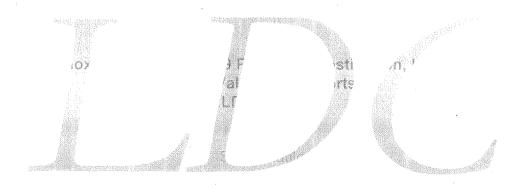
Tronox LLC Facility, 2009 Phase B Investigation, Henderson Data Validation Reports LDC #21495

Semivolatiles



Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, 2209 Phase B Investigation,

Henderson, Nevada

Collection Date:

May 27 through June 4, 2209

LDC Report Date:

September 28, 2009

Matrix:

Water

Parameters:

Semivolatiles

Validation Level:

Stage 4

Laboratory:

Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0903006

Sample Identification

MC-3B

MC-3BRE

EB052709

EB052709RE

M-127B

M-127BRE

FB060409

Introduction

This data review covers 7 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8270C for Semivolatiles.

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

The following are definitions of the data qualifiers:

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

I. Technical Holding Times

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

Sample C		Total Days From Sample Collection Until Extraction	Required Holding Time (in Days) From Sample Collection Until Extraction	Flag	A or P
MC-3BRE EB052709RE	All TCL compounds	11	7	J- (all detects) UJ (all non-detects)	А
M-127BRE	All TCL compounds	10	7	J- (all detects) UJ (all non-detects)	А

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).

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
5/22/09	Octachlorostyrene		All samples in SDG R0903006	J (all detects) UJ (all non-detects)	А

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

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

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

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

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

V. Blanks

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

Samples EB052709 and EB052709RE were identified as equipment blanks. No semivolatile contaminants were found in these blanks with the following exceptions:

Equipment Blank ID	Sampling Date	Compound	Concentration	Associated Samples
EB052709	5/27/09	Diethylphthalate	0.23 ug/L	MC-3B MC-3BRE

Sample FB060409 was identified as a field blank. No semivolatile contaminants were found in this blank with the following exceptions:

Field Blank ID	Sampling Date	Compound	Concentration	Associated Samples
FB060409	6/4/09	Butylbenzylphthalate Di-n-butylphthalate Diethylphthalate	0.12 ug/L 0.78 ug/L 0.28 ug/L	MC-3B MC-3BRE M-127B M-127BRE

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

VI. Surrogate Spikes

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

Sample	Surrogate	%R (Limits)	Compound	Flag	A or P
156625MB	156625MB 2-Fluorobiphenyl Nitrobenzene-d5 2-Fluorobiphenyl		All TCL compounds	J- (all detects) UJ (all non-detects)	Р

VII. Matrix Spike/Matrix Spike Duplicates

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

VIII. Laboratory Control Samples (LCS)

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

LCS ID (Associated Samples)	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Flag	A or P
157385LCS/D (MC-3BRE EB052709RE M-127BRE FB060409 157385MB)	Pyridine	37 (50-120)	27 (50-120)	32 (≤30)	J (all detects) UJ (all non-detects)	P
157385LCS/D (MC-3BRE EB052709RE M-127BRE FB060409 157385MB)	1,4-Dioxane	43 (50-120)	47 (50-120)	-	J- (all detects) UJ (all non-detects)	Р

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

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

XI. Target Compound Identifications

All target compound identifications were within validation criteria.

XII. Project Quantitation Limit

All project quantitation limits were within validation criteria.

All compounds reported below the PQL were qualified as follows:

Sample Finding		Flag	A or P
All samples in SDG R2844538	All compounds reported below the PQL.	J (all detects)	А

XIII. Tentatively Identified Compounds (TICs)

Tentatively identified compounds were not reported by the laboratory.

XIV. System Performance

The system performance was acceptable.

XV. Overall Assessment

The overall assessment of data was acceptable. In the case where more than one result was reported for an individual sample, the least technically acceptable results were rejected as follows:

Sample	Compound	Flag	A or P
MC-3BRE EB052709RE M-127BRE	All TCL compounds	х	А

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

XVI. Field Duplicates

No field duplicates were identified in this SDG.

Tronox LLC Facility, 2209 Phase B Investigation, Henderson, Nevada Semivolatiles - Data Qualification Summary - SDG R0903006

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0903006	MC-3BRE EB052709RE M-127BRE	All TCL compounds	J- (all detects) UJ (all non-detects)	A	Technical holding times (h)
R0903006	MC-3B MC-3BRE EB052709 EB052709RE M-127B M-127BRE FB060409	Octachlorostyrene	J (all detects) UJ (all non-detects)	А	Initial calibration (RRF) (c)
R0903006	MC-3BRE EB052709RE M-127BRE FB060409	Pyridine	J (all detects) UJ (all non-detects)	Р	Laboratory control samples (%R) (I, Id)
R0903006	MC-3BRE EB052709RE M-127BRE FB060409	1,4-Dioxane	J- (all detects) UJ (all non-detects)	Р	Laboratory control samples (%R) (I)
R0903006	MC-3B MC-3BRE EB052709 EB052709RE M-127B M-127BRE FB060409	All compounds reported below the PQL.	J (all detects)	А	Project Quantitation Limit (sp)
R0903006	MC-3BRE EB052709RE M-127BRE	All TCL compounds	×	A	Overall assessment of data (o)

Tronox LLC Facility, 2209 Phase B Investigation, Henderson, Nevada Semivolatiles - Laboratory Blank Data Qualification Summary - SDG R0903006

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2209 Phase B Investigation, Henderson, Nevada Semivolatiles- Field Blank Data Qualification Summary - SDG R0903006

No Sample Data Qualified in this SDG

Tronox Northgate Henderson

LDC #:	21495B2a	VALIDATION COMPLETENESS WORKSHEET
SDG #:_	R0903006	Stage 4

Page: of Paviewer: OVC

Laboratory: Columbia Analytical Services

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

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

	Validation Area		Comments
1.	Technical holding times	SW	Sampling dates: 5/27 - 28 / 09 6/04 / 09
11.	GC/MS Instrument performance check	A	′ ′
III.	Initial calibration	SW	7, RSD
IV.	Continuing calibration/ICV	NSWA	7, RSD CW/1W € 25 B
V.	Blanks	A	
VI.	Surrogate spikes	SW	
VII.	Matrix spike/Matrix spike duplicates	2	Client spec
VIII.	Laboratory control samples	SM	Client spec LCS/D
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	A	
XI.	Target compound identification	A	
XII.	Compound quantitation/CRQLs	A	
XIII.	Tentatively identified compounds (TICs)	N	
XIV.	System performance	A	
XV.	Overall assessment of data	SW	
XVI.	Field duplicates	N	
XVII.	Field blanks	SW	*EB = 3, 4 FB = 7

Note:

A = Acceptable

N = Not provided/applicable SW = See worksheet \mathcal{Y} ND = No compounds detected

R = Rinsate FB = Field blank D = Duplicate TB = Trip blank

TB = Trip blank EB = Equipment blank

Validated Samples:

Water

	voc(er					
1 1	MC-3B	11)	15625 MB	€×+ = 21		31
2 7	MC-3BRE	12	157385	22	88943	32
3 1	EB052709	13		23		33
† 4 7	EB052709RE	14		24		34
5	M-127B	15		25		35
+ γ 6	M-127BRE	16		26		36
7 7	FB060409	17		27		37
8		18		28		38
9		19		29		39
10		20		30		40

VALIDATION FINDINGS CHECKLIST

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

Method: Semivolatiles (EPA SW 846 Method 8270C)

metriod. Sernivolatiles (EPA SW 846 Metriod 8270C)				
Validation Area	Yes	No	NA	Findings/Comments
L. Technicel Kilding times	1	ı	_	
All technical holding times were met.	<u>-</u>			
Cooler temperature criteria was met.				
II. GC/MS Instriment performance check				
Were the DFTPP performance results reviewed and found to be within the specified criteria?	/			
Were all samples analyzed within the 12 hour clock criteria?	/			
				Park Medition Comments
III Initial calibration			4.0	
Did the laboratory perform a 5 point calibration prior to sample analysis?	ľ			
Were all percent relative standard deviations (%RSD) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?	/			
Was a curve fit used for evaluation?				
Did the initial calibration meet the curve fit acceptance criteria of > 0.990?				
Were all percent relative standard deviations (%RSD) ≤ 30% and relative response factors (RRF) ≥ 0.05?				
IV Continuing calibration				
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?		/	-	
V Banks and the second of the				
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.		· /		
Ware all aureants 9/ P within OC limits?	gipuli na pani malifi popo		-	CONTROL OF STREET OF STREET CONTROL OF STREET CO
Were all surrogate %R within QC limits?		,		
If 2 or more base neutral or acid surrogates were outside QC limits, was a reanalysis performed to confirm %R?	XX	-		
If any %R was less than 10 percent, was a reanalysis performed to confirm %R?		/.		
VI Manus spierwings spie greatings				MARKET TO SERVICE AND ADMINISTRATION OF THE SERVICE AND ADMINISTRATION OF
	0,35,30			
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?			/	
All Calculates control				
Was an LCS analyzed for this SDG?				

