

LABORATORY DATA CONSULTANTS, INC.

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Northgate Environmental Management, Inc.

August 19, 2010

1100 Quail Street Ste. 102 Newport Beach, CA 92660 ATTN: Ms. Cindy Arnold

SUBJECT: Tronox LLC Facility, PCS, Henderson, Nevada,

Data Validation

Dear Ms. Arnold,

Enclosed are the final validation reports for the fraction listed below. These SDGs were received on August 5, 2010. Attachment 1 is a summary of the samples that were reviewed for each analysis.

LDC Project # 23733:

SDG#

Fraction

280-4960-2, 280-5189-1

Semivolatiles

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

- Standard Operating Procedures (SOP) 40, Data Review/Validation, BRC 2009
- Quality Assurance Project Plan Tronox LLC Facility, Henderson Nevada, June 2009
- NDEP Guidance, May 2006
- USEPA, Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review, June 2008

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

Sincerely,

Erlinda T. Rauto

Operations Manager/Senior Chemist

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280-4960-2 280-4960-2 280-5189-1 280-5189-1

m m

Matrix: Water/Soil

SDG#

CDC

DL 08/05/10 Stage 2B/4

T/LR

Total

Tronox LLC Facility, PCS, Henderson, Nevada Data Validation Reports LDC #23733

Semivolatiles



Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, PCS, Henderson, Nevada

Collection Date:

June 29, 2010

LDC Report Date:

August 18, 2010

Matrix:

Soil

Parameters:

Semivolatiles

Validation Level:

Stage 2B & 4

Laboratory:

TestAmerica, Inc.

Sample Delivery Group (SDG): 280-4960-2

Sample Identification

SSAK6-05-2BPC SSAO5-05-10BPC**

^{**}Indicates sample underwent Stage 4 review

Introduction

This data review covers 2 soil samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8270C for Semivolatiles.

This review follows the Standard Operating Procedures (SOP) 40, Data Review/Validation (BRC 2009), the Quality Assurance Project Plan Tronox LLC Facility, Henderson, Nevada (June 2009), NDEP guidance (May 2006), and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review (June 2008).

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

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

Samples indicated by a double asterisk on the front cover underwent a Stage 4 review. A Stage 2B review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by Stage 2B criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

- J+ Data are qualified as estimated, with a high bias likely to occur. False positives or false negatives are unlikely to have been reported.
- J- Data are qualified as estimated, with a low bias likely to occur. False positives or false negatives are unlikely to have been reported.
- J Data are qualified as estimated; it is not possible to assess the direction of the potential bias. False positives or false negatives are unlikely to have been reported.
- U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.
- R Data are qualified as rejected. There is a significant potential for the reporting of false negatives or false positives.
- UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.
- B The analytical result may be a false positive totally attributable to blank contamination. This qualifier is applicable to radiochemistry analysis only.
- JB The analytical result may be biased high and partially attributable to blank contamination. This qualifier is applicable to radiochemistry analysis only.
- JK The analytical result is an estimated maximum possible concentration (EMPC).
- X The analytical result is not used for reporting because a more accurate and precise result is reported in its place.
- J-TDS The analytical result is estimated based on failure of the Total Dissolved Solids (TDS) correctness check performed in accordance with the Standard Method 1030E.
- J-CAB The analytical result is estimated based on failure of the cation-anion balance correctness check performed in accordance with Standard Method 1030E.
- J-TDS & CAB The analytical result is unreliable based on the failure of the cation-anion balance and TDS correctness check performed in accordance with standard Method 1030E.
- A Indicates the finding is based upon technical validation criteria.
- P Indicates the finding is related to a protocol/contractual deviation.
- None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

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

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

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

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 method and validation criteria.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

Percent differences (%D) between the initial calibration RRF and the continuing calibration RRF were within the method criteria of less than or equal to 20.0% for calibration check compounds (CCCs) and 25.0% for all other compounds.

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

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

V. Blanks

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

Samples FB-04072010-RZC (from SDG 280-2280-2) and FB-04072010-RZD (from SDG 280-2216-2) were identified as field blanks. No semivolatile contaminants were found in these blanks with the following exceptions:

Field Blank ID	Sampling Date	Compound	Concentration	Associated Samples
FB-04072010-RZD	4/7/10	Bis(2-ethylhexyl)phthalate	2.2 ug/L	SSAK6-05-2BPC

Sample concentrations were compared to concentrations detected in the field blanks as required by the QAPP. No sample data was qualified.

VI. Surrogate Spikes

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

VII. Matrix Spike/Matrix Spike Duplicates

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

VIII. Laboratory Control Samples (LCS)

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

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

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

XI. Target Compound Identifications

All target compound identifications were within validation criteria for samples on which a Stage 4 review was performed. Raw data were not evaluated for the samples reviewed by Stage 2B criteria.

XII. Project Quantitation Limit

All compound quantitation and CRQLs were within validation criteria for samples on which a Stage 4 review was performed.

All compounds reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG 280-4960-2	All compounds reported below the PQL.	J (all detects)	А

Raw data were not evaluated for the samples reviewed by Stage 2B criteria.

XIII. Tentatively Identified Compounds (TICs)

Tentatively identified compounds were not reported by the laboratory.

XIV. System Performance

The system performance was acceptable for samples on which a Stage 4 review was performed. Raw data were not evaluated for the samples reviewed by Stage 2B criteria.

XV. Overall Assessment

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

XVI. Field Duplicates

No field duplicates were identified in this SDG.

Tronox LLC Facility, PCS, Henderson, Nevada Semivolatiles - Data Qualification Summary - SDG 280-4960-2

SDG	Sample	Compound	Flag	A or P	Reason (Code)
280-4960-2	SSAK6-05-2BPC SSAO5-05-10BPC**	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (sp)

Tronox LLC Facility, PCS, Henderson, Nevada Semivolatiles - Laboratory Blank Data Qualification Summary - SDG 280-4960-2

No Sample Data Qualified in this SDG

Tronox LLC Facility, PCS, Henderson, Nevada Semivolatiles - Field Blank Data Qualification Summary - SDG 280-4960-2

No Sample Data Qualified in this SDG

Tronox Northgate Henderson T

LDC #:23733A2a	VALIDATION COMPLETENESS WORKSHEE
SDG #: 280-4960-2	Stage 2B/4
Laboratory: Test America	- -

