

LABORATORY DATA CONSULTANTS, INC.

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ERM

August 6, 2008

2525 Natomas Park Drive, Suite 350 Sacramento, CA 95833

ATTN: Ms. Maria Barajas-Albalawi

SUBJECT: BRC Tronox Parcel F, Data Validation

Dear Ms. Barajas-Albalawi

Enclosed are the final validation reports for the fractions listed below. This SDG was received on July 11, 2008. Attachment 1 is a summary of the samples that were reviewed for each analysis.

LDC Project # 19091:

SDG#	Fraction
F8F110177	Volatiles, Semivolatiles, Chlorinated Pesticides, Polychlorinated Biphenyls, Metals, Wet Chemistry, Gasoline Range Organics, Diesel Range Organics, Polynuclear Aromatic Hydrocarbons, Dioxins/Dibenzofurans

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

- USEPA, Contract Laboratory Program National Functional Guidelines for Organic Data Review, October 1999
- USEPA, Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, October 2004
- EPA SW 846, Third Edition, Test Methods for Evaluating Solid Waste, update 1, July 1992; update IIA, August 1993; update II, September 1994; update IIB, January 1995; update III, December 1996; update IIIA, April 1998; IIIB, November 2004; Update IV, February 2007

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

Sincerely,

Erlinda T. Rauto

Operations Manager/Senior Chemist

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Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

BRC Tronox Parcel F

Collection Date:

June 10, 2008

LDC Report Date:

August 6, 2008

Matrix:

Soil/Water

Parameters:

Volatiles

Validation Level:

EPA Level III & IV

Laboratory:

TestAmerica, Inc.

Sample Delivery Group (SDG): F8F110177

TSB-FR-02-02-20'

TSB-FR-02-02-30'**

TSB-FJ-02-02-10'**

TSB-FJ-02-02-20'**

TSB-FJ-02-02-30'

TB-2 6/10/08

TSB-FJ-02-02-30'MS

TSB-FJ-02-02-30'MSD

^{**}Indicates sample underwent EPA Level IV review

Introduction

This data review covers 7 soil samples and one water sample listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8260B for Volatiles.

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

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

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

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

The following are definitions of the data qualifiers:

- 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.
- 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.
- A Indicates the finding is based upon technical validation criteria.
- P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

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

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

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

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

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

Average relative response factors (RRF) for all volatile target compounds and system performance check compounds (SPCCs) were within method and validation criteria with the following exceptions:

Date	Compound	RRF (Limits)	Associated Samples	Flag	A or P
6/12/08	Ethanol	0.00148 (≥0.05)	All soil samples in SDG F8F110177	J (all detects) UJ (all non-detects)	Α

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

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

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

Date	Compound	%D	Associated Samples	Flag	A or P
6/19/08 (LCAL0317)	lodomethane	67.71684	TB-2 6/10/08 F8F200000-125	J+ (all detects)	А

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

Date	Compound	%D	Associated Samples	Flag	A or P
5/28/08 (LICV9881)	lodomethane	31.67513	All water samples in SDG F8F110177	J+ (all detects)	А
5/28/08 (LICV9881)	2-Hexanone	25.04476	All water samples in SDG F8F110177	J- (all detects) UJ (all non-detects)	А
6/9/08 (XICV2280)	Methylene chloride	29.90220	All soil samples in SDG F8F110177	J- (all detects) UJ (all non-detects)	А

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

V. Blanks

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

Method Blank ID	Analysis Date	Compound TIC (RT in minutes)	Concentration	Associated Samples
F8F120000-446	6/12/08	Tetrachloroethene	1.5 ug/Kg	All soil samples in SDG F8F110177

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

Sample	Compound	Reported	Modified Final
	TIC (RT in minutes)	Concentration	Concentration
TSB-FR-02-02-20'	Tetrachloroethene	1.4 ug/Kg	5.6U ug/Kg

Sample	Compound TIC (RT in minutes)	Reported Concentration	Modified Final Concentration
TSB-FR-02-02-30'**	Tetrachloroethene	1.3 ug/Kg	7.2U ug/Kg
TSB-FJ-02-02-10'**	Tetrachloroethene	1.6 ug/Kg	6.6U ug/Kg
TSB-FJ-02-02-20'**	Tetrachloroethene	1.3 ug/Kg	6.1U ug/Kg
TSB-FJ-02-02-30'	Tetrachloroethene	1.2 ug/Kg	6.5U ug/Kg

Sample TB-2 6/10/08 was identified as a trip blank. No volatile contaminants were found in this blank with the following exceptions:

Trip Blank ID	Sampling Date	Compound	Concentration	Associated Samples
TB-2 6/10/08	6/10/08	Acetone Chloroform	2.9 ug/L 0.14 ug/L	TSB-FR-02-02-20' TSB-FR-02-02-30'** TSB-FJ-02-02-10'** TSB-FJ-02-02-20'** TSB-FJ-02-02-30'

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

VI. Surrogate Spikes

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

Sample	Surrogate	%R (Limits)	Compound	Flag	A or P
F8F200000-125	Bromofluorobenzene	117 (79-115)	All TCL compounds	J+ (all detects)	Р

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable. Although the MS/MSD percent recovery (%R) and relative percent differences (RPD) were not within QC limits for some compounds, the MS/MSD percent recoveries (%R) were within QC limits and no data were qualified.

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Although the relative percent differences (RPD) for one compound and the percent recoveries for some compounds in the LCS/LCSD were not within QC limits, the LCS and MS/MSD percent recoveries (%R) were within QC limits and no data were qualified.

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

All internal standard areas and retention times were within QC limits with the following exceptions:

Sample	Internal Standards	Area (Limits)	Compound	Flag	A or P
TSB-FR-02-02-30'**	1,4-Dichlorobenzene-d4	172980 (187131-748522)	1,1,2,2-Tetrachloroethene 1,2,3-Trichlorobenzene 1,2,4-Trichlorobenzene 1,2,4-Trichlorobenzene 1,2,2-Dichlorobenzene 1,2-Dibromo-3-chloropropane 1,3-Dichlorobenzene 1,3-Dichlorobenzene 1,4-Dichlorobenzene 2-Chlorotoluene 8-Chlorotoluene Bromobenzene lsopropylbenzene n-Butylbenzene n-Propylbenzene p-Cymene sec-Butylbenzene tert-Butylbenzene 1,3,5-Trichlorobenzene Nonanal Bromoform	J (all detects) UJ (all non-detects)	P

Sample	Internal Standards	Area (Limits)	Compound	Flag	A or P
TSB-FJ-02-02-10'**	1,4-Dichlorobenzene-d4	180609 (187131-748522)	1,1,2,2-Tetrachloroethene 1,2,3-Trichlorobenzene 1,2,3-Trichlorobenzene 1,2,4-Trichlorobenzene 1,2,2-Dichlorobenzene 1,2-Dichlorobenzene 1,3-Dichlorobenzene 1,3-Dichlorobenzene 1,4-Dichlorobenzene 2-Chlorotoluene Bromobenzene lsopropylbenzene n-Butylbenzene n-Propylbenzene p-Cymene sec-Butylbenzene tert-Butylbenzene 1,3,5-Trichlorobenzene Nonanal Bromoform	J (all detects) UJ (all non-detects)	P
TSB-FJ-02-02-20'**	1,4-Dichlorobenzene-d4	171259 (187131-748522)	1,1,2,2-Tetrachloroethene 1,2,3-Trichlorobenzene 1,2,3-Trichlorobenzene 1,2,4-Trichlorobenzene 1,2,4-Trimethylbenzene 1,2-Dichlorobenzene 1,2-Dibromo-3-chloropropane 1,3,5-Trimethylbenzene 1,3-Dichlorobenzene 1,4-Dichlorobenzene 2-Chlorotoluene 8-Chlorotoluene Bromobenzene Isopropylbenzene n-Butylbenzene n-Propylbenzene p-Cymene sec-Butylbenzene tett-Butylbenzene 1,3,5-Trichlorobenzene Nonanal Bromoform	J (all detects) UJ (all non-detects)	Р

Sample	Internal Standards	Area (Limits)	Compound	Flag	A or P
TSB-FJ-02-02-30'	1,4-Dichlorobenzene-d4	168365 (187131-748522)	1,1,2,2-Tetrachloroethene 1,2,3-Trichlorobenzene 1,2,4-Trichlorobenzene 1,2,4-Trichlorobenzene 1,2,4-Trimethylbenzene 1,2-Dichlorobenzene 1,2-Dibromo-3-chloropropane 1,3,5-Trimethylbenzene 1,3-Dichlorobenzene 1,4-Dichlorobenzene 2-Chlorotoluene 4-Chlorotoluene Bromobenzene lsopropylbenzene n-Butylbenzene n-Propylbenzene p-Cymene sec-Butylbenzene tert-Butylbenzene 1,3,5-Trichlorobenzene Nonanal Bromoform	J (all detects) UJ (all non-detects)	P

XI. Target Compound Identifications

All target compound identifications were within validation criteria for samples on which a EPA Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XII. Compound Quantitation and CRQLs

All compound quantitation and CRQLs were within validation criteria for samples on which a EPA Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XIII. Tentatively Identified Compounds (TICs)

All tentatively identified compounds were within validation criteria for samples on which a EPA Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XIV. System Performance

The system performance was acceptable for samples on which a EPA Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria

XV. Overall Assessment of Data

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

XVI. Field Duplicates

No field duplicates were identified in this SDG.

BRC Tronox Parcel F Volatiles - Data Qualification Summary - SDG F8F110177

SDG	Sample	Compound	Flag	A or P	Reason
F8F110177	TSB-FR-02-02-20' TSB-FR-02-02-30'** TSB-FJ-02-02-10'** TSB-FJ-02-02-20'** TSB-FJ-02-02-30'	Ethanol	J (all detects) UJ (all non-detects)	А	Initial calibration (RRF)
F8F110177	TB-2 6/10/08	Iodomethane	J+ (all detects)	Α	Continuing calibration (%D)
F8F110177	TB-2 6/10/08	Iodomethane	J+ (all detects)	A	Continuing calibration (ICV %D)
F8F110177	TB-2 6/10/08	2-Hexanone	J- (all detects) UJ (all non-detects)	А	Continuing calibration (ICV %D)
F8F110177	TSB-FR-02-02-20' TSB-FR-02-02-30'** TSB-FJ-02-02-10'** TSB-FJ-02-02-20'** TSB-FJ-02-02-30'	Methylene chloride	J- (all detects) UJ (all non-detects)	А	Continuing calibration (ICV %D)
F8F110177	TSB-FR-02-02-30'** TSB-FJ-02-02-10'** TSB-FJ-02-02-20'** TSB-FJ-02-02-30'	1,1,2,2-Tetrachloroethene 1,2,3-Trichlorobenzene 1,2,4-Trichlorobenzene 1,2,4-Trimethylbenzene 1,2-Dichlorobenzene 1,2-Dichlorobenzene 1,2-Dibromo-3-chloropropane 1,3,5-Trimethylbenzene 1,3-Dichlorobenzene 1,4-Dichlorobenzene 2-Chlorotoluene Bromobenzene Isopropylbenzene n-Butylbenzene n-Propylbenzene p-Cymene sec-Butylbenzene tert-Butylbenzene 1,3,5-Trichlorobenzene Nonanal Bromoform	J (all detects) UJ (all non-detects)	Р	Internal standards (area)

BRC Tronox Parcel F Volatiles - Laboratory Blank Data Qualification Summary - SDG F8F110177

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P
F8F110177	TSB-FR-02-02-20'	Tetrachloroethene	5.6U ug/Kg	А
F8F110177	TSB-FR-02-02-30'**	Tetrachloroethene	7.2U ug/Kg	Α
F8F110177	TSB-FJ-02-02-10'**	Tetrachloroethene	6.6U ug/Kg	Α
F8F110177	TSB-FJ-02-02-20'**	Tetrachloroethene	6.1U ug/Kg	А
F8F110177	TSB-FJ-02-02-30'	Tetrachloroethene	6.5U ug/Kg	А

BRC Tronox Parcel F Volatiles - Field Blank Data Qualification Summary - SDG F8F110177

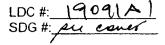
No Sample Data Qualified in this SDG

SDG#	:19091A1 t:F8F110177 atory:_Test America	VALIDATIO		PLETENE evel III/IV		RKSHEET		Date: 7/19/ Page: _/of_/ Reviewer:
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	Validation	Area				Comme	nts	
I.	Technical holding times		4	Sampling d	ates:	6/10/0	28	
11.	GC/MS Instrument performa	nce check	Δ					
111.	Initial calibration	·	A	% PSS), 12	20.990		
IV.	Continuing calibration/ICV		5W	101	4 25	<u>-</u>		
V.	Blanks		SW					
VI.	Surrogate spikes		sw					
VII.	Matrix spike/Matrix spike dup	olicates	SW	Rin	sate - 7	ν		
VIII.	Laboratory control samples		ی۷					
IX.	Regional Quality Assurance	and Quality Control	N					
X.	Internal standards		5W					
XI.	Target compound identificati	on	A	Not review	ed for Level II	II validation.		
XII.	Compound quantitation/CRC)Ls	٨	Not review	ed for Level II	II validation.		
XIII.	Tentatively identified compo	unds (TICs)	Δ	Not review	ed for Level II	II validation.		
XIV.	System performance		Δ	Not review	ed for Level II	II validation.		
XV.	Overall assessment of data		Δ					
XVI.	Field duplicates		7					
XVII.	Field blanks		SW	$\mathcal{T}\mathcal{B}$	76			
Note:	A = Acceptable N = Not provided/applicable SW = See worksheet	R = Rin FB = Fi	eld blank	s detected	D = 0 TB =	Duplicate Trip blank Equipment blank		
	d Samples: ** Indic	ates sample underw wa. Hev	ent Level IV	validation				
71	TSB-FR-02-02-20'	11 F8F121	0000-44	<i>lio</i> 21	81644	46	31	
2/-	TSB-FR-02-02-30'**	127 F8F20	00000-12	22	817-21	ズ	32	
3 /	TSB-FJ-02-02-10'**	133 F8 F2 D	0000-3	6/ 23	81723	361 NONG	33	
4 / -	TSB-FJ-02-02-20'**	14		24			34	
5 /	TSB-FJ-02-02-30',	15		25			35	
6 2	TB-2 6/10/08	16		26			36	

19091A1W.wpd

TSB-FJ-02-02-30'MS

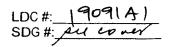
TSB-FJ-02-02-30'MSD



VALIDATION FINDINGS CHECKLIST

Method: Volatiles (EPA SW 846 Method 8260B)

Welliod. Volatiles (CPA SVV 040 Method 0200D)				
Validation Area	Yes	No	NA	Findings/Comments
Lifecture include white				
All technical holding times were met.	/	ļ	<u> </u>	
Cooler temperature criteria was met.				
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Were the BFB performance results reviewed and found to be within the specified criteria?	-			
Were all samples analyzed within the 12 hour clock criteria?		and a state of the		
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 > 0.990?				
Were all percent relative standard deviations (%RSD) \leq 30% and relative response factors (RRF) \geq 0.05?				
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) \leq 25% and relative response factors (RRF) \geq 0.05?		1		
	Andreas I			
Was a method blank associated with every sample in this SDG?				
Was a method blank analyzed at least once every 12 hours for each matrix and concentration?				
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.				
Were all surrogate %R within QC limits?				
If the percent recovery (%R) for one or more surrogates was out of QC limits, was a reanalysis performed to confirm samples with %R outside of criteria?				
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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?		1		
All Gardinos Control Services (1995) A 1995 (1995) A 1995 (1995)				
Vas an LCS analyzed for this SDG?	1			



VALIDATION FINDINGS CHECKLIST

Page: 2 of 2
Reviewer: P7
2nd Reviewer: 1

Validation Area	Yes	No	NA	Findings/Comments
Was an LCS analyzed per analytical batch?	/	<u> </u>		
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?		/		٠.
ILO FIGGIOTE IL GENTO ASSOCIATO CAGNIO CAGNIO ACONTO INC.				
Were performance evaluation (PE) samples performed?			/	
Were the performance evaluation (PE) samples within the acceptance limits?			_	
Kilotertalslettikas kirjaksi kirjaksi kalla kantala kantala kantala kantala kantala kantala kantala kantala ka				
Were internal standard area counts within -50% or +100% of the associated calibration standard?		/		
Were retention times within + 30 seconds of the associated calibration standard?			E200 12 Nov 2 per	
as establication de Merilio entra				
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?		VP NED STREET	स्कृतका <i>ं</i> हे कार	
Ale serge er destabilitation er sette				
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?				
All Cheby (Chaillean Cores (188))				
Were the major ions (> 10 percent relative intensity) in the reference spectrum evaluated in sample spectrum?	7			
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 equired peaks in the chromatograms (samples and blanks)?				
System performance was found to be acceptable.		و المراسد المر		
The state of the s				
Overall assessment of data was found to be acceptable.				
So the discussion is the second of the secon				
field duplicate pairs were identified in this SDG.				
arget compounds were detected in the field duplicates.				
VIDEORIA DE LA COMPANIO DEL COMPANIO DE LA COMPANIO DEL COMPANIO DE LA COMPANIO DEL COMPANIO DE LA COMPANIO DE LA COMPANIO DE LA COMPANIO DEL COMPANIO DE LA COMPANIO DEL COMPANIO DEL COMPANIO DE LA COMPANIO DE LA COMPANIO DEL COMPANION DEL COMPANION DEL COMPANIO DEL COMPANIO DEL COMPANIO DEL COMPANION				
ield blanks were identified in this SDG.			I	man and the state of the state
arget compounds were detected in the field blanks.	7	\exists	\exists	
			Ł_	

TARGET COMPOUND WORKSHEET

METHOD: VOA (EPA SW 846 Method 8260B)

A. Chloromethane*	U. 1,1,2-Trichloroethane	OO. 2,2-Dichloropropane	III. n-Butylbenzene	CCCC.1-Chlorohexane
B. Bromomethane	V. Benzene	PP. Bromochloromethane	JJJ. 1,2-Dichlorobenzene	DDDD. Isopropyl alcohol
C. Vinyl choride**	W. trans-1,3-Dichloropropene	QQ. 1,1-Dichloropropene	KKK. 1,2,4-Trichlorobenzene	EEEE. Acetonitrile
D. Chloroethane	X. Bromoform*	RR. Dibromomethane	LLL. Hexachlorobutadiene	FFFF. Acrolein
E. Methylene chloride	Y. 4-Methyl-2-pentanone	SS. 1,3-Dichloropropane	MMM. Naphthalene	GGGG. Acrylonitrile
F. Acetone	Z. 2-Hexanone	TT. 1,2-Dibromoethane	NNN. 1,2,3-Trichlorobenzene	HHHH. 1,4-Dioxane
G. Carbon disulfide	AA. Tetrachloroethene	UU. 1,1,1,2-Tetrachloroethane	000. 1,3,5-Trichlorobenzene	III. Isobutyl alcohol
H. 1,1-Dichloroethene**	BB. 1,1,2,2-Tetrachloroethane*	VV. Isopropylbenzene	PPP. trans-1,2-Dichloroethene	JJJJ, Methacrylonitrile
1. 1,1-Dichloroethane*	CC. Toluene**	WW. Bromobenzene	QQQ. cls-1,2-Dichloroethene	KKKK. Propionitrile
J. 1,2-Dichloroethene, total	DD. Chlorobenzene*	XX. 1,2,3-Trichloropropane	RRR. m,p-Xylenes	LLLL. Ethyl ether
K. Chloroform**	EE. Ethylbenzene**	YY. n-Propylbenzene	SSS. o-Xylene	MMMM. Benzyl chloride
L. 1,2-Dichloroethane	FF. Styrene	22. 2-Chlorotoluene	TTT. 1,1,2-Trichloro-1,2,2-trifluoroethane	NNNN.
M. 2-Butanone	GG. Xylenes, total	AAA. 1,3,5-Trimethylbenzene	UUU. 1,2-Dichlorotetrafluoroethane	0000.
N. 1,1,1-Trichloroethane	HH. Vinyl acetate	BBB. 4-Chlorotoluene	VVV. 4-Ethyltoluene	pppp.
O. Carbon tetrachloride	II. 2-Chloroethylvinyl ether	CCC. tert-Butylbenzene	WWW. Ethanol	9999.
P. Bromodichloromethane	JJ. Dichlorodifluoromethane	DDD. 1,2,4-Trimethylbenzene	XXX. Di-isopropyl ether	RRRR.
Q. 1,2-Dichloropropane**	KK. Trichlorofluoromethane	EEE. sec-Butylbenzene	YYY. tert-Butanol	8888.
R. cis-1,3-Dichloropropene	LL. Methyl-tert-butyl ether	FFF. 1,3-Dichlorobenzene	ZZZ. tert-Butyl alcohol	TITT.
S. Trichloroethene	MM. 1,2-Dibromo-3-chloropropane	GGG. p-Isopropyltoluene	AAAA. Ethyl tert-butyl ether	חחחח.
T. Dibromochloromethane	NN. Methyl ethyl ketone	HHH. 1,4-Dichlorobenzene	BBBB, tert-Amyl methyl ether	vvvv.

^{* =} System performance check compounds (SPCC) for RRF; ** = Calibration check compounds (CCC) for %RSD.

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VALIDATION FINDINGS WORKSHEET

Initial Calibration

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

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

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

Did the laboratory perform a 5 point calibration prior to sample analysis?

Were percent relative standard deviations (%RSD) and relative response factors (RRF) within method criteria for all CCC's and SPCC's? Was a curve fit used for evaluation? If yes, what was the acceptance criteria used for evaluation?

Did the initial calibration meet the acceptance criteria? N N/A N N/A V N/A

Were all %RSDs and RRFs within the validation criteria of ≤30 %RSD and ≥0.05 RRF?

	T	Τ			<u> </u>		F	T	T	T	T	T	T	Ī	T	T	T	Ī	Τ	T	T	T	T	T	T
Qualifications				2/43/A																					
Associated Samples				FXF120000-446	A11 5011	,																			
Finding RRF (Limit: >0.05)				0.00148																					
Finding %RSD (Limit: <30.0%)																									
Compound				\ √ nmm																					
Standard ID	x 1545-1		0707	1418-880																					
1	\$	-	6.	00 10																					

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DC #: 16	:DG #:

VALIDATION FINDINGS WORKSHEET Continuing Calibration

Reviewer:_ Page: 2nd Reviewer:

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

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

Was a continuing calibration standard analyzed at least once every 12 hours 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?

	T	- -		1	Т	- T	1	 	Т	-		T	Т	 1	- 1	 <u>-</u>	1	 1	
Qualifications	1+/A dot	J-/41/A				J-/ WJ/A			1+/ Adut										
Associated Samples	F8F200000-18	All water				0th-0000 71 18-1	A 50i		FX F2 D0000-12,	9									
Finding RRF (Limit: <u>></u> 0.05)																			
Finding %D (Limit: <25.0%)	51.67513	25.04476				29. 90220			67.71684										
Compound	Iodom ethane	7				田			Iodom ethane										
Standard ID	18867217					X 1612280			LCAL0317										
Date	8	\vdash				8067			80/6/19	- -									
L #	+	(1			4										

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VALIDATION FINDINGS WORKSHEET

2nd Reviewer:

Rease see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A". METHOD: GC/MS VOA (EPA SW 846 Method 8260B) A/N N

Was a method blank analyzed at least once every 12 hours for each matrix and concentration? Was a method blank associated with every sample in this SDG? A/N N

Was there contamination in the method blanks? If yes, please see the qualifications below. Y/N N/A

<u>6/12/08</u> Blank analysis date: Conc. units:_

Associated Samples:

	Blank ID				Sa	Sample Identification	tton		
	FBF12000	/	4	С	7	۲۰			
Methylene chloride AA	1.5	1.4/564	1.4/564 1.3 h.z.y 1.6/6.64	1.6/6.64	1.3 1.14	1.2 16.54	3		
Acetone		,		_	1	1			
								-	
-									
ICROL									
Blank analysis date:			•						

Associated Samples:

Compound	Blank ID	Sample Identification	ntffication	
Methyiene chloride				
Acetone				
CRat.			-	

All results were qualified using the criteria stated below except those circled.