LDC #: 21495 BZG SDG #: See Gover

VALIDATION FINDINGS CHECKLIST

Page: 2 of 2
Reviewer: 200
2nd Reviewer: 200

Validation Area	Yes	No	NA	Findings/Comments
Was an LCS analyzed per extraction batch?	/			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?				
IX. Regional Quality Assurance and Civality Cortics				
Were performance evaluation (PE) samples performed?				
Were the performance evaluation (PE) samples within the acceptance limits?	5/905388/R	1000 Y 30 65 7	200430300	
X. Internal standards				
Were internal standard area counts within -50% or +100% of the associated calibration standard?		,		
Were retention times within ± 30 seconds from the associated calibration standard?				
XI. Terget compound identification				
Were relative retention times (RRT's) within ± 0.06 RRT units of the standard?				
Did compound spectra meet specified EPA "Functional Guidelines" criteria?				
Were chromatogram peaks verified and accounted for?			SX4380	
XII. Compostrict quantitation/CRQL-1				
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the compound?				
Were compound quantitation and CRQLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?		\		
XIII. Terratively (detitlied compounds (T(Cs))				
Were the major ions (> 10 percent relative intensity) in the reference spectrum evaluated in sample spectrum?	•		/	
Were relative intensities of the major ions within \pm 20% between the sample and the reference spectra?			,	
Did the raw data indicate that the laboratory performed a library search for all required peaks in the chromatograms (samples and blanks)?		1		
System performance was found to be acceptable.				
XV Grandi disessine varianti programa i prog				
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.				
XVI. Field blanks : ## ## ## ## ## ## ## ## ### ###			-	
Field blanks were identified in this SDG.				
Target compounds were detected in the field blanks.		<i>,</i>		

VALIDATION FINDINGS WORKSHEET

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

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

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

LDC #:_	2149	5326
SDG #:_	Ea	Core

VALIDATION FINDINGS WORKSHEET Technical Holding Times

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

All circled dates have exceeded the technical holding times.

YN N/A Were all cooler temperatures within valid	ation criteria?
METHOD: GC/MS BNA (EPA SW 846 Method 8270)	

METHOD : GC/N	AS BNA (EPA S	SW 846 Method	8270)				
Sample ID	Matrix	Preserved	Sampling Date	Extraction date	Analysis date	Total # of Days	Qualifier
2,4	n/	N	5/27/09 5/28/09	6/08/09	6/11/89	11	J-/NJ/A
6	1		5/28/09			10	1
•					•		
							,
						-	
	•						
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TECHNICAL HOLDING TIME CRITERIA

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

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

LDC #: 1 445 B2

SDG #:

VALIDATION FINDINGS WORKSHEET Initial 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)

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?_ Did the initial calibration meet the acceptance criteria? Were all %RSDs and RRFs within the validation criteria of ≤30 %RSD and ≥0.05 RRF ?

LDC#: 21495 BZK SDG #: 50 Con

VALIDATION FINDINGS WORKSHEET Field Blanks

Page: lof Reviewer: 2nd Reviewer:

METHOD: GC/MS BNA (EPA SW 846 Method 8270)
Y/N N/A Were field blanks identified in this SDG?

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

Blank units: 49 / L Associated sample units: 49 / L
Sampling date: 5 / 27 / 08 Y N N/A

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

(MD) <u>}</u> Sample Identification Associated Samples: Blank ID 0.23 Compound CRQL

Blank units: いらノレ Associated sample units: 小木 Sampling date: しんりゃんり

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

5,6 (ND) Manage 1, 2

Associated Samples:

Compound	Blank ID	Sample Identification
	7	
444	حا ,0	
××	82'0	
77	0.28	
CRQL		

21495 Bic LDC#: SDG#:

VALIDATION FINDINGS WORKSHEET

Surrogate Recovery

Please see qualification below for all questions answered "N". Not applicable questions are identified as "N/A" SDG #: トリーシャ Cハート) METHOD: GC/MS BNA (EPA SW 846 Method 8270C)

2nd Reviewer: Reviewer: Page:

Were percent recoveries (%R) for surrogates within QC limits?

N/A N/V

Y/N N/A

If 2 or more base neutral or acid surrogates were outside QC limits, was a reanalysis performed to confirm %R?

If any %R was less than 10 percent, was a reanalysis performed to confirm %R?

			T			Ī	T	T	T	Ī	Ī	Γ			Τ	T	T	T							
Qualifications	(5)																								
Qua	d/ 24/-D		*																						
mits)	(45-135))	7	()	((((()	(()	()	()))	()	()	()	()	()	()	()	# 00 H
%R (Limits)	32	90	3)																						
Surrogate	FBP	78 V	HAL																						(50)
Sample ID	BW 529951																			·					(sets)() simil OO (los) simil OO
Date																									* OC limits are advisory
*																									الله الله الله

QC Limits (Water) 21-100

23-120

43-116 33-141 35-114

> 30-115 18-137 24-113

S1 (NBZ) = Nitrobenzene-d5 2 S2 (FBP) = 2-Fluorobiphenyl 3 S3 (TPH) = Terphenyl-d14 15 S4 (PHL) = Phenol-d5

25-121 19-122 20-130* 20-130*

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

10-123 33-110* 16-110*

LDC #: 21459 B26 SDG # Zu Gray

VALIDATION FINDINGS WORKSHEET Laboratory Control Samples (LCS)

Page: 1 of 1

Reviewer:

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

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

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

LCS/LCSD ID	Compound	%R (Limits)		%R (Limits)	RPD (Limits)	Associated Samples	Qualifications	
156625 113/6	RRR)		(de (se-120)	()	1, 3, 5, 156625 MB	No and	(3)
	777)	<u> </u>	() 44	()	F '	1	F
		J	1	,	()			1
		J		((Γ
157385 LCS/D	RRR	37 (50-120)	(20)	27 ()	(04) 26	2. 4 6.7 157385MB	5/N5/P	2
	TTT) Ep	一 入	47 (/)			9/10/-1	1
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)	_	())			T
7)	 	(T

SDG# 1446 \$29

VALIDATION FINDINGS WORKSHEET Overall Assessment of Data

Reviewer: 3/6 2nd Reviewer:

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

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

All available information pertaining to the data were reviewed using professional judgement to compliment the determination of the overall quality of the data.

W A/N X

Was the overall quality and usability of the data acceptable?