Reviewer: Mo 2nd Reviewer: 1

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

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

	Validation Area		Comments
1.	Technical holding times	A	Sampling dates: 6/29 /n
II.	GC/MS Instrument performance check	A	
111.	Initial calibration	Α	2 RSD r~
iV.	Continuing calibration/ICV	A	2 RSD 17 COU FOU = 25 }
V.	Blanks	_A	
VI.	Surrogate spikes	SN)	
VII.	Matrix spike/Matrix spike duplicates	N .	Client gree
VIII.	Laboratory control samples	A	Client open
IX.	Regional Quality Assurance and Quality Control	N	·
Χ.	Internal standards	A	·
XI.	Target compound identification	A	Not reviewed for Stage 2B validation.
XII.	Compound quantitation/CRQLs	A	Not reviewed for Stage 2B validation.
XIII.	Tentatively identified compounds (TICs)	N	Not reviewed for Stage 2B validation.
XIV.	System performance	Á	Not reviewed for Stage 2B validation.
XV.	Overall assessment of data	A	
XVI.	Field duplicates	N	¥-
XVII.	Field blanks	SW)	$FB = FB - 0407 \ 2610 - RZC$ (from 280 - 2280-2) $I = FB - 0407 \ 2010 - RZD$ (from 286 - 2216 - 2)

Note:

A = Acceptable

N = Not provided/applicable SW = See worksheet

*ND = No compounds detected R = Rinsate

D = Duplicate TB = Trip blank

FB = Field blank EB = Equipment blank

Validated Samples: ** Indicates sample underwent Stage 4 validation

	Soil			 	
1	SSAK6-05-2BPC	11	21	31	
2	SSAO5-05-10BPC**	12	22	32	
3	142 280- 22068 /-A	13	23	33	
4		14	24	34	
5		15	25	35	
6		16	26	36	
7		17	27	37	
8		18	28	38	
9		19	29	39	
10	·	20	30	40	

23733 A 29 LDC #:_______ SDG #:_______ See Cover_____

VALIDATION FINDINGS CHECKLIST

Page: _\ of _2 Reviewer: _\forall _\ 2nd Reviewer: _\

Method: Semivolatiles (EPA SW 846 Method 8270C)

Method: Semivolatiles (EPA SW 846 Method 8270C)		_		
Validation Area	Yes	No	NA	Findings/Comments
J. Technical holding times				Be the BE and the Best of the
All technical holding times were met.				
Cooler temperature criteria was met.				
III. GC/MS Instrument performance check				
Were the DFTPP performance results reviewed and found to be within the specified criteria?				
Were all samples analyzed within the 12 hour clock criteria?				
III. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?				
Were all percent relative standard deviations (%RSD) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?				
Was a curve fit used for evaluation?				
Did the initial calibration meet the curve fit acceptance criteria of <a> 0.990?				
Were all percent relative standard deviations (%RSD) < 30% and relative response factors (RRF) > 0.05?	/			
IV. Continuing calibration				Part of the second seco
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?				
Were all percent differences (%D) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?				
Were all percent differences (%D) ≤ 25% and relative response factors (RRF) ≥ 0.05?	_	-		
V. Blanks				
Was a method blank associated with every sample in this SDG?				
Was a method blank analyzed for each matrix and concentration?	/			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.			:	
VI. Surrogate spikes				A Company of the Comp
Were all surrogate %R within QC limits?				
If 2 or more base neutral or acid surrogates were outside QC limits, was a reanalysis performed to confirm %R?		/		
If any %R was less than 10 percent, was a reanalysis performed to confirm %R?			_	
VII. Matrix spike/Matrix spike duplicates				
Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.				
Was a MS/MSD analyzed every 20 samples of each matrix?				
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?				
VIII. Laboratory control samples				
Was an LCS analyzed for this SDG?				

LDC #: 37 33 A 2a SDG #: See Cover

VALIDATION FINDINGS CHECKLIST

Page: 2 of 2 Reviewer: 100 2nd Reviewer: _____

Validation Area	Yes	No	NA	Findings/Comments
Was an LCS analyzed per extraction batch?	/		<u> </u>	
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?				
IX Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?		/	<u> </u>	
Were the performance evaluation (PE) samples within the acceptance limits?				
X Internal standards				
Were internal standard area counts within -50% or +100% of the associated calibration standard?	/			
Were retention times within ± 30 seconds from the associated calibration standard?				
XI. Target compound identification				
Were relative retention times (RRT's) within ± 0.06 RRT units of the standard?				
Did compound spectra meet specified EPA "Functional Guidelines" criteria?	/		<u></u>	
Were chromatogram peaks verified and accounted for? XII. 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?		/		
XIII. Tentatively identified compounds (TICs)	2			
Were the major ions (> 10 percent relative intensity) in the reference spectrum evaluated in sample spectrum?			/	
Were relative intensities of the major ions within \pm 20% between the sample and the reference spectra?				
Did the raw data indicate that the laboratory performed a library search for all required peaks in the chromatograms (samples and blanks)?			/	
XIV. System performance				
System performance was found to be acceptable.		_		
XV. Overall assessment of data				CANDA TANDA TA
Overall assessment of data was found to be acceptable.				
XVI. Field duplicates				
Field duplicate pairs were identified in this SDG.		7		
Target compounds were detected in the field duplicates.			7	
XVII. Field blanks				
Field blanks were identified in this SDG.				
Target compounds were detected in the field blanks.				

VALIDATION FINDINGS WORKSHEET

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

A. Phenol**	P. Bis(2-chloroethoxy)methane	EE. 2,6-Dinitrotoluene	TT. Pentachlorophenol™	III. Benzo(a)pyrene**
B. Bis (2-chloroethyl) ether	Q. 2,4-Dichlorophenol™	FF. 3-Nitroaniline	UU. Phenanthrene	JJJ. Indeno(1,2,3-cd)pyrene
C. 2-Chlorophenol	R. 1,2,4-Trichlorobenzene	GG. Acenaphthene**	VV. Anthracene	KKK. Dibenz(a,h)anthracene
D. 1,3-Dichlorobenzene	S. Naphthalene	HH. 2,4-Dinitrophenol*	WW. Carbazole	LLL. Benzo(g,h,i)perylene
E. 1,4-Dichforobenzene**	T. 4-Chloroaniline	II. 4-Nitrophenol*	XX. Di-n-butylphthalate	MMM. Bis(2-Chloroisopropyl)ether
F. 1,2-Dichlorobenzene	U. Hexachlorobutadiene**	JJ. Dibenzofuran	YY. Fluoranthene**	NNN. Aniline
G. 2-Methylphenol	V. 4-Chloro-3-methylphenol**	KK. 2,4-Dinitrotoluene	ZZ. Pyrene	OOO. N-Nitrosodimethylamine
H. 2,2'-Oxybis(1-chloropropane)	W. 2-Methylnaphthalene	LL. Diethylphthalate	AAA. Butylbenzylphthalate	PPP. Benzoic Acid
I. 4-Methylphenol	X. Hexachlorocyclopentadiene*	MM. 4-Chlorophenyl-phenyl ether	BBB. 3,3'-Dichlorobenzidine	QQQ. Benzyl alcohol
J. N-Nitroso-di-n-propylamine*	Y. 2,4,6-Trichlorophenol™	NN. Fluorene	CCC. Benzo(a)anthracene	RRR. Pyridine
K. Hexachloroethane	Z. 2,4,5-Trichlorophenol	00. 4-Nitroaniline	DDD. Chrysene	SSS. Benzidine
L. Nitrobenzene	AA. 2-Chloronaphthalene	PP. 4,6-Dinitro-2-methylphenol	EEE. Bis(2-ethylhexyl)phthalate	111.
M. Isophorone	BB. 2-Nitroaniline	QQ. N-Nitrosodiphenylamine (1)**	FFF. Di-n-octylphthalate**	ກກກ
N. 2-Nitrophenol**	CC. Dimethylphthalate	RR. 4-Bromophenyl-phenylether	GGG. Benzo(b)fluoranthene	wv.
O. 2,4-Dimethylphenol	DD. Acenaphthylene	SS. Hexachlorobenzene	HHH. Benzo(k)fluoranthene	www.

