Methyl isobutyl ketone	6,400	108-10-1	308	0	5	0	No	1.62%	0.00%	0.21	EB-38	4.5	132	NA	0.00%	0.00003	No	No	No	NA
Methylene Chloride	480	75-09-2	354	0	168	0	No	47.46%	0.00%	5.9	DB2	18	145	NA	0.00%	0.01	No	No	No	NA
Motor Oil	2,000	NA	91	0	45	1	Yes	49.45%	1.10%	6,300	SLR5	3	27	1	3.70%	3.2	No	No	No	NA
Naphthalene	1,600	91-20-3	732	0	259	1	Yes	35.38%	0.14%	2,100	DB11	8	167	1	0.60%	1.3	No	Yes	Yes	No
n-Butylbenzene	4,000	104-51-8	138	0	3	0	No	2.17%	0.00%	0.0016	EB-11	3	67	NA	0.00%	0.0000004	No	No	No	NA
Nickel	1,600	7440-02-0	403	0	397	0	No	98.51%	0.00%	84.2	DMW-6A	2	151	NA	0.00%	0.05	No	No	No	NA
Nitrobenzene	160	98-95-3	307	0	0	0	No	0.00%	0.00%	NA	NA	NA	122	NA	0.00%	NA	No	No	No	NA
N-Nitrosodi-n-propylamine	0.14	621-64-7	304	139	1	1	Yes	0.33%	0.33%	0.23	IAB-23	5	120	1	0.83%	1.6	No	No	No	NA
N-Nitrosodiphenylamine	204	86-30-6	305	0	2	0	No	0.66%	0.00%	0.12	IAB-37	20	120	NA	0.00%	0.0006	No	No	No	NA
n-Propylbenzene	8,000	103-65-1	269	0	3	0	No	1.12%	0.00%	1.8	EB-51	7.5	113	NA	0.00%	0.0002	No	No	No	NA
o-Cresol	4,000	95-48-7	340	0	13	0	No	3.82%	0.00%	6	DB6	4.5	133	NA	0.00%	0.002	No	No	No	NA
o-Xylene	16,000	95-47-6	255	0	9	0	No	3.53%	0.00%	2.7	EB-51	7.5	103	NA	0.00%	0.0002	No	No	No	NA
PCN-002	6,400	91-58-7	305	0	0	0	No	0.00%	0.00%	NA	NA	NA	120	NA	0.00%	NA	No	No	No	NA
Pentachlorophenol	2.5	87-86-5	360	14	40	0	Yes	11.11%	0.00%	0.69	DB6	4.5	133	NA	0.00%	0.3	No	No	No	NA
Phenol	24,000	108-95-2	339	0	44	0	No	12.98%	0.00%	4.3	DB6	4.5	133	NA	0.00%	0.0002	No	No	No	NA
Pyrene	2,400	129-00-0	483	0	311	0	No	64.39%	0.00%	1,700	EMW-10S	4.5	172	NA	0.00%	0.7083	No	No	No	NA
Sec-Butylbenzene	8,000	135-98-8	269	0	3	0	No	1.12%	0.00%	1.4	EB-51	7.5	113	NA	0.00%	0.0002	No	No	No	NA
Selenium	0.8	7782-49-2	370	179	69	21	Yes	18.65%	5.68%	17	SB11	0	150	16	10.67%	21	Yes	Yes	Yes	Yes

Table J-2
Soil Data Statistical Results
8th Avenue Terminals, Inc. Site

Chemical	Screening Level (SL) Value (mg/kg)	Cas. No.	Number of Analyses	Number of Non-detects over SL	Number of Detections	Number of Detections over SL	Chemical Retained as COPC?	Total Percent Detected	Total Percent of Samples with Detections over SL	Highest Detected Concentration (mg/kg)	Location of Highest Detected Concentration	Depth of Highest Concentration (feet)	Number of Different Locations Analyzed	Number of Different Locations with Detections over SL	Total Percent of Different Locations with SL Exceedances	Exceedance Factor for Highest Concentration	Chemical Retained as COC Based on Statistical Analysis?	Chemical Identified as Groundwater COC?	Chemical Retained as Soil COC?	Chemical Retained as Indicator Hazardous Substance?
Silver	400	7440-22-4	374	0	142	0	No	37.97%	0.00%	5.7	IAB-20	5	150	NA	0.00%	0.01	No	No	No	NA
Styrene	16,000	100-42-5	352	0	10	0	No	2.84%	0.00%	1.3	DB2	12	144	NA	0.00%	0.0001	No	No	No	NA
Tert-Butylbenzene	8,000	98-06-6	269	0	1	0	No	0.37%	0.00%	0.098	EB-51	7.5	113	NA	0.00%	0.00001	No	No	No	NA
Tetrachloroethene	476	127-18-4	354	0	15	0	No	4.24%	0.00%	0.0043	DB4	6	145	NA	0.00%	0.00001	No	No	No	NA
Toluene	6,400	108-88-3	370	0	42	0	No	11.35%	0.00%	1.7	DB2	9.5	153	NA	0.00%	0.0003	No	No	No	NA
Total cPAHs TEQ	0.19	NA	452	3	302	113	Yes	66.81%	25.00%	451	EMW-10S	5	150	70	46.67%	2,374	Yes	Yes	Yes	Yes
Total Dioxins/Furans TEQ	0.000013	NA	97	0	90	16	Yes	92.78%	16.49%	0.000279	IAB-24	7	40	13	32.50%	21	Yes	No	Yes	Yes
Total PCBs	0.5	NA	390	13	95	16	Yes	24.36%	4.10%	4	DMW-6	4.5	137	15	10.95%	8.0	No	Yes	Yes	Yes
Total Xylenes	16,000	1330-20-7	113	0	30	0	No	26.55%	0.00%	16	DB2	9.5	49	NA	0.00%	0.001	No	No	No	NA
Toxaphene	0.91	8001-35-2	8	0	0	0	No	0.00%	0.00%	NA	NA	NA	8	NA	0.00%	NA	No	No	No	NA
Trans-1,2-Dichloroethene	1,600	156-60-5	306	0	0	0	No	0.00%	0.00%	NA	NA	NA	130	NA	0.00%	NA	No	No	No	NA
Trans-1,3-Dichloropropene	10	10061-02-6	306	0	0	0	No	0.00%	0.00%	NA	NA	NA	130	NA	0.00%	NA	No	No	No	NA
Trichloroethene	12	79-01-6	354	0	10	0	No	2.82%	0.00%	0.0015	EB-22	2	146	NA	0.00%	0.0001	No	No	No	NA
Vinyl Acetate	80,000	108-05-4	149	0	0	0	No	0.00%	0.00%	NA	NA	NA	73	NA	0.00%	NA	No	No	No	NA
Vinyl Chloride	0.67	75-01-4	352	14	3	0	Yes	0.85%	0.00%	0.0035	FB-2	8	143	NA	0.00%	0.005	No	Yes	Yes	Yes
Zinc	570	7440-66-6	425	1	424	25	Yes	99.76%	5.88%	15,000	IAB-20	5	166	22	13.25%	26	Yes	No	Yes	No

COPC = chemical of potential concern
COC = chemical of concern
NA = not applicable
TEQ = toxic equivalent