#	Date	Sample ID	Finding	Associated Samples	Qualifications	
		2,4,6	confirmation runs	1 1	(6) A/X	
			(MB SNIT ONTEND UM	2,43)		
Comr	Comments:					

LDC#: 21465 826

Initial Calibration Calculation Verification VALIDATION FINDINGS WORKSHEET

Reviewer: 3V¢ Page: 1_of_ 2nd Reviewer: 1

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

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

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

 $\begin{aligned} A_x &= \text{Area of compound}, \\ C_x &= \text{Concentration of compound}, \\ S &= \text{Standard deviation of the RRFs}, \end{aligned}$

Recalculated 3.80 0.17 ノング 1, 0 Reported 3.79 3,5/ 10.15 %RSD 11,0 6,01 Recalculated Average RRF 273 686.0 26-1 0,706 1.079 Average RRF 706 Reported 0.747 0.989 1.190 194 - 079 Recalculated RRF (1,シ std) 0,993 0,666 1, 147 مم م م 1000 0 std) 0, 993 Reported 0.702 0.666 800.1 1.147 RRF , e 0 Compound (Reference Internal Standard) Bis(2-ethylhexyl)phthalate (5th internal standard) Bis(2-ethylhexyl)phthalate (5th internal standard) Bis(2-ethylhexyl)phthalate (5th internal standard) Parischlorophanol (4th internal standard) Pentachlorophenol (4th internal standard) Pentachlorophenol (4th internal standard) Benzo(a)pyrene (6th internal standard). Benzo(a)pyrene (6th internal standard) Naphthalene (2nd internal standard) Naphthalene (2nd internal standard) Naphthalene (2nd internal standard) Renzo(a)pyrene (6th internal standa Fluorene (3rd internal standard) Fluorene (3rd internal standard) Fluorene (3rd internal standard) Phenol (1st internal standard) Phenel (1st internal standard) Phenol (1st internal standard) 60/22/5 Calibration Date Standard ID 3

lifications and associated samples when reported results do not agree within 10.0% of the recalculated	
and assoc	
ualifications	2
et for list of g	7
igs workshe	4.0
Refer to Initial Calibration findin	
Comments: E	results.

	0.6427	1.628	1,234	8 36.0	0,746	1.267
Λ	6.6613	1.047	1.258	1,013	0.759	1.273
2	= 0.6973	1.02	= 1.193	1.009	= 0.746	: 1,254
	1.4-D	Ş	Z	2	EBE	127
						INICLC.2S

2495824 SDG #: See Cover LDC#:

Continuing Calibration Results Verification VALIDATION FINDINGS WORKSHEET

Page: of 1 Reviewer:_

2nd 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 * (ave. RRF - RRF)/ave. RRF RRF = $(A_x)(C_x)/(A_y)(C_x)$

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

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

					Reported	Recalculated	Renorted	Recalculated
#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Average RRF (initial)	RRF (CC)	RRF (CC)	Œ%	G %
Ľ	의	6/04/09	Rhend (1'st internal standard) 1, 4 - D' 6 X A y L	0.706	0.708	0.708	0,3	6.9
			-	1.079	1.039	1.639	3.7	5.7
			Fluorene (3rd internal standard)	1.190	1,247	1. 26.7	6.5	6.5
<u>_</u>			Retrachiorophenol (4th internal standard)	686 6	1-048	1.048	ود ک	ورع
			Bis(2-ethylhexyl)phthalate (5th internal standard)	0,743	0.748	876-0	6.7	6.7
			Renzo(a)mirene (6th internal standard)	1, 194	1.253	526.	4.9	6,74
2	74749	6/11/9	Ebenet (1st internal standard) 1, 4 切 のかい	0.706	0.772	6.772	9.3	9.3
			Naphthalene (2nd internal standard)	1.679	1.044	1.644	٧.٧ ۲	3,7
			Fluorene (3rd internal standard)	1.190 J. 190		1.230	2.4	3.4
			Pentachierophenol (4th internal standard)	0. 9×9	0.933	0.933	5.7	5,7
			Bis(2-ethylhexyl)phthalate (5th internal standard)	0.743	0.833	0.833	(بح(12,1
			Renzo(a)pyrene (6th internal standard)	1.194	1.245	. 04 V	4.3	4,3
က			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 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 #: 21 495 B>9 SDG #: Sre Cover

VALIDATION FINDINGS WORKSHEET Surrogate Results Verification

Page:	<u>lof_1</u>
Reviewer:	200
2nd reviewer:	Ø

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

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

% Recovery: SF/SS * 100

Where: SF = Surrogate Found

SS = Surrogate Spiked

Sample ID:

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5	2.00	1.89	95	95	0
2-Fluorobiphenyl	1	1.74	87	87	
Terphenyl-d14	4	1.82	91	9)	\ \ \ \ \
Phenoi-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					

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					

हैय कि Laboratory Control Sample/Laboratory Control Sample Duplicates Results Verification LDC #: 21 495 & 29

SDG #:

VALIDATION FINDINGS WORKSHEET

Page: 1 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: __

565 88

	Spi	Ke	dS	Spike	31	SU	01	I CSD	1.08/	I CS/I CSD
Compound	Added (ded)	Concentration (ntration)	Percent Recovery	ecovery	Percent Recovery	Recovery	R	RPD
	SOI	I CSD	1 CS	LCSD	Renorted	Recalc	Reported	Recalc	Reported	Recalculated
Phenol										
N-Nitroso-di-n-propylamine										
4-Chloro-3-methylphenol			:							
Acenaphthene	4,00	4.00	3.29	3.27	87	82	82	20		
Pentachlorophenol										
Pyrene	4.00	4. O)	3.35	3.55	78	78	84	68	3	S
						/		/		

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 #:	21	495	B	24
SDG #:_	Sre	Core	(

VALIDATION FINDINGS WORKSHEET Sample Calculation Verification

Page:_	l of1	_
Reviewer:	- JVI	<u>'</u>
2nd reviewer:	Ø.	

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

(Y)	N	N/A
¥	N	N/A

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

,			_
Conc	entratio	$n = \frac{(A_{*})(I_{*})(V_{*})(DF)(2.0)}{(A_{*})(RRF)(V_{*})(V_{*})(%S)}$	Example:
A_{x}	=	Area of the characteristic ion (EICP) for the compound to be measured	Sample I.D. # 1,4-Dioxane
A_{is}	=	Area of the characteristic ion (EICP) for the specific internal standard	1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1
l _s	=	Amount of internal standard added in nanograms (ng)	$\begin{array}{cccccccccccccccccccccccccccccccccccc$
V _o	=	Volume or weight of sample extract in milliliters (ml) or grams (g).	
V_i	=	Volume of extract injected in microliters (ul)	= 0.59 ug/L
V_{t}	=	Volume of the concentrated extract in microliters (ul)	
Df	=	Dilution Factor.	
%S	=	Percent solids, applicable to soil and solid matrices only.	

2.0	= Factor of 2 to accoun	t for GPC cleanup			
#	Sample ID	Compound	Reported Concentration ()	Calculated Concentration ()	Qualification

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

Project/Site Name:

Tronox LLC Facility, 2009 Phase B Investigation,

Henderson, Nevada

Collection Date:

June 1 through June 4, 2009

LDC Report Date:

September 22, 2009

Matrix:

Soil

Parameters:

Semivolatiles

Validation Level:

Stage 2B

Laboratory:

Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0903051

Sample Identification

RSA12-0.5B

RSA12-0.5BMSD

RSA12-0.5BDL

SA189-0.5BMS

RSAI3-0.5B

SA189-0.5BMSD

RSAJ5-0.5B

RSAK5-0.5B

RSAK5-0.5BDL

SA76-0.5B

SA76009-0.5B

RSAL3-0.5B

SA100-0.5B

RSAM3-0.5B

RSAM2-0.5B SA189-0.5B

SA88-0.5B

SA152-0.5B

SA152009-0.5B

RSAJ2-0.5B

RSAJ3-0.5B

SA202-0.5B

RSA12-0.5BMS

Introduction

This data review covers 24 soil samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8270C for Semivolatiles.

This review follows the Standard Operating Procedures (SOP) 40, Data Review/Validation (BRC 2009), the Quality Assurance Project Plan Tronox LLC Facility, Henderson, Nevada (June 2009), NDEP guidance (May 2006), and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review (June 2008) as there are no current guidelines for the method stated above.

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

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

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

I. Technical Holding Times

All technical holding time requirements were met.