Note: Common contaminants such as Methylene chloride, Acetone, 2-Butanone, Carbon disulfide and TICs that were detected in samples within ten times the associated method blank concentration were also qualified as not detected, "U". Other contaminants within five times the method blank concentration were also qualified as not detected, "U".

1404141 LDC#: SDG#:

VALIDATION FINDINGS WORKSHEET Field Blanks

Page: 2nd Reviewer:_ Reviewer:

1-4-1

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

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

Were field blanks identified in this SDG?

Field blank type. (circle one) Field Blank / Rinsate / Trip Blank / Other: walk Associated sample units: Blank units:

Sample Identification Associated Samples: Blank ID 6 | Blank ID o Z 2.9 Compound Methylene chloride Chloroform Acetone

Blank units: Associated sample units: Field blank / Rinsate / Trip Blank / Other: Blank units:_

Associated Samples:

Compound	Blank ID	Blank ID		Sample Identification	ntification		
Maile							
Methylene chloride							
Acetone	-						
Chloroform							
CRQL							

CIRCLED RESULTS WERE NOT QUALIFIED. ALL RESULTS NOT CIRCLED WERE QUALIFIED BY THE FOLLOWING STATEMENT:
Common contaminants such as Methylene chloride, Acetone, 2-Butanone and Carbon disuifide that were detected in samples within ten times the associated field blank concentration were qualified as not detected, "U". Other contaminants within five times the field blank concentration were also qualified as not detected, "U".

LDC #: 1909[4) SDG #:

VALIDATION FINDINGS WORKSHEET Surrogate Spikes

Page: Reviewer: 2nd Reviewer:

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

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

Were all surrogate %R within QC limits?

If the percent recovery (%R) for one or more surrogates was out of QC limits, was a reanalysis performed to confirm samples with %R out of outside of criteria?

	9-1151 1+/Pa								()	()		()	
%Recovery (Limits)	117									٠			
Surrogate	BFB												
Sample ID	F8 F2 100000-12												: : : : : : : : : : : : : : : : : : : :
Date						-							
#													

SMC2 (BFB) = Bromofluorobenzene SMC3 (DCE) = 1,2-Dichloroethane-d4 SMC4 (DFM) = Dibromofluoromethane

SMC1 (TOL) = Toluene-d8

CC LIMITS (Soil) 74-121 80-120 80-120 81-117

QC Limits (Water) 80-120 86-118 88-110 86-115

te co LDC #: 1909(1 €) SDG #:

Matrix Spike/Matrix Spike Duplicates VALIDATION FINDINGS WORKSHEET

Page:__ Reviewer: 2nd Reviewer:

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

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

N/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.

/ N / N/A

Was a MS/MSD analyzed every 20 samples of each matrix? Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?

#	Date	MS/MSD ID	Compound	MS %R (Limits)	MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		748		(521-PT) HS1	())	5	NO OUAL MAPIN
			Ludomethan	١)	02) 62 (~) MS/MSDin
)			(
))		
				()	•)		
				()))		
		Rinsak 2 MSID	Iodo methanc) bluc ()	02) 22 () Marc	14 2 B C 14
)	_) ((
)	_)	(
	5 .)	•) ((
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)	•) ((
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)) () (
		Compound	pund	n oc n	QC Limits (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)
	ľ	1,1-Dichloroethene		56	59-172%	< 22%	61-145%	< 14%
	Š	Trichloroethene		9	62-137%	< 24%	71-120%	≥ 14%
	>	Benzene		9	66-142%	< 21%	76-127%	≤ 11%
	99	Toluene		ĭú	59-139%	< 21%	76-125%	<u><</u> 13%
	DD.	Chlorobenzene		Ø	60-133%	< 21%	75-130%	≤ 13%

VALIDATION FINDINGS WORKSHEET Laboratory Control Samples (LCS)

Page: /of /

10201 115/2:11

Reviewer: 2nd Reviewer:

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

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

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

Qualification	Conpos	1 1 7																					
Associated Samples	All water +	F8F200000-125																					
RPD (Limits)	112 (20)	. ()	()	()	()	()	()	()	()	(()	()	()	()	()	()	()	()	()	()		()	()
LCSD %R (Limits)	()	(atl-sh) 181	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	())))	()
LCS %R (Limits)	DH-24 1862	ر الا	•	()		()	()	()	()	()	()	()	()	()		()	())))
Compound	7	lodoms thang																					
TCS/ICSD ID	8172125-45																						
Date				-																			

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LDC #:	SDG #:

VALIDATION FINDINGS WORKSHEET Internal Standards

Page: Reviewer:

2nd Reviewer:

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

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

Were the retention times of the internal standards within +/- 30 seconds of the retention times of the associated calibration standard? Were all internal standard area counts within -50 to +100% of the associated calibration standard?

Qualifications 45,4 RT (Limits) 187131-748922 Area (Limits) 59689 180609 08 622 171259 Internal Standard TACA Sample ID J 3 Date

(BCM) = Bromochloromethane (DFB) = 1,4-Difluorobenzene (CBZ) = Chlorobenzene-d5

(4DCB) = 1,4-Dichlorobenzene-d4 (2DCB) = 1,2-Dichlorobenzene-d4 (PFB) = Pentafluorobenzene

(FBZ) = Fluorobenzene

Volatile Internal Standards

Fiuorobenzene Chlorobenzene-d5 1,1,1-Trichloroethane 1,1,2-Tetrachloroethane 1,2-Dibromoethane 1,1-Dichloroethane 1,3-Dichloropropane	1,4-Dichlorobenzene-d4 1,1,2,2-Tetrachloroethane - 1,2,3-Trichlorobenzene- 1,2,3-Trichloropropane - 1,2,4-Trichlorobenzene
1,1,2-Trichloroethane 1,2-Dibromoethane	1,2,3-Trichlorobenzene- 1,2,3-Trichloropropane-
1,1-Dichloroethene 1,1-Dichloropropene 1,2-Dichloroethane 1,2-Dichloropropane 2,2-Dichloropropane Acetone Benzene Bromochloromethane Bromodichloromethane Bromomethane Carbon tetrachloride Chloroform Chloroform Chloromethane Chloroform Chloromethane Cis-1,3-Dichloropropene Dibromomethane Dichlorodifluoromethane Dichlorodifluoromethane Dichlorodifluoromethane Dichlorodifluoromethane Dichlorodifluoromethane Methyl-tert-butyl ether 2-Butanone Trichloroethene Tchloroethene Tchloroethene Tchloroethene Tchloroethene Trichloroethene Trichloroethene Trichloroethene Tchloroethene	1,2,4-Trimethylbenzene 1,2-Dichlorobenzene 1,2-Dibromo-3-chloropropane 1,3,5-Trimethylbenzene 1,3-Dichlorobenzene 1,4-Dichlorobenzene 2-Chlorotoluene 4-Chlorotoluene Bromobenzene Hexachlorobutadiene Isopropylbenzene Mathyl isobutyl ketene n-Butylbenzene n-Propylbenzene Naphthalene p-Isopropyttoluene p-Isopropyttoluene sec-Butylbenzene 1,3,5-Trichlorobenzene Nonand Bromporto

```
Todomethane
Acetonitrile
Yiny, Acetate
1,1,2-Trichloror1,1,2-Trifluoroethane
Ethanol
3,3-Dimethy, pentane
2,3-
2,2-
2,4-
2,3-Trimethy, butane
3-Ethy, pentane
2-Methy, hexane
3-
Heptane
1,2-Dichloroethene (total)
```

LDC#: 19091 A SDG # ALL cover

Initial Calibration Calculation Verification VALIDATION FINDINGS WORKSHEET

o V Page: Reviewer: 2nd Reviewer:_

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

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 = $(A_x)(C_x)/(A_y)(C_x)$ average RRF = sum of the RRFs/number of standards %RSD = 100 $^+$ (S/X)

 $A_{\mathtt{h}}$ = Area of associated internal standard $C_{\mathtt{h}}$ = Concentration of internal standard A_x = Area of compound,
C_x = Concentration of compound,
S = Standard deviation of the RRFs
X = Mean of the RRFs

				Reported	Recalculated	Reported	Recalculated	Reported	Recalculated
#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	RRF (幻 std)	RRF (いっ std)	Average RRF (initial)	Average RRF (initial)	%RSD	%RSD
-	1CAL-X	80/6/9	ving chloride	ii I	6.34552	0.33747	0.33747	5.136	5.136
П			Ethyl Bengeral standard)		2.30191	30ppl.2	3.19908	P8P51.4	6-139
			(3rd internal Sandard)	1.20993	1.29993	1.28018	1.2878	5.32652	١
2	1CAL-XBPC 6/12/08	80/21/9	2, 2- Pine thy (perteun) (1st interbal standard)	0.5W73	0.5W73 0.5W43	b६a६ऽव	650530	4.9967	4.996.1
			(2nd internal standard)						
			(3rd internal standard)						
3			(1st internal standard)						
			(2nd internal standard)						
			(3rd internal standard)						
4			(1st internal standard)						
T			(2nd internal standard)						
			(3rd internal standard)						

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#: 19091A SDG#: 124 cons

Continuing Calibration Results Verification VALIDATION FINDINGS WORKSHEET

Page: Reviewer: 2nd Reviewer:

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

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

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

Where: ave. RRF = initial calibration average RRF RRF = continuing calibration RRF A_x = Area of compound, A_y = Concentration of compound, C_y = Concert

A_b = Area of associated internal standard C_b = Concentration of internal standard

ſ			-	3				
					Reported	Recalculated	Reported	Recalculated
#	Standard ID	Calibration Date	Compound (Reference internal Standard)	Average RRF (Initial)	RRF (CC)	RRF	Q%	Q %
-	XCAL2316 6/12/09	12/05	ving) Chlonde (1st internal standard)	0.33747	०.३०८५५	74B08-0	8.60390	8.6039
			(She internal standard)	2.1990x	2.37076	1012-4	7.80675	'
			1, 2 - UC (S. (3rd internal standard)	1.28078	1.38717	1-387TM	21858.2	8.3537
7			(Lackarda lacedari \$21)					
			(13t literiial staildard)					
			(2nd internal standard)					
			(3rd internal standard)					
70			(1st internal standard)					
T			(2nd internal standard)					
1			(3rd internal standard)					
4			(1st internal standard)					
\top			(2nd internal standard)					
			(3rd internal standard)					

Comments: Refer to Continuing Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results. LDC #: 1909 | A | SDG #: see court

VALIDATION FINDINGS WORKSHEET <u>Surrogate Results Verification</u>

Page: / of / Reviewer: /7 2nd reviewer:

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

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: # 2

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Toluene-d8	50.0	53.0191	106	106	U
Bromofluorobenzene		55.9784	112	112	1
1,2-Dichloroethane-d4		59.4200	119	119	
Dibromofluoromethane		\$5.0604	110	110	J

Sample ID:

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Toluene-d8					
Bromofluorobenzene					
1,2-Dichloroethane-d4					
Dibromofluoromethane					

Sample ID:

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Toluene-d8					
Bromofluorobenzene					
1,2-Dichloroethane-d4					
Dibromofluoromethane					

Sample ID:

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Toluene-d8					
Bromofluorobenzene					
1,2-Dichloroethane-d4					
Dibromofluoromethane					

Sample ID:_

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Toluene-d8					
Bromofluorobenzene					
1,2-Dichloroethane-d4					
Dibromofluoromethane					

DC#: 1909| A | SDG #: pur count

VALIDATION FINDINGS WORKSHEET Matrix Spike/Matrix Spike Duplicates Results Verification

Page: / of / Reviewer: £7 2nd Reviewer:

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

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

Where: SSC = Spiked sample concentration SA = Spike added

SC = Sample concentration

RPD = I MSC - MSDC I * 2/(MSC + MSDC)

MSC = Matrix spike percent recovery

MSDC = Matrix spike duplicate percent recovery

MS/MSD sample: 7 4 8

	σ.	Spike	Sample		ample	Matrix Spike	Spike	Matrix Spike Duplicate	Duplicate	MS/	MS/MSD
Compound	Addec (AA)	h	Concentration (火) イン	Concentration	ration	Percent Recovery	есочегу	Percent Recovery	ecovery	œ	RPD
	, ws	/ Wsp	0	O SW	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalculated
1,1-Dichloroethene	6.40 0.89	64.9	۵n	6.3	4.11	106	901	011	91	3.0	3.0
Trichloroethene				13.4	72.0	113	13	=	II)	4.0	2.0
Benzene				66.2	45.2	201	101	201	ري. ا	و	ا م
Toluene				68.7	67.7	90	901	호	8	1.60	- 2
Chlorobenzene	>	->	->	0.99	4.29	101	۱۵۱	101	- 2	6×0	25 0 8×0

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#: 1909| A)
SDG#: Fed const

VALIDATION FINDINGS WORKSHEET Laboratory Control Sample Results Verification

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

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 = ILCS - LCSD I* 2/(LCS + LCSD)

LCS = Laboraotry control sample percent recovery

LCS ID: 816 446-165

ery LCSD = Laboratory control sample duplicate percent recovery

r====											 			
OSD.			Recalculated	-										
1/50	1 CS/I CSD		Reported											
G,	ì	ecovery	Recalc											
I CSD	Decree Decree	Leiceili	Reported					7 7						
Cs	Vavosa	, and a second	Recalc	36	901	201	101	101						
31	Percent Recovery		Reported	96	901	701	hol	101						
ample	tion	6 ,4	1CSD	NA			,	3						
Spiked S	Concentration		831	48.0	53.0	5/5	27.75	S'as						
•	a ded		LCSD	MA				<i>></i>		,				
Spi	Added //		SOT	SB.O				A						
	Compound	(1) (1) (1) (1) (1) (1) (1) (1) (1) (1)	The state of the s	1,1-Dichloroethene	Trichloroethene	Benzene	Toluene	Chlorobenzene	-					

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 #: 1909 | A | SDG #: pu coner

VALIDATION FINDINGS WORKSHEET Sample Calculation Verification

Reviewer: 27

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

Percent solids, applicable to soils and solid matrices

Dilution factor.

Df

%S

Were all reported results recalculated and verified for all level IV samples? YN N/A Y N N/A

Were all recalculated results for detected target compounds agree within 10.0% of the reported results? $M = 3 / \sqrt{6}$

Example: $(A_{\star})(I_{\star})(DF)$ Concentration = (A_k)(RRF)(V₀)(%S) Sample I.D. #2 . chlorojorm Area of the characteristic ion (EICP) for the compound to be measured Area of the characteristic ion (EICP) for the specific internal standard Conc. = (58801) (50) (50) (50) (50) Amount of internal standard added in nanograms Relative response factor of the calibration standard. RRF Volume or weight of sample pruged in milliliters (ml) V_o 12 ug /kg or grams (g).

Calculated Reported Concentration Concentration Qualification Compound Sample ID

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

BRC Tronox Parcel F

Collection Date:

June 10, 2008

LDC Report Date:

July 23, 2008

Matrix:

Soil

Parameters:

Semivolatiles

Validation Level:

EPA Level III & IV

Laboratory:

TestAmerica, Inc.

Sample Delivery Group (SDG): F8F110177

Sample Identification

TSB-FR-02-02-20'

TSB-FR-02-02-30'**

TSB-FJ-02-02-10'**

TSB-FJ-02-02-20'**

TSB-FJ-02-02-30'

^{**}Indicates sample underwent EPA Level IV review

Introduction

This data review covers 5 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 a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

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

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

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

The following are definitions of the data qualifiers:

- 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.
- A Indicates the finding is based upon technical validation criteria.
- P Indicates the finding is related to a protocol/contractual deviation.
- None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

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

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

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

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

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

Average relative response factors (RRF) for all semivolatile target compounds and system performance check compounds (SPCCs) were greater than or equal to 0.05 as required with the following exceptions:

Date	Compound	RRF (Limits)	Associated Samples	Flag	A or P
6/18/08	Phthalic acid	0.01422 (≥0.05)	All samples in SDG F8F110177	J (all detects) UJ (all non-detects)	Α
	n-(Hydroxymethyl)phthalimide	0.04408 (≥0.05)		J (all detects) UJ (all non-detects)	

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

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

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

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

All of the continuing calibration RRF values were within method and validation criteria with the following exceptions:

Date	Compound	RRF (Limits)	Associated Samples	Flag	A or P
6/18/08	Phthalic acid	0.01330 (≥0.05)	All samples in SDG F8F110177	J (all detects) UJ (all non-detects)	А
	n-(Hydroxymethyl)phthalimide	0.04331 (≥0.05)		J (all detects) UJ (all non-detects)	

V. Blanks

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

No field blanks were identified in this SDG.

VI. Surrogate Spikes

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

VII. Matrix Spike/Matrix Spike Duplicates

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

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Although the LCS percent recovery (%R) was not within QC limits for one compound, the MS/MSD percent recovery (%R) was within QC limits and no data were qualified.

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 EPA Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XII. Compound Quantitation and CRQLs

All compound quantitation and CRQLs were within validation criteria for samples on which a EPA Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XIII. Tentatively Identified Compounds (TICs)

All tentatively identified compounds were within validation criteria for samples on which a EPA Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XIV. System Performance

The system performance was acceptable for samples on which a EPA Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XV. Overall Assessment of Data

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

XVI. Field Duplicates

No field duplicates were identified in this SDG.

BRC Tronox Parcel F Semivolatiles - Data Qualification Summary - SDG F8F110177

SDG	Sample	Compound	Flag	A or P	Reason
F8F110177	TSB-FR-02-02-20' TSB-FR-02-02-30'** TSB-FJ-02-02-10'** TSB-FJ-02-02-20'** TSB-FJ-02-02-30'	Phthalic acid n-(Hydroxymethyl)phthalimide	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	А	Initial calibration (RRF)
F8F110177	TSB-FR-02-02-20' TSB-FR-02-02-30'** TSB-FJ-02-02-10'** TSB-FJ-02-02-20'** TSB-FJ-02-02-30'	Phthalic acid n-(Hydroxymethyl)phthalimide	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	А	Continuing calibration (RRF)

BRC Tronox Parcel F

Semivolatiles - Laboratory Blank Data Qualification Summary - SDG F8F110177

No Sample Data Qualified in this SDG

BRC Tronox Parcel F

Semivolatiles - Field Blank Data Qualification Summary - SDG F8F110177

No Sample Data Qualified in this SDG

DG#	:19091A2		PLETENESS WORKSHEET Level III/IV Page:
/IETH	OD: GC/MS Semivolatiles (EPA SW 846	Method 8	
he sa	amples listed below were reviewed for each control of the control	ch of the f	ollowing validation areas. Validation findings are noted in
	Validation Area		Comments
l.	Technical holding times	4	Sampling dates: 6 10 08
II.	GC/MS Instrument performance check	A	
III.	Initial calibration	SW	% PND, 12 20.99D
IV.	Continuing calibration/ICV	SV	1CV = 25
V.	Blanks	A	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	A	TSB - GJ -08-10
VIII.	Laboratory control samples	SW	KCS
IX.	Regional Quality Assurance and Quality Control	N	
Χ.	Internal standards	4	
XI.	Target compound identification	A	Not reviewed for Level III validation.
XII.	Compound quantitation/CRQLs	A	Not reviewed for Level III validation.
XIII.	Tentatively identified compounds (TICs)	A	Not reviewed for Level III validation.
XIV.	System performance	4	Not reviewed for Level III validation.
XV.	Overall assessment of data	A	
XVI.	Field duplicates	N	
		\sim	

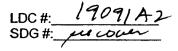
N = Not provided/applicable SW = See worksheet

R = Rinsate FB = Field blank

TB = Trip blank
EB = Equipment blank

Validated Samples: ** Indicates sample underwent Level IV validation

	SOIL				
1	TSB-FR-02-02-20'	11	8168439	21	31
2	TSB-FR-02-02-30'**	12		22	32
3	TSB-FJ-02-02-10'**	13		23	33
4	TSB-FJ-02-02-20'**	14		24	34
5	TSB-FJ-02-02-30'	15		25	35
6	F8 F16 6000 - 439	16	8168439	26	36
7		17		27	37
8		18		28	 38
9		19		29	39
10		20		30	40



VALIDATION FINDINGS CHECKLIST

Page:__/of_2 Reviewer:______ 2nd Reviewer:______

Method: Semivolatiles (EPA SW 846 Method 8270C)

Method: Semivolatiles (EPA SW 846 Method 8270C)	,			· · · · · · · · · · · · · · · · · · ·
Validation Area	Yes	No	NA	Findings/Comments
Literatzek delentak südes				
All technical holding times were met.		<u> </u>	<u> </u>	
Cooler temperature criteria was met.	20.22			
IP SOVES INSULABITICS (KATEURS BIORE)				
Were the DFTPP performance results reviewed and found to be within the specified criteria?	/			
Were all samples analyzed within the 12 hour clock criteria?		, w. an		
fi siotianealisticia				
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 ≥ 0.990?				
Were all percent relative standard deviations (%RSD) \leq 30% and relative response factors (RRF) \geq 0.05?	W	1	/	
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) \leq 25% and relative response factors (RRF) \geq 0.05?	M	V		·
24.34.14s / A				
Was a method blank associated with every sample in this SDG?				
Was a method blank analyzed for each matrix and concentration?	\angle			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.				
Ze vo reke eniker				
Were all surrogate %R within QC limits?	1			
If 2 or more base neutral or acid surrogates were outside QC limits, was a reanalysis performed to confirm %R?			1	
If any %R was less than 10 percent, was a reanalysis performed to confirm %R?				
M. AbdresdenAbtressCounteries				
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?				
Was an LCS analyzed for this SDG?		L	\perp	

LDC #: 1909/A2 SDG #: Lu cover

VALIDATION FINDINGS CHECKLIST

Page: 2of 2 Reviewer: 7 2nd Reviewer: 9

Validation Area	Yes	No	N.	A Findings/Comments
Was an LCS analyzed per extraction batch?			-	
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?		_	+	
Missis Contrasticas de Contras				
Were performance evaluation (PE) samples performed?			/	+
Were the performance evaluation (PE) samples within the acceptance limits?			L	
a previous processors				
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?				
ess Series e subscripto d'Albaneau				
Were relative retention times (RRT's) within ± 0.06 RRT units of the standard?			<u> </u>	
Did compound spectra meet specified EPA "Functional Guidelines" criteria?			<u> </u>	
Were chromatogram peaks verified and accounted for?				
ade Schulestidalezonenen versile				
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?				
ON TENEN ALCOHOUSE BOTTONS FROS				
Were the major ions (> 10 percent relative intensity) in the reference spectrum evaluated in sample spectrum?	_		2.3	ting the section of the common time of plantage than the first spirit and the section of the section of a
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)?				
and sometimes are declarated as				
System performance was found to be acceptable.				
		- 17 - 170 ×		
Overall assessment of data was found to be acceptable.	1			
			er s eng	
M. Prisaggi Vila			-	
ield duplicate pairs were identified in this SDG.	<u>-</u>	4		
arget compounds were detected in the field duplicates.				
of Presidentia				
ield blanks were identified in this SDG.				·
arget compounds were detected in the field blanks.				