Table J-3
Groundwater Data Statistical Results
8th Avenue Terminals, Inc. Site

Chemical	Screening Level (SL) Value (µg/L)	Alternate Chemical Name	Total or Dissolved	CAS No.	Number of Analyses	Number of Non-detects over SL	Number of Detections	Number of Detections over SL	Chemical Retained as COPC?	Total Percent Detected	Total Percent of Samples with Detections over SL	Highest Detected Concentration (µg/L)	Location of Highest Detected Concentration	Number of Different Locations with Detections over SL	Exceedance Factor for Highest Concentration	Chemical Retained as COC?	GW COC Based on Surface Water SL?	Chemical Retained as Indicator Hazardous Substance?
1,1,1,2-Tetrachloroethane	7.4			630-20-6	113	0	0	0	No	0.00%	0.00%	NA	NA	NA	NA	No	NA	NA
1,1,1-Trichloroethane	5,461			71-55-6	113	0	0	0	No	0.00%	0.00%	NA	NA	NA	NA	No	NA	NA
1,1,2,2-Tetrachloroethane	0.3			79-34-5	113	1	0	0	Yes	0.00%	0.00%	NA	NA	NA	NA	No	NA	NA
1,1,2-Trichloroethane	0.9			79-00-5	113	1	0	0	Yes	0.00%	0.00%	NA	NA	NA	NA	No	NA	NA
1,1-Dichloroethane	11			75-34-3	113	0	0	0	No	0.00%	0.00%	NA	NA	NA	NA	No	NA	NA
1,1-Dichloroethene	129.4			75-35-4	113	0	0	0	No	0.00%	0.00%	NA	NA	NA	NA	No	NA	NA
1,2,4-Trichlorobenzene	0.05			120-82-1	113	44	0	0	Yes	0.00%	0.00%	NA	NA	NA	NA	No	NA	NA
1,2,4-Trimethylbenzene	239			95-63-6	113	0	9	0	No	7.96%	0.00%	2.4	DMW-3	NA	0.01	No	NA	NA
1,2-Dichlorobenzene	5.6			95-50-1	226	0	2	0	No	0.88%	0.00%	0.027	EMW-2S	NA	0.005	No	NA	NA
1,2-Dichloroethane	4.2			107-06-2	113	0	0	0	No	0.00%	0.00%	NA	NA	NA	NA	No	NA	NA
1,2-Dichloropropane	1.0			78-87-5	113	1	0	0	Yes	0.00%	0.00%	NA	NA	NA	NA	No	NA	NA
1,3-Dichlorobenzene	2			541-73-1	226	3	8	0	Yes	3.54%	0.00%	0.2	CMW-1	NA	0.1	No	NA	NA
1,4-Dichlorobenzene	4.8			106-46-7	226	0	0	0	No	0.00%	0.00%	NA	NA	NA	NA	No	NA	NA
2,4,5-Trichlorophenol	600			95-95-4	113	0	0	0	No	0.00%	0.00%	NA	NA	NA	NA	No	NA	NA
2,4,6-Trichlorophenol	3.0			88-06-2	113	3	0	0	Yes	0.00%	0.00%	NA	NA	NA	NA	No	NA	NA
2,4-Dichlorophenol	8.5			120-83-2	113	3	0	0	Yes	0.00%	0.00%	NA	NA	NA	NA	No	NA	NA
2,4-Dimethylphenol	46			105-67-9	113	0	0	0	No	0.00%	0.00%	NA	NA	NA	NA	No	NA	NA
2,4-Dinitrophenol	100			51-28-5	113	3	0	0	Yes	0.00%	0.00%	NA	NA	NA	NA	No	NA	NA
2,4-Dinitrotoluene	3.0			121-14-2	113	3	0	0	Yes	0.00%	0.00%	NA	NA	NA	NA	No	NA	NA
2-Chlorophenol	8.1			95-57-8	113	3	0	0	Yes	0.00%	0.00%	NA	NA	NA	NA	No	NA	NA
3,3'-Dichlorobenzidine	5.0			91-94-1	40	0	0	0	No	0.00%	0.00%	NA	NA	NA	NA	No	NA	NA
4,6-Dinitro-2-Methylphenol	25			534-52-1	113	3	0	0	Yes	0.00%	0.00%	NA	NA	NA	NA	No	NA	NA
4-Chloro-3-Methylphenol	36			59-50-7	113	0	0	0	No	0.00%	0.00%	NA	NA	NA	NA	No	NA	NA
Acenaphthene	3.2			83-32-9	113	0	55	7	Yes	48.67%	6.19%	300	DMW-3	3	92	Yes	Yes	No
Acrolein	5.0			107-02-8	40	1	0	0	Yes	0.00%	0.00%	NA	NA	NA	NA	No	NA	NA
Acrylonitrile	0.1			107-13-1	40	40	0	0	Yes	0.00%	0.00%	NA	NA	NA	NA	No	NA	NA
Anthracene	9.3			120-12-7	113	0	57	3	Yes	50.44%	2.65%	13	DMW-3	1	1.4	No	NA	NA
Antimony	87		Dissolved	7440-36-0	146	0	87	0	No	59.59%	0.00%	36.4	CMW-6	NA	0.42	No	NA	NA
Antimony	87		Total	7440-36-0	148	0	88	0	No	59.46%	0.00%	35.9	CMW-6	NA	0.41	No	NA	NA
Arsenic	5.0		Dissolved	7440-38-2	139	0	139	64	Yes	100.00%	46.04%	283	EMW-13S	28	56.6	Yes	No	Yes
Arsenic	5.0		Total	7440-38-2	148	0	148	85	Yes	100.00%	57.43%	289	EMW-13S	32	57.8	Yes	No	No
Benzo[a]anthracene	0.01			56-55-3	113	36	26	9	Yes	23.01%	7.96%	0.13	CMW-4	6	13	Yes	No[a]	No
Benzene	1.6			71-43-2	113	1	4	0	Yes	3.54%	0.00%	0.45	EMW-2S	NA	0.28	No	NA	NA
Benzo(a)pyrene	0.01			50-32-8	113	37	10	5	Yes	8.85%	4.42%	0.14	CMW-4	2	14	Yes	No[a]	No
Benzo(b)fluoranthene	0.01			205-99-2	113	5	16	7	Yes	14.16%	6.19%	0.21	CMW-4	5	21	Yes	No[a]	No
Benzo(k)fluoranthene	0.01			207-08-9	113	5	6	2	Yes	5.31%	1.77%	0.063	CMW-4	2	4.8	No	NA	NA
Benzoic Acid	1,058			65-85-0	113	3	3	0	Yes	2.65%	0.00%	19	EMW-19D	NA	0.02	No	NA	NA
Bis(2-chloro-1-methylethyl) ether	31			108-60-1	40	0	0	0	No	0.00%	0.00%	NA	NA	NA	NA	No	NA	NA
Bis(2-Chloroethyl)Ether	1.0			111-44-4	113	3	0	0	Yes	0.00%	0.00%	NA	NA	NA	NA	No	NA	NA
Bromoform	12			75-25-2	113	0	0	0	No	0.00%	0.00%	NA	NA	NA	NA	No	NA	NA
Bromomethane	13			74-83-9	113	0	0	0	No	0.00%	0.00%	NA	NA	NA	NA	No	NA	NA
Butyl benzyl phthalate	1.0			85-68-7	113	3	0	0	Yes	0.00%	0.00%	NA	NA	NA	NA	No	NA	NA
Cadmium	1.2		Dissolved	7440-43-9	145	8	25	2	Yes	17.24%	1.38%	10.7	MW2	2	9.0	No	NA	NA
Cadmium	1.2		Total	7440-43-9	148	11	25	3	Yes	16.89%	2.03%	2.96	SLR-3	1	2.5	No	NA	NA
Carbon Disulfide	399			75-15-0	40	0	1	0	No	2.50%	0.00%	0.16	EMW-14D	NA	0.0004	No	NA	NA
Carbon Tetrachloride	0.35			56-23-5	113	1	0	0	Yes	0.00%	0.00%	NA	NA	NA	NA	No	NA	NA
CFC-113	183	1,1,2 - Trichlorotrifluoroethane		76-13-1	40	0	0	0	No	0.00%	0.00%	NA	NA	NA	NA	No	NA	NA
CFC-12	5.6	Dichlorodifluoromethane		75-71-8	73	0	0	0	No	0.00%	0.00%	NA	NA	NA	NA	No	NA	NA
Chlorobenzene	200			108-90-7	113	0	0	0	No	0.00%	0.00%	NA	NA	NA	NA	No	NA	NA
Chlorodibromomethane	2.2	Dibromochloromethane		124-48-1	113	0	0	0	No	0.00%	0.00%	NA	NA	NA	NA	No	NA	NA
Chloroethane	18,526			75-00-3	113	0	0	0	No	0.00%	0.00%	NA	NA	NA	NA	No	NA	NA
Chloroform	1.2			67-66-3	113	1	1	0	Yes	0.88%	0.00%	0.13	EMW-19D	NA	0.11	No	NA	NA