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

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Page:	Reviewer:	2nd Reviewer:
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(SHEET	;	Sample Identification				
VALIDATION FINDINGS WORKSHEET Field Blanks		Associated Sample Ider				
N FINDINGS W						
ALIDATIC	id blanks? 作分 定 .					
>	8270C) his SDG? ed in the fie	sate / Ottle	(20			
	ethod ed in t detect ple ur		1-010			
	ETHOD: GC/MS BNA (EPA SW 846 Method 8270C) N N/A Were field blanks identified in this SDG? N N/A Were target compounds detected in the field blanks? Iank units: 15 / Associated sample	Blank ID	FB-0407 2010-RZD	2.2		
(2) # 18	S BN Fere Series	מו מופ מופ		EEE		
) Y	IETHOD: GC/MS BN N/A Were North N/A Were Ilank units: 1/5 /L ampling date: 4	Compound				
DC #:_ DG #:_	NETHOD: N N/A N N/A Ilank units					

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

CRaL

i ield viailik type: (cilicle Oile) i teld piailik i Nillsate / Otlei:	בי זיכות הישווו	// Misale / Otilei.	DOSCU	Associated Salliples.			
Compound	Blank ID			Sample Identification	ıtion		
							•
CRQL							

5x Phthalates 2x All others

LDC# 23733 Ava

VALIDATION FINDINGS WORKSHEET

Reviewer. Page:

2nd Reviewer:

Surrogate Recovery

Please see qualification below for all questions answered "N". Not applicable questions are identified as "N/A". METHOD: GC/MS BNA (EPA SW 846 Method 8270C)

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

7PP 57 (53-P0) No quae (No nich Cott) 7PH 59 (57-P0) C (No nich Cott) (C)	*	Date	Sample ID	Surrogate	%R (Limits)	,	Qualifications
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$				2 FP	5/ (53	No	(No acid
TPH SP (SS-126) Cold Ind				TBP	15) 25		-
				TPH		(201 -	(onthe) and base)
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QC Limits (Water) 21-100 10-123 33-110* 16-110*

QC Limits (Soil) 25-121 19-122 20-130*

S5 (2FP)= 2-Fluorophenol S6 (TBP) = 2,4,6-Tribromophenol S7 (2CP) = 2-Chlorophenol-44 S8 (DCB) = 1,2-Dichlorobenzene-44

QC Limits (Water) 35-114

43-116 33-141

QC Limits (Soil) 23-120 30-115 18-137 24-113

S1 (NBZ) = Nitrobenzere-d5 S2 (FBP) = 2-Fluorobipheny S3 (TPH) = Terphenyi-d14 S4 (PHL) = Phenol-d5

* QC limits are advisory

LDC#: 23733Ava

VALIDATION FINDINGS WORKSHEET Initial Calibration Calculation Verification

Page: 1 of 1 Reviewer: JVG

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

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

				Reported	Recalculated	Reported	Recalculated	Reported	Recalculated
		Calibration		RRF	RRF	Average RRF	Average RRF	%RSD	%RSD
#	Standard ID	Date	Compound (Internal Standard)	(50 std)	(50 std)	(Initial)	(Initial)		
-	ICAL	7/3/2010	7/3/2010 1,4-Dioxane (IS1)	0.6102	0.6102	0.6008	8009:0	5.1	5.07
	MSS K		Naphthalene (IS2)	1.0418	1.0418	0.9914	0.9914	12.0	11.97
			Dimethyl phthalate (IS3)	1.2443	1.2443	1.2017	1.2017	7.9	7.86
			Hexachlorobenzene (IS4)	0.2373	0.2373	0.2237	0.2237	7.1	7.08
			Chrysene (IS5)	1.0879	1.0879	1.0549	1.0549	8.8	8.79
			Benzo(a)pyrene (IS6)	1.1315	1.1315	1.0538	1.0538	5.1	5.09

Area IS	211425	807956	462977	764720	816792	802029	
Area cpd	161271	1052210	720125	226817	1110735	1134417	
onc IS/Cpd	40/20	40/20	40/20	40/20	40/20	40/20	

Conc	1,4-Dioxane	Naphthalene	Dimeth phtha	Hexachloro	Chrysene	Benzo(a)py
4.00	0.6711	1.1335	1.2809		1.1689	0.9886
10.00	0.5864	1.1043	1.3010	0.2427	1.1376	1.0534
20.00	0.5921	1.0824	1.2857	0.2373	1.1410	1.1022
50.00	0.6102	1.0418	1.2443	0.2373	1.0879	1.1315
80.00	0.6003	0.9839	1.2100	0.2228	1.0410	1.0984
120.00	0.5907	0.9067	1.1502	0.2160	0.9807	1.0480
160.00	0.5774	0.8649	1.0871	0.2081	0.9513	1.0196
200.00	0.5780	0.8135	1.0545	0.2020	0.9308	0.9884
×	0.6008	0.9914	1.2017	0.2237	1.0549	1.0538
S	0.0304	0.1187	0.0945	0.0158	0.0927	0.0536

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.