VALIDATION FINDINGS WORKSHEET

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

A. Phenoi**	P. Bis(2-chloroethoxy)methane	EE. 2,6-Dinitrotoluene	TT. Pentachloropheno!**	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. Acenaphthene⁴*	VV. Anthracene	KKK. Dibenz(a,h)anthracene
D. 1,3-Dichlorobenzene	S. Naphthalene	HH. 2,4-Dinitrophenol*	WW. Carbazole	LLL. Benzo(g,h,i)perylene
E. 1,4-Dichlorobenzene**	T. 4-Chloroaniline	II. 4-Nitrophenol*	XX. Di-n-butylphthalate	MMM. Bis(2-Chloroisopropyl)ether
F. 1,2-Dichlorobenzene	U. Hexachlorobutadiene**	JJ. Dibenzofuran	YY. Fluoranthene**	NNN. Aniline
G. 2-Methylphenol	V. 4-Chloro-3-methylphenol**	KK. 2,4-Dinitrotoluene	ZZ. Pyrene	OOO. N-Nitrosodimethylamine
H. 2,2'-Oxybis(1-chloropropane)	W. 2-Methylnaphthalene	LL. Diethyiphthalate	AAA. Butylbenzylphthalate	PPP. Benzoic Acid
l. 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-Trichlorophenoi**	NN. Fluorene	CCC. Benzo(a)anthracene	RRR. Pyridine
K. Hexachloroethane	Z. 2,4,5-Trichlorophenol	OO. 4-Nitroaniline	DDD. Chrysene	SSS. Benzidine
L. Nitrobenzene	AA. 2-Chloronaphthalene	PP. 4,6-Dinitro-2-methylphenol	EEE. Bis(2-ethylhexyl)phthalate	Ĭ.
M. Isophorone	BB. 2-Nitroaniline	QQ. N-Nitrosodiphenylamine (1)**	FFF. Di-n-octylphthalate**	nnn
N. 2-Nitrophenol**	CC. Dimethylphthalate	RR. 4-Bromophenyl-phenylether	GGG. Benzo(b)fluoranthene	WW.
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.

1909142

VALIDATION FINDINGS WORKSHEET

Reviewer:

Initial Calibration

SDG #: Lee Court METHOD: GC/MS BNA (EPA SW 846 Method 8270)

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

| N N/A Did the laboratory conduct an acceptable 5 point calibration prior to sample analysis?

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

Was a curve fit used for evaluation? If yes, what was the acceptance criteria used for evaluation? Were all %RSDs and RRFs within the validation criteria of ≤30 %RSD and ≥0.05 RRF? Did the initial calibration meet the acceptance criteria? N N N N N

Qualifications		3/20/5																
Associated Samples		718+11V	7														•	•
Finding RRF (Limit: <u>></u> 0.05)	42HO.0	9.52lo-0	191400	@01/000														
Finding %RSD (Limit: <30.0%)			[K	0										,	•	•		
Compound		Phthalic Acid	N-(hydnoxymeth	of apimilating														
Standard ID		JICAL SPEC																
Date		80819	-									·						
*					_													

VALIDATION FINDINGS WORKSHEET

1404147 the doner

SDG#:

Continuing Calibration

Page: // 2nd Reviewer:

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

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?

Y N NIA

1909/42 LDC #: SDG #:

VALIDATION FINDINGS WORKSHEET Laboratory Control Samples (LCS)

Page: Reviewer:

2nd Reviewer:

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

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

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

*	Date	TCS/rcsD ID	Compound	LCS %R // im/ts)	CSD CSD CBD	3	CHICAL DI COOR		
		8168439-165	HH	19 (54-90	-			A 11+B1K	
)	^)		7
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))	î	()		
)) (()		
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Le gone 1909142 SDG #: LDC #:

Initial Calibration Calculation Verification VALIDATION FINDINGS WORKSHEET

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

METHOD: GC/MS BNA (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:

 $RRF = (A_x)(C_u)/(A_u)(C_x)$ 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,

 $A_{s} = Area \ of \ associated internal \ standard \ C_{b} = Concentration \ of internal \ standard \ X = Mean \ of \ the \ RRFs$

L									
				Reported	Recalculated	Reported	Recalculated	Reported	Recalculated
#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	RRF (50 std)	RRF (50 std)	Average RRF (initial)	Average RRF	%RSD	%RSD
-	1911-J	80/2/9	Phenol (1st internal standard)	ESAL 83.1	1.87953		1558.1	CLON	1.070
\perp		-	Naphthalene (2nd internal standard)	1.09458	1.09438		1.0001	1.328	1.23
			Fluorene (3rd internal standard)	1-4/119	1.41718	1.41229	67117-	0.573	0.573
			Pentachlorophenol (4th internal standard)	6.10260	arono	0.19634	0.19634	10.255	10:00
			Bis(2-ethylhexyl)phthalate (5th internal standard)	0.90Tb3	0.90163	0.86543	0.8543	9520	DISTA
			Renzo(a)pyrene (6th internal standard)	1.13808	1.13808	1. 11.02	1.1182	237.2	7007
7	repr Brix	2 C/18	Act Topheno (Bhand) (15) internal standard)	0.51976	0.51976		0.51274	0.71511	12120
	,	7.1.1	Naphthalene (2nd internal standard)						
	CAI SYEC	9710	Fluerence Brd interdal standard Onthalimick	0.04162	291ha .0	0.04408	O. O. NOS	8.41339	841339
			Pentachlorophenol (4th internal standard)						+ 7
			Bis(2-ethylhexyl)phthalate (5th internal standard)						
			Benzo(a)pyrane (6th internal standard)						
8			Phenol (1st internal standard)						
			Naphthalene (2nd internal standard)						
			Fluorene (3rd internal standard)						
			Pentachlorophenol (4th internal standard)						
			Bis(2-ethylhexyl)phthalate (5th internal standard)						
			Benzo(a)pyrene (6th internal standard)						

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# 19091 A7 SDG#: per const

VALIDATION FINDINGS WORKSHEET Continuing Calibration Results Verification

Page: /of/ Reviewer: //

METHOD: GC/MS BNA (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 $^{\circ}$ (ave. RRF - RRF)/ave. RRF RRF = $(A_{\lambda})(C_{\mu})/(A_{\mu})(C_{\lambda})$

Where: ave. RRF = initial calibration average RRF RRF = continuing calibration RRF

 $A_x = Area of compound,$ $C_x = Concentration of compound,$

 A_{is} = Area of associated internal standard C_{is} = Concentration of internal standard

L					Reported	Recalculated	Reported	Recalculated
*	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Average RRF (initial)	RRF (CC)	RRF (CC)	Φ%	0 %
	JCALSIPS	80 8119	Phenol (1st internal standard)	1.8x537	HL1178-1	1.87174	0.8840	0.8840
			Naphthalene (2nd internal standard)	1.10901	1.10135	1.10135	0.69070	0,69070
\perp			Fluorene (3rd internal standard)	1.41229	1.39 80	1.3980)	1.01058	4-10-1058
\perp			Pentachlorophenol (4th internal standard)	0.19634	0,203,10	0,203.30	3.74980	3.74980
			Bis(2-ethylhexyl)phthalate (5th internal standard)	o. 86343	330L 8-0	3018.8	0.8622	0.56227
┸			Benzo(a)pyrena (6th internal standard)	1.11182	(- NS07	1.11507	024170	Orter o
7	70475196 6 18/08	80 18 9	Pheno (1st internal standard)	0.51214	0.52/85	0.52185	467711	1.7632
	70.0		Naphthalene (2nd internal standard)					
\perp	1 - W - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -	29 81 9	Alegene (3)d internal standard) O phtha Umb	alimide 0.04408	0.0435)	0.0433)	P/X5 [-1	1.12819
			Pentachlorophenol (4th internal standard)					
			Bis(2-ethylhexyl)phthalate (5th internal standard)					
			Renzo(a)pyrene (6th internal standard)					
<u>س</u>			Phenol (1st internal standard)					
			Naphthalene (2nd internal standard)					
			Fluorene (3rd internal standard)					
			Pentachlorophenol (4th internal standard)					
\perp			Bis(2-ethylhexyl)phthalate (5th internal standard)					
			Benzo(a)pyrene (6th internal standard)					

Comments: Refer to Continuing Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results. LDC#: 19091A2

VALIDATION FINDINGS WORKSHEET Surrogate Results Verification

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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: 2

SS = Surrogate Spiked

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5	50	35.2132	טך	10	υ
2-Fluorobiphenyl		37.0385	74	14	
Terphenyl-d14	V	36.164	72	12	
Phenol-d5	75	52.8544	70	70	
2-Fluorophenol	ı	52.0442	69	69	
2,4,6-Tribromophenol		55.2829	74	74	
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					

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#: 1909/A7 SDG#: pu const

VALIDATION FINDINGS WORKSHEET Matrix Spike/Matrix Spike Duplicates Results Verification

Page: of Reviewer: 7

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

Where: SSC = Spiked sample concentration SA = Spike added

SC = Sample concentation

RPD = I MS - MSD I * 2/(MS + MSD)

MS = Matrix spike percent recovery

MSD = Matrix spike duplicate percent recovery

MS/MSD samples: TSB

TSB-41-08-10

	is ?	Spike	Sample	Spiked Sample	Sample	Matrix Spike	Spike	Matrix Spike Duplicate	Duplicate	MS/MSD	USD
Compound	, yak	Z 2	(Mg / Kd	Concentration	tration	Percent Recovery	ecovery	Percent Recovery	ecoverv	daa	
		0	0.0	J	þ		,				
	WS	MSD		MS	MSD	Reported	Recalc	Reported	Recalc	Reported	Recalculated
Phenol	25.10	3570	ON.	अव0 भव0	2450	20	16	0,000	69	7	
N-Nitroso-di-n-propylamine				2730	26-70	7	77	75	X	7.7	270
4-Chloro-3-methy/phenol				2760	०७७	7-	7	75	75	XX	2,2
Acenaphthene				2640	2620	7.5	7	7 20	77	C	3 9
Pentachlorophenol				0087	2230	20	p-7	12	62		2 6
Pyrene			J	2 2 7	1202	0	- 6	Ţ		7 (2 1
	•	*	*	7957	10.0	9	62	9	67	1-1	7:7

								_			

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 #: (9091 A2 SDG #: As coney

VALIDATION FINDINGS WORKSHEET

Laboratory Control Sample/Laboratory Control Sample Duplicates Results Verification

Page: /of/ 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 and laboratory control sample duplicate were recalculated for the compounds identified below using the following calculation:

% Recovery = 100 * (SC/SA

Where: SSC = Spike concentration SA = Spike added

RPD = ILCS - LCSD I* 2/(LCS + LCSD)

LCS = Laboratory control sample percent recovery LCSD = Laboratory control sample duplicate percent recovery

LCS/LCSD samples: タル を439

	S	pike ·	Sp	Spike	31	CS		Cen		200 700
Compound	¥ 3	Added (ng/ke)	Concentration (va (K)	Itration	Percent Recovery	\ecovery	Percent Recovery	Secovery	ă	RPD
	١))	0					и	
		\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	C	Terri I	Keported	Recalc	Reported	Recalc	Reported	Recalculated
Phenol	3330	000cg	2360	NA	71	7-	-7.5.			\
N-Nitroso-di-n-propylamine	-		いしが	_	17	77				
4-Chloro-3-methylphenol			386C		1	77				
Acenaphthene			ماعد		15	75				
Pentachiorophenol			2240		19	67				
Pyrene	<u> </u>		2350		22	R	7 7 3			
				•			1			

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 #:_	19091A	2
SDG #:_	u cover	-

VALIDATION FINDINGS WORKSHEET Sample Calculation Verification

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	,

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

Factor of 2 to account for GPC cleanup

Υ	N/	N/A
Y	N	N/A

2.0

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?

Concer	tration	$= \frac{(A_{s})(I_{s})(V_{s})(DF)(2.0)}{(A_{ts})(RRF)(V_{o})(V_{s})(\%S)}$	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	
l _s	=	Amount of internal standard added in nanograms (ng)	Conc. = ()()()()()()
V_{o}	=	Volume or weight of sample extract in milliliters (ml) or grams (g).	,
V_{i}	=	Volume of extract injected in microliters (ul)	= .
V_{ι}	=	Volume of the concentrated extract in microliters (ul)	M l / /
Df	=	Dilution Factor.	
%S	=	Percent solids, applicable to soil and solid matrices only.	ιν

#	Sample ID	Compound	Reported Concentration	Calculated Concentration	Ouglification
		Sompound			Qualification
-					
-					
 					
 					
 					
	•				
 		7777-01-			
ļi	, , , , , , , , , , , , , , , , , , ,				

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

BRC Tronox Parcel F

Collection Date:

June 10, 2008

LDC Report Date:

July 22, 2008

Matrix:

Soil

Parameters:

Chlorinated Pesticides

Validation Level:

EPA Level III & IV

Laboratory:

TestAmerica, Inc.

Sample Delivery Group (SDG): F8F110177

Sample Identification

TSB-F-02-02-20'

TSB-F-02-02-30'**

TSB-FJ-02-02-10'**

TSB-FJ-02-02-20'**

TSB-FJ-02-02-30'

^{**}Indicates sample underwent EPA Level IV review

Introduction

This data review covers 5 soil samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8081A for Chlorinated Pesticides.

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

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

Blank results are summarized in Section V.

Field duplicates are summarized in Section XIV.

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

The following are definitions of the data qualifiers:

- 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.
- A Indicates the finding is based upon technical validation criteria.
- P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

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

II. GC/ECD Instrument Performance Check

Instrument performance was acceptable unless noted otherwise under initial calibration and continuing calibration sections.

III. Initial Calibration

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

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

Retention time windows were evaluated and considered technically acceptable for samples on which a EPA Level IV review was performed. Raw data were not evaluated for the samples on which a Level III review was performed.

IV. Continuing Calibration

Continuing calibration was performed at required frequencies.

The percent differences (%D) of calibration factors in continuing standard mixtures were within the 15.0% QC limits with the following exceptions:

Date	Standard	Channel	Compound	%D	Associated Samples	Flag	A or P
6/18/08	KCAL081	А	2,4'-DDT	16.2	TSB-FJ-02-02-20'** TSB-FJ-02-02-30'	J- (all detects) UJ (all non-detects)	A

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

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

Retention times (RT) of all compounds in the calibration standards were within QC limits for samples on which a EPA Level IV review was performed. Raw data were not evaluated for the samples on which a Level III review was performed.

V. Blanks

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

No field blanks were identified in this SDG.

VI. Surrogate Spikes

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

VII. Matrix Spike/Matrix Spike Duplicates

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

VIII. Laboratory Control Samples (LCS)

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

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Pesticide Cleanup Checks

a. Florisil Cartridge Check

Florisil cleanup was not required and therefore not performed in this SDG.

b. GPC Calibration

GPC cleanup was not required and therefore not performed in this SDG.

XI. Target Compound Identification

All target compound identifications were within validation criteria for samples on which an EPA Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XII. Compound Quantitation and Reported CRQLs

All compound quantitation and CRQLs were within validation criteria for samples on which an EPA Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XIII. Overall Assessment of Data

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

XIV. Field Duplicates

No field duplicates were identified in this SDG.

BRC Tronox Parcel F Chlorinated Pesticides - Data Qualification Summary - SDG F8F110177

SDG	Sample	Compound	Flag	A or P	Reason
F8F110177	TSB-FJ-02-02-20'** TSB-FJ-02-02-30'	2,4'-DDT	J- (all detects) UJ (all non-detects)	А	Continuing calibration (%D)

BRC Tronox Parcel F
Chlorinated Pesticides - Laboratory Blank Data Qualification Summary - SDG
F8F110177

No Sample Data Qualified in this SDG

BRC Tronox Parcel F
Chlorinated Pesticides - Field Blank Data Qualification Summary - SDG
F8F110177

No Sample Data Qualified in this SDG

LDC	#: <u>19091A3a</u>	VA	LIDATIO	N COMP	LET	ENI	ESS WORKSHE	ET	Date: 7/19
	#: F8F110177	_		L	evel l	III/IV			Page: /of/ Reviewer:/
Labo	ratory: <u>Test America</u>								2nd Reviewer:
MET	HOD: GC Chlorinated Pe	sticid	es (EPA SV	V 846 Met	hod 8	081 <i>A</i>	N)		
			ewed for ea	ch of the f	ollowi	ing va	alidation areas. Vali	dation findi	ngs are noted in attached
/alida	ation findings worksheets.								
	Validation	Area			<u> </u>		Co	omments	
1.	Technical holding times	71120		Δ	Samo	oling d	/ /	//	
II.	GC/ECD Instrument Perform	nance	Check	Δ		g u	<u> </u>	/	
111.	Initial calibration			Δ					
IV.	Continuing calibration/ICV			ىسى		101	=15		
V.	Blanks			Δ					
VI.	Surrogate spikes			A					
VII.	Matrix spike/Matrix spike du	plicate	S	A	7	tsB	-80-LP-	10	
VIII	Laboratory control samples			Ą		LC	5	· · · · · · · · · · · · · · · · · · ·	
IX.	Regional quality assurance	and qu	ality control	N					
Xa.	Florisil cartridge check			N					
Xb.	GPC Calibration			N					
XI.	Target compound identificat	ion		<u> </u>	Not r	review	ed for Level III validation	າ.	
XII.	Compound quantitation and	report	ed CRQLs	Δ	Not r	review	ed for Level III validation	າ	
XIII	Overall assessment of data			A					
XIV	Field duplicates		,	N					
XV.	Field blanks			\sim					
Note:	A = Acceptable		ND = No	o compound	s detec	cted	D = Duplicate		
1010.	N = Not provided/applicable SW = See worksheet	:	R = Rin	•	0 00.0		TB = Trip blank EB = Equipmen	t hlank	
/alida	ted Samples: ** Indicates sam	ole und					EB Equipmon	e Diarii	
v anda	5012	1	1	- Tanadion					
1	TSB-FR-02-02-20'	11	F8F1	60000-	164	21	8168164	31	
\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	TSB-FR-02-02-30'**	12				22		32	
	TSB-FJ-02-02-10'**	13				23		33	
4	TSB-FJ-02-02-20'**	14		·		24		34	
5	TSB-FJ-02-02-30'	15				25		35	
6		16				26		36	

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LDC #: /909/13a SDG #: su coney

	Page:_	1 of 2	
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Method: Pesticides/PCBs (EPA SW 846 Method 8081/8082)

Validation Area	Yes	No	NA	Findings/Comments
i; Technical holding times				
All technical holding times were met.				
Cooler temperature criteria was met.				
II. GC/ECD Instrument performance check				
Was the instrument performance found to be acceptable?				
III. Initial calibration				<u> </u>
Did the laboratory perform a 5 point calibration prior to sample analysis?		-		
Was a linear fit used for evaluation? If yes, were all percent relative standard deviations (%RSD) \leq 20%?				
Was a curve fit used for evaluation? If Yes, what was the acceptance criteria used?				
Did the initial calibration meet the curve fit acceptance criteria?				
Were the RT windows properly established?				
Were the required standard concentrations analyzed in the initial calibration?				
IV. Continuing calibration				
What type of continuing calibration calculation was performed?%D or%R				
Were Evaluation mix standards analyzed prior to the initial calibration and sample analysis?		-		
Were endrin and 4,4'-DDT breakdowns \leq 15%.0 for individual breakdown in the Evaluation mix standards?				
Was a continuing calibration analyzed daily?		•		
Were all percent differences (%D) ≤ 15%.0 or percent recovieries 85-115%?	W	A.		
Were all the retention times within the acceptance windows?				
V. Blanks				
Was a method blank associated with every sample in this SDG?				
Was a method blank analyzed for each matrix and concentration?				
Were extract cleanup blanks analyzed with every batch requiring clean-up?			_	
Was there contamination in the method blanks or clean-up blanks? If yes, please see the Blanks validation completeness worksheet.		1		
VI. Surrogate spikes				
Were all surrogate %R within the QC limits?				
if the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?				
f any %R was less than 10 percent, was a reanalysis performed to confirm %R?				

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VALIDATION FINDINGS CHECKLIST

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	T	<u> </u>	$\overline{\Gamma}$	
Validation Area	Yes	No	NA	Findings/Comments
VII: Metrix spike/Matrix spike duplicates	T		1	T
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?				
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?				
X. Target compound identification				
Were the retention times of reported detects within the RT windows?			\	
XI: Compound quantitation/CRQLs				
Were compound quantitation and CRQLs adjusted to reflect all sample dilutions, dry weight factors, and clean-up activities applicable to level IV validation?				
XII. System performance				
System performance was found to be acceptable.				
XIII. Overall essessment 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		1		
Field blanks were identified in this SDG.				
Target compounds were detected in the field blanks.			/	

VALIDATION FINDINGS WORKSHEET

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

A aipna-bric				
	I. Dieldrin	Q. Endrin ketone	Y. Aroclor-1242	66.
B. beta-BHC J. 4,	J. 4,4'-DDE	R. Endrin aldehyde	Z. Aroclor-1248	H.
C. delta-BHC K. E	K. Endrin	S. alpha-Chlordane	AA Aroclor-1254	=
D. gamma-BHC L. E.	L. Endosulfan II	T. gamma-Chlordane	BB. Aroclor-1260	JJ.
E. Heptachlor M. 4	M. 4,4"-DDD	U. Toxaphene	CC. DB 608	KK.
F. Aldrin N. E	N. Endosulfan sulfate	V. Aroclor-1016	DD. DB 1701	IL.
G. Heptachlor epoxide O. 4.	0. 4,4'-DDT	W. Aroclor-1221	Ef.	MM.
H. Endosulfan I P. M	P. Methoxychlor	X. Aroclor-1232	FF.	NN.

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Notes:_

SDG#: 1909/ A3~

METHOD:

VALIDATION FINDINGS WORKSHEET Continuing Calibration

Page: __of_ Reviewer: _____

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

What type of continuing calibration calculation was performed? __%D or __RPD __XX_NXA_ Were continuing calibration standards analyzed at the required frequencies?

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

ever/IV only

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

Qualifications	15/W1/A																					
Associated Samples	4, 5																					
RT (limit))	()	()	()	()	()	()	()	()	()	(())	()	()	()	()	()	()	()	()	(
%D / RPD (Limit < 15.0)	16.2																					
Compound	12,4-00T																					
Detector/ Column	ch A																					
Standard ID	KCA1081																					
Date	80/81/2																					
#							<u> </u>								<u> </u>	L						

19091432 SDG #: JAK LDC #:_

Initial Calibration Calculation Verification VALIDATION FINDINGS WORKSHEET

J of Page: 2nd Reviewer: Reviewer:

METHOD: GC

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

average CF = sum of the CF/number of standards %RSD = 100 * (S/X)CF = A/C

A = Area of compound,
C = Concentration of compound,
S = Standard deviation of the CF
X = Mean of the CFs

				Reported	Recalculated	Reported	Recalculated	Reported	Recalculated
#	Standard ID	Calibration Date	Compound	0. PX std) 0.00 std)	CF Olow std)	Average CF (initial)	Average CF (initial)	%RSD	%RSD
-	1001	89/91/9	endowhan I chA	530216040	530216040	(302)6040 5302/6040 510998/40 510998/405	Q1789012	3.1487	3.1488)
			7 10	089964191	089961191	017427151 019742751 089964191 089964191	01947151	6.2575	625175
2			l chB	28500 1720	026/00 25 DELI 00 5 %	17353341	21/8E38/20 21/888 38/20	485 % 18	1 2.9658
			7	44217640	44217640 44217640	are rere h	Coff to the	89810.9	5 6.0/863
က							·		
4									

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.