Table J-3
Groundwater Data Statistical Results
8th Avenue Terminals, Inc. Site

Chemical	Screening Level (SL) Value (µg/L)	Alternate Chemical Name	Total or Dissolved	CAS No.	Number of Analyses	Number of Non-detects over SL	Number of Detections	Number of Detections over SL	Chemical Retained as COPC?	Total Percent Detected	Total Percent of Samples with Detections over SL	Highest Detected Concentration (µg/L)	Location of Highest Detected Concentration	Number of Different Locations with Detections over SL	Exceedance Factor for Highest Concentration	Chemical Retained as COC?	GW COC Based on Surface Water SL?	Chemical Retained as Indicator Hazardous Substance?
Chloromethane	153			74-87-3	113	0	2	0	No	1.77%	0.00%	0.14	SLR-6	NA	0.0009	No	NA	NA
Chromium	27		Dissolved	7440-47-3	145	0	141	2	Yes	97.24%	1.38%	34.4	SLR-3	1	1.3	No	NA	NA
Chromium	27		Total	7440-47-3	148	0	142	3	Yes	95.95%	2.03%	34.8	SLR-3	1	1.3	No	NA	NA
Chrysene	0.02			218-01-9	113	31	28	8	Yes	24.78%	7.08%	0.16	CMW-4	4	8	Yes	Yes	No
Cis-1,3-Dichloropropene	2.0			10061-01-5	113	0	0	0	No	0.00%	0.00%	NA	NA	NA	NA	No	NA	NA
Copper	2.4		Dissolved	7440-50-8	140	9	90	31	Yes	64.29%	22.14%	49	EMW-16D	19	20	Yes	Yes	Yes
Copper	2.4		Total	7440-50-8	148	11	108	51	Yes	72.97%	34.46%	57.7	SEEP-3	26	24	Yes	Yes	No
Cumene	715	Isopropylbenzene		98-82-8	113	0	1	0	No	0.88%	0.00%	0.16	DMW-3	NA	0.0002	No	NA	NA
Di(2-ethylhexyl) phthalate	3.0	bis(2-ethylhexyl)phthalate		117-81-7	113	3	0	0	Yes	0.00%	0.00%	NA	NA	NA	NA	No	NA	NA
Dibenzo(a,h)anthracene	0.01			53-70-3	113	43	3	1	Yes	2.65%	0.88%	0.026	CMW-4	1	2.6	No	NA	NA
Dibutyl phthalate	8.0	Di-n-butyl phthalate		84-74-2	113	0	0	0	No	0.00%	0.00%	NA	NA	NA	NA	No	NA	NA
Dichlorobromomethane	1.8	Bromodichloromethane		75-27-4	113	1	0	0	Yes	0.00%	0.00%	NA	NA	NA	NA	No	NA	NA
Diesel-Range Organics	500			68334-30-5	113	0	10	3	Yes	8.85%	2.65%	3,100	DMW-3	1	6.2	No	NA	NA
Total Semi-Volatile Petroleum Hydrocarbons (Diesel + Oil)	500			68334-30-5	226	0	11	3	Yes	4.87%	1.33%	3,100	DMW-3	1	6.2	No	NA	NA
Diethyl phthalate	200			84-66-2	113	0	12	0	No	10.62%	0.00%	0.17	SLR-6	NA	0.0009	No	NA	NA
Dimethyl phthalate	600			131-11-3	113	0	0	0	No	0.00%	0.00%	NA	NA	NA	NA	No	NA	NA
Di-n-octyl phthalate	1.0			117-84-0	113	3	1	0	Yes	0.88%	0.00%	0.045	CMW-1	NA	0.05	No	NA	NA
Ethylbenzene	31			100-41-4	113	0	5	0	No	4.42%	0.00%	0.75	DMW-3	NA	0.024	No	NA	NA
Ethylene dibromide	0.27	1,2-Dibromoethane (EDB)		106-93-4	113	1	0	0	Yes	0.00%	0.00%	NA	NA	NA	NA	No	NA	NA
Fluoranthene	3.3			206-44-0	113	0	60	3	Yes	53.10%	2.65%	11	DMW-3	1	3.4	No	NA	NA
Fluorene	3.0			86-73-7	113	0	38	6	Yes	33.63%	5.31%	140	DMW-3	2	47	Yes	Yes	No
Gasoline-Range Organics	800			86290-81-5	73	0	10	0	No	13.70%	0.00%	710	DMW-3	NA	0.89	No	NA	NA
Hexachlorobenzene	0.10			118-74-1	113	44	0	0	Yes	0.00%	0.00%	NA	NA	NA	NA	No	NA	NA
Hexachlorobutadiene	0.10			87-68-3	226	157	0	0	Yes	0.00%	0.00%	NA	NA	NA	NA	No	NA	NA
Hexachlorocyclopentadiene	5.0			77-47-4	113	3	0	0	Yes	0.00%	0.00%	NA	NA	NA	NA	No	NA	NA
Hexachloroethane	2.0			67-72-1	113	3	0	0	Yes	0.00%	0.00%	NA	NA	NA	NA	No	NA	NA
Indeno(1,2,3-cd)pyrene	0.01			193-39-5	113	40	9	3	Yes	7.96%	2.65%	0.085	CMW-4	2	8.5	No	NA	NA
Isophorone	110			78-59-1	113	0	0	0	No	0.00%	0.00%	NA	NA	NA	NA	No	NA	NA
Lead	8.1		Dissolved	7439-92-1	145	0	15	1	Yes	10.34%	0.69%	8.6	CMW-1	1	1.1	No	NA	NA
Lead	8.1		Total	7439-92-1	148	0	60	1	Yes	40.54%	0.68%	28	CMW-4	1	3.5	No	NA	NA
Lube Oil-Range Organics	500			NA	73	0	1	0	No	1.37%	0.00%	210	SLR-6	NA	0.42	No	NA	NA
Mercury	0.03		Dissolved	7439-97-6	141	0	46	0	No	32.62%	0.00%	0.00895	SLR-3	NA	0.36	No	NA	NA
Mercury	0.03		Total	7439-97-6	146	0	75	1	Yes	51.37%	0.68%	0.037	CMW-4	1	1.5	No	NA	NA
Methyl ethyl ketone	1,746,565			78-93-3	113	0	0	0	No	0.00%	0.00%	NA	NA	NA	NA	No	NA	NA
Methyl isobutyl ketone	469,589	4-Methyl-2-pentanone		108-10-1	113	0	0	0	No	0.00%	0.00%	NA	NA	NA	NA	No	NA	NA
Methylene Chloride	100			75-09-2	113	0	3	0	No	2.65%	0.00%	6.8	EMW-6S	NA	0.07	No	NA	NA
Naphthalene	8.9			91-20-3	226	0	85	8	Yes	37.61%	3.54%	960	DMW-3	2	108	Yes	No[a]	No
Nickel	8.2		Dissolved	7440-02-0	145	0	129	10	Yes	88.97%	6.90%	9.59	EMW-16D	4	1.2	No	NA	NA
Nickel	8.2		Total	7440-02-0	148	0	134	6	Yes	90.54%	4.05%	14	CMW-4	4	1.7	No	NA	NA
Nitrobenzene	100			98-95-3	113	0	0	0	No	0.00%	0.00%	NA	NA	NA	NA	No	NA	NA
N-Nitrosodi-n-propylamine	1.00			621-64-7	113	4	0	0	Yes	0.00%	0.00%	NA	NA	NA	NA	No	NA	NA
N-Nitrosodiphenylamine	3.00			86-30-6	113	3	0	0	Yes	0.00%	0.00%	NA	NA	NA	NA	No	NA	NA
o-Cresol	27	2-Methylphenol		95-48-7	113	0	0	0	No	0.00%	0.00%	NA	NA	NA	NA	No	NA	NA
o-Xylene	432			95-47-6	113	0	5	0	No	4.42%	0.00%	1.3	EMW-12S	NA	0.003	No	NA	NA
PCB-aroclor 1016	0.03			12674-11-2	113	1	2	0	Yes	1.77%	0.00%	0.021	DMW-2	NA	2.1	No	NA	NA
PCB-aroclor 1221	0.03			11104-28-2	113	1	0	0	Yes	0.00%	0.00%	NA	NA	NA	NA	No	NA	NA
PCB-aroclor 1232	0.03			11141-16-5	113	1	0	0	Yes	0.00%	0.00%	NA	NA	NA	NA	No	NA	NA
PCB-aroclor 1242	0.03			53469-21-9	113	2	0	0	Yes	0.00%	0.00%	NA	NA	NA	NA	No	NA	NA
PCB-aroclor 1248	0.03			12672-29-6	113	1	0	0	Yes	0.00%	0.00%	NA	NA	NA	NA	No	NA	NA
PCB-aroclor 1254	0.03			11097-69-1	113	2	5	2	Yes	4.42%	1.77%	0.14	EMW-13S	3	4.7	No	NA	NA
PCB-aroclor 1260	0.03			11096-82-5	113	1	1	0	Yes	0.88%	0.00%	0.029	DMW-2	NA	0.97	No	NA	NA
PCN-002	86	2-Chloronaphthalene		91-58-7	113	0	0	0	No	0.00%	0.00%	NA	NA	NA	NA	No	NA	NA
Pentachlorophenol	0.50			87-86-5	113	44	0	0	Yes	0.00%	0.00%	NA	NA	NA	NA	No	NA	NA
Phenol	365			108-95-2	113	0	12	0	No	10.62%	0.00%	0.57	EMW-13S	NA	0.002	No	NA	NA
Pyrene	8			129-00-0	113	0	67	0	No	59.29%	0.00%	7.5	DMW-3	NA	0.94	No	NA	NA