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

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

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

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
5/22/09	Octachlorostyrene	0.048 (≥0.05)	All samples in SDG R0903051	J (all detects) UJ (all non-detects)	А

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

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

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

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

All of the continuing calibration RRF values were greater than or equal to 0.05 with the following exceptions:

Date	Compound	RRF (Limits)	Associated Samples	Flag	A or P
6/9/09	Octachlorostyrene	0.047 (≥0.05)	RSA12-0.5BDL RSAI3-0.5B RSAJ5-0.5B RSAK5-0.5BDL SA76-0.5B SA100-0.5B RSA12-0.5BMS RSA12-0.5BMSD 88783MB	J (all detects) UJ (all non-detects)	А
6/10/09	Octachiorostyrene	0.049 (≥0.05)	SA76009-0.5B RSAL3-0.5B SA189-0.5B SA88-0.5B SA152-0.5B SA152009-0.5B RSAJ2-0.5B RSAJ3-0.5B SA202-0.5B SA189-0.5BMS	J (all detects) UJ (all non-detects)	А

V. Blanks

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

Method Blank ID	Extraction Date	Compound TIC (RT in minutes)	Concentration	Associated Samples
88783MB	6/4/09	Di-n-butylphthalate	33 ug/Kg	RSA12-0.5B RSA12-0.5BDL RSAI3-0.5B RSAJ5-0.5B RSAK5-0.5BDL SA76-0.5B SA76009-0.5B RSAL3-0.5B SA100-0.5B RSAM3-0.5B

Method Blank ID	Extraction Date	Compound TIC (RT in minutes)	Concentration	Associated Samples
88824MB	6/8/09	Di-n-butylphthalate Naphthalene	63 ug/Kg 1.7 ug/Kg	SA189-0.5B SA88-0.5B SA152-0.5B SA152009-0.5B RSAJ2-0.5B RSAJ3-0.5B SA202-0.5B

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

Sample	Compound TIC (RT in minutes)	Reported Concentration	Modified Final Concentration
RSAM3-0.5B	Di-n-butylphthalate	40 ug/Kg	40U ug/Kg
RSAM2-0.5B	Di-n-butylphthalate	69 ug/Kg	69U ug/Kg
SA189-0.5B	SA189-0.5B Di-n-butylphthalate Naphthalene		120U ug/Kg 1.4U ug/Kg
SA152-0.5B	Naphthalene	1.4 ug/Kg	1.4U ug/Kg
SA152009-0.5B	A152009-0.5B Di-n-butylphthalate		39U ug/Kg
SA202-0.5B	Di-n-butylphthalate Naphthalene	89 ug/Kg 1.4 ug/Kg	89U ug/Kg 1.4U ug/Kg

Sample FB072109-SO (from SDG R0904016) was identified as a field blank. No semivolatile contaminants were found in this blank with the following exceptions:

Field Blank ID	Sampling Date	Compound	Concentration	Associated Samples
FB072109-SO	7/21/09	Bis(2-ethylhexyl)phthalate Butylbenzylphthalate Di-n-butylphthalate Diethylphthalate	1.4 ug/Kg 0.18 ug/Kg 1.5 ug/Kg 0.35 ug/Kg	All soil samples in SDG R0903051

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

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. Surrogate recoveries (%R) were not within QC limits for several samples. Since these samples were diluted out, no data were qualified.

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 recoveries (%R) and relative percent differences (RPD) were not within QC limits for some compounds, the LCS and LCSD 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 LCS percent recovery (%R) was not within QC limits for one compound, the LCSD 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

Raw data were not reviewed for this SDG.

XII. Project Quantitation Limit

All project quantitation limits were within validation criteria with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
RSA12-0.5B RSAK5-0.5B	Hexachlorobenzene Octachlorostyrene	Sample result exceeded calibration range.	Reported result should be within calibration range.	J (all detects) J (all detects)	A

All compounds reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG R0903051 All compounds reported below the PQL.		J (all detects)	Α

Raw data were not reviewed for this SDG.

XIII. Tentatively Identified Compounds (TICs)

Raw data were not reviewed for this SDG.

XIV. System Performance

Raw data were not reviewed for this SDG.

XV. Overall Assessment

The overall assessment of data was acceptable. In the case where more than one result was reported for an individual sample, the least technically acceptable results were rejected as follows:

Sample	Compound	Flag	A or P
RSA12-0.5B RSAK5-0.5B	Hexachlorobenzene Octachlorostyrene	××	А
RSA12-0.5BDL RSAK5-0.5BDL	All TCL compounds except Hexachlorobenzene Octachlorostyrene	×	A

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

XVI. Field Duplicates

Samples SA76-0.5B and SA76009-0.5B and samples SA152-0.5B and SA152009-0.5B were identified as field duplicates. No semivolatiles were detected in any of the samples with the following exceptions:

	Concentrat	ion (ug/Kg)				
Compound	SA76-0.5B	SA76009-0.5B	RPD (Limits)	Difference (Limits)	Flags	A or P
Hexachlorobenzene	17000	13000	27 (≤50)	-	-	-
Octachlorostyrene	5400	7000	26 (≤50)	•	-	-

	Concentration (ug/Kg)					
Compound	SA152-0.5B	SA152009-0.5B	RPD (Limits)	Difference (Limits)	Flags	A or P
Di-n-butylphthalate	180U	39	-	141 (≤180)	-	-

	Concentration (ug/Kg)					
Compound	SA152-0.5B	SA152009-0.5B	RPD (Limits)	Difference (Limits)	Flags	A or P
Naphthalene	1.4	6.8U	•	5.4 (≤6.8)	-	<u>-</u>

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles - Data Qualification Summary - SDG R0903051

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0903051	RSA12-0.5B RSA12-0.5BDL RSAI3-0.5B RSAK5-0.5B RSAK5-0.5BDL SA76-0.5B SA76009-0.5B RSAL3-0.5B SA100-0.5B RSAM3-0.5B RSAM3-0.5B RSAM2-0.5B SA189-0.5B SA189-0.5B SA152-0.5B SA152-0.5B SA152-0.5B SA152-0.5B SA152-0.5B	Octachlorostyrene	J (all detects) UJ (all non-detects)	A	Initial calibration (RRF) (c)
R0903051	RSA12-0.5BDL RSAI3-0.5B RSAJ5-0.5B RSAK5-0.5BDL SA76-0.5B SA76009-0.5B RSAL3-0.5B SA100-0.5B SA189-0.5B SA189-0.5B SA88-0.5B SA152-0.5B SA152-0.5B SA152-0.5B RSAJ2-0.5B RSAJ2-0.5B	Octachlorostyrene	J (all detects) UJ (all non-detects)	A	Continuing calibration (RRF) (c)
R0903051	RSA12-0.5B RSAK5-0.5B	Hexachlorobenzene Octachlorostyrene	J (all detects) J (all detects)	А	Project Quantitation Limit (e)

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0903051	RSA12-0.5B RSA12-0.5BDL RSAI3-0.5B RSAJ5-0.5B RSAK5-0.5B RSAK5-0.5BDL SA76-0.5B SA76009-0.5B RSAL3-0.5B SA100-0.5B RSAM3-0.5B RSAM2-0.5B SA189-0.5B SA189-0.5B SA152-0.5B SA152-0.5B SA152-0.5B SA152-0.5B SA152-0.5B SA152-0.5B	All compounds reported below the PQL.	J (all detects)	Α	Project Quantitation Limit (sp)
R0903051	RSA12-0.5B RSAK5-0.5B	Hexachlorobenzene Octachlorostyrene	X X	Α	Overall assessment of data (o)
R0903051	RSA12-0.5BDL RSAK5-0.5BDL	All TCL compounds except Hexachlorobenzene Octachlorostyrene	х	А	Overall assessment of data (o)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles - Laboratory Blank Data Qualification Summary - SDG R0903051

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P	Code
R0903051	RSAM3-0.5B	Di-n-butylphthalate	40U ug/Kg	А	bl
R0903051	RSAM2-0.5B	Di-n-butylphthalate	69U ug/Kg	А	bl
R0903051	SA189-0.5B	Di-n-butylphthalate Naphthalene	120U ug/Kg 1.4U ug/Kg	А	bl
R0903051	SA152-0.5B	Naphthalene	1.4U ug/Kg	A	bl
R0903051	SA152009-0.5B	Di-n-butylphthalate	39U ug/Kg	А	bl
R0903051	SA202-0.5B	Di-n-butylphthalate Naphthalene	89U ug/Kg 1.4U ug/Kg	А	bl