Continuing Calibration Results Verification VALIDATION FINDINGS WORSHEET

Page of Reviewer:__ 2nd Reviewer:_

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

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

ave. RRF = initial calibration average RRF

Where:

RRF = (Ax)(Cis)/(Ais)(Cx)

RRF = continuing calibration RRF

Ais = Area of associated internal standard Ax = Area of compound

Cis = Concentration of internal standard Cx = Concentration of compound

		dibrotion of			700 CECTON	Chorac	poteli class	Pottono	- Cooperation of the Cooperation
#	Standard ID	Date	Compound (Reference IS))	(Initial RRF)	(CC RRF)	(CC RRF)	neholied %D	Necalculated %D
1	K4961	07/09/10	1,4-Dioxane	(IS1)	0.6008	0.5608	0.5608	6.7	6.7
			Naphthalene	(IS2)	0.9914	0.9786	0.9786	1.3	1.3
			Dimethyl phthalate	(183)	1.2017	1.1736	1.1736	2.3	2.3
			Hexachlorobenzene	(184)	0.2237	0.2241	0.2241	0.2	0.2
			Chrysene	(185)	1.0549	1.0580	1.0580	0.3	0.3
			Benzo(a)pyrene	(981)	1.0538	1.0854	1.0854	3.0	3.0
2									

		CCV1		ccv2		-
Compound (Reference IS)	S)	Concentration	Area Cpd	Area IS	Area Cpd	Area IS
		(IS/Cpd)				
1,4-Dioxane	(IS1)	40/80	258207	230209		
Naphthalene	(182)	40/80	1731395	884668		
Dimethyl phthalate	(183)	40/80	1184987	504835		
Hexachlorobenzene	(IS4)	40/80	364529	813302		
Chrysene	(IS5)	40/80	1796085	848806		
Benzo(a)pyrene	(186)	40/80	1857934	855895		

80 C

LDC#: 23733 A 29 SDG #: Sre Cover

VALIDATION FINDINGS WORKSHEET Surrogate Results Verification **Surrogate Results Verification**

Page:_	lof <u>1</u>
Reviewer:	M
2nd reviewer:	W

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

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

% Recovery: SF/SS * 100

Where: SF = Surrogate Found SS = Surrogate Spiked

Sample ID: #

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5	100	73.72	74	74	O
2-Fluorobiphenyl		72.14	72	フン	
Terphenyl-d14	7	77.]	77	フフ	
Phenol-d5			/		
2-Fluorophenol					
2,4,6-Tribromophenol					
2-Chlorophenol-d4					

Sample ID:

1,2-Dichlorobenzene-d4

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5					
2-Fluorobiphenyl					
Terphenyl-d14					
Phenol-d5					
2-Fluorophenol					
2,4,6-Tribromophenol					
2-Chlorophenol-d4					
1,2-Dichlorobenzene-d4					

Sample ID:

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5					
2-Fluorobiphenyl					
Terphenyl-d14					
Phenol-d5					
2-Fluorophenol					
2,4,6-Tribromophenol					
2-Chlorophenol-d4					
1,2-Dichlorobenzene-d4					

LDC#: 23733 A2G

SDG #: See Cover

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

Page: lof ! Reviewer:__

2nd Reviewer:

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

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

% Recovery = 100 * (SC/SA

SSC = Spike concentration SA = Spike added Where:

RPD = I LCSC - LCSDC I * 2/(LCSC + LCSDC)

LCS/LCSD samples:

87022

	S,	olke	SS	Spike	91	cs	0	l csp	1 CS/	CS/I CSD
Compound	Added (VS //ex	ided //=	Conce (1/4)	Concentration (Mc /c,)	Percent Recovery	ecovery	Percent Recovery	Secovery	RI	RPD
	1.05	/ LCSD	1.08	l CSD	Reported	Recalc	Reported	Recalc	Reported	Recalculated
Phenol										
N-Nitroso-di-n-propylamine										
4-Chloro-3-methylphenol										
Acenaphthene	26.75	٨A	2220	NA	84	84				
Pentachlorophenol										
Pyrene	2630		2,300	\rightarrow	28	87				

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

LDC #:	257	33	Ą	20
SDG #:	See	Cn		_

VALIDATION FINDINGS WORKSHEET Sample Calculation Verification

Page:_	lof_1_
Reviewer:	JV6
2nd reviewer:	<u></u>

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

\cap	Ý	Ν	N/A
	X	Ν	N/A

 V_{t}

Df

Were all reported results recalculated and verified for all level IV samples?

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

•				
	Concen	itration	$a = \frac{(A_{*})(I_{*})(V_{*})(DF)(2.0)}{(A_{i*})(RRF)(V_{*})(V_{i})(\%S)}$	Example:
	A_{x}	=	Area of the characteristic ion (EICP) for the compound to be measured	Sample I.D. #
	A_{is}	=	Area of the characteristic ion (EICP) for the specific internal standard	<i>c</i>
	l _s	=	Amount of internal standard added in nanograms (ng)	Conc. = (4453)
	V_{o}	=	Volume or weight of sample extract in milliliters (ml) or grams (g).	7038428
	V_{i}	=	Volume of extract injected in microliters (ul)	= 51.56

Volume of the concentrated extract in microliters (ul)

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

Dilution Factor.

Sample I.D. $\frac{4}{7}$, S:

Conc. = $\frac{(4453)(40.0)(1000 \text{ nL})(1000 \text{ nL})(100$

2 52 mg/kg

2.0	= Factor of 2 to accour	nt for GPC cleanup				
#	Sample ID	Compound		Reported Concentration ()	Calculated Concentration ()	Qualification
 						
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<u> </u>						
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				:		
	HT I					
 						
L			<u> </u>			

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, PCS, Henderson, Nevada

Collection Date:

July 7, 2010

LDC Report Date:

August 18, 2010

Matrix:

Soil

Parameters:

Semivolatiles

Validation Level:

Stage 2B & 4

Laboratory:

TestAmerica, Inc.

Sample Delivery Group (SDG): 280-5189-1

Sample Identification

SA148-2BPC

SA148-3BPC**

SA148-3BPCMS

SA148-3BPCMSD

^{**}Indicates sample underwent Stage 4 review

Introduction

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

This review follows the Standard Operating Procedures (SOP) 40, Data Review/Validation (BRC 2009), the Quality Assurance Project Plan Tronox LLC Facility, Henderson, Nevada (June 2009), NDEP guidance (May 2006), and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review (June 2008).

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

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

Samples indicated by a double asterisk on the front cover underwent a Stage 4 review. A Stage 2B review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by Stage 2B criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

- J+ Data are qualified as estimated, with a high bias likely to occur. False positives or false negatives are unlikely to have been reported.
- J- Data are qualified as estimated, with a low bias likely to occur. False positives or false negatives are unlikely to have been reported.
- J Data are qualified as estimated; it is not possible to assess the direction of the potential bias. False positives or false negatives are unlikely to have been reported.
- U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.
- R Data are qualified as rejected. There is a significant potential for the reporting of false negatives or false positives.
- UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.
- B The analytical result may be a false positive totally attributable to blank contamination. This qualifier is applicable to radiochemistry analysis only.
- JB The analytical result may be biased high and partially attributable to blank contamination.