Table J-3
Groundwater Data Statistical Results
8th Avenue Terminals, Inc. Site

Chemical	Screening Level (SL) Value (µg/L)	Alternate Chemical Name	Total or Dissolved	CAS No.	Number of Analyses	Number of Non-detects over SL	Number of Detections	Number of Detections over SL	Chemical Retained as COPC?	Total Percent Detected	Total Percent of Samples with Detections over SL	Highest Detected Concentration (µg/L)	Location of Highest Detected Concentration	Number of Different Locations with Detections over SL	Exceedance Factor for Highest Concentration	Chemical Retained as COC?	GW COC Based on Surface Water SL?	Chemical Retained as Indicator Hazardous Substance?
Selenium	71		Dissolved	7782-49-2	139	0	86	4	Yes	61.87%	2.88%	138	EMW-16D	3	1.94	No	NA	NA
Selenium	71		Total	7782-49-2	148	0	104	14	Yes	70.27%	9.46%	176	EMW-16D	10	2.48	Yes	Yes	No
Silver	1.9		Dissolved	7440-22-4	145	2	22	0	Yes	15.17%	0.00%	0.93	CMW-1	NA	0.49	No	NA	NA
Silver	1.9		Total	7440-22-4	148	1	34	0	Yes	22.97%	0.00%	1.06	EMW-3S	NA	0.56	No	NA	NA
Styrene	8,186			100-42-5	113	0	0	0	No	0.00%	0.00%	NA	NA	NA	NA	No	NA	NA
Tetrachloroethene	2.9			127-18-4	113	0	3	0	No	2.65%	0.00%	1	SLR-6	NA	0.34	No	NA	NA
Toluene	130			108-88-3	113	0	6	0	No	5.31%	0.00%	5.3	EMW-17S	NA	0.04	No	NA	NA
Total cPAHs TEQ	0.01			NA	113	31	33	15	Yes	29.20%	13.27%	0.751	SLR-3	11	75	Yes	No[a]	Yes
Total PCBs	0.01			NA	113	3	6	6	Yes	5.31%	5.31%	0.17	EMW-13S	5	17	Yes	No[a]	Yes
Trans-1,2-Dichloroethene	1,000			156-60-5	113	0	0	0	No	0.00%	0.00%	NA	NA	NA	NA	No	NA	NA
Trans-1,3-Dichloropropene	2.0			10061-02-6	113	0	0	0	No	0.00%	0.00%	NA	NA	NA	NA	No	NA	NA
Trichloroethene	0.70			79-01-6	113	1	2	0	Yes	1.77%	0.00%	0.28	CMW-1	NA	0.40	No	NA	NA
Vinyl Acetate	7,809			108-05-4	40	0	0	0	No	0.00%	0.00%	NA	NA	NA	NA	No	NA	NA
Vinyl Chloride	0.18			75-01-4	113	38	9	8	Yes	7.96%	7.08%	1.5	EMW-2S	4	8.3	Yes	Yes	Yes
Zinc	81		Dissolved	7440-66-6	145	0	86	2	Yes	59.31%	1.38%	105	EMW-3S	1	1.3	No	NA	NA
Zinc	81		Total	7440-66-6	148	0	88	3	Yes	59.46%	2.03%	133	CMW-4	3	1.6	No	NA	NA

Notes:

COPC = chemcial of potential concern

COC = chemical of concern

µg/L = micrograms per liter

TEQ = toxic equivalent

[a] The screening level is the practical quantitaion limit (PQL). The screening level would have been based on a protection of surface water or sediment criteria if the PQL was lower.

Table J-4
Surface Sediment Data Statistical Results
8th Avenue Terminals, Inc. Site

Chemical	Screening Level (SL) Value	Number of Analyses	Number of Non-detects over SL	Number of Detections	Number of Detections over SL	Chemical Retained as COPC?	Total Percent Detected	Total Percent of Samples with Detections over SL	Highest Detected Concentration	Location of Highest Detected Concentration	Depth of Highest Detected Concentration	Number of Different Locations with Detections Over SL	Total Percent of Different Locations with Detections Over SL	Exceedance Factor for Highest Detected Concentration	Chemical Retained as COC?
Metals (mg/kg)															
Arsenic	57	24	0	24	0	No	100%	0%	36	SSED-13A	0 - 10 cm	0	0%	0.63	No
Cadmium	5.1	24	0	19	0	No	79%	0%	0.4	SSED-01	0 - 10 cm	0	0%	0.078	No
Chromium	260	24	0	24	0	No	100%	0%	45.7	IS-1	0 - 3 in	0	0%	0.18	No
Copper	390	24	0	24	0	No	100%	0%	128	IS-5	0 - 3 in	0	0%	0.33	No
Lead	450	24	0	24	0	No	100%	0%	96.5	IS-4	0 - 3 in	0	0%	0.21	No
Mercury	0.41	24	0	24	0	No	100%	0%	0.22	SSED-06	0 - 10 cm	0	0%	0.54	No
Silver	6.1	24	0	19	0	No	79%	0%	0.34	SSED-10	0 - 10 cm	0	0%	0.056	No
Zinc	410	24	0	24	0	No	100%	0%	398	IS-4	0 - 3 in	0	0%	0.97	No
Semi-Volatile Organic Compounds (SVOCs) (mg/kg-OC)															
1,2,4-Trichlorobenzene	0.81	24	3	0	0	Yes	0%	0%	NA	NA	NA	0	0%	NA	No
1,2-Dichlorobenzene	2.3	24	1	0	0	Yes	0%	0%	NA	NA	NA	0	0%	NA	No
1,4-Dichlorobenzene	3.1	24	1	5	0	Yes	21%	0%	0.17	SSED-06	0 - 10 cm	0	0%	0.054	No
bis(2-Ethylhexyl)phthalate	47	24	0	4	1	Yes	17%	4%	55	IS-1	0 - 3 in	1	4%	1.17	No
Butylbenzyl phthalate	4.9	24	1	23	0	Yes	96%	0%	3.07	IS-2	0 - 3 in	0	0%	0.63	No
Diethyl phthalate	61	24	0	9	0	No	38%	0%	12.12	SSED-14	0 - 10 cm	0	0%	0.20	No
Dimethyl phthalate	53	24	0	15	0	No	63%	0%	1.39	SSED-09	0 - 10 cm	0	0%	0.026	No
Di-n-butyl phthalate	220	24	0	4	0	No	17%	0%	2.58	IS-2	0 - 3 in	0	0%	0.012	No
Di-n-octyl phthalate	58	24	0	1	0	No	4%	0%	0.44	SSED-03	0 - 10 cm	0	0%	0.0076	No
Hexachlorobenzene	0.38	24	5	0	0	Yes	0%	0%	NA	NA	NA	0	0%	NA	No
Hexachlorobutadiene (Hexachloro-1,3-butadiene)	3.9	24	1	0	0	Yes	0%	0%	NA	NA	NA	0	0%	NA	No
n-Nitrosodiphenylamine	11	24	0	1	0	No	4%	0%	0.049	IS-5	0 - 3 in	0	0%	0.0045	No
SVOCs (µg/kg)															
2,4-Dimethylphenol	29	24	1	0	0	Yes	0%	0%	NA	NA	NA	0	0%	NA	No
2-Methylphenol (o-Cresol)	63	24	1	11	0	Yes	46%	0%	29	SSED-07	0 - 10 cm	0	0%	0.46	No
4-Methylphenol (p-Cresol)	670	19	0	18	0	No	95%	0%	46	SSED-07	0 - 10 cm	0	0%	0.069	No
Benzoic acid	650	24	1	18	5	Yes	75%	21%	1,200	SSED-07	0 - 10 cm	5	22%	1.85	No
Benzyl alcohol	57	24	1	20	16	Yes	83%	67%	570	SSED-09	0 - 10 cm	15	65%	10.00	Yes
Pentachlorophenol	360	24	0	6	0	No	25%	0%	38	SSED-16A	0 - 10 cm	0	0%	0.11	No
Phenol	420	24	0	21	0	No	88%	0%	200	SSED-07	0 - 10 cm	0	0%	0.48	No
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg-OC)															
2-Methylnaphthalene	38	24	0	23	0	No	96%	0%	2.85	SSED-16A	0 - 10 cm	0	0%	0.075	No
Acenaphthene	16	24	0	21	1	Yes	88%	4%	74.07	SSED-16A	0 - 10 cm	1	4%	4.63	No
Acenaphthylene	66	24	0	22	0	No	92%	0%	2.14	SSED-16A	0 - 10 cm	0	0%	0.032	No
Anthracene	220	24	0	24	1	Yes	100%	4%	470.09	SSED-16A	0 - 10 cm	1	4%	2.14	No
Benzo(a)anthracene	110	24	0	24	1	Yes	100%	4%	1,153.8	SSED-16A	0 - 10 cm	1	4%	10.49	Yes
Benzo(a)pyrene	99	24	0	24	1	Yes	100%	4%	626.78	SSED-16A	0 - 10 cm	1	4%	6.33	No
Benzo(g,h,i)perylene	31	24	0	24	1	Yes	100%	4%	256.41	SSED-16A	0 - 10 cm	1	4%	8.27	No
Chrysene	110	24	0	24	1	Yes	100%	4%	1,025.6	SSED-16A	0 - 10 cm	1	4%	9.32	No
Dibenzo(a,h)anthracene	12	24	0	22	2	Yes	92%	8%	85.47	SSED-16A	0 - 10 cm	2	9%	7.12	Yes
Dibenzofuran	15	24	0	23	0	No	96%	0%	6.13	SSED-16A	0 - 10 cm	0	0%	0.41	No
Fluoranthene	160	24	0	24	1	Yes	100%	4%	2,849.0	SSED-16A	0 - 10 cm	1	4%	17.81	Yes
Fluorene	23	24	0	23	1	Yes	96%	4%	95.44	SSED-16A	0 - 10 cm	1	4%	4.15	No
Indeno(1,2,3-c,d)pyrene	34	24	0	24	2	Yes	100%	8%	242.17	SSED-16A	0 - 10 cm	2	9%	7.12	Yes
Naphthalene	99	24	0	19	0	No	79%	0%	7.45	SSED-13A	0 - 10 cm	0	0%	0.075	No
Phenanthrene	100	24	0	24	1	Yes	100%	4%	1,139.6	SSED-16A	0 - 10 cm	1	4%	11.40	Yes
Pyrene	1,000	24	0	24	1	Yes	100%	4%	2,279.2	SSED-16A	0 - 10 cm	1	4%	2.28	No
Total Benzofluoranthenes (b,j,k)	230	24	0	24	2	Yes	100%	8%	1,524.2	SSED-16A	0 - 10 cm	2	9%	6.63	Yes
Total HPAH	960	24	0	24	1	Yes	100%	4%	10,042.7	SSED-16A	0 - 10 cm	1	4%	10.46	Yes
Total LPAH	370	24	0	24	1	Yes	100%	4%	1,784.9	SSED-16A	0 - 10 cm	1	4%	4.82	No