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles- Field Blank Data Qualification Summary - SDG R0903051

No Sample Data Qualified in this SDG

Tronox Northgate Henderson

VALIDATION COMPLETENESS WORKSHEET

LDC #:_ 21495C2a SDG #: R0903051

Stage 2B

Reviewer:

2nd Reviewer:

Laboratory: Columbia Analytical Services

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

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

	Validation Area		Comments
1.	Technical holding times	A	Sampling dates: 6/61 - 04 /09
II.	GC/MS Instrument performance check	A	
111.	Initial calibration	SW	
IV.	Continuing calibration/ICV	SW	CON/100 = 25 %
V.	Blanks	SW	
VI.	Surrogate spikes	SW	
VII.	Matrix spike/Matrix spike duplicates	SN	
VIII.	Laboratory control samples	SW)	US/p
IX.	Regional Quality Assurance and Quality Control	N	
Χ.	Internal standards	À	
XI.	Target compound identification	N	
XII.	Compound quantitation/CRQLs	SM	
XIII.	Tentatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data	SW	
XVI.	Field duplicates	SW	D, = 7,8 D2 = 15.16
XVII.	Field blanks	SW	$D_1 = 7.8$ $D_2 = 15.16$ FB = 20 $FB = FB 072109 - SD from R096$

Note:

A = Acceptable

N = Not provided/applicable SW = See worksheet

ND = No compounds detected

R = Rinsate

D = Duplicate TB = Trip blank

FB = Field blank

EB = Equipment blank

Validated Samples:

Vallda	ted Samples:	Soil	#-	Water					
1 7	RSA12-0.5B	۶	11 2	RSAM3-0.5B	۶	21 3	RSA12-0.5BMS	31	157385 MB
2 2	RSA12-0.5BDL		12 2	RSAM2-0.5B		22 ;	ŔSA12-0.5BMSD	ナ ₃₂ ァ	1567827 MB
3 2	RSAI3-0.5B		13 3	SA189-0.5B		23 3	SA189-0.5BMS	333	88824 MB
4 2	RSAJ5-0.5B		14 3	SA88-0.5B	·	24 7	SA189-0.5BMSD	34	
↓ 5 γ	RSAK5-0.5B		15 3	SA152-0.5B	p	25		35	
† 6 ?	RSAK5-0.5BDL		16 ვ	SA152009-0.5B	Ø	26		36	
7 2	SA76-0.5B	p	17 %	RSAJ2-0.5B		27		37	
8 2	SA76009-0.5B	ь	18 %	RSAJ3-0.5B		28		38	
9 3	RSAL3-0.5B		19 3	SA202-0.5B	1	29		39	
10 7	SA100-0.5B	<u> </u>	20- 	FB00040 9	W	30		40	

#20-reported in R0903006) (no r>)

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

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

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

21495 C2Q

LDC #:

Page: 1 of

Reviewer 2nd Reviewer.

Initial Calibration

SDG #: 54 Cm-7 METHOD: GC/MS BNA (EPA SW 846 Method 8270C)

KN N/A N/A

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

			Ī	T	Ī		T -		Π	Ī	Τ		Ī	Π					Ī
II I	(2)																		
Qualification	4/14/1																		
	5																		
Samples	BIKS																		
Associated	All + Blks	Marie - 144 U								Section (Sec.) Sec.									
Finding RRF (Limit: >0.05)	0 48																		
Findin (Limit:	0.														-				
Finding %RSD (Limit: <30.0%)																	•		
Findir (Limit:																			_
punodi	иии																		
ID Corr																			
ard ID	1.																		
Standard ID	145																		
Date	40/25/2	, ,																	
) #																			_

21 495 629

LDC# SDG#:

Continuing Calibration

Reviewer: 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 8270C)

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 ?

&N N/A

	7	-	_	-	Т	T	7	7	7	-	- 1	 -	-	_	7	71		1	Т	_	_		-	7		T	 	
one per per per per per per per per per pe		JANY (C)				>																						
Associated Samples	0-417 00 2132	2	58783 MB			8 9 13-19, 23,24																						
Finding RRF (Limit: >0.05)	0.047	7				0.079																						
Finding %D (Limit: <25.0%)																									-			
Compound	MM				77.77	MMM																						
Standard ID	DA 502	(35)			DACK																							
# Date	69/12/2	-			10/0/01																							

Z	7
Ċ	ارکم
2	
2140	4
17:21	#
20	SDG
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Page: 1 of Reviewer:_ 2nd Reviewer:_

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

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

Was a method blank analyzed for each concentration preparation level?

Was a method blank associated with every sample?

Y/N N/A Y/ N N/A

Blank extraction date: 6/64/64 Blank analysis date: 6/68/69

Was the blank contaminated? If yes, please see qualification below.

(19) Sample Identification Associated Samples: 4 9 40 8183 MB Blank ID 8 × Compound Conc. units:_ <u>پي</u>

Associated Samples: Blank extraction date: 4/08/09 Blank analysis date: 6/09/09

<u>m</u>

(79)

	-					
ation						
Sample Identification	6)	89 14	1.4/4	,		***************************************
S	(xz) 81		(3.7))		
	9	39/4				
	15		1.4/U	,		
	13	120/4	1.4/4			
Blank ID	88824 MP	63	1.7	/		
pu		χX	S			
Compound						
		215	3.6	•		

5x Phthalates 2x all others

LDC# 21 495 C24 SDG #:

VALIDATION FINDINGS WORKSHEET

Field Blanks

Page: of Reviewer:_ 2nd Reviewer:_

> METHOD: GC/MS BNA (EPA SW 846 Method 8270) Y N N/A

Were target compounds detected in the field blanks? Were field blanks identified in this SDG?

VN N/A Were target compounds detected in the fight Manuals: 149 / Associated sample units: 174 / ΔΑ

Associated Samples: Sampling date: 6/o4/o1 Field blank type: (circle one) [Field Blank/ Rinsate / Other:

ate / Other: Associated Samples: Associated	Sample Identification						
Field Blank/ Rins	Blank ID	20 /	20.00	84.9	0.28		
Sampling date:	Compound		444	××	77		CROL

Associated sample units: 49 /kg Blank units: 19 /L

Field blank type: (circle one) Field Blank / Rinsate / Other. Sampling date: 7/21 /69

Associated Samples:

20115 マヤ

		T					
		> MB)					
tification		۵					
Sample Identification		DV 1					
V ,		eithe,					
		All Result either ND or > M&)					
		(A)					
F8672/09-50 Blank ID	10/10/2	1.4	8/:0	51	0.35		
Compound		EEE	A A A	ХX	77		CRQL
		7.0	0,0	- 1	; <u>;</u>	<u> </u>	

5x Phthalates 2x all others

LDC# 21495C 24 SDG#:

VALIDATION FINDINGS WORKSHEET

Surrogate Recovery

2nd Reviewer:

Reviewer:

Page: / of

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

Please see qualification below for all questions answered "N". Not applicable questions are identified as "N/A" Were percent recoveries (%R) for surrogates within QC limits?

X N/A N/A N/A A/N N

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

#	Date	Sample ID	Surrogate	%R (Limits)	Qualifications
		2 (400x)	FBP	(381-135)	No mad
		3 ((60x5))	NBZ		
			HAT.	\ \rightarrow\ \ri	
		6 (30x)			
		7 (JODK)			
		ال دخمماح کا			
				()	
				()	
				(
				()	
				()	
				()	
				()	
				()	
				()	
				()	
• OC lim	* QC limits are advisory	QC Limits (Soil) QC Limits (Water)	(per)	QC Limits (Soil)	OC Limits (Water)

21495 C2A LDC #: SDG #:

VALIDATION FINDINGS WORKSHEET Matrix Spike/Matrix Spike Duplicates

Page:

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

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

Y N N/A

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. YN NA

Y)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?