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Continuing Calibration Results Verification VALIDATION FINDINGS WORKSHEET

, of Page: Reviewer: 2nd Reviewer:_

> HPLC METHOD: GC

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

% Difference = 100 * (ave. CF - CF)/ave. CF CF = A/C

Where: ave. CF = initial calibration average CF CF = continuing calibration CF A = Area of compound C = Concentration of compound

					Reported	Received	Deported	Porsinilated
							namata 4	Delamanen
*	Standard ID	Calibration Date	Compound	Average CF(Ical)/ CCV Conc.	CF/Conc. CCV	CF/Conc. CCV	%D	%D
-	1 KCAL064	89/81/2	endosulpan / chA	0.025	0.0289	0.039	3.7	3.7
1			mc tho Ly chlor	7	0.0252	0.0%2	8.0	8-0
1								
2	4CA1080 6/18/08	6/18/19			0.082	0.0052	0-1	0.1
			7	7	Lx0.0	72000	7.6	2.2
က						·		
4								

Comments: Refer to Continuing Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results. LDC #: 19091 A3a SDG #: pu come

VALIDATION FINDINGS WORKSHEET **Surrogate Results Verification**

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

The percent recoveries	(%R) of surrogates v	vere recalculated for the cor	mpounds identified below	using the following calculation:
------------------------	----------------------	-------------------------------	--------------------------	----------------------------------

% Recovery: SF/SS * 100

Where: SF = Surrogate Found

Sample ID: #2

SS = Surrogate Spiked

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
				Reported	Recalculated	
Tetrachloro-m-xylene	ch A	0.02	.0.018391	92	92	0
Tetrachloro-m-xylene DCB	V	<i>\psi\</i>	0.01682	84	84	0
Decachlorobiphenyl						
Decachlorobiphenyl						

Sample ID:

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
				Reported	Recalculated	
Tetrachioro-m-xylene						
Tetrachioro-m-xylene						
Decachlorobiphenyl						
Decachlorobiphenyl						

Sample ID:_____

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
				Reported	Recalculated	
Tetrachioro-m-xylene						
Tetrachioro-m-xylene						
Decachlorobiphenyl						
Decachlorobiphenyl						

Sample ID:_____

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
				Reported	Recalculated	
Tetrachloro-m-xylene						
Tetrachioro-m-xylene						
Decachlorobiphenyl						
Decachlorobiphenyl						

Notes:		

19091 ABC SDG#: LDC #:

Matrix Spike/Matrix Spike Duplicates Results Verification VALIDATION FINDINGS WORKSHEET

2nd Reviewer: Page: / of Reviewer:_

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

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 ≈ Concentration

MSD = Matrix spike duplicate percent recovery

RPD = I MS - MSD I * 2/(MS + MSD) MS/MSD samples:_

MS = Matrix spike percent recovery J1-80-69-15

	₽ Si	Spike Added	Sample	Spiked	Spiked Sample	Matrix	Matrix Spike	Matrix Spil	Matrix Spike Duplicate	W	MS/MSD
Compound			())	()	Percent	Percent Recovery	Percent	Percent Recovery		RPD
	MS	MSD	1	MS	MSD	Reported	Recalc	Reported	Recalc	10000	
gamma-BHC	17.7	17.5		15.6	15.3	%	ż	2.8	87	C) - C	necalculated
4,4'-DDT	7	1		15.6	16.3	Z	25	73	86	4.5	4.0
									2		
			·								

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

LDC# 19091 A34 SDG #: ALL CONIN

VALIDATION FINDINGS WORKSHEET

Laboratory Control Sample/Laboratory Control Sample Duplicate Results Verification

/ Of /	K	0
Page:	Reviewer:	nd Reviewer.

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

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* (SSC-SC)/SA

SSC = Spiked sample concentration SA = Spike added Where:

SC = Concentration

RPD = I LCS - LCSD I * 2/(LCS + LCSD)

LCS = Laboratory control sample percent recovery

LCSD = Laboratory control sample duplicate percent recovery

LCS/LCSD samples: 8168/6/ ナセン

	JS P	pike	Spiked	i Sample	ľ	CS	רכ	rcsp	SOT	LCS/LCSD
Compound	Ž	(Ug //FX	Zonoz 7	Concentration (1987)	Percent	Percent Recovery	Percent	Percent Recovery	œ	RPD
	rcs	LCSD	SOT	GSDT	Reported	Recalc.	Reported	Recalc.	Reported	Recalc
gamma-BHC	16.7	NA	0:51	42	06	90				
4,4'-DDT	1	1	16.8	3	/0/	/0/	NA			

Comments: Refer to Laboratory Control Sample/Laboratory Control Sample Duplicate findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results. LDC #: 19091 A30 SDG #: pu coner

VALIDATION FINDINGS WORKSHEET Sample Calculation Verification

Page:_	<u>/</u> of_/
Reviewer:	7
2nd reviewer:	<u> </u>
_	7

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

Υ	N	N/A)
Υ	N	N/A
		7

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?

Example:	
Sample I.D	;
Conc. = (
=	
	ND

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

C-\W/PDO	CCIMPRAP	EST/BECA	1036

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

BRC Tronox Parcel F

Collection Date:

June 10, 2008

LDC Report Date:

July 22, 2008

Matrix:

Soil

Parameters:

Polychlorinated Biphenyls

Validation Level:

EPA Level III & IV

Laboratory:

TestAmerica, Inc.

Sample Delivery Group (SDG): F8F110177

Sample Identification

TSB-FR-02-02-20'

TSB-FR-02-02-30'**

TSB-FJ-02-02-10'**

TSB-FJ-02-02-20'**

TSB-FJ-02-02-30'

^{**}Indicates sample underwent EPA Level IV review

Introduction

This data review covers 5 soil samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8082 for Polychlorinated Biphenyls.

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

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

Blank results are summarized in Section V.

Field duplicates are summarized in Section XIV.

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

The following are definitions of the data qualifiers:

- 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.
- A Indicates the finding is based upon technical validation criteria.
- P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

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

II. GC/ECD Instrument Performance Check

Instrument performance was acceptable unless noted otherwise under initial calibration and continuing calibration sections.

III. Initial Calibration

Initial calibration of multicomponent compounds was performed for the primary (quantitation) column as required by the method.

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

Retention time windows were evaluated and considered technically acceptable for samples on which a EPA Level IV review was performed. Raw data were not evaluated for the samples on which a Level III review was performed.

IV. Continuing Calibration

Continuing calibration was performed at required frequencies.

The percent differences (%D) of calibration factors in continuing standard mixtures were within the 15.0% QC limits.

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

Retention times (RT) of all compounds in the calibration standards were within QC limits for samples on which a EPA Level IV review was performed. Raw data were not evaluated for the samples on which a Level III review was performed.

V. Blanks

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

No field blanks were identified in this SDG.

VI. Surrogate Spikes

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

VII. Matrix Spike/Matrix Spike Duplicates

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

VIII. Laboratory Control Samples (LCS)

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

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Pesticide Cleanup Checks

a. Florisil Cartridge Check

Florisil cleanup was not required and therefore not performed in this SDG.

b. GPC Calibration

GPC cleanup was not required and therefore not performed in this SDG.

XI. Target Compound Identification

All target compound identifications were within validation criteria for samples on which a EPA Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XII. Compound Quantitation and Reported CRQLs

All compound quantitation and CRQLs were within validation criteria for samples on which a EPA Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XIII. Overall Assessment of Data

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

XIV. Field Duplicates

No field duplicates were identified in this SDG.

BRC Tronox Parcel F
Polychlorinated Biphenyls - Data Qualification Summary - SDG F8F110177

No Sample Data Qualified in this SDG

BRC Tronox Parcel F
Polychlorinated Biphenyls - Laboratory Blank Data Qualification Summary - SDG
F8F110177

No Sample Data Qualified in this SDG

BRC Tronox Parcel F
Polychlorinated Biphenyls - Field Blank Data Qualification Summary - SDG
F8F110177

No Sample Data Qualified in this SDG

DG a	#: 19091A3b #: F8F110177 atory: Test America	_ VA _ _	LIDATIO		PLETEN evel III/I		WORKSI	HEET		Date: 7/18/ Page:of/ Reviewer: 2nd Reviewer:
/IETH	IOD: GC Polychlorinated	d Biph	enyls (EPA	SW 846 I	Method 80	082)				
he e	amnles listed helow were	a rovic	wed for ea	ch of the f	ollowing v	validati	on areas M	/alidation	findi	ngs are noted in attached
	tion findings worksheets		Wed for ea		onowing v	anuan	on areas, v	andatioi	milan	ngs are noted in attached
	Validation	Area						Comme	nts	
1.	Technical holding times			Δ	Sampling (dates:	6/10/08	3		
II.	GC/ECD Instrument Perforn	nance	Check	NA	<u> </u>		11-1-1-			
——— III.	Initial calibration	nance	Onook	Δ	•					
IV.	Continuing calibration/ICV			A	101	£ 15				
V.	Blanks	•		A	1	, •				
	1									
VI.	Surrogate spikes			A	alia	Α		1		TES 0 10 10
VII.	Matrix spike/Matrix spike du	plicate	<u>\$</u>	AH	cliev		SPECI			01-80-LD-8 <t< td=""></t<>
VIII.	Laboratory control samples			A	105	•	-	<u>v</u>		
IX.	Regional quality assurance	and qu	ality control	N						
Xa.	Florisil cartridge check			N						
Xb.	GPC Calibration			N						
XI.	Target compound identificat	tion		_	Not reviev	ved for I	_evel III valida	tion.		
XII.	Compound quantitation and	reporte	ed CRQLs	<u>A</u>	Not reviev	ved for l	_evel III valida	tion.		
XIII.	Overall assessment of data			<u>\\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ </u>						
XIV.	Field duplicates			N						
XV.	Field blanks			\ 						
ote:	A = Acceptable N = Not provided/applicable SW = See worksheet)	R = Rin	o compound sate eld blank	s detected		D = Duplicate TB = Trip bla EB = Equipm	nk		,
alidate	ed Samples: ** India	cates s	ample underw	ent Level IV	validation	,				
	TSB-FR-02-02-20'	11	F8 F16	0000-1	62 211	811	08162	;	31	
	TSB-FR-02-02-30'**	12			22			;	32	
1	TSB-FJ-02-02-10'**	13			23				33	
1	TSB-FJ-02-02-20'**	14			24				34	
	TSB-FJ-02-02-30'	15			25				35	
一		10		· · · · · · · · · · · · · · · · · · ·	100	1				

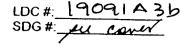
LDC #: 1909 | A3b SDG #: pur coney

VALIDATION FINDINGS CHECKLIST

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

Method: GC HPLC

Yes	No	NA	Findings/Comments
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VALIDATION FINDINGS CHECKLIST

Page: 2 of 2 Reviewer: 7 2nd Reviewer: 9

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19091A3b SDG#: LDC #:

Initial Calibration Calculation Verification VALIDATION FINDINGS WORKSHEET

Page: 2nd Reviewer. Reviewer.

> HPLC METHOD: GC_

The calibration Factor (CF), average CF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following

CF = A/C average CF = sum of the CF/number of standards %RSD = $100 \cdot (S/X)$

A ≈ Area of compound,
C ≈ Concentration of compound,
S ≈ Standard deviation of the CF
X ≈ Mean of the CFs

			Reported	Recalculated .	Reported	Pacalculated	Č	
# Standard ID	Calibration	(ភ	<u>.</u>	1	K	Reported	Recalculated
1601	5 1 0 B	punoduon	(coOstd)	(100 (Btd)	(initial)	Average CF (initial)	%RSD	2003
<u>.</u>	0.1.1.0	Aroclor 1260 ChA	71317	17875	27977	27917	12.0	O.C.
	-	dho who	3x 550	<u> </u>	39164	39167	9.50	9.382
								202
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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

LDC# 19091 A3 b ex cons SDG#

Continuing Calibration Results Verification VALIDATION FINDINGS WORKSHEET

Page: Reviewer._ 2nd Reviewer:

> HPLC METHOD: GC_

The percent difference (%D) of the initial calibration average Calibration Factors (CF) and the continuing calibration CF were recalculated for the compounds identified below

% Difference = 100 * (ave. CF - CF)/ave. CF CF = A/C

Where: ave. CF = initial calibration average CF

CF ≈ continuing calibration CF
A ≈ Area of compound
C ≈ Concentration of compound

					Reported	Receiculated	Reported	Receivated
	Standard ID	Calibration Date	Compound	Average CF(ical)/ CCV Conc.	CF/Conc.	CF/Conc.	Q%	Q%
	2	80/31/9	Swale		95a. 1902	δ	4.8	, , \
	40:61							9
	PCAL 100	80 3119	Arrocher 1260 CAA	C001 A	937.3347	937.3347 937.334	۲,5	۲. ۱
	16:03							
_								
3								
7.							-	
		,						

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

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-DC #: \20-1/1	SDG #: 42 502

VALIDATION FINDINGS WORKSHEE! Surrogate Results Verification

rage: 01 Reviewer: 2nd reviewer:

METHOD: __GC__ HPLC

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

% Recovery: SF/SS * 100

Where: SF = Surrogate Found SS = Surrogate Spiked

Sample ID:

Surrogate	Column/Detector	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
				Reported	Recalculated	
DCB	Ch A	of G	C1582 .01	[8	78	0

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Percent Difference				
Percent Recovery	Recalculated			
Percent Recovery	Reported			
Surrogate Found				
Surrogate Spiked				
Column/Detector			:	
Surrogate				

1		
1	-	
1	-	
1	1	
1		
1	1	
1	1	
1	1	
1	1	
1	1	
i	1	
1	1	
1	1	
1	1	
1	1	
-	1	
	1	
	1	

Surrogate	Column/Detector	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
				Reported	Recalculated	

この第一十四日十一年の七 SDG#: 4

VALIDATION FINDINGS WORKSHEET

Matrix Spike/Matrix Spike Duplicates Results Verification

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

METHOD: GC HPLC
The percent recoveries (%R) and relative percent differences (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using

the following calculation: %Recovery = 100 * (SSC - SC)/SA

SSC = Spiked sample concentration SA = Spike added MS = Matrix spike

SC = Sample concentration

MSD = Matrix spike duplicate

G1-80-10 T58-MS/MSD samples:__

RPD =(((\$SCMS - SSCMSD) * 2) / (\$SCMS + \$SCMSD))*100

2,000	Spike	• <u>•</u>	Sample	Spike	Spike Sample	Matri	Matrix snike	Matrix Call			
Compound	9 .	\ K	Conc	Concer	ntigation			makity Spike Duplicate	e Duplicate	MS/MSD	gs
では、一切のでは、大きなのでは、大きないでは、大きないでは、大きないでは、大きないでは、大きないでは、大きないでは、大きないでは、大きないでは、大きないでは、大きないでは、大きないでは、大きないでは、		P	大学の上	SW.	N N	Percent	Percent Recovery	Percent Recovery	Recovery	RPD	0
11、11、11、11、11、11、11、11、11、11、11、11、11、	MS	MSD	1	MS	MSD	Reported	Recalc.	Reported	Special	d	
Gasoline (8015)									Nacal C.	керопед	Recalc.
Diesel (8015)											
Benzene (8021B)											
Methane (RSK-175)											
2,4-D (8151)											
Dinoseb (8151)											
Naphthalene (8310)											
Anthracene (8310)											
HMX (8330)											
2,4,6-Trinitrotoluene (8330)											
Arocles 1260	177	118	dN	181	1 वर्ष	103/	/ , 0 :	0	Ó	7	
							2	D D	0	7.	7.7
Comments: <u>Refer to Matrix Spike/Matrix Spike Duplicates findings worksheet for list of qualifications and associated samples when reported results do not agree within 10 no.</u>	ke/Matrix S	pike Dupli	cates finding	s worksheet fo	or list of qualif	cations and a	ssociated sam	ples when rep	II orted results	do not agree	within 10 0%

_METHOD: __GC__HPLC

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

Page: of	Reviewer:	2nd Reviewer: O
Page:	Reviewer:	2nd Revie

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

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

SSC = Spiked concentration SA = Spike added Where

SC = Sample concentration

RPD *(((ssclcs - ssclcsD) * 2) / (ssclcs + ssclcsD))*100

LCS/LCSD samples:

LCS = Laboratory Control Sample percent recovery

LCSD = Laboratory Control Sample duplicate percent recovery

	Spike	ke Z	Sample	Spike Sample	ample	רכs	S	rcsp	0	TCS/TCSD	gs
Compound	(Ma	Kay	(Malliey		Y W	Percent Recovery	ecovery	Percent Recovery	scovery	RPD	
	ncs o	rcsp	0 =	SOT	gs27	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Gasoline (8015)											
Diesel (8015)											
Benzene (8021B)											
Methane (RSK-175)											
2,4-D (8151)											
Dinoseb (8151)											
Naphthalene (8310)											
Anthracene (8310)											
HMX (8330)											
2,4,6-Trinitrotoluene (8330)											
Aroda 1260	167	VV.		121	42	103	103	NA ~			
					-						

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

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VALIDATION FINDINGS WORKSHEET Sample Calculation Verification

2nd Reviewer: Reviewer:

> HPLC METHOD:

Were all recalculated results for detected target compounds within 10% of the reported results? Were all reported results recalculated and verified for all level IV samples?

(RF)(Vs or Ws)(%S/100) (A)(Fv)(Df) Concentration≈

Example:

Sample ID.

A≈ Area or height of the compound to be measured Fv≈ Final Volume of extract Df≈ Dilution Factor

RF≈ Average response factor of the compound In the initial calibration
Vs≈ Initial volume of the sample
Ws≈ Initial weight of the sample
%S≈ Percent Solid

Compound Name _

Sample ID Compound Concentrations Concentrations (Concentrations) (Concent	-					
		Sample ID	Compound	Reported Concentrations	Recalculated Results Concentrations	Qualifications
	 					
	•					
	-+			-		
	+					
	┅					

Comments:

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

BRC Tronox Parcel F

Collection Date:

June 10, 2008

LDC Report Date:

July 23, 2008

Matrix:

Soil

Parameters:

Metals

Validation Level:

EPA Level III & IV

Laboratory:

TestAmerica, Inc.

Sample Delivery Group (SDG): F8F110177

Sample Identification

TSB-FR-02-02-20'

TSB-FR-02-02-30'**

TSB-FJ-02-02-10'**

TSB-FJ-02-02-20'**

TSB-FJ-02-02-30'

^{**}Indicates sample underwent EPA Level IV review

Introduction

This data review covers 5 soil samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Methods 6010B, 6020, and 7000 for Metals. The metals analyzed were Aluminum, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Lithium, Magnesium, Manganese, Molybdenum, Mercury, Nickel, Niobium, Palladium, Phosphorus, Platinum, Potassium, Selenium, Silicon, Silver, Sodium, Strontium, Sulfur, Thallium, Tin, Titanium, Tungsten, Uranium, Vanadium, Zinc, and Zirconium.

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

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

Blanks are summarized in Section III.

Field duplicates are summarized in Section XIII.

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

The following are definitions of the data qualifiers:

- 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.
- A Indicates the finding is based upon technical validation criteria.
- P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

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

II. Calibration

An initial calibration was performed.

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

III. Blanks

Method blanks were reviewed for each matrix as applicable. No contaminant concentrations were found in the initial, continuing and preparation blanks with the following exceptions:

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
PB (prep blank)	lron	12.1 mg/Kg	All samples in SDG F8F110177
ICB/CCB	Antimony Thallium Tungsten Vanadium	1.3 ug/L 1.1 ug/L 1.4 ug/L 2.7 ug/L	All samples in SDG F8F110177

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

No field blanks were identified in this SDG.

IV. ICP Interference Check Sample (ICS) Analysis

The frequency of analysis was met.

The criteria for analysis were met.

V. Matrix Spike Analysis

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

Spike ID (Associated Samples)	Analyte	MS (%R) (Limits)	MSD (%R) (Limits)	RPD (Limits)	Flag	A or P
TSB-FJ-06-02-101MS/MSD (All samples in SDG F8F110177)	Antimony Barium Copper Magnesium Niobium Phosphorus Tungsten Zinc	50.0 (75-125) 61.1 (75-125) 73.2 (75-125) 43.4 (75-125) 38.8 (75-125) 43.6 (75-125) 71.5 (75-125)	50.0 (75-125) 61.0 (75-125) - 34.8 (75-125) 39.3 (75-125) 63.8 (75-125) 71.0 (75-125) 74.8 (75-125)	- - - - - -	J- (all detects) UJ (all non-detects)	А

VI. Duplicate Sample Analysis

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable.

VII. Laboratory Control Samples (LCS)

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

VIII. Internal Standards (ICP-MS)

All internal standard percent recoveries (%R) were within QC limits for samples on which a EPA Level IV review was performed with the following exceptions:

Sample	Internal Standard	%R (Limits)	Analyte	Flag	A or P
TSB-FJ-02-02-10'**	Sc ⁴⁵	132.5 (30-120)	Strontium	J (all detects) UJ (all non-detects)	А

Raw data were not evaluated for the samples reviewed by Level III criteria.

IX. Furnace Atomic Absorption QC

Graphite furnace atomic absorption was not utilized in this SDG.

X. ICP Serial Dilution

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

Diluted Sample	Analyte	%D (Limits)	Associated Samples	Flag	A or P
TSB-FJ-06-02-10'L	Calcium Phosphorus Titanium	13.8 (≤10) 15.6 (≤10) 19.2 (≤10)	All samples in SDG F8F110177	J (all detects) J (all detects) J (all detects)	А

XI. Sample Result Verification

All sample result verifications were acceptable for samples on which a EPA Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XII. Overall Assessment of Data

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

XIII. Field Duplicates

No field duplicates were identified in this SDG.

BRC Tronox Parcel F Metals - Data Qualification Summary - SDG F8F110177

SDG	Sample	Analyte	Flag	A or P	Reason
F8F110177	TSB-FR-02-02-20' TSB-FR-02-02-30'** TSB-FJ-02-02-10'** TSB-FJ-02-02-20'** TSB-FJ-02-02-30'	Antimony Barium Copper Magnesium Niobium Phosphorus Tungsten Zinc	J- (all detects) UJ (all non-detects)	A	Matrix spike/Matrix spike duplicates (%R)
F8F110177	TSB-FJ-02-02-10'**	Strontium	J (all detects) UJ (all non-detects)	А	Internal standards (%R)
F8F110177	TSB-FR-02-02-20' TSB-FR-02-02-30'** TSB-FJ-02-02-10'** TSB-FJ-02-02-20'** TSB-FJ-02-02-30'	Calcium Phosphorus Titanium	J (all detects) J (all detects) J (all detects)	А	ICP serial dilution (%D)

BRC Tronox Parcel F
Metals - Laboratory Blank Data Qualification Summary - SDG F8F110177

No Sample Data Qualified in this SDG

BRC Tronox Parcel F Metals - Field Blank Data Qualification Summary - SDG F8F110177

No Sample Data Qualified in this SDG

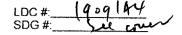
SDG	#: 19091A4 #: F8F110177 ratory: Test America	_ VA	LIDATIOI -		LETENES evel III/IV	S WORKSH	EET	Page: 1 of 1
METI	HOD: Metals (EPA SW	846 Me	ethod 6020/	6010B/700	00)			2nd Reviewer:
	amples listed below we ation findings worksheet		ewed for each	ch of the fo	ollowing valid	ation areas. Va	alidation find	ings are noted in attached
	Validatio	n Area				(Comments	
1.	Technical holding times			A	Sampling dates	s: 6/10/08		
11.	Calibration			A				
111.	Blanks			5W				
IV.	ICP Interference Check S	ample (IC	CS) Analysis	A		,		
V.	Matrix Spike Analysis			SW	3 M3/ms	D TSB-F	J-06-2-1	ol
VI.	Duplicate Sample Analysi	s		N				
VII.	Laboratory Control Sampl	es (LCS)		A	ly			
VIII.	Internal Standard (ICP-MS	S)		9W	Not her	iened for	-en 3	
IX.	Furnace Atomic Absorption	n QC		N	hit ut	liged		
X.	ICP Serial Dilution			3W		u ,		
XI.	Sample Result Verification	n		Α	Not reviewed f	or Level III validati	on.	
XII.	XII. Overall Assessment of Data			A				
XIII.	Field Duplicates			N				
XIV.	Field Blanks			N				
Note:	A = Acceptable N = Not provided/applicat SW = See worksheet	ole	R = Rin:	o compound sate eld blank	s detected	D = Duplicate TB = Trip blar EB = Equipme	nk	
Valida	red Samples (or) ** In	dicates s	ample underw	ent Level IV	validation			
1	TSB-FR-02-02-20'	11			21		31	
2	TSB-FR-02-02-30'**	12			22		32	
3	TSB-FJ-02-02-10'**	13			23		33	
4	TSB-FJ-02-02-20'**	14			24		34	
5	TSB-FJ-02-02-30'	15			25		35	
6	PB	16			26		36	
7		17			27		37	
8		18			28		38	
9		19			29		39	
10		20			30		40	
Notes	3:							

VALIDATION FINDINGS CHECKLIST

Page: of A Reviewer: wu 2nd Reviewer:

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

Method:Metals (EPA SW 846 Method 6010/7000/6020)				
Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times	4 2 2 3	7:12	Mi	
All technical holding times were met.	1			
Cooler temperature criteria was met.				
II. Calibration.				
Were all instruments calibrated daily, each set-up time?	1			
Were the proper number of standards used?	-		<u> </u>	
Were all initial and continuing calibration verification %Rs within the 90-110% (80- 120% for mercury and 85-115% for cyanide) QC limits?	1			
Were all initial calibration correlation coefficients > 0.995? (Level IV only)	/			
III Blanks			<u> </u>	
Was a method blank associated with every sample in this SDG?	/			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.				
IV IGB littlerference Check Sample				
Were ICP interference check samples performed daily?	/			
Were the AB solution percent recoveries (%R) with the 80-120% QC limits?			210 ASTA 2	
IV-Matrocspike/Matrix-spike duplicates				
Were a matrix spike (MS) and duplicate (DUP) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD or MS/DUP. Soil / Water.				
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the 75-125 QC limits? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.		/		
Were the MS/MSD or duplicate relative percent differences (RPD) ≤ 20% for waters and ≤ 35% for soil samples? A control limit of +/- RL(+/-2X RL for soil) was used for samples that were ≤ 5X the RL, including when only one of the duplicate sample values were < 5X the RL.	✓			
V-Laboratory/control samples				
Was an LCS anaylzed for this SDG?				
Was an LCS analyzed per extraction batch?				
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 80-120% QC limits for water samples and laboratory established QC limits for soils?				
Vi, Farrace Atomic Absorption QC	17 44 21273			
If MSA was performed, was the correlation coefficients > 0.995?				
Do all applicable analysies have duplicate injections? (Level IV only)			_	
For sample concentrations > RL, are applicable duplicate injection RSD values < 20%? (Level IV only)				
Were analytical spike recoveries within the 85-115% QC limits?		l		



VALIDATION FINDINGS CHECKLIST

Page: 2 of 2
Reviewer: WM
2nd Reviewer: 4

Validation Area	Yes	No	NA	Findings/Comments
VILICR Senal Dilution				
Was an ICP serial dilution analyzed if analyte concentrations were > 50X the IDL?	V			I > (SUX MOL For ziplan
Were all percent differences (%Ds) < 10%?		/		
Was there evidence of negative interference? If yes, professional judgement will be used to qualify the data.		/	<u>} </u>	
VIII: Internal Standards (EPA-SW:846:Method 6020)				
Were all the percent recoveries (%R) within the 30-120% of the intensity o	K	V		
If the %Rs were outside the criteria, was a reanalysis performed?	λK	/		
IX: Regional Quality Assurance and Quality Control :				
Were performance evaluation (PE) samples performed?			/	
Were the performance evaluation (PE) samples within the acceptance limits?			/	
X Sample Result Ventication: See 155 4 1993				
Were RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?				
XI Overall assessment of data				
Overall assessment of data was found to be acceptable.	/			
XII. Field duplicates				
Field duplicate pairs were identified in this SDG.		✓	**********	
Target analytes were detected in the field duplicates.			/	
XIII. Field, blanks				
Field blanks were identified in this SDG.		7		
Target analytes were detected in the field blanks.			1	

LDC #: \(\frac{909}{44}\)
SDG #: \(\frac{1}{26}\)
where \(\frac{1}{26}\)

VALIDATION FINDINGS WORKSHEET Sample Specific Element Reference

All circled elements are applicable to each sample.