Table J-4
Surface Sediment Data Statistical Results
8th Avenue Terminals, Inc. Site

Chemical	Screening Level (SL) Value	Number of Analyses	Number of Non-detects over SL	Number of Detections	Number of Detections over SL	Chemical Retained as COPC?	Total Percent Detected	Total Percent of Samples with Detections over SL	Highest Detected Concentration	Location of Highest Detected Concentration	Depth of Highest Detected Concentration	Number of Different Locations with Detections Over SL	Total Percent of Different Locations with Detections Over SL	Exceedance Factor for Highest Detected Concentration	Chemical Retained as COC?
PAHs (µg/kg)															
Total cPAHs TEQ	1,000	24	0	24	1	Yes	100%	4%	6,582.0	SSED-16A	0 - 10 cm	1	4%	6.58	No
Polychlorinated Biphenyls (PCBs) (mg/kg-OC)															
Total PCBs	12	24	0	24	14	Yes	100%	58%	67.81	SSED-16A	0 - 10 cm	13	57%	5.65	Yes
Dioxins and Furans (ng/kg)															
Total Dioxins/Furans TEQ	25	23	0	23	1	Yes	100%	4%	25.31	IS-4	0 - 3 in	1	5%	1.01	No

Notes:
Intertidal sediment samples were included in this surface sediment sample statistical analysis.
COPC = chemical of potential concern
COC = chemical of concern
mg/kg = milligrams per kilogram
OC = organic carbon
µg/kg = micrograms per kilogram
ng/kg = nanograms per kilogram
TEQ = toxicity equivalent
LPAH = low molecular weight PAHs
HPAH = high molecular weight PAHs
cPAH = carcinogenic PAHs

Table J-5
Subsurface Sediment Data Statistical Results
8th Avenue Terminals, Inc. Site

Chemical	Screening Level (SL) Value	Number of Analyses	Number of Non-detects over SL	Number of Detections	Number of Detections over SL	Chemical Retained as COPC?	Total Percent Detected	Total Percent of Samples with Detections over SL	Highest Detected Concentration	Location of Highest Detected Concentration	Depth of Highest Detected Concentration	Number of Different Locations with Detections Over SL	Total Percent of Different Locations with Detections Over SL	Exceedance Factor for Highest Detected Concentration	Chemical Retained as COC?
Metals (mg/kg)															
Arsenic	57	20	0	20	0	No	100%	0%	29	SSED-SB-14A	0.5 - 2 ft	0	0%	0.51	No
Cadmium	5.1	20	0	18	0	No	90%	0%	0.7	SSED-SB-12A	6 - 7.7 ft	0	0%	0.14	No
Chromium	260	20	0	20	0	No	100%	0%	56	SSED-SB-14A	0.5 - 2 ft	0	0%	0.22	No
Copper	390	20	0	20	0	No	100%	0%	112	SSED-SB-14A	0.5 - 2 ft	0	0%	0.29	No
Lead	450	20	0	20	0	No	100%	0%	100	SSED-SB-14A	0.5 - 2 ft	0	0%	0.22	No
Mercury	0.41	20	0	20	0	No	100%	0%	0.35	SSED-SB-14A	0.5 - 2 ft	0	0%	0.85	No
Silver	6.1	20	0	20	0	No	100%	0%	0.9	SSED-SB-14A	0.5 - 2 ft	0	0%	0.15	No
Zinc	410	20	0	20	0	No	100%	0%	309	SSED-SB-14A	0.5 - 2 ft	0	0%	0.75	No
Semi-Volatile Organic Compounds (SVOCs) (mg/kg-OC)															
1,2,4-Trichlorobenzene	0.81	20	11	0	0	Yes	0%	0%	NA	NA	NA	0	0%	NA	No
1,2-Dichlorobenzene	2.3	20	5	0	0	Yes	0%	0%	NA	NA	NA	0	0%	NA	No
1,4-Dichlorobenzene	3.1	20	4	3	0	Yes	15%	0%	0.27	SSED-SB-12A	6 - 7.7 ft	0	0%	0.088	No
bis(2-Ethylhexyl)phthalate	47	20	2	0	0	Yes	0%	0%	NA	NA	NA	0	0%	NA	No
Butylbenzyl phthalate	4.9	20	2	5	0	Yes	25%	0%	0.80	SSED-SB-12A	6 - 7.7 ft	0	0%	0.16	No
Diethyl phthalate	61	20	0	1	0	No	5%	0%	15.93	SSED-SB-13A	3 - 5 ft	0	0%	0.26	No
Dimethyl phthalate	53	20	0	1	0	No	5%	0%	5.04	SSED-SB-12A	6 - 7.7 ft	0	0%	0.095	No
Di-n-butyl phthalate	220	20	0	3	0	No	15%	0%	1.18	SSED-SB-12A	6 - 7.7 ft	0	0%	0.0053	No
Di-n-octyl phthalate	58	20	0	0	0	No	0%	0%	NA	NA	NA	0	0%	NA	No
Hexachlorobenzene	0.38	20	14	0	0	Yes	0%	0%	NA	NA	NA	0	0%	NA	No
Hexachlorobutadiene (Hexachloro-1,3-butadiene)	3.9	20	3	0	0	Yes	0%	0%	NA	NA	NA	0	0%	NA	No
n-Nitrosodiphenylamine	11	20	0	0	0	No	0%	0%	NA	NA	NA	0	0%	NA	No
SVOCs (µg/kg)															
2,4-Dimethylphenol	29	20	1	1	0	Yes	5%	0%	12	SSED-SB-12A	2 - 4 ft	0	0%	0.41	No
2-Methylphenol (o-Cresol)	63	20	1	7	0	Yes	35%	0%	13	SSED-SB-12A	6 - 7.7 ft	0	0%	0.21	No
4-Methylphenol (p-Cresol)	670	20	0	11	0	No	55%	0%	52	SSED-SB-12A	6 - 7.7 ft	0	0%	0.078	No
Benzoic acid	650	20	1	7	1	Yes	35%	5%	830	SSED-SB-12A	2 - 4 ft	1	17%	1.28	No
Benzyl alcohol	57	3	0	3	3	Yes	100%	100%	260	SSED-SB-12A	4 - 6 ft	1	100%	4.56	Yes
Pentachlorophenol	360	20	0	2	0	No	10%	0%	23	SSED-SB-12A	6 - 7.7 ft	0	0%	0.064	No
Phenol	420	20	0	14	0	No	70%	0%	160	SSED-SB-12A	2 - 4 ft	0	0%	0.38	No
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg-OC)															
2-Methylnaphthalene	38	20	1	18	0	Yes	90%	0%	17.72	SSED-SB-12A	8 - 10 ft	0	0%	0.47	No
Acenaphthene	16	20	2	17	1	Yes	85%	5%	125.98	SSED-SB-12A	8 - 10 ft	1	17%	7.87	No
Acenaphthylene	66	20	0	9	0	No	45%	0%	4.36	SSED-SB-19	2 - 4 ft	0	0%	0.066	No
Anthracene	220	20	0	16	2	Yes	80%	10%	1,209.7	SSED-SB-16A	1 - 2.7 ft	2	33%	5.50	Yes
Benzo(a)anthracene	110	20	0	18	3	Yes	90%	15%	2,580.6	SSED-SB-16A	1 - 2.7 ft	3	50%	23.46	Yes
Benzo(a)pyrene	99	20	0	16	3	Yes	80%	15%	1,564.5	SSED-SB-16A	1 - 2.7 ft	3	50%	15.80	Yes
Benzo(g,h,i)perylene	31	20	0	17	4	Yes	85%	20%	741.94	SSED-SB-16A	1 - 2.7 ft	3	50%	23.93	Yes
Chrysene	110	20	0	18	3	Yes	90%	15%	2,580.6	SSED-SB-16A	1 - 2.7 ft	3	50%	23.46	Yes
Dibenzo(a,h)anthracene	12	20	0	13	3	Yes	65%	15%	177.42	SSED-SB-16A	1 - 2.7 ft	3	50%	14.78	Yes
Dibenzofuran	15	20	2	15	1	Yes	75%	5%	102.36	SSED-SB-12A	8 - 10 ft	1	17%	6.82	No
Fluoranthene	160	20	0	18	3	Yes	90%	15%	7,258.1	SSED-SB-16A	1 - 2.7 ft	3	50%	45.36	Yes
Fluorene	23	20	1	16	1	Yes	80%	5%	200.79	SSED-SB-12A	8 - 10 ft	1	17%	8.73	No
Indeno(1,2,3-c,d)pyrene	34	20	0	15	3	Yes	75%	15%	645.16	SSED-SB-16A	1 - 2.7 ft	3	50%	18.98	Yes
Naphthalene	99	20	0	19	0	No	95%	0%	37.80	SSED-SB-12A	8 - 10 ft	0	0%	0.38	No
Phenanthrene	100	20	0	20	2	Yes	100%	10%	3,064.5	SSED-SB-16A	1 - 2.7 ft	2	33%	30.65	Yes
Pyrene	1,000	20	0	19	3	Yes	95%	15%	5,806.5	SSED-SB-16A	1 - 2.7 ft	3	50%	5.81	Yes
Total Benzofluoranthenes (b,j,k)	230	20	0	18	3	Yes	90%	15%	2,483.9	SSED-SB-16A	1 - 2.7 ft	3	50%	10.80	Yes
Total HPAH	960	20	0	19	3	Yes	95%	15%	23,838.7	SSED-SB-16A	1 - 2.7 ft	3	50%	24.83	Yes
Total LPAH	370	20	0	20	2	Yes	100%	10%	4,314.0	SSED-SB-16A	1 - 2.7 ft	2	33%	11.66	Yes
PAHs (µg/kg)															
Total cPAHs TEQ	1,000	20	0	18	3	Yes	90%	15%	13,510.0	SSED-SB-16A	1 - 2.7 ft	3	50%	13.51	Yes