	2.5	_	-					·,						_			_
Qualifications	Noque (LCS/D)																
Associated Samples							/1										
RPD (Limits)	()	(08) 28	()	()	()	55 (30)	()	()	()	()	()	(()	()	()	()	()
MSD %R (Limits)	2 26 (10-182)	()	215 (11-188)	0 (50-150)	(461-01) 002	(051-05) OE	12425 (50-150)	()	()	()	()	(()	()	()	()	()
MS %R (Limits)	1225 (10-1824	()	225 (11-188)	6 (50-150)		()	(05/-05) 5666	()	()	()	()	()	()	()	()	()	()
Compound	1004	XX	7.7	/حُرْد	22	RKR	nnn										
MS/MSD ID	21/22	/															
Date																	
#																	

	Compound	QC Limits (Soil)	RPD (Soll)	QC Limits (Water)	RPD (Water)		Compound	QC Limits (Soll)	RPD (Soll)	QC Limits (Water)	RPD (Water)
Ą.	Phenol	26-90%	~35%	12-110%	<u>≤</u> 42%	99 .	Acenaphthene	31-137%	<u>≤</u> 19%	46-118%	<u>s</u> 31%
ϋ	C. 2-Chlorophenol	25-102%	× 50%	27-123%	< 40%	=	4-Nitrophenol	11-114%	< 50%	10-80%	< 50%
шi	1,4-Dichlorobenzene	28-104%	< 27%	36-97%	< 28%	χ.	2,4-Dinitrotoluene	28-89%	< 47%	24-96%	< 38%
	N-Nitroso-di-n-propylamine	41-126%	< 38%	41-116%	< 38%	Ë	Pentachlorophenol	17-109%	< 47%	9-103%	< 50%
œ	1,2,4-Trichlorobenzene	38-107%	< 23%	39-98%	< 28%	Ŋ	Pyrene	35-142%	< 36%	26-127%	< 31%
>	4-Chloro-3-methylphenol	26-103%	< 33%	23-97%	< 42%						

LDC# 21495 (24 SDG #: 25 Cm-1

VALIDATION FINDINGS WORKSHEET Laboratory Control Samples (LCS)

2nd Reviewer. Reviewer:

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

Y N N/A

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

Was a LCS required?

Y N N/A

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

	, (() / d				(1,020)																			
Qualifications	J / MJ /	JOHN S				No mal																			
Associated Samples	20, 197385MB	<i>></i>				13-19, 86524 MB													men de la companya de						
RPD (LImits)	1 08) 28		()	()	()	()	())	, , ,	()			(()		(()	()	()	()	()	()	()	,
LCSD %R (Limits)	27 /(50-120)	(1) 45	()	()	()	()	()	()	,	()	(()	(()	()	()	()	()	()	()	()	()	()	()	`
LC3 %R (Limits)		43 ()	())	()	(221-05) 781	()	()		()	()	()	()	()	()	()	()	(()	()	()	()	()	()	,
Compound	RRR/	111)		XX																			
CSACSD ID	1 5 7 385 LCS /D					88824 LCS/D																			-
# Dete																									

 $\widetilde{\xi}_{\tilde{z}}$

LDC #: 21 495 (26 SDG #: Lec Gray

Compound Quantitation and Reported CRQLs VALIDATION FINDINGS WORKSHEET

Page: 1 of 1 Reviewer: _

2nd Reviewer:

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

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

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?

						Ť				
ions	(6)		3							
Qualifications	J ders/A									
Associated Samples										
Ası	1	0								
	1 range									
	r cal									
Finding	иии									
	7 SS	/							:	
	S				_					
Sample ID										
S	p									
	_									
Date										
#										

Comments: See sample calculation verification worksheet for recalculations

LDC #: 2/445 C29 SDG #: 54 Cm

VALIDATION FINDINGS WORKSHEET Overall Assessment of Data

Page:

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

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

All available information pertaining to the data were reviewed using professional judgement to compliment the determination of the overall quality of the data.

Y/N N/A

Was the overall quality and usability of the data acceptable?

II					
Date	Sample ID	Finding	Associated Samples	Qualifications	
	70	7 Cm	range	X	(e)
2	9	All execut SS UNU	4.11		-
				:	

LDC #:_	21495 (29
SDG #:_	Sulover

VALIDATION FINDINGS WORKSHEET Field Duplicates

Page:_	of_/
Reviewer:	TV/4
2nd reviewer:	N

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

/ Y	N	N/A
Y	N	N/A

Were field duplicate pairs identified in this SDG? Were target compounds identified in the field duplicate pairs?

Compound	<u>Concentratio</u>	ng leg /key	RPD
SS UUU	17000 5400	13000 7000	27 (= 502 RPD) 26

	Concentration	one us/by,	
Compound	15	16	RPD
Ух	180 4	39	141 (= 180 Diff)
2	1.4	6.8 U	5.4 (= 6.8 Diff)
			·

	Concentration ()	
Compound		RPD
1		
·		·

	Concentratio	n()	
Compound			RPD
·			
	·	·	
·			

XX - U at MDL rot RL (34U)

S- 0.854 ATMPL NUT RL

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, 2009 Phase B Investigation,

Henderson, Nevada

Collection Date:

June 9 through June 16, 2009

LDC Report Date:

September 23, 2009

Matrix:

Water

Parameters:

Semivolatiles

Validation Level:

Stage 2B

Laboratory:

Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0903243

Sample Identification

H-28AB AW-BW-02B M-142B M-130B

M-29B

Introduction

This data review covers 5 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8270C for Semivolatiles.

This review follows the Standard Operating Procedures (SOP) 40, Data Review/Validation (BRC 2009), the Quality Assurance Project Plan Tronox LLC Facility, Henderson, Nevada (June 2009), NDEP guidance (May 2006), and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review (June 2008) as there are no current guidelines for the method stated above.

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

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

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

I. Technical Holding Times

All technical holding time requirements were met.

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

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

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

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
5/22/09	Octachlorostyrene	0.048 (≥0.05)	All samples in SDG R0903243	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.

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

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

V. Blanks

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

Method Blank ID	Extraction Date	Compound TIC (RT in minutes)	Concentration	Associated Samples
89594MB	6/17/09	Butylbenzylphthalate Di-n-butylphthalate	0.18 ug/L 1.2 ug/L	M-142B M-130B

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

Sample FB060409 (from SDG R0903006) was identified as a field blank. No semivolatile contaminants were found in this blank with the following exceptions:

Field Blank ID	Sampling Date	Compound	Concentration	Associated Samples
FB060409	6/4/09	Butylbenzylphthalate Di-n-butylphthalate Diethylphthalate	0.12 ug/L 0.78 ug/L 0.28 ug/L	H-28AB AW-BW-02B M-142B M-130B

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

VI. Surrogate Spikes

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

VII. Matrix Spike/Matrix Spike Duplicates

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

VIII. Laboratory Control Samples (LCS)

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

LCS ID (Associated Samples)	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Flag	A or P
89594LCS/D (M-142B M-130B 89594MB)	Pyridine	35 (50-120)	39 (50-120)	-	J- (all detects) UJ (all non-detects)	Р
89818LCS/D (M-29B 89818MB)	Pyridine	16 (50-120)	33 (50-120)	67 (≤30)	J (all detects) UJ (all non-detects)	Р

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

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

XI. Target Compound Identifications

Raw data were not reviewed for this SDG.

XII. Project Quantitation Limit

All compounds reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG R0903243	All compounds reported below the PQL.	J (all detects)	А

Raw data were not reviewed for this SDG.

XIII. Tentatively Identified Compounds (TICs)

Raw data were not reviewed for this SDG.

XIV. System Performance

Raw data were not reviewed for this SDG.

XV. Overall Assessment

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

XVI. Field Duplicates

No field duplicates were identified in this SDG.