Sample ID	Matrix	Target Analyte List (TAL)
1-5	501)	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si,
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, Si,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si,
	,	
1-+	50:)	Nb, Pd, P, Pt, Sn, Sr, Ti, W, U, Li, S, Zr,
		Nb, Pd, P, Pt, Sn, Sr, Ti, W, U, Li, S, Zr,
		Nb, Pd, P, Pt, Sn, Sr, Ti, W, U, Li, S, Zr,
		Nb, Pd, P, Pt, Sn, Sr, Ti, W, U, Li, S, Zr,
		Nb, Pd, P, Pt, Sn, Sr, Ti, W, U, Li, S, Zr,
		Nb, Pd, P, Pt, Sn, Sr, Ti, W, U, Li, S, Zr,
		Nb, Pd, P, Pt, Sn, Sr, Ti, W, U, Li, S, Zr,
		Nb, Pd, P, Pt, Sn, Sr, Ti, W, U, Li, S, Zr,
		Nb, Pd, P, Pt, Sn, Sr, Ti, W, U, Li, S, Zr,
		Nb, Pd, P, Pt, Sn, Sr, Ti, W, U, Li, S, Zr,
		Nb, Pd, P, Pt, Sn, Sr, Ti, W, U, Li, S, Zr,
		Nb, Pd, P, Pt, Sn, Sr, Ti, W, U, Li, S, Zr,
	T	Analysis Method
СР		Lis-7
CP-MS		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, S.
ICP-MS		(Nb, Pd, P, Pt, Sn, Sr, Ti, W, U, Zr,)
GFAA		Al Sh. As. Ba. Be. Cd. Ca. Cr. Co. Cu. Fe. Ph. Mg. Mn. Hg. Ni, K. Se. Ag. Na, Tl. V. Zn. Mo. B. Si, CN.

Comments: Mercury by CVAA if performed

Nb: Niobium, Pd: Palladium, P: Phosphorus, Pt: Platinum, S: Sulfur, W: Tungsten, U: Uranium, Zr: Zirconium

METHOD: Trace Metals (EPA SW 846 Method 6010/6020/7000) Sample Concentration units, unless otherwise noted: mg/Kg LDC #: 19091A4 SDG #: See Cover

VALIDATION FINDINGS WORKSHEET

PB/ICB/CCB QUALIFIED SAMPLES

Page: of A

Associated Samples: All (ND or > RL) Soil preparation factor applied:

¥200	al		1		T					-	1	1 -	ï	 <u> </u>	Т	 T		 	 1	1	
fion																					
Sample Identification																					
Sample																					
				AND THE RESERVE OF TH										- William							
																					_
																					-
																					-
	Blank	Action I imit		121	0.22																-
	Maximum	ICB/CCB ^a (119/L)	l í		1.1	1.4	2.7							***							=
	Maximum	PB ^a (ug/l)																			-
		PB ^a (mg/Kg)		12.1																	=
	Analyte		Sb	Бe	F	>	>														_

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.

200 200 LDC #: [40 9 1 AL SDG #:

Matrix Spike/Matrix Spike Duplicates VALIDATION FINDINGS WORKSHEET

2nd Reviewer:___ Reviewer:

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

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

| Y | N | N/A | Was a matrix spike analyzed for each matrix in this SDG?
| Y | N | N/A | Were matrix spike percent recoveries (%R) within the control limits of 75-125? If the sample concentration exceeded the spike concentration by a factor

Were all duplicate sample relative percent differences (RPD) ≤ 20% for water samples and ≤35% for soil samples? of 4 or more, no action was taken. N N/A

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

E1-06- Soil SP Sac Sac Sp.0 -101 -	E1-06- Soil Sp Sp Sp Sp.0 - 101 - 1	MS/MSD ID	Matrtx	Analyte	MS %Recovery	MSD %Recovery	RPD (Limits)	Associated Samples	Qualifications
101 61.0 61.0 61.0 61.0 61.0 61.0 61.0 6	13.2 61.0 CA 13.2 24.8 Why 38.8 34.2 14.8 34.4 38.8 34.2 14.8 14.8 Why 33.6 63.8 14.8 14.8	75B-FJ-06-	50,	as	SQ. 0	50.0		H) H)	J-/43/A
My 43.4 Mb 35.8 35.8 35.8 37.6 6 7 7 7 7 7 8.7.6 My 43.4 35.8 31.6 6 6 7 7 7 7 7 8 7 8 7 7 7 7 7 7 7 7 7 7 7 7 7	My 43.4 3 Who 43.4 3 Who 43.6 6 Who 25.8 7; Ca 74X	101-20		Ba	(> 9	0/19			
Mg 43.4 Mb 38.8 2h 21.6 2h 21.6 2h 21.6 Mg 7.6 Mg 7.6 M	Mg 43.4 W 73.8 2h 2h 2h 2h 2h 3s.8 43.4 2h 2h 3s.8 43.4 2h 3s.8 43.4 2h 43.4	-		3	13.2				
Wb 38.8 P 43.6 27, 27, Cc 74)	Wb 38.8 43.6 27, 24, 6 43.7 43.7			Re	43.4	34,8			
43.6 2h 2h 2h 2h 2h 2h 2h 2h 3h 2h 3h 2h 3h 2h 3h 2h 3h 2h 3h 3h 2h 3h	2h 43.6 2h 2h 6h.E			N P 0		39,3			
2h 2	22h 21/2 22h 21/2 24/3 26/52/17/20/20/20/20/20/20/20/20/20/20/20/20/20/]		4		8.59			
8, Fe, My, Si, Sy 7; Co. 74)	1 2h			M	カバト	n . n			
18, Fe, My, Si, Sy 7; Co. 74;	18, Fr. My, Si, Sr. Ti, Ca. 74)			Łh		14.8		-	
R. Fr. My Si Sy Ti Ca	W. Fr. My Si Sr Ti Ca								
18, Fe My 5; 5x T; Ca	FR, My, Si, Sy, Ti, Ca								
M. Fr. My Si Sy Ti Ca	W. Fe, My, Si, Sv, Ti, Ca.								
R. F.R. My Si Sy Ti Ca	18, Fe, My, Si, Sy, Ti, Ca.								
R. Fr. My Si Sy Ti Ca	18, Fe, My, Si, Sy, Ti, Ca.								
R. Fr. My Si Sy Ti Ca	18, Fe, My, Si, Sy, Ti, Ca.								
R. Fr. My Si Sy Ti Ca	18, Fe, My, Si, Sv. Ti, Ca.								
18, Fe My 5; 5x 7; Ca	18, Fe, My, Si, Sv, Ti, Ca								
18, Fe My 5; 5x 7; Ca	18, Fe, My, Si, Sv, Ti, Ca								
18, Fe My 5; 5x 7; Ca	18, Fe, My, Si, Sv, Ti, Ca								
18, Fe My 5; 5x 7; Ca	18, Fe, My, Si, Sv, Ti, Ca								
18, FR, My, Si, Sv. Ti, Ca	18, Fe, My, Si, Sv, Ti, Ca								
18, Fe, My, Si, Sv. 7; Ca	18, Fe, My, Si, Sv, Ti, Ca								
R. Fe My Si Sy Ti Ca	18, Fe, My, Si, Sv, Ti, Ca								
			Fe My	5, Sx	ابی	41			

LDC #: (9.91/A4 SDG #: 186 com

VALIDATION FINDINGS WORKSHEET Internal Standards (ICP-MS)

Page: Reviewer: 2nd Reviewer:

METHOD: Metals (EPA SW 846 Method 6020)

Y N N/A

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

Y (N) N/A

Were all internal standard percent recoveries within 30-120% of the internal standard in the initial calibration standard?

Associated Samples If the response to either of the above questions is no, were the samples reanalyzed as required? %R (Limits) Associated Metals Internal Standard

LDC #: 1909 | Act C

VALIDATION FINDINGS WORKSHEET **ICP Serial Dilution**

Reviewer:_ 2nd Reviewer: Page:

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

If analyte concentrations were > 50X the MDL (ICP) ,or >100X the MDL (ICP/MS), was a serial dilution analyzed? Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

X N/A N/A

Were ICP serial dilution percent differences (%D) <10%? Is there evidence of negative interference? If yes, professional judgement will be used to qualify the data.

LEVEL IV ONLY:

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

イージ XMP É Comments:_

LDC #: 1909 | Art SDG #: See cove

VALIDATION FINDINGS WORKSHEET Initial and Continuing Calibration Calculation Verification

Page: of A Reviewer: W47 2nd Reviewer:

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

An initial and continuing calibration verification percent recovery (%R) was recalculated for each type of analysis using the following formula:

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

Where, Found = concentration (in ug/L) of each analyte measured in the analysis of the ICV or CCV solution True = concentration (in ug/L) of each analyte in the ICV or CCV source

					Recalculated	Reported	
Standard ID	Type of Analysis	Element	Found (ug/L)	True (ug/L)	%R	%R	Acceptable (Y/N)
MI	ICP (Initial calibration)	L,	4037	4000	(001)	6.00.9	>
	GFAA (Initial calibration)		,				
MI	CVAA (Initial calibration)	(49	125	2.5	(vo. 4	100.4	Y
M27	ICP (Continuing calibration)	, S	8745	00005	105.4	10St. 4	
	GFAA (Continuing calibration)				/		
b)	CVAA (Continuing calibration)	Ha	b~b	Sco	4800	9-86	>
772	ICP/MS (Initial calibration)	Pb	1019,4	(600)	(0/1)	(./9	
ιςν	ICP/MS (Continuing calibation)	Ą	388,6	4000	4 1,0	970	_

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

LDC # | 9091 Ay

VALIDATION FINDINGS WORKSHEET Level IV Recalculation Worksheet

2nd Reviewer: Page: __of_ Reviewer:____

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

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

%R = Found x 100 True

Where, Found = Concentration of each analyte measured in the analysis of the sample. For the matrix spike calculation, Found = SSR (spiked sample result) - SR (sample result).

True = Concentration of each analyte in the source.

A sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

RPD = <u>IS-DL</u> × 100 (S+D)/2

Where, S = Original sample concentration

D = Duplicate sample concentration

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

%D = 1-SDR x 100

Where, I = Initial Sample Result (mg/L) SDR = Serial Dilution Result (mg/L) (Instrument Reading x 5)

					Recalculated	Reported	
Sample ID	Type of Analysis	Element	Found / S / I (units)	True / D / SDR (units)	%R/RPD/%D	%R/RPD/%D	Acceptable (Y/N)
2480	ICP interference check	Fr.	2.y0)	و ه)	104	to 4	>_
1.05	Laboratory control sample	M	6 311	192	104.9	1048	_
15B - FJ-06 Matrix spike	Matrix spike	72	ξιζής τ (ss-ss)	1-559.2	5'68	1.78	
	Duplicate	Z	4346	0116	8-9	8-9	
-	ICP serial dilution	8 R	(121.66 4.18.27)	24195	37	100	`

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

LDC #: (109	A4
SDG #:	See	we

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VALIDATION FINDINGS WORKSHEET Sample Calculation Verification

Page:	1017
Reviewer:	hu
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	Y

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

Dilution factor Decimal percent solids

		•	.,,	·
Please O N M N Y N	see qua N/A N/A N/A	Have results been reported a	nd calculated correctly? ed range of the instruments	able questions are identified as "N/A". and within the linear range of the ICP?
	ed analy	rte results fortion:	7	were recalculated and verified using the
Concent	tration =	(RD)(FV)(Dil) (In. Vol.)(%S)	Recalculation:	
RD FV In. Vol.	= = =	Raw data concentration Final volume (ml) Initial volume (ml) or weight (G)	S= 9,314 0, tg	x 0. 6931 = 2688 mg/m

Sample ID	Analyte	Reported Concentration (\mathref{VM} \mathref{k}_{\infty})	Calculated Concentration	Acceptable (Y/N)
2	Lì Lì	133	133	Y
	5	2690	2690	
	AC	18>00	(8200)	
	A3	35.5	305	
	Ba	56.2	86.~	
	12e	0.97	0197	
	B	27.8	27.8	
	Co	23400	13400	
	- Cx	26,4	26, 4	
	Co	8.8	8.8	
	Cy	28.8	2818	
	Fe	19900	19950	
	Pb	10.6	(a,b	
	Mg	4.400	45100	
	49	310	310	
	Mo	2,9	2,8	
	V	20.7	≥ ∞, ′γ	
	Pd	0.48	0.48	
	P	8/2	812	
	K	3780	3780	
	Si`	1200	1200	
	Ag	0.19	0.19	J

LDC #:	9	29	AY
SDG #:	(ree	we

VALIDATION FINDINGS WORKSHEET Sample Calculation Verification

Page:_	201 g
Reviewer:	My
2nd reviewer:	Û

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

MEIH	OD: IIA	ce Metals (EFA SW 646 Method C	3010/7000/		
Please N N N N	see qua N/A N/A N/A	alifications below for all questions Have results been reported and Are results within the calibrated Are all detection limits below the	calculated correctly? range of the instruments		
	-	rte results for	7	were recalculated	I and verified using the
followi	ng equa	tion:			
Concen	tration =	(RD)(FV)(Dil) (In. Vol.)(%S)	Recalculation:	un vel 1 all 1 +	1
RD FV In. Vol.	=	Raw data concentration Final volume (ml) Initial volume (ml) or weight (G)	Va = 668	0-55 x 0.6931	=964.4 mg/r
Dil	=	Dilution factor		•	

Sample ID	Analyte	Reported Concentration (way ref.)	Calculated Concentration (WS / 4)	Acceptable (Y/N)
7	Na	964	964	У
	NA SY	719	219	,
	Tì	866	866	
	Ч	6.7	6.7	
	V	60,9	60.9	
	Zy	620	65%	/
	2 v	44.4	44.4	<i>Y</i>
			,	
	1000			
				· · · · · · · · · · · · · · · · · · ·
			:	

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

BRC Tronox Parcel F

Collection Date:

June 10, 2008

LDC Report Date:

July 23, 2008

Matrix:

Soil

Parameters:

Wet Chemistry

Validation Level:

EPA Level III & IV

Laboratory:

TestAmerica, Inc.

Sample Delivery Group (SDG): F8F110177

Sample Identification

TSB-FR-02-02-20'

TSB-FR-02-02-30'**

TSB-FJ-02-02-10'**

TSB-FJ-02-02-20'**

TSB-FJ-02-02-30'

^{**}Indicates sample underwent EPA Level IV review

Introduction

This data review covers 5 soil samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Method 300.0 for Bromide, Bromine, Chlorate, Chloride, Chorine, Fluoride, Nitrate as Nitrogen, Nitrite as Nitrogen, Orthophosphate as Phosphorus, and Sulfate and EPA SW 846 Method 9071B for Oil & Grease.

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

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

Blank results are summarized in Section III.

Field duplicates are summarized in Section IX.

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

The following are definitions of the data qualifiers:

- 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.
- A Indicates the finding is based upon technical validation criteria.
- P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

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

II. Calibration

a. Initial Calibration

All criteria for the initial calibration of each method were met.

b. Calibration Verification

Calibration verification frequency and analysis criteria were met for each method when applicable.

III. Blanks

Method blanks were reviewed for each matrix as applicable. No contaminant concentrations were found in the initial, continuing and preparation blanks with the following exceptions:

Method Blank ID	Analyte	Concentration	Associated Samples
МВ	Orthophosphate as P	1.1 mg/L	All samples in SDG F8F110177
ICB/CCB	Orthophosphate as P	0.237 mg/L	All samples in SDG F8F110177

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

No field blanks were identified in this SDG.

IV. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

V. Duplicates

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable. Results were within QC limits.

VI. Laboratory Control Samples

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

VII. Sample Result Verification

All sample result verifications were acceptable for samples on which a EPA Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

VIII. Overall Assessment of Data

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

IX. Field Duplicates

No field duplicates were identified in this SDG.

BRC Tronox Parcel F
Wet Chemistry - Data Qualification Summary - SDG F8F110177

No Sample Data Qualified in this SDG

BRC Tronox Parcel F
Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG F8F110177

No Sample Data Qualified in this SDG

BRC Tronox Parcel F
Wet Chemistry - Field Blank Data Qualification Summary - SDG F8F110177

No Sample Data Qualified in this SDG

SDG :	t: 19091A6 #: F8F110177 atory: Test America	VA	LIDATIOI -		PLETE evel III		SS WORKSHEET	Date: <u>7</u> Page: <u>1</u> Reviewer: 2nd Reviewer:	of
	IOD: (Analyte) Bromide, od 300.0), O & G (EPA S				e, Chori	ne, Fl	uoride, Nitrate, Nitrite,	Órthophosphate-P, Sulfate	<u>(EPA</u> —
	amples listed below were tion findings worksheets.		wed for ea	ch of the f	following	yalio	dation areas. Validation	n findings are noted in atta	ached
	Validation	Area	10.0				Comme	ents	
1.	Technical holding times			A	Samplir	ıg date	s: 6/10/8		
lla.	Initial calibration			Δ		<u></u>			
Ilb.	Calibration verification			A					
111.	Blanks			5~					
IV	Matrix Spike/Matrix Spike D	uplicate	es	A	7	ms/	Pup TSB-FJ-	06-02-10	
V	Duplicates			A		1			
VI.	Laboratory control samples			A	Les				
VII.	Sample result verification			A	Not rev	iewed	for Level III validation.		
VIII.	Overall assessment of data			A					
IX.	Field duplicates			N					
х	Field blanks	3,300		W					
Note:	A = Acceptable N = Not provided/applicable SW = See worksheet	;	R = Rin	o compound sate eld blank	ls detecte	d	D = Duplicate TB = Trip blank EB = Equipment blank	4	
/alidat	ed Samples: ** India	cates sa	ample underw	ent Level IV	validatio	n			
1	TSB-FR-02-02-20'	11			2	1		31	
2	TSB-FR-02-02-30'**	12			2:	2		32	
3	TSB-FJ-02-02-10'**	13			2:	3		33	
4	TSB-FJ-02-02-20'**	14			2	4		34	
5	TSB-FJ-02-02-30'	15			2	5		35	
6	MB	16			2	3		36	
7	. •	17			2	7		37	
8		18			2	в		38	
9		19			2	9		39	
10		20			3	0		40	
Votes	:								

LDC #:	19091	Ab
SDG #:	Çe	e com

VALIDATION FINDINGS CHECKLIST

Page: 1 of 1
Reviewer: 4
2nd Reviewer: 4

Method: Inorganics (EPA Method Tel could

Method:Inorganics (EPA Method Tel caul	T	T	ī	T
Validation Area	Yes	No	NA	Findings/Comments
(: Technical holding times:	121	11.		<u>. Parel de la la la composición de a composición dela composición de la composición dela composición dela composición de la composición dela composición de la composición dela composición dela composición dela composición dela composición dela composición dela co</u>
All technical holding times were met.	1			
Cooler temperature criteria was met.	/			
lisCaldization				
Were all instruments calibrated daily, each set-up time?	1			
Were the proper number of standards used?	1			
Were all initial calibration correlation coefficients > 0.995?	1			
Were all initial and continuing calibration verification %Rs within the 90-110% QC limits?	/			
Were titrant checks performed as required? (Level IV only)			/	
Were balance checks performed as required? (Level IV only)	V			
Was a method blank associated with every sample in this SDG?				
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.	/			
N/Malospike/Matix/spike/duplicates and Duplicates (** ** ** ** ** ** ** ** ** ** ** ** **	Q.			SERVE DESERVE IN THE PROPERTY.
Were a matrix spike (MS) and duplicate (DUP) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD or MS/DUP. Soil / Water.	_			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the 75-125 QC limits? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.				
Were the MS/MSD or duplicate relative percent differences (RPD) \leq 20% for waters and \leq 35% for soil samples? A control limit of \leq CRDL(\leq 2X CRDL for soil) was used for samples that were \leq 5X the CRDL, including when only one of the duplicate sample values were \leq 5X the CRDL.				
V Laboratory Controls amples:		real,		
Was an LCS anaylzed for this SDG?				
Was an LCS analyzed per extraction batch?				
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 80-120% (85-115% for Method 300.0) QC limits?				
VI. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?			\angle	
Nere the performance evaluation (PF) samples within the acceptance limits?				

LDC #: 19091 Ab SDG #: See con

VALIDATION FINDINGS CHECKLIST

Page: Yof Y Reviewer: MM 2nd Reviewer:

Validation Area	Yes	No	NA	Findings/Comments
VII. Sample Result Verification		u (i.) Lustas		
Were Rt.s adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	/			
Were detection limits < RL?				
(1) (Copy of the Copy of the C		i.		
Overall assessment of data was found to be acceptable.	/			
Commission was a second to the second				Neikak Italia iki
Field duplicate pairs were identified in this SDG.		\		
Target analytes were detected in the field duplicates.				
Appending Constitution of the property of the property of the party of				
Field blanks were identified in this SDG.		/	,	
Target analytes were detected in the field blanks.			7	

LDC #: 195/ 4/6 SDG #: Sucore

VALIDATION FINDINGS WORKSHEET Sample Specific Analysis Reference

Page: __(_of__/_ Reviewer: ______ 2nd reviewer: _____

All circled methods are applicable to each sample.