Table J-5
Subsurface Sediment Data Statistical Results
8th Avenue Terminals, Inc. Site

Chemical	Screening Level (SL) Value	Number of Analyses	Number of Non-detects over SL	Number of Detections	Number of Detections over SL	Chemical Retained as COPC?	Total Percent Detected	Total Percent of Samples with Detections over SL	Highest Detected Concentration	Location of Highest Detected Concentration	Depth of Highest Detected Concentration	Number of Different Locations with Detections Over SL	Total Percent of Different Locations with Detections Over SL	Exceedance Factor for Highest Detected Concentration	Chemical Retained as COC?
Polychlorinated Biphenyls (PCBs) (mg/kg-OC)															
Total PCBs	12	20	0	9	6	Yes	45%	30%	109.92	SSED-SB-14A	0.5 - 2 ft	4	67%	9.16	Yes
Dioxins and Furans (ng/kg)															
Total Dioxins/Furans TEQ	25	6	0	5	2	Yes	83%	33%	66.65	SSED-SB-13A	0.5 - 2 ft	2	50%	2.67	Yes

Notes:
COPC = chemical of potential concern
COC = chemical of concern
mg/kg = milligrams per kilogram
OC = organic carbon
µg/kg = micrograms per kilogram
ng/kg = nanograms per kilogram
TEQ = toxicity equivalent
LPAH = low molecular weight PAHs
HPAH = high molecular weight PAHs
cPAH = carcinogenic PAHs

Table J-6
Stormwater Data Statistical Results
8th Avenue Terminals, Inc. Site

Chemical	Groundwater Screening Level (SL) Value	Number of Analyses	Number of Non-detects over SL	Number of Detections	Number of Detections over SL	Chemical Retained as COPC?	Total Percent Detected	Total Percent of Samples with Detections over SL	Highest Detected Concentration	Location of Highest Detected Concentration	Number of Different Locations with Detections Over SL	Total Percent of Different Locations with Detections Over SL	Exceedance Factor for Highest Detected Concentration	Chemical Retained as COC?
Metals (µg/L)														
Antimony	86.7	13	0	10	0	No	77%	0%	1.71	OF-6	0	0%	0.020	No
Arsenic	5	13	0	13	2	Yes	100%	15%	11.5	OF-4	2	33%	2.30	Yes
Cadmium	1.19	13	0	10	0	No	77%	0%	0.44	OF-3	0	0%	0.37	No
Chromium	27	13	0	13	0	No	100%	0%	6.68	OF-3	0	0%	0.24	No
Copper	2.4	13	2	11	11	Yes	85%	85%	43.6	OF-3	6	100%	18.17	Yes
Lead	8.1	13	0	13	2	Yes	100%	15%	14.7	OF-6	2	33%	1.81	No
Mercury	0.025	13	0	13	0	No	100%	0%	0.023	OF-3	0	0%	0.92	No
Nickel	8.2	13	0	11	2	Yes	85%	15%	30	OF-4	2	33%	3.66	Yes
Selenium	71	13	0	7	0	No	54%	0%	2.41	OF-4	0	0%	0.034	No
Silver	1.9	13	0	0	0	No	0%	0%	NA	NA	0	0%	NA	No
Zinc	81	13	0	13	10	Yes	100%	77%	255	OF-6	6	100%	3.15	Yes
Volatile Organic Compounds (VOCs) (µg/L)														
1,1,1,2-Tetrachloroethane	7.4	13	0	0	0	No	0%	0%	NA	NA	0	0%	NA	No
1,1,1-Trichloroethane	5,461	13	0	0	0	No	0%	0%	NA	NA	0	0%	NA	No
1,1,2,2-Tetrachloroethane	0.3	13	0	0	0	No	0%	0%	NA	NA	0	0%	NA	No
1,1,2-Trichloroethane	0.9	13	0	0	0	No	0%	0%	NA	NA	0	0%	NA	No
1,1-Dichloroethane	11.1	13	0	0	0	No	0%	0%	NA	NA	0	0%	NA	No
1,1-Dichloroethene	129	13	0	0	0	No	0%	0%	NA	NA	0	0%	NA	No
1,2,4-Trimethylbenzene	239	13	0	0	0	No	0%	0%	NA	NA	0	0%	NA	No
1,2-Dichloroethane	4.2	13	0	0	0	No	0%	0%	NA	NA	0	0%	NA	No
1,2-Dichloroethene, trans-	1,000	13	0	0	0	No	0%	0%	NA	NA	0	0%	NA	No
1,2-Dichloropropane	1.04	13	0	0	0	No	0%	0%	NA	NA	0	0%	NA	No
1,3-Dichloropropene, cis-	2	13	0	0	0	No	0%	0%	NA	NA	0	0%	NA	No
1,3-Dichloropropene, trans-	2	13	0	0	0	No	0%	0%	NA	NA	0	0%	NA	No
2-Butanone (MEK)	1,746,565	13	0	0	0	No	0%	0%	NA	NA	0	0%	NA	No
Benzene	1.6	13	0	0	0	No	0%	0%	NA	NA	0	0%	NA	No
Bromoform (Tribromomethane)	12	13	0	0	0	No	0%	0%	NA	NA	0	0%	NA	No
Bromomethane (Methyl bromide)	12.9	13	0	0	0	No	0%	0%	NA	NA	0	0%	NA	No
Carbon tetrachloride (Tetrachloromethane)	0.35	13	0	0	0	No	0%	0%	NA	NA	0	0%	NA	No
Chlorobenzene	200	13	0	0	0	No	0%	0%	NA	NA	0	0%	NA	No
Chloroethane	18,526	13	0	0	0	No	0%	0%	NA	NA	0	0%	NA	No
Chloroform	1.19	13	0	2	2	Yes	15%	15%	13	OF-2	1	17%	10.94	Yes
Chloromethane	153	13	0	0	0	No	0%	0%	NA	NA	0	0%	NA	No
Dibromochloromethane	2.2	13	0	0	0	No	0%	0%	NA	NA	0	0%	NA	No
Dichlorodifluoromethane	5.65	13	0	0	0	No	0%	0%	NA	NA	0	0%	NA	No
Dichloromethane (Methylene chloride)	100	13	0	0	0	No	0%	0%	NA	NA	0	0%	NA	No
Ethylbenzene	31	13	0	0	0	No	0%	0%	NA	NA	0	0%	NA	No
Ethylene dibromide (1,2-Dibromoethane)	0.27	13	0	0	0	No	0%	0%	NA	NA	0	0%	NA	No
Hexachlorobutadiene (Hexachloro-1,3-butadiene)	0.1	13	0	0	0	No	0%	0%	NA	NA	0	0%	NA	No
Isopropylbenzene (Cumene)	715	13	0	0	0	No	0%	0%	NA	NA	0	0%	NA	No
Methyl isobutyl ketone (4-Methyl-2-pentanone)	469,589	13	0	0	0	No	0%	0%	NA	NA	0	0%	NA	No
o-Xylene	432	13	0	0	0	No	0%	0%	NA	NA	0	0%	NA	No
Styrene	8,186	13	0	0	0	No	0%	0%	NA	NA	0	0%	NA	No
Tetrachloroethene (PCE)	2.9	13	0	0	0	No	0%	0%	NA	NA	0	0%	NA	No
Toluene	130	13	0	0	0	No	0%	0%	NA	NA	0	0%	NA	No
Trichloroethene (TCE)	0.7	13	0	0	0	No	0%	0%	NA	NA	0	0%	NA	No
Vinyl chloride	0.18	13	0	0	0	No	0%	0%	NA	NA	0	0%	NA	No