 This qualifier is applicable to radiochemistry analysis only.
- JK The analytical result is an estimated maximum possible concentration (EMPC).
- X The analytical result is not used for reporting because a more accurate and precise result is reported in its place.
- J-TDS The analytical result is estimated based on failure of the Total Dissolved Solids (TDS) correctness check performed in accordance with the Standard Method 1030E.
- J-CAB The analytical result is estimated based on failure of the cation-anion balance correctness check performed in accordance with Standard Method 1030E.
- J-TDS & CAB The analytical result is unreliable based on the failure of the cation-anion balance and TDS correctness check performed in accordance with standard Method 1030E.
- A Indicates the finding is based upon technical validation criteria.
- P Indicates the finding is related to a protocol/contractual deviation.
- None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

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

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

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

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 method and validation criteria.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

Percent differences (%D) between the initial calibration RRF and the continuing calibration RRF were within the method criteria of less than or equal to 20.0% for calibration check compounds (CCCs) and 25.0% for all other compounds with the following exceptions:

Date	Compound	%D	Associated Samples	Flag	A or P
7/26/10	Pyridine	31.2	SA148-3BPCMS SA148-3BPCMSD	J- (all detects) UJ (all non-detects)	A

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

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

V. Blanks

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

Method Blank ID	Extraction Date	Compound TIC (RT in minutes)	Concentration	Associated Samples
MB 280-22481/1-A	7/10/10	Dimethylphthalate Di-n-octylphthalate	26.4 ug/Kg 66.4 ug/Kg	All samples in SDG 280-5189-1

Sample concentrations were compared to concentrations detected in the method blanks as required by the QAPP. No sample data was qualified with the following exceptions:

Sample	Compound	Reported	Modified Final
	TIC (RT in minutes)	Concentration	Concentration
SA148-2BPC	Dimethylphthalate	75 ug/Kg	75U ug/Kg
	Di-n-octylphthalate	83 ug/Kg	83U ug/Kg
SA148-3BPC**	Dimethylphthalate	50 ug/Kg	50U ug/Kg

Sample FB04062010-RZB (from SDG 280-2131-2) was identified as a field blank. No semivolatile contaminants were found in this blank with the following exceptions:

Field Blank ID	Sampling Date	Compound	Concentration	Associated Samples
FB04062010-RZB	4/6/10	Bis(2-ethylhexyl)phthalate	2.7 ug/L	All samples in SDG 280-5189-1

Sample concentrations were compared to concentrations detected in the field blanks as required by the QAPP. No sample data was qualified.

VI. Surrogate Spikes

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

VII. Matrix Spike/Matrix Spike Duplicates

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

VIII. Laboratory Control Samples (LCS)

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

LCS ID	Compound	%R (Limits)	Associated Samples	Flag	A or P
LCS 280-22481/2-A	Pyridine	16 (23-120)	All samples in SDG 280-5189-1	J- (all detects) UJ (all non-detects)	Р

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

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

XI. Target Compound Identifications

All target compound identifications were within validation criteria for samples on which a Stage 4 review was performed. Raw data were not evaluated for the samples reviewed by Stage 2B criteria.

XII. Project Quantitation Limit

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

Sample	Compound	Finding	Flag	A or P
SA148-2BPC SA148-3BPC**	Benzo(b)fluoranthene Benzo(k)fluoranthene	Due to lack of resolution between these compounds in the samples, the laboratory performed the quantitation using the total peak area.	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	Р

All compounds reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG 280-5189-1	All compounds reported below the PQL.	J (all detects)	Α

Raw data were not evaluated for the samples reviewed by Stage 2B criteria.

XIII. Tentatively Identified Compounds (TICs)

Tentatively identified compounds were not reported by the laboratory.

XIV. System Performance

The system performance was acceptable for samples on which a Stage 4 review was performed. Raw data were not evaluated for the samples reviewed by Stage 2B criteria.

XV. Overall Assessment

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

XVI. Field Duplicates

No field duplicates were identified in this SDG.

Tronox LLC Facility, PCS, Henderson, Nevada Semivolatiles - Data Qualification Summary - SDG 280-5189-1

SDG	Sample	Compound	Flag	A or P	Reason (Code)
280-5189-1	SA148-2BPC SA148-3BPC**	Pyridine	J- (all detects) UJ (all non-detects)	Р	Laboratory control samples (%R) (l)
280-5189-1	SA148-2BPC SA148-3BPC**	Benzo(b)fluoranthene Benzo(k)fluoranthene	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	Р	Compound quantitation and CRQLs (q)
280-5189-1	SA148-2BPC SA148-3BPC**	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (sp)

Tronox LLC Facility, PCS, Henderson, Nevada Semivolatiles - Laboratory Blank Data Qualification Summary - SDG 280-5189-1

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P	Code
280-5189-1	SA148-2BPC	Dimethylphthalate Di-n-octylphthalate	75U ug/Kg 83U ug/Kg	А	bl
280-5189-1	SA148-3BPC**	Dimethylphthalate	50U ug/Kg	А	bl

Tronox LLC Facility, PCS, Henderson, Nevada Semivolatiles - Field Blank Data Qualification Summary - SDG 280-5189-1

No Sample Data Qualified in this SDG

Tronox Northgate Henderson _VALIDATION COMPLETENESS WORKSHEET

LDC #: 23733B2a	VALIDATION COMPLETENE
SDG #: 280-5189-1	Stage 2B/4
Laboratory: Test Americ	a

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

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

	Validation Area		Comments
١.	Technical holding times	A	Sampling dates: 7/07/10
II.	GC/MS Instrument performance check	A	
III.	Initial calibration	A	2 RSD r~
IV.	Continuing calibration/ICV	SW	2 RSD r~ COV/W = 25 }
V.	Blanks	SW)	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	A	
VIII.	Laboratory control samples	SW	ICS
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	A	
XI.	Target compound identification	A	Not reviewed for Stage 2B validation.
XII.	Compound quantitation/CRQLs	SW	Not reviewed for Stage 2B validation.
XIII.	Tentatively identified compounds (TICs)	N	Not reviewed for Stage 2B validation.
XIV.	System performance	A	Not reviewed for Stage 2B validation.
XV.	Overall assessment of data	A	
XVI.	Field duplicates	N	
XVII.	Field blanks	SN	FB = FB04 06 2010 - KZB (from 280-2131-2

Note:

A = Acceptable

N = Not provided/applicable

SW = See worksheet

ND = No compounds detected

R = Rinsate

FB = Field blank

D = Duplicate

TB = Trip blank

EB = Equipment blank

Validated Samples: ** Indicates sample underwent Stage 4 validation

1	SA148-2BPC	11	21	31	
2	SA148-3BPC**	12	22	32	
3	SA148-3BPCMS	13	23	33	
4	SA148-3BPCMSD	14	24	34	
5		15	25	35	
6		16	26	36	
7		17	27	37	
8		18	28	38	
9		19	29	39	
10		20	30	40	

LDC #: 23733 B 26 SDG #: See Cover

VALIDATION FINDINGS CHECKLIST

Method: Semivolatiles (EPA SW 846 Method 8270C)

Method: Semivolatiles (EPA SW 846 Method 8270C)				
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				
Were the DFTPP performance results reviewed and found to be within the specified criteria?				
Were all samples analyzed within the 12 hour clock criteria?		500 AUSTUJA 16704	100 M	
ill. Initial calibration				建筑设置 (1987年)
Did the laboratory perform a 5 point calibration prior to sample analysis?		<u> </u>	<u> </u>	
Were all percent relative standard deviations (%RSD) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?	_			
Was a curve fit used for evaluation?	_			
Did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	/			
Were all percent relative standard deviations (%RSD) ≤ 30% and relative response factors (RRF) ≥ 0.05?	/			
IV. Continuing calibration				Bergera de la companya del companya de la companya del companya de la companya del la companya de la companya d
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?	/			
Were all percent differences (%D) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?	/			
Were all percent differences (%D) ≤ 25% and relative response factors (RRF) ≥ 0.05?	/			
V. Blanks				
Was a method blank associated with every sample in this SDG?	/			
Was a method blank analyzed for each matrix and concentration?	/			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.		W		
VI. Surrogate spikes				The state of the s
Were all surrogate %R within QC limits?	<			
If 2 or more base neutral or acid surrogates were outside QC limits, was a reanalysis performed to confirm %R?			_	
If any %R was less than 10 percent, was a reanalysis performed to confirm %R?				
VII. Matrix spike/Matrix spike duplicates	T .	ı	I	
Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.				
Was a MS/MSD analyzed every 20 samples of each matrix?		<u> </u>		
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?				
VIII. Laboratory control samples		IZ	T	
Was an LCS analyzed for this SDG?	1/	<u>[</u>		

LDC#: >>737 Bra

VALIDATION FINDINGS CHECKLIST

Page: 2 of 2
Reviewer: 16
2nd Reviewer: 17

Validation Area	Yes	No	NA	Findings/Comments
Was an LCS analyzed per extraction batch?				
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?				
IX. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?				
Were the performance evaluation (PE) samples within the acceptance limits?				3 (BC-94) 3 (BC-94)
X Internal standards				
Were internal standard area counts within -50% or +100% of the associated calibration standard?				
Were retention times within ± 30 seconds from the associated calibration standard?	\angle		nemows.	
XI. Target compound identification				
Were relative retention times (RRT's) within ± 0.06 RRT units of the standard?				
Did compound spectra meet specified EPA "Functional Guidelines" criteria?	/			
Were chromatogram peaks verified and accounted for?			edonos curs	
XII. 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?				
XIII. Tentatively identified compounds (TICs)				grading the second
Were the major ions (> 10 percent relative intensity) in the reference spectrum evaluated in sample spectrum?			_	
Were relative intensities of the major ions within \pm 20% between the sample and the reference spectra?			_	
Did the raw data indicate that the laboratory performed a library search for all required peaks in the chromatograms (samples and blanks)?		/		
XIV. System performance		Ŧ	1	
System performance was found to be acceptable.				
XV. Overall assessment of data		T		The second of th
Overall assessment of data was found to be acceptable.				
XVI. Field duplicates	T	i e e e e e e e e e e e e e e e e e e e		Application of the second of t
Field duplicate pairs were identified in this SDG.		/		
Target compounds were detected in the field duplicates.			_	
XVII. Field blanks	т	1	I	
Field blanks were identified in this SDG.	/			
Target compounds were detected in the field blanks.	<u> </u>	<u> </u>		

VALIDATION FINDINGS WORKSHEET

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

A, Phenoi**	P. Bis(2-chloroethoxy)methane	EE. 2,6-Dinitrotoluene	TT. Pentachlorophenol**	III. Benzo(a)pyrene**
B. Bis (2-chloroethyl) ether	Q. 2,4-Dichlorophenol**	FF. 3-Nitroaniline	UU. Phenanthrene	JJJ. Indeno(1,2,3-cd)pyrene
C. 2-Chlorophenol	R. 1,2,4-Trichlorobenzene	GG. Acenaphthene**	VV. Anthracene	KKK. Dibenz(a,h)anthracene
D. 1,3-Dichlorobenzene	S. Naphthalene	HH. 2,4-Dinitrophenol*	WW. Carbazole	LLL. Benzo(g,h,i)perylene
E, 1,4-Dichlorobenzene**	T. 4-Chloroaniline	II. 4-Nitrophenol*	XX. Di-n-butylphthalate	MMM. Bis(2-Chloroisopropyl)ether
F. 1,2-Dichlorobenzene	U, Hexachlorobutadiene**	JJ. Dibenzofuran	YY. Fluoranthene**	NNN. Aniline
G. 2-Methylphenol	V. 4-Chloro-3-methylphenol**	KK. 2,4-Dinitrotoluene	ZZ. Pyrene	000. N-Nitrosodimethylamine
H. 2,2'-Oxybis(1-chloropropane)	W. 2-Methylnaphthalene	LL. Diethylphthalate	AAA. Butylbenzylphthalate	PPP, Benzoic Acid
I. 4-Methylphenol	X. Hexachlorocyclopentadiene*	MM. 4-Chlorophenyl-phenyl ether	BBB. 3,3'-Dichlorobenzidine	QQQ. Benzyl alcohol
J. N-Nitroso-di-n-propylamine*	Y. 2,4,6-Trichlorophenol**	NN. Fluorene	CCC. Benzo(a)anthracene	RRR. Pyridine
K. Hexachloroethane	Z. 2,4,5-Trichlorophenol	00. 4-Nitroaniline	DDD. Chrysene	SSS. Benzidine
L. Nitrobenzene	AA. 2-Chloronaphthalene	PP. 4,6-Dinitro-2-methylphenol	EEE. Bis(2-ethylhexyl)phthalate	тт.
M. Isophorone	BB. 2-Nitroaniline	QQ. N-Nitrosodiphenylamine (1)**	FFF. Di-n-octylphthalate**	ກດດ
N. 2-Nitrophenol**	CC. Dimethylphthalate	RR. 4-Bromophenyl-phenylether	GGG. Benzo(b)fluoranthene	WV.
O. 2,4-Dimethylphenol	DD. Acenaphthylene	SS. Hexachlorobenzene	HHH. Benzo(k)fluoranthene	WWW.