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles - Data Qualification Summary - SDG R0903243

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0903243	H-28AB AW-BW-02B M-142B M-130B M-29B	Octachlorostyrene	J (all detects) UJ (all non-detects)	А	Initial calibration (RRF) (c)
R0903243	M-142B M-130B	Pyridine	J- (all detects) UJ (all non-detects)	Р	Laboratory control samples (%R) (I)
R0903243	M-29B	Pyridine	J (all detects) UJ (all non-detects)	Р	Laboratory control samples (%R)(RPD) (I,Id)
R0903243	H-28AB AW-BW-02B M-142B M-130B M-29B	All compounds reported below the PQL.	J (all detects)	А	Project Quantitation Limit (sp)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles - Laboratory Blank Data Qualification Summary - SDG R0903243

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles- Field Blank Data Qualification Summary - SDG R0903243

No Sample Data Qualified in this SDG

Tronox Northgate Henderson

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VALIDATION	COMPLETENESS WORKSHEET

LDC #: 21495D2a SDG #: R0903243

Stage 2B

2nd Reviewer:

Laboratory: Columbia Analytical Services

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

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

	Validation Area	,	Comments
1.	Technical holding times	A	Sampling dates: 6 /69 - 16 /69
II.	GC/MS Instrument performance check	A	/ '
111.	Initial calibration	SW	
IV.	Continuing calibration/ICV	NGW A	COV/100 4 25 2
V.	Blanks	SW	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	2	Client spec
VIII.	Laboratory control samples	SW	chient spec
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	A	
XI.	Target compound identification	N	
XII.	Compound quantitation/CRQLs	N	
XIII.	Tentatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data	A	
XVI.	Field duplicates	N	
XVII.	Field blanks	SW	FB = FB060409 from R0903006

Note:

A = Acceptable

N = Not provided/applicable

SW = See worksheet

ND = No compounds detected

R = Rinsate

FB = Field blank

D = Duplicate

TB = Trip blank

EB = Equipment blank

Validated Samples:

Water

	***OIL ¥						
1	H-28AB	11	89336 MB	21	,	31	
2	AW-BW-02B	12	89594 MB	22		32	
3 >	M-142B	13 3	89818 MB	23		33	
t ₄ γ	M-130B	14		24		34	
5 7	M-29B	15		25		35	
6		16		26		36	
7		17		27		37	
8		18		28		38	
9		19		29		39	
10		20		30		40	

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

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

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

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

LUC #: 11497 729

SDG #:

Initial Calibration

Page:

2nd Reviewer: Reviewer:

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? Were all %RSDs and RRFs within the validation criteria of ≤30 %RSD and ≥0.05 RRF ? Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

| N/A | N/A | N/A | Were percent relative standard deviations (%RSD) and relative response factors (RRF) within I Was a curve fit used for evaluation? If yes, what was the acceptance criteria used for evaluation.

Y N N/A

*	# Date	Standard ID Compound Finding %RSD and ≥0.05 RRF ? CAL	Cifferta of ≤30 %RSD a Finding %RSD (Limit: ≤30.0%)	Inding RRF (Limit: ≥0.05) 0.0 48	Associated Samples AI + BIKS	Qualifications JMS A (c)

24	9
1495	j
0	
LDC #:	# 5000

Page: of 1 Reviewer: 2nd Reviewer: (

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

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A". Was a method blank analyzed for each matrix? Y N N/A

Was a method blank analyzed for each concentration preparation level? Was a method blank associated with every sample? Y N N/A Y/N N/A

Was the blank contaminated? If yes, please see qualification below.

AN NY

W Associated Samples: Blank extraction date: 6 17 161 Blank analysis date: 6 17/69 ž Conc. units:_

(MD) Sample Identification 89594 MZ Blank ID 6.18 7 744 X Compound

Blank analysis date: Blank extraction date:_ Conc. units:

Compound Blank ID Sample Identification	Conc. units:		Associated Samples:
	Compound	Blank ID	

LDC # 21 495 boa SDG #: Sec Cary

VALIDATION FINDINGS WORKSHEET

Reviewer:__ 2nd Reviewer:_

Page:_

Field Blanks

Were field blanks identified in this SDG?

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

V N/A

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

Blank units: 49 / Associated sample units: 45 / L
Sampling date: 6 / 64 / 6 |
Field blank type: (circle one) | Field Blank | Rinsate / Other:

(an) Sample Identification 1-4 Associated Samples: FB060409 Blank ID 0.78 0.28 0.12 AAA 11 × Compound CROL

2, 4.

3,0

Associated sample units:_ Blank units:

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

		 	 	 	_	
	:					
	ıtion					
	Sample Identification					
Associated Samples:	S					
Associa						
ther:						
/ Rinsate / Of						
Field Blank	Blank ID					
oe: (circle one	puno					
Field blank type: (circle one) Field Blank / Rinsate / Other:	Compound					CROL

5x Phthalates 2x all others

LDC# 21 495 D2A SDG#: 54 Cne/

VALIDATION FINDINGS WORKSHEET Laboratory Control Samples (LCS)

Page: of Reviewer:

2nd Reviewer.

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

Y N N/A

		7. 2	<u>, `</u>					Ž	_									.,.							
Qualifications	No one (KS.				J-145/8 (1)			J/MJ/P (1.																	
Associated Samples	1,2,89356 MB	_~			3 4 89594 Mb			5 89818 MR																	
RPD (Limits)	(06) 99	(()	()	()	()	((20)	,	((()	•		()	()	()	()	()	(
LCSD %R (LImits)	27 (50-120)	()	()	()	(0 c/-05) be	()	()	33 (50-120)	,	()	()	()	()	()	()	()		()	()	()	()	()	()	()	()
LCS %R (Limits)	()	(ac1-0g) 8+	()	()	35 (52-120)	()	()	16 (50-120)] (()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()
Compound	RRR	777			RRR			RER																	
CS/CSD ID	89336 LISID				89594 LCS 10			8 9818 LCS/D																	
Date									*																

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, 2009 Phase B Investigation,

Henderson, Nevada

Collection Date:

June 17 through June 24, 2009

LDC Report Date:

September 23, 2009

Matrix:

Water

Parameters:

Semivolatiles

Validation Level:

Stage 2B

Laboratory:

Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0903404

Sample Identification

M-78B

M-78BRE

M-128B

H-38B

M-19B

M-34B

M-125B

M-22AB

M-17AB

M-125BMS

M-125BMSD

Introduction

This data review covers 11 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8270C for Semivolatiles.

This review follows the Standard Operating Procedures (SOP) 40, Data Review/Validation (BRC 2009), the Quality Assurance Project Plan Tronox LLC Facility, Henderson, Nevada (June 2009), NDEP guidance (May 2006), and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review (June 2008) as there are no current guidelines for the method stated above.

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

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

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

I. Technical Holding Times

All technical holding time requirements were met.

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

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

Percent relative standard deviations (%RSD) were less than or equal to 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
5/22/09	Octachlorostyrene	0.048 (≥0.05)	M-78B M-78BRE M-128B H-38B M-19B M-34B M-125B M-125BMS M-125BMS M-125BMSD 89818MB 90162MB	J (all detects) UJ (all non-detects)	А

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

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

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

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

All of the continuing calibration RRF values were greater than or equal to 0.05 with the following exceptions:

Date	Compound	RRF (Limits)	Associated Samples	Flag	A or P
6/24/09	Octachlorostyrene	0.044 (≥0.05)	M-78BRE H-38B M-19B M-34B	J (all detects) UJ (all non-detects)	А
6/26/09	Octachlorostyrene	0.049 (≥0.05)	M-125B M-125BMS M-125BMSD 90162MB	J (all detects) UJ (all non-detects)	А

V. Blanks

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

Method Blank ID	Extraction Compound Blank ID Date TIC (RT in minutes)		Concentration	Associated Samples	
90162MB	6/25/09	Di-n-butylphthalate	0.98 ug/L	M-125B	

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

Sample FB060409 (from SDG R0903006) was identified as a field blank. No semivolatile contaminants were found in this blank with the following exceptions:

Field Blank ID	Sampling Date	Compound	Concentration	Associated Samples
FB060409	6/4/09	Butylbenzylphthalate Di-n-butylphthalate Diethylphthalate	0.12 ug/L 0.78 ug/L 0.28 ug/L	M-78B M-78BRE M-128B H-38B M-125B

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

VI. Surrogate Spikes

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

VII. Matrix Spike/Matrix Spike Duplicates

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

Spike ID (Associated Samples)	Compound	MS (%R) (Limits)	MSD (%R) (Limits)	RPD (Limits)	Flag	A or P
M-125BMS/MSD (M-125B)	Pyridine	36 (50-150)	21 (50-150)	53 (≤30)	J (all detects) UJ (all non-detects)	А