Table J-6
Stormwater Data Statistical Results
8th Avenue Terminals, Inc. Site

Chemical	Groundwater Screening Level (SL) Value	Number of Analyses	Number of Non-detects over SL	Number of Detections	Number of Detections over SL	Chemical Retained as COPC?	Total Percent Detected	Total Percent of Samples with Detections over SL	Highest Detected Concentration	Location of Highest Detected Concentration	Number of Different Locations with Detections Over SL	Total Percent of Different Locations with Detections Over SL	Exceedance Factor for Highest Detected Concentration	Chemical Retained as COC?
Semi-Volatile Organic Compounds (SVOCs) (µg/L)														
1,2,4-Trichlorobenzene	0.05	13	0	0	0	No	0%	0%	NA	NA	0	0%	NA	No
1,2-Dichlorobenzene	5.6	13	0	0	0	No	0%	0%	NA	NA	0	0%	NA	No
1,3-Dichlorobenzene	2	13	0	0	0	No	0%	0%	NA	NA	0	0%	NA	No
1,4-Dichlorobenzene	4.79	13	0	0	0	No	0%	0%	NA	NA	0	0%	NA	No
2,4,5-Trichlorophenol	600	13	0	0	0	No	0%	0%	NA	NA	0	0%	NA	No
2,4,6-Trichlorophenol	3	13	0	0	0	No	0%	0%	NA	NA	0	0%	NA	No
2,4-Dichlorophenol	8.54	13	0	0	0	No	0%	0%	NA	NA	0	0%	NA	No
2,4-Dimethylphenol	46.2	13	0	0	0	No	0%	0%	NA	NA	0	0%	NA	No
2,4-Dinitrophenol	100	13	0	0	0	No	0%	0%	NA	NA	0	0%	NA	No
2,4-Dinitrotoluene	3	13	0	0	0	No	0%	0%	NA	NA	0	0%	NA	No
2-Chloronaphthalene	85.9	13	0	0	0	No	0%	0%	NA	NA	0	0%	NA	No
2-Chlorophenol	8.09	13	0	0	0	No	0%	0%	NA	NA	0	0%	NA	No
2-Methylphenol (o-Cresol)	27.0	13	0	0	0	No	0%	0%	NA	NA	0	0%	NA	No
4-Chloro-3-methylphenol	36	13	0	0	0	No	0%	0%	NA	NA	0	0%	NA	No
Benzoic acid	1,058	13	0	0	0	No	0%	0%	NA	NA	0	0%	NA	No
bis(2-Chloroethyl)ether	1	13	0	0	0	No	0%	0%	NA	NA	0	0%	NA	No
bis(2-Ethylhexyl)phthalate	3	13	1	3	3	Yes	23%	23%	8.3	OF-2	3	50%	2.77	Yes
Butylbenzyl phthalate	1	13	0	2	0	No	15%	0%	0.18	OF-4	0	0%	0.18	No
Diethyl phthalate	200	13	0	3	0	No	23%	0%	0.13	OF-3	0	0%	0.00065	No
Dimethyl phthalate	600	13	0	6	0	No	46%	0%	0.3	OF-1	0	0%	0.00050	No
Di-n-butyl phthalate	8	13	0	3	0	No	23%	0%	0.29	OF-1	0	0%	0.036	No
Dinitro-o-cresol (4,6-Dinitro-2-methylphenol)	25	13	0	0	0	No	0%	0%	NA	NA	0	0%	NA	No
Di-n-octyl phthalate	1	13	0	6	0	No	46%	0%	0.22	OF-1	0	0%	0.22	No
Hexachlorobenzene	0.1	13	0	0	0	No	0%	0%	NA	NA	0	0%	NA	No
Hexachlorocyclopentadiene	5	13	0	0	0	No	0%	0%	NA	NA	0	0%	NA	No
Hexachloroethane	2	13	0	0	0	No	0%	0%	NA	NA	0	0%	NA	No
Isophorone	110	13	0	3	0	No	23%	0%	0.035	OF-1	0	0%	0.00032	No
Nitrobenzene	100	13	0	0	0	No	0%	0%	NA	NA	0	0%	NA	No
n-Nitrosodi-n-propylamine	1	13	0	0	0	No	0%	0%	NA	NA	0	0%	NA	No
n-Nitrosodiphenylamine	3	13	0	0	0	No	0%	0%	NA	NA	0	0%	NA	No
Pentachlorophenol	0.5	13	0	0	0	No	0%	0%	NA	NA	0	0%	NA	No
Phenol	365	13	0	0	0	No	0%	0%	NA	NA	0	0%	NA	No
Polycyclic Aromatic Hydrocarbons (PAHs) (µg/L)														
Acenaphthene	3.24	13	0	2	0	No	15%	0%	0.0096	OF-6	0	0%	0.0030	No
Anthracene	9.35	13	0	8	0	No	62%	0%	0.013	OF-5	0	0%	0.0014	No
Benzo(a)anthracene	0.01	13	0	5	1	Yes	38%	8%	0.025	OF-3	1	17%	2.50	No
Benzo(a)pyrene	0.01	13	0	1	1	Yes	8%	8%	0.015	OF-3	1	17%	1.50	No
Benzo(b)fluoranthene	0.01	13	0	6	1	Yes	46%	8%	0.033	OF-3	1	17%	3.30	No
Benzo(k)fluoranthene	0.01	13	0	1	1	Yes	8%	8%	0.025	OF-3	1	17%	2.50	No
Chrysene	0.016	13	0	12	3	Yes	92%	23%	0.049	OF-3	3	50%	3.06	Yes
Dibenzo(a,h)anthracene	0.01	13	0	0	0	No	0%	0%	NA	NA	0	0%	NA	No
Fluoranthene	3.26	13	0	13	0	No	100%	0%	0.094	OF-3	0	0%	0.029	No
Fluorene	2.97	13	0	3	0	No	23%	0%	0.013	OF-3	0	0%	0.0044	No
Indeno(1,2,3-c,d)pyrene	0.01	13	0	2	1	Yes	15%	8%	0.017	OF-3	1	17%	1.70	No
Naphthalene	8.92	13	0	9	0	No	69%	0%	0.03	OF-3	0	0%	0.0034	No
Pyrene	8	13	0	13	0	No	100%	0%	0.1	OF-3	0	0%	0.013	No
Total cPAHs TEQ	0.01	13	0	12	1	Yes	92%	8%	0.026	OF-3	1	17%	2.57	No

Table J-6
Stormwater Data Statistical Results
8th Avenue Terminals, Inc. Site

Chemical	Groundwater Screening Level (SL) Value	Number of Analyses	Number of Non-detects over SL	Number of Detections	Number of Detections over SL	Chemical Retained as COPC?	Total Percent Detected	Total Percent of Samples with Detections over SL	Highest Detected Concentration	Location of Highest Detected Concentration	Number of Different Locations with Detections Over SL	Total Percent of Different Locations with Detections Over SL	Exceedance Factor for Highest Detected Concentration	Chemical Retained as COC?
Polychlorinated Biphenyls (PCBs) (µg/L)														
Aroclor 1016	0.03	13	0	0	0	No	0%	0%	NA	NA	0	0%	NA	No
Aroclor 1221	0.03	13	0	0	0	No	0%	0%	NA	NA	0	0%	NA	No
Aroclor 1232	0.03	13	0	0	0	No	0%	0%	NA	NA	0	0%	NA	No
Aroclor 1242	0.03	13	0	0	0	No	0%	0%	NA	NA	0	0%	NA	No
Aroclor 1248	0.03	13	0	0	0	No	0%	0%	NA	NA	0	0%	NA	No
Aroclor 1254	0.03	13	0	0	0	No	0%	0%	NA	NA	0	0%	NA	No
Aroclor 1260	0.03	13	0	0	0	No	0%	0%	NA	NA	0	0%	NA	No
Total PCBs	0.01	13	0	0	0	No	0%	0%	NA	NA	0	0%	NA	No
Petroleum Hydrocarbons (mg/L)														
Diesel range hydrocarbons	500	13	0	13	0	No	100%	0%	0.42	OF-2	0	0%	0.00084	No
Gasoline range hydrocarbons	800	13	0	1	0	No	8%	0%	0.013	OF-4	0	0%	0.000016	No
Total Diesel Range Organics	500	13	0	13	0	No	100%	0%	0.42	OF-2	0	0%	0.00084	No
Total Semi-volatile Petroleum Hydrocarbons (Sum of DRO+ORO)	500	13	0	13	0	No	100%	0%	1.82	OF-2	0	0%	0.0036	No