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

LDC# 23733 B24

VALIDATION FINDINGS WORKSHEET Continuing Calibration

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

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

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

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

Were all %D and RRFs within the validation criteria of ≤25 %D and ≥0.05 RRF?

2nd Reviewer: Reviewer:

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ations	J-/43 /A (c																	
	J.														•			
	3.4	,																_
Finding RRF (Limit: <u>></u> 0.05)																		
Finding %D (Limit: <25.0%)	31.2																	
Finding %D Compound (Limit: <25.0%)	RRR (-)																	
유																		
Date	2/26/10																	
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LDC #:	SDG #:

VALIDATION FINDINGS WORKSHEET

Page: Reviewer: 2nd Reviewer:	-ot	2	(
	Page:	Reviewer:	2nd Reviewer:

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

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

Was a method blank analyzed for each matrix? Y N N/A N/A

Was a method blank analyzed for each concentration preparation level?

Was a method blank associated with every sample? Y N/A

 $\frac{V}{N}$ N/A Was the blank contaminated? If yes, please see qualification below. Blank analysis date: $\frac{7}{47}$ /10

(17) AIL Associated Samples: Conc. units: 45 /kg

	tification						
	Sample Identification						
coording cambion		λ	7/ B				
100001		_	15/4	83/4			
		MB 280-22481 K-A					
	Blank ID	MB 280-2	26.4	4.90			
Colles dilles.	Compound		22	7777			

date:	
lysis (
Blank analysis date:	
Bla	
date:	
Blank extraction date:	:6
extra	Conc. units:
Blank	Conc

ſ		T		- 1	1	1	T	7
	ů.							
	Sample Identification							
	San							
Associated Samples:								
Associated								
o date.								
Digiin allalysis date	Blank ID							
Diality extraction date Conc. units:	Compound							
Conc. units:								

5x Phthalates 2x all others

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3	J
DC #:	#: DC:#:

VALIDATION FINDINGS WORKSHEET Field Blanks

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

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

Were field blanks identified in this SDG?

Sampling date: 4 / 6 c / 70 Y N N/A

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

<u>-</u> ---

Sample Identification Associated Samples: FB04062010-RZB Blank ID 2,7 鈕 Compound CRQL

sample units:
Associated
nk units:
걸
-

Sampling date:

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

Associated Samples:

Compound	Blank ID		Sa	Sample Identification	no		
CROL							

5x Phthalates 2x All others

LDC#: 23733 Brg

VALIDATION FINDINGS WORKSHEET Laboratory Control Samples (LCS)

Page: \ of \ 2nd Reviewer: Reviewer:

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

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

Y N N/A

Was a LCS required? Y N N/A

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

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relec	Sola
LDC#:	SDG #:

Compound Quantitation and Reported CRQLs VALIDATION FINDINGS WORKSHEET

Page: Reviewer: 2nd Reviewer:

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

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

Were compound quantitation and CRQLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation? Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the compound?

Qualifications	J/43 /6 /6"										
Associated Samples	WIESO hex										
Finding	perky										
Sample ID	7	,									
Date					-			·			
*											

Comments: See sample calculation verification worksheet for recalculations

LDC #: 73 733 BYQ

VALIDATION FINDINGS WORKSHEET Initial Calibration Calculation Verification

Page: of 1 Reviewer: JVG 2nd Reviewer:

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

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

					Reported	Recalculated	Reported	Recalculated	Reported	Recalculated
		Calibration			RRF	RRF	Average RRF	Average RRF	%RSD	%RSD
#	Standard ID Date	Date	Compound (Internal Standard)	ard)	(50 std)	(50 std)	(Initial)	(Initial)		
1	ICAL	7/21/2010	7/21/2010 1,4-Dioxane ((181)	0.5607	0.5607	0.5706	0.5707	4.1	4.13
	MSSK			(182)	1.0611	1.0611	1.0093	1.0093	5.7	5.70
			Fluorene ((183)	1.3101	1.3101	1.2473	1.2473	5.3	5.25
			Hexachlorobenzene (I	(184)	0.2418	0.2418	0.2300	0.2300	3.8	3.81
			Chrysene (I	(185)	1.1089	1.1089	1.0581	1.0581	6.7	6.75
			Benzo(a)pyrene (I.	(981)	1.1425	1.1425	1.0793	1.0794	8.5	8.53

Area IS	160417	616036	358588	534527	565669	542046
Area cpd	112429	817090	587234	161541	784054	774079
nc IS/Cpd	40/20	40/20	40/20	40/20	40/20	40/20

Sono	1,4-Dioxane	Naphthalene	Fluorene	Hexachloro	Chrysene	Benzo(a)py
4.00	0.6209	1.0632	1.2493		1.1443	0.8934
10.00	0.5673	1.0390	1.2573	0.2339	1.1045	0.9948
20.00	0.5842	1.0490	1.3209	0.2330	1.1007	1.0754
50.00	0.5607	1.0611	1.3101	0.2418	1.1089	1.1425
80.00	0.5523	1.0236	1.2953	0.2310	1.0810	1.1683
120.00	0.5455	0.9799	1.2298	0.2266	0.9887	1.1297
160.00	0.5731	0.9540	1.1898	0.2305	0.9795	1.1318
200.00	0.5612	0.9045	1.1261	0.2131	0.9573	1.0989
×	0.5707	1.0093	1.2473	0.2300	1.0581	1.0794
S	0.0236	0.0575	0.0655	0.0088	0.0714	0.0920

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.