Sample ID	Matrix	Parameter
1-5	Soil	Br Bromine CI Chlorine F NO ₃ NO ₂ SO ₄ O-PO ₄ Chlorate CIO ₄ (O+C/TPH
		Br Bromine Cl Chlorine F NO ₃ NO ₂ SO ₄ O-PO ₄ Chlorate ClO ₄ O+G/TPH
		Br Bromine Cl Chlorine F NO ₃ NO ₂ SO ₄ O-PO ₄ Chlorate ClO ₄ O+G/TPH
		Br Bromine Cl Chlorine F NO ₃ NO ₂ SO ₄ O-PO ₄ Chlorate ClO ₄ O+G/TPH
		Br Bromine Cl Chlorine F NO ₃ NO ₂ SO ₄ O-PO ₄ Chlorate ClO ₄ O+G/TPH
		Br Bromine Cl Chlorine F NO ₃ NO ₂ SO ₄ O-PO ₄ Chlorate ClO ₄ O+G/TPH
		Br Bromine Cl Chlorine F NO ₃ NO ₂ SO ₄ O-PO ₄ Chlorate ClO ₄ O+G/TPH
		Br Bromine Cl Chlorine F NO ₃ NO ₂ SO ₄ O-PO ₄ Chlorate ClO ₄ O+G/TPH
		Br Bromine Cl Chlorine F NO ₃ NO ₂ SO ₄ O-PO ₄ Chlorate ClO ₄ O+G/TPH
		Br Bromine Cl Chlorine F NO ₃ NO ₂ SO ₄ O-PO ₄ Chlorate ClO ₄ O+G/TPH
		Br Bromine Cl Chlorine F NO ₃ NO ₂ SO ₄ O-PO ₄ Chlorate ClO ₄ O+G/TPH
		Br Bromine Cl Chlorine F NO ₃ NO ₂ SO ₄ O-PO ₄ Chlorate ClO ₄ O+G/TPH
		Br Bromine Cl Chlorine F NO ₃ NO ₂ SO ₄ O-PO ₄ Chlorate ClO ₄ O+G/TPH
		Br Bromine Cl Chlorine F NO ₃ NO ₂ SO ₄ O-PO ₄ Chlorate ClO ₄ O+G/TPH
		Br Bromine Cl Chlorine F NO ₃ NO ₂ SO ₄ O-PO ₄ Chlorate ClO ₄ O+G/TPH
		Br Bromine Cl Chlorine F NO ₃ NO ₂ SO ₄ O-PO ₄ Chlorate ClO ₄ O+G/TPH
		Br Bromine Cl Chlorine F NO ₃ NO ₂ SO ₄ O-PO ₄ Chlorate ClO ₄ O+G/TPH
		Br Bromine Cl Chlorine F NO ₃ NO ₂ SO ₄ O-PO ₄ Chlorate ClO ₄ O+G/TPH
		Br Bromine Cl Chlorine F NO ₃ NO ₂ SO ₄ O-PO ₄ Chlorate ClO ₄ O+G/TPH
		Br Bromine Cl Chlorine F NO ₃ NO ₂ SO ₄ O-PO ₄ Chlorate ClO ₄ O+G/TPH
		Br Bromine Cl Chlorine F NO ₃ NO ₂ SO ₄ O-PO ₄ Chlorate ClO ₄ O+G/TPH
		Br Bromine Cl Chlorine F NO ₃ NO ₂ SO ₄ O-PO ₄ Chlorate ClO ₄ O+G/TPH
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		Br Bromine Cl Chlorine F NO ₃ NO ₂ SO ₄ O-PO ₄ Chlorate ClO ₄ O+G/TPH
		·
		·

Comments:	

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VALIDATION FINDINGS WORKSHEET

Blanks

Page: of 2nd Reviewer: Reviewer:

> Ser cour METHOD: Inorganics, Method _

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

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

N N/A Were any inorganic contaminants detected above the reporting limit in the method blanks? If yes, please see qualifications below. 3

Associated Samples:

Conc. units:

						•				-		
u												
Sample Identification				•								
Sam												
Blank	Action Limit											
Maximum		الادره		,								
Blank ID	7 7 8	1-1										
Analyte		d-100-0									-	

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

(god 1 A6 LDC#: SDG#:

Initial and Continuing Calibration Calculation Verification Validatin Findings Worksheet

2nd Reviewer: Reviewer: Page:

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80181/3

Method: Inorganics, Method

The correlation coefficient (r) for the calibration of _____ was recalculated.Calibration date:_

An initial or continuing calibration verification percent recovery (%R) was recalculated for each type of analysis using the following formula:

%R = Found X 100

Where,

Found = concentration of each analyte measured in the analysis of the ICV or CCV solution

True = concentration of each analyte in the ICV or CCV source

	- And Million				Recalculated	Reported	Acceptable
Type of analysis	Analyte	Standard	Conc. (ug/L)	Area	r or r²	r or r²	(Y/N)
Initial calibration		s1	200	0.04			
	ច	s2	200	0.091	0.99984	0.99991	>
		83	1000	0.191			
		84	2500	0.474			
		s5	5000	0.989			
$\mathcal{L}\mathcal{L}$ Calibration verification	denti	2007	120		₹c)	M	5
$\epsilon \mathcal{C} $ Calibration verification	H	000)	f '58e1		2 '80)	J. (4)	7
$\widetilde{\mathcal{L}_{e}}$ Calibration verification	& &	ه گ	2016.6		800)	800)	7

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

1929/ AG LDC #: SDG #:

VALIDATION FINDINGS WORKSHEET Level IV Recalculation Worksheet

Page: Reviewer: 2nd Reviewer:

METHOD: Inorganics, Method _

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

Where %R = Found x 100

Found =

True =

concentration of each analyte <u>measured</u> in the analysis of the sample. For the matrix spike calculation, Found = SSR (spiked sample result) - SR (sample result). concentration of each analyte in the source.

A sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

 $RPD = \underbrace{1S \cdot D!}_{(S+D)/2} \times 100 \text{ Where,}$

။ ။ တ **ဝ**

Original sample concentration Duplicate sample concentration

The state of the s			Receiculated	Reported	
Laboratory control sample Of G Matrix spike sample Ularth Duplicate sample	Found / S Element (units)	True / D (unite)	%R / RPD	%R / RPD	Acceptable (Y/N)
Matrix spike sample Ulanth Duplicate sample					
Matrix spike sample Userth Duplicate sample	0+9 (1.13	(330	28	28	}
Duplicate sample	(SSR-SR)				
Duplicate sample	dent 43.6	42,17	(ه ۶	(03	
-		(\	,	
				•	>
tox	ctr tos	ンなる	ÿ	٧,	

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

LDC #: 1909/A6 SDG #: <u>Lu</u> cou	VALIDATION FINDINGS Sample Calculation V		Page: of / Reviewer: Mu 2nd reviewer:
METHOD: Inorganics, Method	See com		β
Please see qualifications below for Y N N/A Have results been Are results within the N N/A Are all detection limits.	all questions answered "N". Not reported and calculated correct ne calibrated range of the instru nits below the CRQL?	applicable questions are ly? ments?	dentified as "N/A".
Compound (analyte) results forrecalculated and verified using the		reporte	ed with a positive detect were
Concentration = $U = 0.215 \text{ $	1000 96	= 158,97 mg	Huy

#	Sample ID	Analyte	Reported Concentration (Calculated Concentration (Wyly)	Acceptable (Y/N)
	2	cklonds U U	4.8	4.8	Y
		U	159	159	<u> </u>
		Clr	317	318	
		F	3.5	3.5	
		NO3-N	3.4	3,4	<u> </u>
		soψ	224	575	y .
		,			
			<u> </u>		
 					
]					
					
<u> </u>					
 			·		
					
				 	

Note:				 	
	·····	 	 	 	-

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

BRC Tronox Parcel F

Collection Date:

June 10, 2008

LDC Report Date:

July 22, 2008

Matrix:

Soil

Parameters:

Gasoline Range Organics

Validation Level:

EPA Level III & IV

Laboratory:

TestAmerica, Inc.

Sample Delivery Group (SDG): F8F110177

Sample Identification

TSB-FR-02-02-20'

TSB-FR-02-02-30'**

TSB-FJ-02-02-10'**

TSB-FJ-02-02-20'**

TSB-FJ-02-02-30'

^{**}Indicates sample underwent EPA Level IV review

Introduction

This data review covers 5 soil samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8015B for Gasoline Range Organics.

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

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

Blank results are summarized in Section III.

Field duplicates are summarized in Section IX.

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

The following are definitions of the data qualifiers:

- 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.
- 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.
- A Indicates the finding is based upon technical validation criteria.
- P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

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

II. Calibration

a. Initial Calibration

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

The percent relative standard deviations (%RSD) of calibration factors for compounds were less than 20.0%.

b. Calibration Verification

Calibration verification was performed at required frequencies. The percent differences (%D) of amounts in continuing standard mixtures were within the 15.0% QC limits.

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

III. Blanks

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

No field blanks were identified in this SDG.

IV. Accuracy and Precision Data

a. Surrogate Recovery

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

b. Matrix Spike/Matrix Spike Duplicates

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.

c. Laboratory Control Samples

Laboratory control samples were reviewed for each matrix as applicable. Although the LCS percent recovery (%R) was not within QC limits for one compound, the LCSD percent recoveries (%R) were within QC limits and no data were qualified.

V. Target Compound Identification

All target compound identifications were within validation criteria for samples on which a EPA Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

VI. Compound Quantitation and CRQLs

All compound quantitation and CRQLs were within validation criteria for samples on which a EPA Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

VII. System Performance

The system performance was acceptable for samples on which a EPA Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

VIII. Overall Assessment of Data

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

IX. Field Duplicates

No field duplicates were identified in this SDG.

BRC Tronox Parcel F
Gasoline Range Organics - Data Qualification Summary - SDG F8F110177

No Sample Data Qualified in this SDG

BRC Tronox Parcel F
Gasoline Range Organics - Laboratory Blank Data Qualification Summary - SDG
F8F110177

No Sample Data Qualified in this SDG

BRC Tronox Parcel F
Gasoline Range Organics - Field Blank Data Qualification Summary - SDG
F8F110177

No Sample Data Qualified in this SDG

LDC #: 19091A7	VALIDATION COMPLETENESS WORKSHEET	
SDG #: <u>F8F110177</u>	Level III/IV	
Laboratory: Test America	-	2
METHOD: CC Cooding Bongs	Organics (EDA CIMO46 Mothod 2015P)	

Date: 7/19/08
Page: of/
Reviewer:
2nd Reviewer:
у.

METHOD: GC Gasoline Range Organics (EPA SW846 Method 8015B)

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

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 6/10/09
lla.	Initial calibration	A	
IIb.	Calibration verification/ICV	A	IW 515
III.	Blanks	Α	,
IVa.	Surrogate recovery	A	
IVb.	Matrix spike/Matrix spike duplicates	A	TSB-FJ-06-02-10 LCS 10
IVc.	Laboratory control samples	SW	LCS 10
V.	Target compound identification	Δ	Not reviewed for Level III validation.
VI.	Compound Quantitation and CRQLs	Δ	Not reviewed for Level III validation.
VII.	System Performance	А	Not reviewed for Level III validation.
VIII.	Overall assessment of data	A	
IX.	Field duplicates	<i>N</i>	
X.	Field blanks	N	

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

Valida	ated Samples:	** Indicates s	ample underwent Level IV valid	lation	SOIL		
1	TSB-FR-02-02-20'	11	F8 F 130000 0- 267	21	8165267	31	
2	TSB-FR-02-02-30'**	12		22		32	
3	TSB-FJ-02-02-10'**	13		23		33	
4	TSB-FJ-02-02-20'**	14		24		34	
5	TSB-FJ-02-02-30'	15		25		35	
6		16		26		36	
7		17		27		37	
8		18		28		38	
9		19		29		39	
10		20		30		40	

Notes:		

LDC #:_	19	091	A	7
SDG #:_	yau	co	nes	
				_

VALIDATION FINDINGS CHECKLIST

Method:	GC	HPLC

Yes	No	NA	Findings/Comments
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1_	<u> </u>		
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	MATERIAL PROPERTY OF THE PROPE		
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	Yes	Yes No Yes No NA I I I I I I I I I I I I I I I I I I I	

LDC #: 1969/47 SDG #: Lu conin

VALIDATION FINDINGS CHECKLIST

Page: 2 of 2
Reviewer: 7
2nd Reviewer: 4

		,	, 	
Validation Area	Yes	No	NA	Findings/Comments
IX. Regional XX uality: Assurance and Quality Control				
Were performance evaluation (PE) samples performed?			/	
Were the performance evaluation (PE) samples within the acceptance limits?				
X Eldings Constant of Springer and Service Ser				
Were the retention times of reported detects within the RT windows?			-	
34 Sampoint quantitation (FEO) 5 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1			M.	
Were compound quantitation and CRQLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?				
System performance was found to be acceptable.		-		
di arellareasematarane kulong di arellareasemataran				
Overall assessment of data was found to be acceptable.	11	_		
AVATAKI Upicaus Vieta in the comment of the comment				
Field duplicate pairs were identified in this SDG.			- 1	
Farget compounds were detected in the field duplicates.				
V-Fauldant				
ield blanks were identified in this SDG.		7	- T	
arget compounds were detected in the field blanks.			1	

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VALIDATION FINDINGS WORKSHEET Laboratory Control Samples (LCS)

Page: Reviewer: 2nd Reviewer:

> GC HPLC метноб:

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

| Note a laboratory control samples (LCS) and laboratory control sample duplicate (LCSD) analyzed for each matrix in this SDG?
| Note the LCS percent recoveries (%R) and relative percent differences (RPD) within the QC limits?

Level IV/D Only
Y. M. N/A. Was an LCS analyzed every 20 samples for each matrix or whenever a sample extraction was performed?

, 18																								
Associated Samples	A/1 + B/K																							
RPD (Limits)	()	()	()	()	()	()	()	()	· (()	()	()	()	()	()]()	()	()	()	()	()	()	()	,
LCSD %R (Limits)	()	()	()	()	()	()	()	(· ·	()	()	()	()	()	()		()	()	()	()	()	()	()	
LCS %R (Limits)	120 (73-113	()	()	()	()	()	()	, ,		()	()	()	()	()	()	1 ()	()	()	()	()	()	()	()	
Compound	G180																							
TCS/FCSD ID	8165267																							

19091 AJ SDG#: LDC #:

Initial Calibration Calculation Verification VALIDATION FINDINGS WORKSHEET

Page: 2nd Reviewer._ Reviewer.

> FPLC METHOD: GC_

The calibration Factor (CF), average CF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following

CF = A/C average CF \approx sum of the CF/number of standards %RSD \approx 100 $^{\circ}$ (S/X)

A * Area of compound,
C * Concentration of compound,
S * Standard deviation of the CF
X * Mean of the CF

			Reported	Secelaritates				
				Serial Market	I	Reported Recalculated	Reported	Recalculated
# Standard ID	Date	Compound	CF (/ -/)	5	Average CF	Average CF		
757	5/27/08		Dia C	17:0 std)	(initial)	(initial)	%RSD	%RSD
		Oxy	11025649 1	1025649	17025649 17035649 11 97732 1718732	7/6/27	J. G. n	
1					27128	11001126	27:1	3.275
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7								
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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

1909/47 LDC #: SDG#

Continuing Calibration Results Verification VALIDATION FINDINGS WORKSHEET

Page: Reviewer._ 2nd Reviewer:

> HPLC METHOD: GC_

The percent difference (%D) of the initial calibration average Calibration Factors (CF) and the continuing calibration CF were recalculated for the compounds identified below

% Difference = 100 * (ave. CF - CF)/ave, CF CF = A/C

Where: ave. CF = initial calibration average CF

CF ≈ continuing calibration CF
A ≈ Area of compound
C ≈ Concentration of compound

					Reported	Recalculated	Reported	Received
*	Standard ID	Calibration Date	Compound	Average CF(Ical)/ CCV Conc.	CF/Conc.	CF/Conc.	Q%	g%
-	LCA L377B 6/13/08	80/51/9	ar O	0.7	10195	76/07	4.()	2.0
7	40/81/2 C/13/08	80/81/9	aRO	0-1	0.9976	1.66.0	2.0	0.2
1								
က								
							Ė	
4		-						
Γ		•						
		-						

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

.DC #: 1909/ 47 SDG #: per comp GC_HPLC

METHOD:

VALIDATION FINDINGS WORKSHEE I Surrogate Results Verification

Reviewer:

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: 柱2

Percent Difference O Recalculated Percent Recovery ار ال Percent Recovery Reported 8 3 5.00 Surrogate Found Surrogate Spiked 0.00 Speci lied Column/Detector Surrogate T F 7

ᇷ	ı
	ı
힐	ı
티	I
Ö	l

Surrogate Percent Spiked Found Recovery Reported	Found
	Spiked
	Column/Detector

mole ID

Surrogate Surrogate Percent Percent Percent Spiked Found Recovery Recovery Difference	Reported		
Column/Detector			
Surrogate			

/ サ/606/ Tann #: 1 404/4/ SDG#:

Matrix Spike/Matrix Spike Duplicates Results Verification VALIDATION FINDINGS WORKSHEET

Page: Lof Z 2nd Reviewer: Reviewer:

METHOD:

HPLC

אוב ו חסט:

The percent recoveries (%R) and relative percent differences (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using

the following calculation: %Recovery = 100 * (SSC - SC)/SA

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

Where

TSB-FJ-06-02-10

MS/MSD samples:

SSC = Splked sample concentration SA = Spike added MS = Matrix spike

SC = Sample concentration

MSD = Matrix spike duplicate

Recalc,

RPD

X

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% MS/MSD Reported Matrix Spike Duplicate Recalc. 72 Percent Recovery 26 Reported Recalc. 2 Percent Recovery Matrix spike Reported 36 0.978 MSD Spike Sample Concentration 1.02 ¥3 Sample Conc, 11 Em Z 1.06 MSD Added, Spike ė o MS 2,4,6-Trinitrotoluene (8330) (RSK-175) (8021B) (8015) (8015) (8151) (8151) (8310) (8310) (8330) Compound Naphthalene Anthracene Gasoline Benzene Methane Dinoseb Diesel 2,4-D HMX

4160	2000
190	77
*	#
LDC LDC	SDG

GG HPLC

METHOD:

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

Reviewer:_

Page: of sviewer:

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

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

SSC = Spiked concentration SA = Spike added Where

SC ≈ Sample concentration

RPD =(((ssclcs - ssclcsD) * 2) / (ssclcs + ssclcsD))*100

LCS = Laboratory Control Sample percent recovery

LCSD = Laboratory Control Sample duplicate percent recovery

アン 8165267-LCS/LCSD samples:

	Spike	e .	Sample	Spike S	ample	rcs	S	רכצם	٥	rcs√rcsD	csp
Compound	(Ma	The I	Sone -	Concentration (1973)	tration	Percent Recovery	Recovery	Percent Recovery	ecovery	RPD	0
	o SOT	GSD1) 	C SOT	O CCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Gasoline (8015)	7.0	0.7		J. 20	0.786	8	120	66	66	6/	61
Diesel (8015)											
Benzene (8021B)			·								
Methane (RSK-175)											
2,4-D (8151)											
Dinoseb (8151)											
Naphthalene (8310)											
Anthracene (8310)											
HMX (8330)											
2,4,6-Trinitrotoluene (8330)											

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

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VALIDATION FINDINGS WORKSHEET Sample Calculation Verification

Page: Lof Reviewer:

METHOD: __GC__ HPLC

	>	>
(,	N/A	Y/N
`	Z	Z
	╮	J

Vere all recalculated results for detected target compounds within 10% of the reported results? Vere all reported results recalculated and verified for all level IV samples?

Example:	Sample ID.
(A)(Fv)(Df) (RF)(Vs or Ws)(%S/100)	
Soncentration≖ (A 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4
Ö	9

A≈ Area or height of the compound to be measured Fv≈ Final Volume of extract Df≈ Dilution Factor

Compound Name_

Df≈ Dilution Factor
RF≈ Average response factor of the compound
In the initial calibration

Concentration =_

Vs= Initial volume of the sample Ws= Initial weight of the sample %S= Percent Solid

2

_					
#⊧	Sample ID	Compound	Reported Concentrations	Recalculated Results Concentrations	Qualifications
		-			
L					
Comments:	ents:				

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

BRC Tronox Parcel F

Collection Date:

June 10, 2008

LDC Report Date:

July 22, 2008

Matrix:

Soil

Parameters:

Diesel Range Organics

Validation Level:

EPA Level III & IV

Laboratory:

TestAmerica, Inc.

Sample Delivery Group (SDG): F8F110177

Sample Identification

TSB-FR-02-02-20'

TSB-FR-02-02-30'**

TSB-FJ-02-02-10'**

TSB-FJ-02-02-20'**

TSB-FJ-02-02-30'

^{**}Indicates sample underwent EPA Level IV review

Introduction

This data review covers 5 soil samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8015B for Diesel Range Organics.

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

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

Blank results are summarized in Section III.

Field duplicates are summarized in Section IX.

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

The following are definitions of the data qualifiers:

- 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.
- 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.
- A Indicates the finding is based upon technical validation criteria.
- P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

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

II. Calibration

a. Initial Calibration

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

The percent relative standard deviations (%RSD) of calibration factors for compounds were less than 20.0%.

b. Calibration Verification

Calibration verification was performed at required frequencies. The percent differences (%D) of amounts in continuing standard mixtures were within the 15.0% QC limits.

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

III. Blanks

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

No field duplicates were identified in this SDG.

IV. Accuracy and Precision Data

a. Surrogate Recovery

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

b. Matrix Spike/Matrix Spike Duplicates

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.

c. Laboratory Control Samples

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

V. Target Compound Identification

All target compound identifications were within validation criteria for samples on which a EPA Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

VI. Compound Quantitation and CRQLs

All compound quantitation and CRQLs were within validation criteria for samples on which a EPA Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

VII. System Performance

The system performance was acceptable for samples on which a EPA Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

VIII. Overall Assessment of Data

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

IX. Field Duplicates

No field duplicates were identified in this SDG.