Notes:
COPC = chemical of potential concern
COC = chemical of concern
µg/L = micrograms per liter
mg/L = milligrams per liter
TEQ = toxicity equivalent
LPAH = low molecular weight PAHs
HPAH = high molecular weight PAHs
cPAH = carcinogenic PAHs

Table J-7
Catch Basin Solids Data Statistical Results
8th Avenue Terminals, Inc. Site

Chemical	Sediment Screening Level (SL) Value	Number of Analyses	Number of Non-detects over SL	Number of Detections	Number of Detections over SL	Chemical Retained as COPC?	Total Percent Detected	Total Percent of Samples with Detections over SL	Highest Detected Concentration	Location of Highest Detected Concentration	Number of Different Locations with Detections Over SL	Total Percent of Different Locations with Detections Over SL	Exceedance Factor for Highest Detected Concentration	Chemical Retained as COC?
Metals (mg/kg)														
Arsenic	57	21	0	19	0	No	90%	0%	25.1	DP4CB2	0	0%	0.44	No
Cadmium	5.1	19	0	12	1	Yes	63%	5%	8.8	DP3CB1	1	7%	1.73	No
Chromium	260	19	0	19	0	No	100%	0%	161	DP3CB1	0	0%	0.62	No
Copper	390	18	0	18	1	Yes	100%	6%	447	DP5CB1	1	7%	1.15	No
Lead	450	21	0	21	1	Yes	100%	5%	526	DP4CB4	1	6%	1.17	No
Mercury	0.41	21	0	20	1	Yes	95%	5%	0.44	DP3CB1	1	6%	1.07	No
Silver	6.1	19	0	10	0	No	53%	0%	2.06	DP4CB4	0	0%	0.34	No
Zinc	410	21	0	21	17	Yes	100%	81%	3,450	PS-1	13	81%	8.41	Yes
Semi-Volatile Organic Compounds (SVOCs) (mg/kg-OC)														
1,2,4-Trichlorobenzene	0.81	15	0	1	0	No	7%	0%	0.0259	DP4CB4	0	0%	0.032	No
1,2-Dichlorobenzene	2.3	15	0	1	0	No	7%	0%	0.014	DP4CB4	0	0%	0.0061	No
1,4-Dichlorobenzene	3.1	15	0	0	0	No	0%	0%	NA	NA	0	0%	NA	No
bis(2-Ethylhexyl)phthalate	47	15	2	11	10	Yes	73%	67%	756	DP6CB4	8	67%	16.09	Yes
Butylbenzyl phthalate	4.9	15	10	4	4	Yes	27%	27%	96.2	DP2CB5	3	25%	19.63	Yes
Diethyl phthalate	61	15	0	4	3	Yes	27%	20%	89.8	DP5CB1	2	17%	1.47	No
Dimethyl phthalate	53	15	0	2	0	No	13%	0%	3.78	DP4CB4	0	0%	0.071	No
Di-n-butyl phthalate	220	15	0	0	0	No	0%	0%	NA	NA	0	0%	NA	No
Di-n-octyl phthalate	58	15	0	4	0	No	27%	0%	52.9	DP6CB4	0	0%	0.91	No
Hexachlorobenzene	0.38	15	13	0	0	Yes	0%	0%	NA	NA	0	0%	NA	No
Hexachlorobutadiene (Hexachloro-1,3-butadiene)	3.9	15	0	0	0	No	0%	0%	NA	NA	0	0%	NA	No
n-Nitrosodiphenylamine	11	15	0	0	0	No	0%	0%	NA	NA	0	0%	NA	No
SVOCs (µg/kg)														
2,4-Dimethylphenol	29	17	17	0	0	Yes	0%	0%	NA	NA	0	0%	NA	No
2-Methylphenol (o-Cresol)	63	17	16	0	0	Yes	0%	0%	NA	NA	0	0%	NA	No
3-Methylphenol & 4-Methylphenol (m&p-Cresol)	63	16	13	3	3	Yes	19%	19%	21,000	DP4CB4	3	23%	333.3	Yes
Benzoic acid	650	17	14	2	2	Yes	12%	12%	3,100	DP4CB4	2	14%	4.77	Yes
Benzyl alcohol	57	16	13	3	2	Yes	19%	13%	2,000	DP1CB2	2	15%	35.09	Yes
Pentachlorophenol	360	17	14	1	1	Yes	6%	6%	440	PS-1	1	7%	1.22	No
Phenol	420	17	13	3	1	Yes	18%	6%	560	DP4CB4	1	7%	1.33	No
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg-OC)														
2-Methylnaphthalene	38	15	0	2	0	No	13%	0%	0.369	DP6CB4	0	0%	0.0097	No
Acenaphthene	16	15	0	2	0	No	13%	0%	0.853	DP4CB4	0	0%	0.053	No
Acenaphthylene	66	15	0	0	0	No	0%	0%	NA	NA	0	0%	NA	No
Anthracene	220	15	0	9	0	No	60%	0%	5.09	DP6CB1	0	0%	0.023	No
Benzo(a)anthracene	110	15	0	15	0	No	100%	0%	5.8	DP5CB4	0	0%	0.053	No
Benzo(a)pyrene	99	15	0	13	0	No	87%	0%	4.64	DP4CB4	0	0%	0.047	No
Benzo(g,h,i)perylene	31	15	0	11	0	No	73%	0%	5.59	DP4CB4	0	0%	0.18	No
Chrysene	110	15	0	15	0	No	100%	0%	12.8	DP5CB4	0	0%	0.12	No
Dibenzo(a,h)anthracene	12	15	0	2	0	No	13%	0%	1.67	DP4CB4	0	0%	0.14	No
Dibenzofuran	15	15	0	1	0	No	7%	0%	0.248	DP4CB4	0	0%	0.017	No
Fluoranthene	160	15	0	15	0	No	100%	0%	14	DP4CB4	0	0%	0.088	No
Fluorene	23	15	0	2	0	No	13%	0%	0.636	DP4CB4	0	0%	0.028	No
Indeno(1,2,3-c,d)pyrene	34	15	0	5	0	No	33%	0%	4.31	DP4CB4	0	0%	0.13	No
Naphthalene	99	15	0	3	0	No	20%	0%	2.17	DP3CB1	0	0%	0.022	No
Phenanthrene	100	15	0	13	0	No	87%	0%	8.95	DP4CB4	0	0%	0.090	No
Pyrene	1,000	15	0	15	0	No	100%	0%	13.8	DP6CB4	0	0%	0.014	No

Table J-7
Catch Basin Solids Data Statistical Results
8th Avenue Terminals, Inc. Site

Chemical	Sediment Screening Level (SL) Value	Number of Analyses	Number of Non-detects over SL	Number of Detections	Number of Detections over SL	Chemical Retained as COPC?	Total Percent Detected	Total Percent of Samples with Detections over SL	Highest Detected Concentration	Location of Highest Detected Concentration	Number of Different Locations with Detections Over SL	Total Percent of Different Locations with Detections Over SL	Exceedance Factor for Highest Detected Concentration	Chemical Retained as COC?
Total Benzofluoranthenes (b,j,k)	230	15	0	15	0	No	100%	0%	13.47	DP5CB4	0	0%	0.059	No
Total HPAH	960	15	0	15	0	No	100%	0%	64.81	DP5CB4	0	0%	0.068	No
Total LPAH	370	15	0	13	0	No	87%	0%	13.17	DP6CB1	0	0%	0.036	No
PAHs (µg/kg)														
Total cPAHs TEQ	1,000	21	0	20	1	Yes	95%	5%	1,312	DP5DP3	1	6%	1.31	No
Polychlorinated Biphenyls (PCBs) (mg/kg-OC)														
Total PCBs	12	15	1	2	0	Yes	13%	0%	2	DP6CB4	0	0%	0.19	No
Dioxins and Furans (ng/kg)														
Total Dioxins/Furans TEQ	25	3	0	3	2	Yes	100%	67%	236.4	DP6CB1	2	100%	9.45	Yes

Notes:
COPC = chemical of potential concern
COC = chemical of concern
mg/kg = milligrams per kilogram
OC = organic carbon
µg/kg = micrograms per kilogram
ng/kg = nanograms per kilogram
TEQ = toxicity equivalent
LPAH = low molecular weight PAHs
HPAH = high molecular weight PAHs
cPAH = carcinogenic PAHs