Continuing Calibration Results Verification **VALIDATION FINDINGS WORSHEET**

Page ___ of__ Reviewer:__ 2nd Reviewer._

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

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:

Where:

ave. RRF = initial calibration average RRF

% Difference = 100 * (ave. RRF - RRF)/ave. RRF

RRF = (Ax)(Cis)/(Ais)(Cx)

RRF = continuing calibration RRF

Ais = Area of associated internal standard Ax = Area of compound

Cis = Concentration of internal standard Cx = Concentration of compound

		Calibration		****	Average RRF	Reported	Recalculated	Reported	Recalculated
Star	Standard ID	Date	Compound (Reference IS)		(Initial RRF)	(CC RRF)	(CC RRF)	%D	۵%
3	K5486	07/26/10	1,4-Dioxane	(IS1)	0.5706	0.5421	0.5421	5.0	5.0
			Naphthalene	(182)	1.0093	1.0474	1.0474	3.8	3.8
			Fluorene	(183)	1.2473	1.3218	1.3218	6.0	6.0
			Hexachlorobenzene	(184)	0.2300	0.2439	0.2439	6.0	6.0
			Chrysene	(185)	1.0581	1.0708	1.0708	1.2	1.2
			Benzo(a)pyrene	(981)	1.0793	1.1855	1.1855	9.8	9.8
	K5532	07/27/10	1,4-Dioxane	(181)	0.5706	0.5443	0.5443	4.6	4.6
			Naphthalene	(182)	1.0093	1.0689	1.0689	5.9	5.9
			Fluorene	(183)	1.2473	1.3191	1.3191	5.8	5.8
			Hexachlorobenzene	(184)	0.2300	0.2438	0.2438	6.0	6.0
			Chrysene	(185)	1.0581	1.1145	1.1145	5.3	5.3
			Benzo(a)pvrene	(981)	1.0793	1,1724	1,1724	86	86

			CCV1		CCV2	
Compound (Reference IS)		Concentration	Area Cpd	Area IS	Area Cpd	Area IS
		(IS/Cpd)				
1,4-Dioxane	(IS1)	40/80	228201	210491	202149	185703
Naphthalene	(IS2)	40/80	1687974	805819	1517262	709711
Fluorene	(183)	40/80	1267589	479482	1084580	411103
Hexachlorobenzene	(184)	40/80	383230	785735	317955	652027
Chrysene	(185)	40/80	1868368	872394	1544610	692941
Benzo(a)pyrene	(981)	40/80	1802120	760039	1522934	649517

LDC #: \(\frac{\sigma_3}{3} \) \(\frac{\sigma_2}{\sigma_1} \) VALIDATION FINDINGS WORKSHEET SDG #: \(\frac{\sigma_1}{\sigma_2} \) Surrogate Results Verification

Page:	<u>lof 1</u>
Reviewer:	SV
2nd reviewer:	5

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

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

% Recovery: SF/SS * 100

Where: SF = Surrogate Found

Sample ID: # ~

SS = Surrogate Spiked

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5	100	74. 8	75	75	Ø
2-Fluorobiphenyl	1	81. 4	81	8 /	
Terphenyl-d14	1	95,5	96	96	1
Phenol-d5					
2-Fluorophenol					
2,4,6-Tribromophenol					

Sample ID:

2-Chlorophenol-d4 1,2-Dichlorobenzene-d4

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5					
2-Fluorobiphenyl					
Terphenyl-d14					
Phenol-d5					
2-Fluorophenol					
2,4,6-Tribromophenol					
2-Chlorophenol-d4					
1,2-Dichlorobenzene-d4					

Sample ID:

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5					
2-Fluorobiphenyl					
Terphenyl-d14					
Phenol-d5					
2-Fluorophenol					
2,4,6-Tribromophenol					
2-Chlorophenol-d4					
1,2-Dichlorobenzene-d4					

LDC#: 2372382C SDG #: See Care

Matrix Spike/Matrix Spike Duplicates Results Verification VALIDATION FINDINGS WORKSHEET

Page: lof 1

Reviewer: Dife.

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

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

% Recovery = 100 * (SSC - SC)/SA

SSC = Spiked sample concentration SA = Spike added Where:

SC = Sample concentation

MSC = Matrix spike concentration

MSDC = Matrix spike duplicate concentration

RPD = IMSC - MSC I * 2/(MSC + MSDC) MS/MSD samples:

	ias	9	Samole	Spiked S	ample	Matrix Spike	Spike	Matrix Spike Duplicate	Duplicate	MS/MSD	3D
Compound	Added (100)	, (eq.	Concentration	Concentration	ration	Percent Recovery	ecovery	Percent Recovery	ecovery	RPD	
	S _M	MSD	0	MS	MSD	Reported	Recalc	Reported	Recalc	Reported	Recalculated
Phenol											
N-Nitroso-di-n-propylamine											
4-Chloro-3-methylphenol											
	2770	2750	Q	2080	2670	9/	4۷	22	75/	۵	o. N
Pentachlorophenol											
	2720	2750	190	2220	2420	44	75	8)	B	8	∞
								_			

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

LDC#: 29 797 Bry SDG #: See Corr

VALIDATION FINDINGS WORKSHEET

Laboratory Control Sample/Laboratory Control Sample Duplicates Results Verification

Page: lof 1 Reviewer: 377 2nd Reviewer:

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

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

% Recovery = 100 * (SC/SA

SSC = Spike concentration SA = Spike added Where:

RPD = I LCSC - LCSDC I* 2/(LCSC + LCSDC)

LCS/LCSD samples: 1CS 280- 2481

	S.	ika	8	971		y.		900	20	200 1100
Compound	A Ag	Added (M)	Concei (1/2)	Concentration	Percent F	Percent Recovery	Parcent	Parcent Recovery	Caa	
	301	7	-	0		-				
					Danie			KACAUC	керогия	Kecalcillated
Phenol										
N-Nitroso-di-n-propylamine										
4-Chloro-3-methylphenol										
Acenaphthene	2192	KA	19 60	K.A.	75	72				\
Pentachlorophenoi										
Pyrene	26 10	→	1946	~	47	42				
										:

Comments: Refer to Laboratory Control Sample/Laboratory Control Sample Duplicates findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results. LDC #: 73733 BZG SDG #: Sre Cover

VALIDATION FINDINGS WORKSHEET Sample Calculation Verification

Page:	<u>lof_1</u>
Reviewer:	Me
2nd reviewer:	1.

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

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

Concentration = $(A_{\star})(I_{\star})(V_{\star})(DF)(2.0)$ $(A_{is})(RRF)(V_o)(V_i)(%S)$ Area of the characteristic ion (EICP) for the compound to be measured Area of the characteristic ion (EICP) for the specific internal standard Amount of internal standard added in nanograms (ng) Volume or weight of sample extract in milliliters (ml) or = grams (g). Volume of extract injected in microliters (ul) = Volume of the concentrated extract in microliters (ul) Df Dilution Factor. Percent solids, applicable to soil and solid matrices only. %S

Sample I.D. $\frac{\#}{\sqrt{}}$, $\frac{\int IJ}{\int IJ}$ Conc. = $\frac{(58/07)(40)(1000uL)(1000$

2.0	= Factor of 2 to accoun	nt for GPC cleanup			
#	Sample ID	Compound	Reported Concentration ()	Calculated Concentration ()	Qualification
[
 			 		
<u> </u>			 		
 			 		