BRC Tronox Parcel F
Diesel Range Organics - Data Qualification Summary - SDG F8F110177

No Sample Data Qualified in this SDG

BRC Tronox Parcel F
Diesel Range Organics - Laboratory Blank Data Qualification Summary - SDG
F8F110177

No Sample Data Qualified in this SDG

BRC Tronox Parcel F
Diesel Range Organics - Field Blank Data Qualification Summary - SDG
F8F110177

No Sample Data Qualified in this SDG

SDG:	#: 19091A8 #: F8F110177 ratory: Test America	VA -	LIDATIO			TENI 	ESS WORKSI	HEET	Date: 7/19 Page: /of / Reviewer: 2nd Reviewer:
	IOD: GC Diesel Range (– Orgar	nics (EPA S\	N846 Metl	hod	8015E	3)		2nd Reviewer:
	amples listed below were tion findings worksheets.		ewed for eac	ch of the fo	ollow	ving va	alidation areas. V	alidation fin	dings are noted in attached
	Validation	Area						Comments	
1.	Technical holding times			٨	Sam	npling d	1/10		
lla.	Initial calibration			Ā	Jun	ipiirig d	uico.	<u> </u>	
IIb.	Calibration verification/ICV			Ā		1 CV	= 15		
111.	Blanks			A					
IVa.	Surrogate recovery			A					
IVb.	Matrix spike/Matrix spike du	plicate	ıs	A	75	A -	F1-02-02	-30'+	TSB-CJ-09-0'
IVc.	Laboratory control samples	<u> </u>	<u> </u>	A		LCS			
V.	Target compound identificat	ion		A	Not	review	ed for Level III valida	tion	
VI.	Compound Quantitation and		Ls	A			ed for Level III valida		
VII.	System Performance			Α			ed for Level III valida		
VIII.	Overall assessment of data			A					
IX.	Field duplicates			N					,
Χ.	Field blanks			N				, , , , , , , , , , , , , , , , , , , 	
Note: Validat	A = Acceptable N = Not provided/applicable SW = See worksheet ed Samples: ** Indic		= Rinsate	o compounds eld blank ent Level IV		TE	D = Duplicat 3 = Trip blank EB = Equipm		
1/	TSB-FR-02-02-20'	11 <i>f</i>	8 F 1300	00-29	_	21	8165291	31	
2/	TSB-FR-02-02-30'**	12	F8F180			22	8170312	32	
3/	TSB-FR-02-02-20' TSB-FJ-02-02-30'** TSB-FJ-02-02-10'** TSB-FJ-02-02-20'**	13				23		33	
42	TSB-FJ-02-02-20'**	14				24		34	
52	TSB-FJ-02-02-30'	15				25		35	
6		16				26		36	
6 7		17				27		37	
٥		18				28		38	

Notes:		

LDC #:_	190	91 48
SDG #:_	you	coner

VALIDATION FINDINGS CHECKLIST

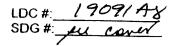
Page: /of 1
Reviewer: //
2nd Reviewer: ______

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GC

HPLC

Method: GC HPLC				
Validation Area	Yes	No	NA	Findings/Comments
Testinical Rolding time 3.57				
All technical holding times were met.				
Cooler temperature criteria was met.				2
Il de la companya de		削費		
Did the laboratory perform a 5 point calibration prior to sample analysis?				
Was a linear fit used for evaluation? If yes, were all percent relative standard deviations (%RSD) < 20%?				
Was a curve fit used for evaluation? If Yes, what was the acceptance criteria used?	١,			
Did the initial calibration meet the curve fit acceptance criteria?				
Were the RT windows properly established?	<u> //</u>			
MA Contaction of Calminion (Calminion)			V	
What type of continuing calibration calculation was performed?%D or%R	/			
Was a continuing calibration analyzed daily?				
Were all percent differences (%D) < 15%.0 or percent recoveries 85-115%?				
Were all the retention times within the acceptance windows?				
Vellages 1795				
Was a method blank associated with every sample in this SDG?	4			
Was a method blank analyzed for each matrix and concentration?			\perp	
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.			-	
vi. Simogaie spikes				
Were all surrogate %R within the QC limits?				
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?	N		1	
If any %R was less than 10 percent, was a reanalysis performed to confirm %R?	1		1	
Will Malor spike Matrix spike duplicates (## 1884)		猫		
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?	1	7	1	
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?	7			
Ville taboratory control samples and the samples are the same same same same same same same sam				
Was an LCS analyzed for this SDG?				
Was an LCS analyzed per extraction batch?			\perp	
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	1			



VALIDATION FINDINGS CHECKLIST

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

	, _	T		
Validation Area	Yes	No	NA	Findings/Comments
(X. Regional (Auality Assurance and Quality Control	Mag			
Were performance evaluation (PE) samples performed?			/	
Were the performance evaluation (PE) samples within the acceptance limits?				
At language and accommendate of the comment of the				
Were the retention times of reported detects within the RT windows?			-	
A Casardomolyusamustion/etrors				
Were compound quantitation and CRQLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?		_		
System performance was found to be acceptable.				
All consultations and the state of the state				
Overall assessment of data was found to be acceptable.	-	_		
Field duplicate pairs were identified in this SDG.			-	
Target compounds were detected in the field duplicates.			7	
We exposure the second				
Field blanks were identified in this SDG.	T	刁	- 1	· · · · · · · · · · · · · · · · · · ·
arget compounds were detected in the field blanks.			7	

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30 31 AS SDG#: LDC #:

Initial Calibration Calculation Verification VALIDATION FINDINGS WORKSHEET

2nd Reviewer: Page: Reviewer.

> HPLC METHOD: GC_

The calibration Factor (CF), average CF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following

CF = A/C average CF = sum of the CF/number of standards %RSD = $100 * (S/\chi)$

A = Area of compound,
C = Concentration of compound,
S = Standard deviation of the CF
X = Mean of the CFs

	Recalcillated	%RSD	3.457										
	Keported	%RSD	3.476	À									
	Ħ	Average CF (initial)	16023										=
Reported	O social	(Initial)	16023										
Recalculated	3	(pg) 0a/)	16234										
Reported	ភ	(100@td)	16236										
		Compound	780										
	Calibration	5116 hv	90/11/										
	Standard ID	1831	l	•				-					
	*	-	1		7	1	က		Γ	-	4	T	_

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

INICI O ISB

84/206 SDG#: LDC #:

Continuing Calibration Results Verification VALIDATION FINDINGS WORKSHEET

Page: 2nd Reviewer:_ Reviewer.

> HPLC METHOD: GC_

The percent difference (%D) of the initial calibration average Calibration Factors (CF) and the continuing calibration CF were recalculated for the compounds identified below

% Difference = 100 * (ave. CF - CF)/ave, CF CF = A/C

Where: ave. CF ≈ initial calibration average CF CF ≈ continuing calibration CF

A ≈ Area of compound C ≈ Concentration of compound

					Reported	Receivilated	Reported	b otalisala
*	Standard ID	Calibration Date	Compound	Average CF(Ical)/ CCV Conc.	CF/Conc.	CF/Conc.	Q%	a %
-	1 Feat1525	80/11/9	D/20c/	1000.00	996.53/2	6	0.3	0.3
77	EC41.549	c/18/08	7	1	1039-4417	103.9.447	3.9	3.9
1								
1								
m	80/61/9 5257 40/6/08	80/61/9	7	000/	919,8723	818-8123	2.C	2.0
1								
1								
4								
1								

Comments: Refer to Continuing Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10,0% of the

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Ö	SDG

VALIDATION FINDINGS WORKSHEE! Surrogate Results Verification

METHOD: ___GC__ HPLC

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

% Recovery: SF/SS * 100

Where: SF = Surrogate Found SS = Surrogate Spiked

Sample ID:

4

Surrogate	Column/Detector	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
				Reported	Recalculated	
O- Terpheny	not yeufied	'۲	20.9889	h8	48	Q
	1 1					

Sample ID:

Surrogate	Column/Detector	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
				Reported	Recalculated	

sample ID:	•			-		
Surrogate	Column/Detector	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
				Reported	Recalculated	

LUU#: 1707/178 SDG#:

VALIDATION FINDINGS WORKSHEET

Matrix Spike/Matrix Spike Duplicates Results Verification

Page: Lof Z Reviewer: 2nd Reviewer:__

> HPLC METHOD:

The percent recoveries (%R) and relative percent differences (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using

RPD =(((SSCMS - SSCMSD) * 2) / (SSCMS + SSCMSD))*100 Where the following calculation:
%Recovery = 100 * (SSC - SC)/SA

SSC = Spiked sample concentration SA = Spike added MS = Matrix spike

SC = Sample concentration

MSD = Matrix spike duplicate

130 - FJ-02-02 75B MS/MSD samples:

	Spi	¥.	Samula	0							
	Added	pb	Conc,	Conce	Spine Sample Concentration	Matri	Matrix spike	Matrix Spike Duplicate	e Dupilcate	MS/MSD	ISD
DIROCAL STATE OF THE STATE OF T	leu	Ž	84/ Bu)	hu)	les/	Percent	Percent Recovery	Percent Recovery	Secovery	6	
1000年の日本の日本の日本の日本の日本の日本の日本の日本の日本の日本の日本の日本の日本の	MS	MSD		WS	MSD	Reported	Receir	1000			
Gasoline (8015)								Dellodev	Kecaic.	Reported	Recalc.
Diesel (8015)	2:18	3%,6		74.6	7 7 7	K	1,0	0			
Benzene (80218)					0:07	ő	Š	87	80	5.2	5.2
Methane (RSK-175)											
2,4-D (8151)											
Dinoseb (8151)											
Naphthalene (8310)											
Anthracene (8310)											
HMX (8330)											
2,4,6-Trinitrotoluene (8330)											
Comments: Refer to Matrix Spike/Matrix Spike Duplicates findings worksheet for list of qualifications and associated complements.	oike/Matrix S	pike Dupli	cates finding	s worksheet f	or list of aualif	Cations and a					
of the recalculated results.						מחמומשה	Saucialdo Salli	pies when rep	orted results	do not agree	within 10.0%

8416061	en coner
#	#
200	SDG

VALIDATION FINDINGS WORKSHEET

Laboratory Control Sample/Laboratory Control Sample Duplicates Results Verification

Reviewer: 2nd Reviewed

METHOD: GC_HPLC

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

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

SSC # Spiked concentration SA # Spike added Where

SC = Sample concentration

RPD *(((ssclcs - ssclcsd) * 2) / (ssclcs + ssclcsd))*100

LCS = Laboratory Control Sample percent recovery

LCSD = Laboratory Control Sample duplicate percent recovery

%165a 91-LCS/LCSD samples:

	Spike	ke	Sample	Spike Sample	ample	SOT	Š	rcsp	Q	rcs/rcsd	csp
Compound	gra)	Kg/	1 mg /kg		1/45	Percent Recovery	Recovery	Percent Recovery	covery	RPD	Q
	LCS	LCSD		SOT	CSD C	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Gasoline (8015)											
Diesel (8015)	83.3	NA	\mathcal{O}	68.9	47	83	83	NA I			
Benzene (8021B)											
Methane (RSK-175)											
2,4-D (8151)											
Dinoseb (8151)											
Naphthalene (8310)											
Anthracene (8310)											
HMX (8330)											
2,4,6-Trinitrotoluene (8330)											
					•						

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

LDC # 190 9/ 43 SDG # 14 Const

VALIDATION FINDINGS WORKSHEET Sample Calculation Verification

Page: Lof Reviewer:

,	\	
		\

GC HPLC

METHOD:

X/A	N/A	
z	N	
\sim	S	

Were all recalculated results for detected target compounds within 10% of the reported results? Were all reported results recalculated and verified for all level IV samples?

	,	•
	(A)(Fv)(Df)	(RF)(Vs or Ws)(%S/100)
)	Concentration≈	

Example:
Sample ID.

e ID. Compound Name

Concentration =_

A= Area or height of the compound to be measured
Fv= Final Volume of extract
Df≈ Dilution Factor
RF≈ Average response factor of the compound
In the initial calibration

Vs≈ Initial volume of the sample Ws≈ Initial weight of the sample %S≈ Percent Solid

Z Z

**	Sample ID	Compound	Reported Concentrations	Recalculated Results Concentrations	Qualifications
			**		
		-	-		
	÷				
Comments:	ents:				

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

BRC Tronox Parcel F

Collection Date:

June 10, 2008

LDC Report Date:

July 22, 2008

Matrix:

Soil

Parameters:

Polynuclear Aromatic Hydrocarbons

Validation Level:

EPA Level III & IV

Laboratory:

TestAmerica, Inc.

Sample Delivery Group (SDG): F8F110177

Sample Identification

TSB-FR-02-02-20'

TSB-FR-02-02-30'**

TSB-FJ-02-02-10'**

TSB-FJ-02-02-20'**

TSB-FJ-02-02-30'

^{**}Indicates sample underwent EPA Level IV review

Introduction

This data review covers 5 soil samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8310 for Polynuclear Aromatic Hydrocarbons.

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

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

Blank results are summarized in Section III.

Field duplicates are summarized in Section IX.

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

The following are definitions of the data qualifiers:

- 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.
- A Indicates the finding is based upon technical validation criteria.
- P Indicates the finding is related to a protocol/contractual deviation.
- None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

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

II. Calibration

a. Initial Calibration

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

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

Retention time windows were evaluated and considered technically acceptable for samples on which a EPA Level IV review was performed. Raw data were not evaluated for the samples on which a Level III review was performed.

b. Calibration Verification

Calibration verification was performed at required frequencies.

The percent differences (%D) of calibration factors in continuing standard mixtures were within the 15.0% QC limits with the following exceptions:

Date	Detector	Compound	%D	Associated Samples	Flag	A or P
6/16/08	Not specified	Benzo(g,h,i)perylene	15.2	TSB-FJ-02-02-20'** TSB-FJ-02-02-30'	J+ (all detects)	А

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

Date	Detector	Compound	%D	Associated Samples	Flag	A or P
6/4/08	Not specified	Benzo(k)fluoranthene	16.69	All samples in SDG F8F110177	J+ (all detects)	А

Retention time windows were evaluated and considered technically acceptable for samples on which a EPA Level IV review was performed. Raw data were not evaluated for the samples on which a Level III review was performed.

III. Blanks

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

No field blanks were identified in this SDG.

IV. Accuracy and Precision Data

a. Surrogate Recovery

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

b. Matrix Spike/Matrix Spike Duplicates

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

c. Laboratory Control Samples

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

V. Target Compound Identification

All target compound identifications were within validation criteria for samples on which a EPA Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

VI. Compound Quantitation and CRQLs

All compound quantitation and CRQLs were within validation criteria for samples on which a EPA Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

VII. System Performance

The system performance was acceptable for samples on which a EPA Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

VIII. Overall Assessment of Data

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

IX. Field Duplicates

No field duplicates were identified in this SDG.

BRC Tronox Parcel F Polynuclear Aromatic Hydrocarbons - Data Qualification Summary - SDG F8F110177

SDG	Sample	Compound	Flag	A or P	Reason
F8F110177	TSB-FJ-02-02-20'** TSB-FJ-02-02-30'	Benzo(g,h,i)perylene	J+ (all detects)	А	Continuing calibration (%D)
F8F110177	TSB-FR-02-02-20' TSB-FR-02-02-30'** TSB-FJ-02-02-10'** TSB-FJ-02-02-20'** TSB-FJ-02-02-30'	Benzo(k)fluoranthene	J+ (all detects)	A	Continuing calibration (ICV %D)

BRC Tronox Parcel F
Polynuclear Aromatic Hydrocarbons - Laboratory Blank Data Qualification Summary
- SDG F8F110177

No Sample Data Qualified in this SDG

BRC Tronox Parcel F Polynuclear Aromatic Hydrocarbons - Field Blank Data Qualification Summary -SDG F8F110177

No Sample Data Qualified in this SDG

LDC #: 190	091A9	VALIDATION COMPLETENESS WORKS	SHEET Date:	7/	K
SDG #: F8	F110177	Level III/IV	Page:_	/ _{of_}	/
Laboratory: T	est America		Reviewer:	1	7
			2nd Reviewer:	<u> '</u> 4	_
METHOD: G	C Polynuclear Aron	natic Hydrocarbons (EPA SW 846 Method 8310)		/	
The samples	listed below were r	eviewed for each of the following validation areas.	Validation findings are noted in a	attach	e

validation findings worksheets.

	Validation Area		Comments
l.	Technical holding times	A	Sampling dates: 6/10/0 ¥
lla.	Initial calibration	A	
IIb.	Calibration verification/ICV	SW	1W = 15
III.	Blanks	Δ	
IVa.	Surrogate recovery	A	
IVb.	Matrix spike/Matrix spike duplicates	A	75B-GJ-08-1D
IVc.	Laboratory control samples	A	LCS
V.	Target compound identification	Δ	Not reviewed for Level III validation.
VI.	Compound Quantitation and CRQLs	A	Not reviewed for Level III validation.
VII.	System Performance	A	Not reviewed for Level III validation.
VIII.	Overall assessment of data	A	
IX.	Field duplicates	N	
X.	Field blanks	N	

		١.		
	•	_	N	

ND = No compounds detected R = Rinsate

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

FB = Field blank

D = Duplicate TB = Trip blank EB = Equipment blank

Validated Samples: ** Indicates sample underwent Level IV validation

	Soll						·
1	TSB-FR-02-02-20'	11	F8 F160000-158	21	8168158	31	
2	TSB-FR-02-02-30'**	12		22		32	
3	TSB-FJ-02-02-10'**	13		23		33	
4	TSB-FJ-02-02-20'**	14		24	and the state of t	34	
5	TSB-FJ-02-02-30'	15		25		35	
6		16		26	·	36	
7		17		27		37	
8		18		28		38	
9		19		29		39	
10		20		30		40	

Notes:		

LDC #: 1909/A9 SDG #: Le coues

VALIDATION FINDINGS CHECKLIST

Page: __of____ Reviewer: ______ 2nd Reviewer: ______

GC **HPLC** Method: Findings/Comments Yes No Validation Area l. Technical holdingstimes All technical holding times were met Cooler temperature criteria was met. Il Timual calibration Did the laboratory perform a 5 point calibration prior to sample analysis? Was a linear fit used for evaluation? If yes, were all percent relative standard deviations (%RSD) ≤ 20%? Was a curve fit used for evaluation? If Yes, what was the acceptance criteria used? Did the initial calibration meet the curve fit acceptance criteria? Were the RT windows properly established? IV: Continuing calibration What type of continuing calibration calculation was performed? %R Was a continuing calibration analyzed daily? Were all percent differences (%D) < 15%.0 or percent recoveries 85-115%? Were all the retention times within the acceptance windows? 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 Were all surrogate %R within the QC limits? If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R? If any %R was less than 10 percent, was a reanalysis performed to confirm %R? 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? Was an LCS analyzed per extraction batch?

LDC#: 1909/A9 SDG#: Lu coues

VALIDATION FINDINGS CHECKLIST

Page: 2ef 2 Reviewer: 77 2nd Reviewer: 9

Validation Area	Yes	No	NA	Findings/Comments
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?				
IX: Regional Citality Asstrance and Quality Control				
Were performance evaluation (PE) samples performed?				
Were the performance evaluation (PE) samples within the acceptance limits?				
X Target compound identification				
Were the retention times of reported detects within the RT windows?			ر ا	
XI-Compound quantitation/CROLs			T T	16 4 463
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 12				
Overall assessment of data was found to be acceptable.				
XIV. Field duplicates				Contract to the contract of th
Were field duplicate pairs identified in this SDG?				
Were target compounds idetected in the field duplicates?			_	
XV:Fjeld blanks				
Were field blanks identified in this SDG?		/	F	
Were target compounds detected in the field blanks?				

VALIDATION FINDINGS WORKSHEET

METHOD: GC HPLC

8310	8330	8151	8141	8141(con't)	8021B
A. Acenaphthene	A. HMX	A. 2,4-D	A. Dichlorvos	V. Fensulfothion	V. Benzene
B. Acenaphthylene	B. RDX	B. 2,4-DB	B. Mevinphos	W. Bolstar	CC. Toluene
C. Anthracene	C. 1,3,6-Trinitrobenzene	C. 2,4,5-T	C. Demeton-O	X. EPN	EE. Ethyl Benzene
D. Benzo(a)anthracene	D. 1,3-Dinitrobenzene	D. 2,4,5-TP	D. Demeton-S	Y. Azinphos-methyl	SSS. O-Xylene
E. Benzo(a)pyrene	E. Tetryl	E. Dinoseb	E. Ethoprop	Z. Coumaphos	RRR. MP-Xylene
F. Benzo(b)fluoranthene	F. Nitrobenzene	F. Dichlorprop	F. Naled	AA. Parathion	GG. Total Xylene
G. Benzo(g,h,i)perylene	G. 2.4.6-Trinitrotoluene	G. Dicamba	G. Sulfotep	BB. Trichloronate	
H. Benzo(k)fluoranthene	H. 4-Amino-2,6-dinitrotoluene	H. Dalapon	H. Phorate	CC. Trichlorinate	
I. Chrysene	1. 2-Amino-4,6-dinitrotoluene	I. MCPP	1. Dimethoate	DD. Trifluralin	
J. Dibenz(a,h)anthracene	J. 2,4-Dinitrotolune	J. MCPA	J. Diazinon	EE. Def	
K. Fluoranthene	K. 2,6-Dinitrotoluene	K. Pentachlorophenol	K. Disulfoton	FF. Prowl	
L. Fluorene	L. 2-Nitrotoluene	L 2,4,5-TP (silvex)	L. Parathion-methyl	GG, Ethion	
M. Indeno(1,2,3-cd)pyrene	M. 3-Nitrotoluene	M. Silvex	M. Ronnel		
N. Naphthalene	N. 4-Nitrotoluene		N. Malathion		
O. Phenanthrene	Ö		O. Chlorpyrifos		
P. Pyrene	α.́		P. Fenthion		
Ö	G		Q. Parathion-ethyl		
αž			R. Trichlornate		
S;			S. Merphos		
			T. Stirofos		
			U. Tokuthion		

Notes:

LSTNEW.WPD

14081 47 LDC #:

SDG#:

Ge/ HPLC

METHOD:

VALIDATION FINDINGS WORKSHEET Continuing Calibration

Page: / Reviewer:

2nd Reviewer:

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

Mer IV Only

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

Qualifications	11/Adet				,	1º/A dut													
Associated Samples	A11+ B1K					4, 5													
RT (limit)	()	()	()] (()) (()	(()	()	()	()	()	()))	
%D / RPD (Limit ≤ 15.0)	9.91					7.51													
Compound	12					6													
Detector/ Column	not spuili) (1													
Standard ID	Q16V768					QCA1873													
Date	80/h/9				-	00/9//9	, ,												
#	+					4													

SDG#: LDC#:

Initial Calibration Calculation Verification VALIDATION FINDINGS WORKSHEET

Page: Reviewer: 2nd Reviewer:

> HPLC METHOD: GC

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

average CF = sum of the CF/number of standards %RSD = 100 $^{\circ}$ (S/X) CF = A/C

A = Area of compound,
C = Concentration of compound,
S = Standard deviation of the CF
X = Mean of the CFs

				Reported	Recalculated	Reported	Recalculated	Reported	Recalculated
##	Standard ID	Calibration Date	Compound	5/ CF (0.5 std)	5/ CF (0.5' std)	Average CF (initial)	Average CF (initial)	"RSD	%RSD
	7421	80/4/2	Maphthalene		24206	23507	2387		ķ
Т			Anthracene	487318	815734 815734	012908	201908	1-8-1	1.82
╢									
71									
\neg									
ᅦ				-					
T									
Т					,				
┰╢									
4									
Т									

Comments: Referto 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 #: SDG#

Continuing Calibration Results Verification VALIDATION FINDINGS WORKSHEET

Reviewer: 2nd Reviewer:_ Page:

> HPLC METHOD: GC_

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

% Difference = 100 * (ave. CF - CF)/ave. CF CF = A/C

Where: ave. CF = initial calibration average CF CF = continuing calibration CF A = Area of compound C = Concentration of compound

		<u> </u>	Π		<u> </u>		<u> </u>	I			Ī	T
Recalculated	Q %	7.7	6.9		8:0	1.9						
Reported	%D	7.2	6.9		0.8	6./						
Recalculated	CF/Conc. CCV	2.3624	0.534Y		8-3928	0.5307						
Reported	CF/Conc. CCV	5.3624	4455.0		8.3978	0.5307						ļ
	Average CF(Ical)/ CCV Conc.	0:5	0.00			P						
	Compound	Naphthalens	Anthracene			→						
	Calibration Date	30/91/2			116/08	•						
	Standard ID	80/91/2 7987478			QCAL873 6/16/08							
	#:			٦	71			3	-1	4		_

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

202147	recon
1. # DQ1	SDG#:

VALIDATION FINDINGS WORKSHEET Surrogate Results Verification

Page: LofZ Reviewer:____

METHOD: G& HPLC

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

4 % Recovery: SF/SS * 100 Ħ Sample ID:

Where: SF = Surrogate Found SS = Surrogate Spiked

Surrogate	Column/Detector	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
				Reported	Recalculated	
o- Terpheny	instancing	22	8116:61	72	72	0
0	1 1					
	·					

Sample ID:					-	
Surrogate	Column/Detector	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	
				Reported	Recalculated	

sample ID:						
Surrogate	Column/Detector	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
				Reported	Recalculated	

LDC #: 1904/A9 SDG #:

Matrix Spike/Matrix Spike Duplicates Results Verification VALIDATION FINDINGS WORKSHEET

2nd Reviewer: 2 Page: Reviewer:_

METHOD:

HPLC

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

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

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

1080

TSB-6J

MS/MSD samples:

SC = Sample concentration

SSC = Spiked sample concentration SA = Spike added MS = Matrix spike

MSD = Matrix spike duplicate

	σ ¿	Spike	Sample	Spike	Spike Sample	Matri	Matrix spike	Matrix Spike Duplicate	Duplicate	MS/MSD	SD
Compound	657	alky	Sono)	Concer Concer	Concentration (カルケ)	Percent	Percent Recovery	Percent Recovery	ACOVATV	naa	
	MS	MSD	0	MS	MSD	Reported	Recalc.	Reported	Recalc	Reported	Decolo
Gasoline (8015)											2000
Diesel (8015)											
Benzene (8021B)											
Methane (RSK-175)											
2,4-D (8151)											
Dinoseb (8151)						ŕ					
Naphthalene (8310)	867	709		soc	515	77	72	73	73	r. C	2.0
Anthracene (8310)	8-69	70.7	٠.	6.43	767	76	76	22	70	۲.۷	6.5
HMX (8330)				·						2	
2,4,6-Trinitrotoluene (8330)											
		·									
					·						
	·										
Comments: Refer to Matrix Spike/Matrix Spike Duplicates findings worksheet for list of qualifications and associated samples when reported results do not agree with	Spike/Mat	rix Spike D	uplicates find	ings workshe	et for list of a	ualifications	and associate	d samples wh	en reported	results do no	agree with

10.0% of the recalculated results.

LDC # 1902/A9

SDG#:

VALIDATION FINDINGS WORKSHEET

حدد دصره Laboratory Control Sample/Laboratory Control Sample Duplicates Results Verification

Page: Reviewer:_

> AC_HPLC METHOD:

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

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

Where

SC = Sample concentration

RPD =(((SSCLCS - SSCLCSD)*2)/(SSCLCS + SSCLCSD))*100 527-8518918

LCS/LCSD samples:__

SSC = Spiked sample concentration SA = Spike added LCS = Laboratory Control Sample

LCSD = Laboratory Control Sample duplicate

	Spik	w -	Sample	Spike	ample	SOT	S	CSD		TCS/FCSD	CSD
Compound	Added (As/)	18	conc/kg	Concentration	tration	Percent Recovery	Recovery	Percent Recovery	covery	RPD	٥
	, sol	LCSD		rcs	CSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc
Gasoline (8015)											
Diesel (8015)						-					
Benzene (8021B)	÷										
Methane (RSK-175)	٠										
2,4-D (8151)	·										
Dinoseb (8151)											
Naphthalene (8310)	667	78		<i>ተ</i> ጸታ	20	7.3	73				
Anthracene (8310)	66.7	1		215	1	77	77				
HMX (8330)											
2,4,6-Trinitrotoluene (8330)											
									•		

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

LDC #: 1909/A9 SDG #:

VALIDATION FINDINGS WORKSHEET Sample Calculation Verification

2nd Reviewer: Page: Reviewer:

	HPLC
\	29

METHOD:

Example:

Sample ID.

A= Area or height of the compound to be measured Fv= Final Volume of extract Df= Dilution Factor

(RF)(Vs or Ws)(%S/100)

Concentration=

RF≈ Average response factor of the compound

Concentration =_

in the initial calibration

Vs= Initial volume of the sample

Ws= Initial weight of the sample

%S= Percent Solid

Compound Name

#	Sample ID	Compound	Reported Concentrations	Recalculated Results Concentrations (Qualifications

Comments:

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

BRC Tronox Parcel F

Collection Date:

June 10, 2008

LDC Report Date:

July 23, 2008

Matrix:

Soil

Parameters:

Dioxins/Dibenzofurans

Validation Level:

EPA Level III & IV

Laboratory:

TestAmerica, Inc.

Sample Delivery Group (SDG): F8F110177

Sample Identification

TSB-FR-02-02-20'

TSB-FR-02-02-30'**

TSB-FJ-02-02-10'**

TSB-FJ-02-02-20'**

TSB-FJ-02-02-30'

^{**}Indicates sample underwent EPA Level IV review

Introduction

This data review covers 5 soil samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8290 for Polychlorinated Dioxins/Dibenzofurans.

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

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

Blank results are summarized in Section V.

Field duplicates are summarized in Section XIV.

Samples indicated by a double asterisk on the front cover underwent EPA Level IV review. EPA Level III review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by EPA Level III 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.
- 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.
- A Indicates the finding is based upon technical validation criteria.
- P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

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

II. HRGC/HRMS Instrument Performance Check

Instrument performance was checked at the required daily frequency.

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

The exact mass of 380.9760 of PFK was verified. The static resolving power was at least 10,000 (10% valley definition) for samples on which EPA Level IV review was performed. Raw data were not evaluated for the samples reviewed by EPA Level III criteria.

III. Initial Calibration

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

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

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

The minimum S/N ratio for each target compound was greater than or equal to 2.5 and and greater than or equal to 10 for each recovery and internal standard compound for samples on which EPA Level IV review was performed. Raw data were not evaluated for the samples reviewed by EPA Level III criteria.

IV. Routine Calibration (Continuing)

Routine calibration was performed at the required frequencies.

All of the routine calibration percent differences (%D) between the initial calibration RRF and the routine calibration RRF were less than or equal to 20.0% for unlabeled compounds and less than or equal to 30.0% for labeled compounds.

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

V. Blanks

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

No field blanks were identified in this SDG.

VI. Matrix Spike/Matrix Spike Duplicates

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

VII. Laboratory Control Samples (LCS)

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

VIII. Regional Quality Assurance and Quality Control

Not applicable.

IX. Internal Standards

All internal standard recoveries were within QC limits with the following exceptions:

Sample	Internal Standards	%R (Limits)	Compound	Flag	A or P
8169351MB	¹³ C-1,2,3,4,7,8-HxCDF	38 (40-135)	1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,7,8,9-HxCDF	J (all detects) UJ (all non-detects)	Р

X. Target Compound Identifications

All target compound identifications were within validation criteria for samples on which EPA Level IV review was performed. Raw data were not evaluated for the samples reviewed by EPA Level III criteria.

XI. Compound Quantitation and CRQLs

All compound quantitation and CRQLs were within validation criteria for samples on which EPA Level IV review was performed. Raw data were not evaluated for the samples reviewed by EPA Level III criteria.

XII. System Performance

The system performance was acceptable for samples on which EPA Level IV review was performed. Raw data were not evaluated for the samples reviewed by EPA Level III criteria.

XIII. Overall Assessment of Data

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

XIV. Field Duplicates

No field duplicates were identified in this SDG.

BRC Tronox Parcel F Dioxins/Dibenzofurans - Data Qualification Summary - SDG F8F110177

No Sample Data Qualified in this SDG

BRC Tronox Parcel F
Dioxins/Dibenzofurans - Laboratory Blank Data Qualification Summary - SDG
F8F110177

No Sample Data Qualified in this SDG

BRC Tronox Parcel F Dioxins/Dibenzofurans - Field Blank Data Qualification Summary - SDG F8F110177

No Sample Data Qualified in this SDG

SDG # Labora	: 19091A21 : F8F110177 atory: Test America			Le	evel III/I\		SHEET	Date: 7/19/o Page: 10f Reviewer: 1
The sa	OD: HRGC/HRMS Di imples listed below we ion findings workshee	ere revie		,		·	Validation find	ings are noted in attached
	Validatio	on Area	 				Comments	
I.	Technical holding times			A,	Sampling o	lates: 6/10/	, 08	
II.	GC/MS Instrument perform	rmance ch	neck	4				
III.	Initial calibration			4				
IV.	Routine calibration/I CV	lav		4				
V.	Blanks .			4				
VI.	Matrix spike/Matrix spike	duplicate	s	N	dient	quailied		
VII.	Laboratory control sampl	es		A	Les			
VIII.	Regional quality assuran	ce and qu	ality control	N	ļ			
IX.	Internal standards			SW	ļ			
X.	Target compound identifi	cations		+	Not review	ed for Level III val	dation.	
XI.	Compound quantitation a	and CRQL	.s	+	Not review	ed for Level III val	dation.	
XII.	System performance			4	Not review	ed for Level III val	dation.	
XIII.	Overall assessment of da	ata		4	1			
XIV.	Field duplicates			N				
XV.	Field blanks			7				
Note:	A = Acceptable N = Not provided/applica SW = See worksheet		R = Rin FB = Fi	eld blank		D = Duplic TB = Trip EB = Equi		
validate	d Samples: ** Indicates sa	ample und	r			T		
1 -	TSB-FR-02-02-20'	11	816935	IUB	21		31	
2 -	TSB-FR-02-02-30'**	12			22		32	
3	TSB-FJ-02-02-10'**	13			23		33	
4	TSB-FJ-02-02-20'**	14			24		34	
5 -	rsb-fj-02-02-30'	15			25		35	
6		16			26		36	
7		17			27		37	
8		18			28		38	
9		19			29		39	
10		20			30		40	

LDC #: 19091A21 SDG #: F8F110177

VALIDATION FINDINGS CHECKLIST

Page: lof > Reviewer: / 2nd Reviewer:

Method: Dioxins/Dibenzofurans (EPA SW 846 Method 8290)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.				
Cooler temperature criteria was met.				
iji: 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 \leq 25% ?				
Is the static resolving power at least 10,000 (10% valley definition)?	1			
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) \leq 20% for unlabeled standards and \leq 30% for labeled standards?	/			
Did all calibration standards meet the Ion Abundance Ratio criteria?				
Was the signal to noise ratio for each target compound \geq 2.5 and for each recovery and internal standard \geq 10?	_			
IV. Continuing calibration	,			
Was a routine calibration performed at the beginning and end of each 12 hour period?	/			
Were all percent differences (%D) \leq 20% for unlabeled standards and \leq 30% for labeled standards?	/			
Did all routine calibration standards meet the Ion Abundance Ratio criteria?	/			
V. Blanks				
Was a method blank associated with every sample in this SDG?	/			
Was a method blank performed for each matrix and concentration?				
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet?		_		
VI, Matrix spike/Matrix spike duplicates				
Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.		/		
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?				
VII. Laboratory control samples	,,		,	
Was an LCS analyzed for this SDG?			<u> </u>	

LDC #: 19091AH SDG #: FBF110177

VALIDATION FINDINGS CHECKLIST

Page: 2 of 3
Reviewer: 1
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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?	/			
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 40-135% criteria?		/		
Was the minimum S/N ratio of all internal standard peaks \geq 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?	st			
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?	بر		/	
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 \geq 2.5?				
Does the maximum intensity of each specified characteristic ion coincide within \pm 2 seconds (includes labeled standards)?				
For PCDF identification, was any signal (S/N \geq 2.5, at \pm 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?	y /			
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.			l	

LDC #: 19091A21 SDG #: F8F110177

VALIDATION FINDINGS CHECKLIST

Page: 3of 3
Reviewer: J

2nd Reviewer: ✓

Validation Area	Yes	No	NA	Findings/Comments
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 SW 846 Method 8290)

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

SDG #: F8 F110177 LDC #: (909142)

VALIDATION FINDINGS WORKSHEET

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2nd Reviewer:_ Reviewer:

Internal Standards

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

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

YNN N/A

Are all internal standard recoveries were within the 40-135% criteria?

YN N/A

Was the S/N ratio all internal standard peaks > 10?

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

*	Date	Lab ID/Reference	Internal Standard)	% Recovery (Limit: 40-135%)		Qualifications
		8169351MB	m	82	(4a-135) I I/C	/P (K-N X)
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T))	
))	
		Internal Standards	Check Standard Used		Recovery Standards		Check Standard Used
ď	¹³ C-2,3,7,8-TCDF)F		ĸ	¹³ C-1,2,3,4-TCDD		
æ.	¹³ C-2,3,7,8-TCDD	OD			¹³ C-1 2.3.7.8.9-H×CDD		
Ö	¹³ C-1,2,3,7,8-PeCDF	eCDF		×			
<u>-</u>	¹³ C-1,2,3,7,8-Pe	eCDD		ż			
ш	¹³ C-1,2,3, ½ ,7,8-HxCDF	HXCDF		O.			
ш	¹³ C-1,2,3,6,7,8-HxCDD	HXCDD		ď.			
Ö	¹³ C-1,2,3,4,6,7,8-HpCDF	8-HpCDF		Ö			
ᆈ	¹³ C-1,2,3,4,6,7,8-HpCDD	8-HpCDD		Я			
$\ $	l acoon			۲			

LDC #: 19071421 SDG #: F8 F110177

VALIDATION FINDINGS WORKSHEET Initial Calibration Calculation Verification

Page: (of / Reviewer: K

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

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 = $(A_{\lambda}/(C_{\star})/(A_{\star})(C_{\lambda})$ average RRF = sum of the RRFs/number of standards %RSD = 100 * (S/X)

 $A_x = Area of compound,$ $A_k : C_x = Concentration of compound,$ $C_k : S = Standard deviation of the RRFs, <math>X = C_k : C_k$

 $A_{\rm k}=$ Area of associated internal standard d, $G_{\rm k}=$ Concentration of internal standard AFs, X= Mean of the RRFs

				Reported	Recalculated	Reported	Recalculated	Reported	Recalculated
*	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Average RRF (Initial)	Average RRF (initial)	RRF (CS > std)	RRF ((S std)	%BSD	%BSD
-	777	50/91/7	2,3,7,8-TCDF (¹⁸ C-2,3,7,8-TCDF)	2,798	862 0	0.82	11	2 K)	1 0
			2,3,7,8-TCDD (¹³ C-2,3,7,8-TCDD)	219.0	215.0	0.93	0.92	7 6	200
			1,2,3,6,7,8-HxCDD (13C-1,2,3,6,7,8-HxCDD)	0.821	0.820	0.87	200	100	n -
			1,2,3,4,6,7,8-HpCDD (¹3C-1,2,4,6,7,8,-HpCDD)	pp8'0	0.844	28.0	880	2.8	1 2 7
			OCDF (13c-OCDD)	1.72	1722	78.1	8	6.7	7-7-
~			2.3,7,8-TCDF (13C-2,3,7,8-TCDF)						
			2,3,7,8-TCDD (13C-2,3,7,8-TCDD)						
			1,2,3,6,7,8-HxCDD (13C-1,2,3,6,7,8-HxCDD)						
			1,2,3,4,6,7,8-HpCDD (¹³ C-1,2,4,6,7,8,-HpCDD)						
1			OCDF (4c-OCDD)						
ю			2,3,7,8-TCDF (¹³ C-2,3,7,8-TCDF)						
\exists			2,3,7,8-TCDD (¹³ C-2,3,7,8-TCDD)						
			1,2,3,6,7,8-HxCDD (13C-1,2,3,6,7,8-HxCDD)						
1			1,2,3,4,6,7,8-HpCDD (¹³ C-1,2,4,6,7,8,-HpCDD)						
\exists			OCDF (19C-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 #: |909142|

Routine Calibration Results Verification VALIDATION FINDINGS WORKSHEET

Page: 1 of 1 Reviewer: 2nd Reviewer:

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

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_)(C_*)/(A_)(C_)

ave. RRF = initial calibration average RRF RRF = continuing calibration RRF Where:

 $A_{\mathbf{k}} = Area$ of associated internal standard $C_{\mathbf{k}} = Concentration$ of internal standard $A_x = Area of compound,$ $C_x = Concentration of compound,$

L								:
					Reported	Recalculated	Reported	Recalculated
*	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Average RRF	RRF	RRF		
	A754072	80/22/9	2,3,7,8-TCDF (¹³ C-2,3,7,8-TCDF)	0.798	130	18 0	5	O.
			2,3,7,8-TCDD (13C-2,3,7,8-TCDD)	0.913	27.0	864	2 7 7	2.1
			1,2,3,6,7,8-HxCDD (13C-1,2,3,6,7,8-HxCDD)	0.82	0.82	6.83	70	7.7
			1,2,3,4,6,7,8-HpCDD (13C-1,2,4,6,7,8,-HpCDD)	0.844	0.82	0.82	2.4	0.7
			OCDF (3c-OCDD)	1.72	.53	53.	\ =	
7	ST0630B	80/ce/a	2,3,7,8-TCDF (¹3C-2,3,7,8-TCDF)	8,798	0.8H	18.0	4.9	7
			2,3,7,8-TCDD (13C-2,3,7,8-TCDD)	6.913	0.80	0.60	7.0	130
			1,2,3,6,7,8-HxCDD (13C-1,2,3,6,7,8-HxCDD)	0.82	0.89	0.69	7.0	D.0
			1,2,3,4,6,7,8-HpCDD (19C-1,2,4,6,7,8,-HpCDD)	448.0	0.91	15.0	12	7.2
			OCDF (*3c-OCDD)	1.24.1	1.68	1,68	1.6	5.7
က			2,3,7,8-TCDF (¹³ C-2,3,7,8-TCDF)					<i></i>
			2,3,7,8-TCDD (13C-2,3,7,8-TCDD)					
			1,2,3,6,7,8-HxCDD (13C-1,2,3,6,7,8-HxCDD)					
			1,2,3,4,6,7,8-HpCDD (13C-1,2,4,6,7,8,-HpCDD)					
			OCDF (1°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#: 19091421 SDG#: FEF[10177

Laboratory Control Sample Results Verification VALIDATION FINDINGS WORKSHEET

2nd Reviewer: ___ Reviewer: Page:

METHOD: GC/MS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)

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)

8169351209

LCS ID:

LCS = Laboraotry control sample percent recovery

LCSD = Laboratory control sample duplicate percent recovery

·		ir —		_					T	<u> </u>	-	<u> </u>	
CSD	RPD	Reculculated											·
I CS/I CSD	RF	Reported											
di	ecovery	Recalc											-
ICSD	Percent Recovery	Renorted											
S	Recovery	Recalc	78	70	22	80	do						
01	Percent Recovery	Renorted	83	30	Sign	8	40						
ample	tration (,)	O I C&D											
Spiked 9	Concentration (e.g. (e.g	l CS	16.7	701	45.4	89.2	(83						
ike	Added (p.)											-	
ds	Adj	SJ I	R	3		1	260		·				
	Compound		2,3,7,8-TCDD	1,2,3,7,8-PeCDD	1,2,3,4,7,8-HxCDD	1,2,3,4,7,8,9-HpCDF	OCDF						

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.

lons Monitored for HRGC/HRMS Analysis of PCDDs/PCDFs

Analyte	HPCDF HPCDF HPCDD HPCDD HPCDD HPCDD (S) NCDPE PFK	ocof ocob ocob ocob (s) ocop (s) DCOPE PFK	
Elemental Composition	C ₁₂ H ³ C ₁₄ ³ C ₁₀ C ₁₂ H ³ C ₁₄ ³ C ₁₂ O 1 ² C ₁₂ H ³ C ₁₄ O 1 ³ C ₁₂ H ³ C ₁₄ O 1 ³ C ₁₂ H ³ C ₁₄ ³ C ₁₀ O C ₁₂ H ³ C ₁₄ ³ C ₁₂ O ₂ 1 ³ C ₁₂ H ³ C ₁₄ ³ C ₁₂ O ₂ 1 ³ C ₁₂ H ³ C ₁₄ ³ C ₁₂ O ₂ 1 ³ C ₁₂ H ³ C ₁₄ ³ C ₁₂ O ₂ C ₁₂ H ³ C ₁₄ ³ C ₁₂ O ₂ C ₁₂ H ³ C ₁₄ ³ C ₁₂ O ₂ C ₁₅ H ³ C ₁₄ ³ C ₁₂ O ₂	C ₁₂ ²² Cl ₃ ³⁷ ClO C ₁₂ ²² Cl ₃ ²⁷ ClO ₂ C ₁₂ ²² Cl ₃ ²⁷ ClO ₂ C ₁₂ ²² Cl ₃ ³⁷ ClO ₂ 13C ₁₂ ²³ Cl ₃ ³⁷ ClO ₂ C ₁₂ ²³ Cl ₃ ³⁷ Cl ₂ O C ₁₂ ²³ Cl ₃ ³⁷ Cl ₂ O C ₁₂ ²³ Cl ₃ ³⁷ Cl ₂ O	
Ol nol	M M M M H H H H H H H H H H H H H H H H	M H 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	
Accurate Mass ^(a)	407.7818 409.7788 417.8250 419.8220 423.7767 425.7737 435.8169 437.8140 479.7165 [430.9728]	441.7428 443.7399 457.7377 459.7348 469.7780 471.7750 513.6775	
Descriptor	4	ω	
Analyte	TCDF TCDF (8) TCDF (8) TCDD TCDD TCDD (8) TCDD (8) HXCDPE	PecDF PecDF PecDF (S) PecDD PecDD PecDD (S) PecDD (S) PecDD (S)	HXCDF HXCDF HXCDF (S) HXCDD HXCDD HXCDD HXCDD (S) OCOPE
Elemental Composition	C ₁₂ H ₂ ² C ₁ O C ₁₂ H ₂ ² C ₁ O G ₁₂ H ₂ ² C ₁ O G ₁₂ H ₂ C ₁ O G ₁ C ₁ O	C ₁₂ H ₂ C ₁₄ rClO C ₁₂ H ₂ Cl ₂ rClO 13C ₁₂ H ₂ Cl ₂ rClO 13C ₁₂ H ₂ Cl ₂ rClO C ₁₂ H ₂ Cl ₂ rClO C ₁₂ H ₃ Cl ₂ rClO ₂ C ₁₂ H ₃ Cl ₃ rClO ₂ 13C ₁₂ H ₃ Cl ₃ rClO ₂ C ₁₂ H ₃ Cl ₃ rClO C ₁₂ H ₃ Cl ₃ rClO C ₁₂ H ₃ Cl ₃ rClO	C ₁₂ H ₂ *Cl ₁ *7ClO C ₁₂ H ₂ *Cl ₁ *7ClO C ₁₂ H ₂ *Cl ₁ *Cl ₂ O C ₁₂ H ₂ *Cl ₂ O C ₁₂ H ₂ *Cl ₃ *7ClO C ₁₂ H ₂ *Cl ₃ *7ClO C ₁₂ H ₂ *Cl ₃ *Cl ₂ O ₂ C ₁₃ H ₂ *Cl ₃ *Cl ₂ O ₂ C ₁₃ H ₂ *Cl ₃ *Cl ₂ O ₂ C ₁₄ H ₂ *Cl ₃ *Cl ₂ O ₂ C ₁₄ H ₂ *Cl ₃ *Cl ₂ O ₂
Ol uol	M M M M M M M M M M M M M M M M M M M	M+2 M+4 M+2 M+4 M+4 M+2 M+2 M+2 M+2	ΜΑ ΜΑ ΜΑ ΜΑ ΜΑ Ε 4 + 1
Accurate mass ^(a)	303.9016 305.8987 315.9419 317.9389 319.8965 321.8936 331.3368 333.9338 375.8364 [354.9792]	339.8597 341.8567 351.9000 353.8970 355.8546 357.8516 367.8949 369.8919 409.7974 [354.9792]	373.8208 375.8178 383.8639 385.8610 389.8156 391.8127 401.8559 445.7555 1430.97281
Descriptor		2	m

The following nuclidic masses were used: **®**

H = 1.007825 C = 12.000000 $^{13}C = 13.003355$ F = 18.9984

O = 15.994915 $^{36}CI = 34.968853$ $^{37}CI = 36.965903$

S = internal/recovery standard

LDC #:_	19091421
SDG #:	F8F110177

VALIDATION FINDINGS WORKSHEET

Sample Calculation Verification

Page:_	
Reviewer:	M
2nd reviewer:	0

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

R	M	N/A
Y	N	N/A)
		$\overline{}$

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 = $(A_{\cdot})(I_{\cdot})(DF)$ $(A_{is})(RRF)(V_{\circ})(\%S)$			Example:	~ <u>/</u>	И.,	
A_{x}	=	Area of the characteristic ion (EICP) for the compound to be measured	Sample I.D		Ng	;
A_{is}	=	Area of the characteristic ion (EICP) for the specific internal standard				
l _s	=	Amount of internal standard added in nanograms (ng)	Conc. = () ()() (
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.				

#	Sample ID	Compound	Reported Concentration ()	Calculated Concentration ()	Qualification
	· · · · · · · · · · · · · · · · · · ·				
	,				
				1	·
	:				
			1		