VIII. Laboratory Control Samples (LCS)

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

LCS ID (Associated Samples)	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Flag	A or P
89818LCS/D (M-78B M-78BRE M-128B H-38B M-19B M-34B 89818MB)	Pyridine	16 (50-120)	33 (50-120)	67 (≤30)	J (all detects) UJ (all non-detects)	Р

LCS ID (Associated Samples)	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Flag	A or P
90162LCS/D (M-125B 90162MB)	Pyridine	34 (50-120)	27 (50-120)	•	J- (all detects) UJ (all non-detects)	Р

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

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

Sample	Internal Standards	Area (Limits)	Compound	Flag	A or P
M-78B	Perylene-d12	438 (101972-407888)	Di-n-octylphthalate Benzo(b)fluoranthene Benzo(k)fluoranthene Benzo(a)pyrene Indeno(1,2,3-cd)pyrene Dibenz(a,h)anthracene Benzo(g,h,i)perylene	J (all detects) R (all non-detects)	А
M-78BRE	Perylene-d12	969 (127882-511528)	Di-n-octylphthalate Benzo(b)fluoranthene Benzo(k)fluoranthene Benzo(a)pyrene Indeno(1,2,3-cd)pyrene Dibenz(a,h)anthracene Benzo(g,h,i)perylene	J (all detects) R (all non-detects)	A
M-125B	Perylene-d12	121582 (127216-508862)	Di-n-octylphthalate Benzo(b)fluoranthene Benzo(k)fluoranthene Benzo(a)pyrene Indeno(1,2,3-cd)pyrene Dibenz(a,h)anthracene Benzo(g,h,i)perylene	J (all detects) UJ (all non-detects)	А

XI. Target Compound Identifications

Raw data were not reviewed for this SDG.

XII. Project Quantitation Limit

All compounds reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG R0903404	All compounds reported below the PQL.	J (all detects)	Α

Raw data were not reviewed for this SDG.

XIII. Tentatively Identified Compounds (TICs)

Raw data were not reviewed for this SDG.

XIV. System Performance

Raw data were not reviewed for this SDG.

XV. Overall Assessment

The overall assessment of data was acceptable. In the case where more than one result was reported for an individual sample, the least technically acceptable results were rejected as follows:

Sample	Compound	Flag	A or P
M-78BRE	All TCL compounds	x	А

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

XVI. Field Duplicates

No field duplicates were identified in this SDG.

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles - Data Qualification Summary - SDG R0903404

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0903404	M-78B M-78BRE M-128B H-38B M-19B M-34B M-125B	Octachlorostyrene	J (all detects) UJ (all non-detects)	A	Initial calibration (RRF) (c)
R0903404	M-78BRE H-38B M-19B M-34B M-125B	Octachlorostyrene	J (all detects) UJ (all non-detects)	А	Continuing calibration (RRF) (c)
R0903404	M-125B	Pyridine	J (all detects) UJ (all non-detects)	А	Matrix spike/Matrix spike duplicates (%R)(RPD) (m,ld)
R0903404	M-78B M-78BRE M-128B H-38B M-19B M-34B	Pyridine	J (all detects) UJ (all non-detects)	Р	Laboratory control samples (%R)(RPD) (I,Id)
R0903404	M-125B	Pyridine	J- (all detects) UJ (all non-detects)	Р	Laboratory control samples (%R) (I)
R0903404	M-78B M-78BRE	Di-n-octylphthalate Benzo(b)fluoranthene Benzo(k)fluoranthene Benzo(a)pyrene Indeno(1,2,3-cd)pyrene Dibenz(a,h)anthracene Benzo(g,h,i)perylene	J (all detects) R (all non-detects)	А	Internal standards (area) (i)
R0903404	M-125B	Di-n-octylphthalate Benzo(b)fluoranthene Benzo(k)fluoranthene Benzo(a)pyrene Indeno(1,2,3-cd)pyrene Dibenz(a,h)anthracene Benzo(g,h,i)perylene	J (all detects) UJ (all non-detects)	А	Internal standards (area) (i)

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0903404	M-78B M-78BRE M-128B H-38B M-19B M-34B M-125B M-22AB M-17AB	All compounds reported below the PQL.	J (all detects)	А	Project Quantitation Limit (sp)
R0903404	M-78BRE	All TCL compounds	Х	А	Overall assessment of data (o)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles - Laboratory Blank Data Qualification Summary - SDG R0903404

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles- Field Blank Data Qualification Summary - SDG R0903404

No Sample Data Qualified in this SDG

Tronox Northgate Henderson VALIDATION COMPLETENESS WORKSHEET

LDC #: 21495E2a SDG #: R0903404

Stage 2B

Reviewer: 2 2nd Reviewer:

Laboratory: Columbia Analytical Services

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

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

	Validation Area		Comments
l.	Technical holding times	A	Sampling dates: 6/17 - 24/09
11.	GC/MS Instrument performance check	À	
111.	Initial calibration	Sn)	70 KSD r~
IV.	Continuing calibration/ICV	SW	7, KSD rx COV/101 £ 25 }
V.	Blanks	SW	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	SW	
VIII.	Laboratory control samples	SW	us /p
IX.	Regional Quality Assurance and Quality Control	N	
Х.	Internal standards	SW	
XI.	Target compound identification	N	
XII.	Compound quantitation/CRQLs	N	
XIII.	Tentatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data	SW	
XVI.	Field duplicates	N.	
XVII.	Field blanks	SIK)	FB = FB060409 from R0903006

Note:

A = Acceptable

N = Not provided/applicable

SW = See worksheet

ND = No compounds detected

R = Rinsate

FB = Field blank

D = Duplicate

TB = Trip blank

EB = Equipment blank

Validated Samples:

Water

7				
1 '	M-78B	11 M-125BMSD	21 89818 MB	31
2 1	M-78BRE	12	12 × 90 162 MB	32
3 1	M-128B	13	23 3 90 344 MB	33
4 1	H-38B	14	24	34
5 1	M-19B	15	25	35
6 !	M-34B	16	26	36
7 7	M-125B	17	27	37
8 3	M-22AB	18	28	38
9 3	M-17AB	19	29	39
10 ~	M-125BMS	20	30	40

VALIDATION FINDINGS WORKSHEET

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

A. Phenol**	P. Bis(2-chloroethoxy)methane	EE. 2,6-Dinitrotoluene	TT. Pentachlorophenol**	III. Benzo(a)pyrene**
B. Bis (2-chloroethyl) ether	Q. 2,4-Dichlorophenol**	FF. 3-Nitroaniline	UU. Phenanthrene	JJJ. Indeno(1,2,3-cd)pyrene
C. 2-Chlorophenol	R. 1,2,4-Trichlorobenzene	GG. Acenaphthene™	W. 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-Chioroaniline	II. 4-Nitrophenol*	XX. Di-n-butyiphthalate	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. Pyrane	OOO. N-Nitrosodimethylamine
Н. 2,2'-Охуbis(1-chloropropane)	W. 2-Methylnaphthalene	LL. Diethylphthalate	AAA. Butyibenzylphthalate	PPP. Benzoic Acid
i. 4-Methyiphenol	X. Hexachlorocyclopentadiene*	MM. 4-Chlorophenyl-phenyl ether	BBB. 3,3'-Dichlorobenzidine	QQQ. Benzyl alcohol
J. N-Nitroso-di-n-propylamine⁴	Y. 2,4,6-Trichlorophenoi**	NN. Fluorene	CCC. Benzo(a)anthracene	RRR. Pyridine
K. Hexachioroethane	Z. 2,4,5-Trichlorophenol	00. 4-Nitroaniline	DDD. Chrysene	SSS. Benzidine
L. Nitrobenzene	AA. 2-Chloronaphthalene	PP. 4,6-Dinitro-2-methylphenol	EEE. Bis(2-ethylhexyl)phthalate	TT. 1,4. Dioxane
M. Isophorone	BB. 2-Nitroaniline	QQ. N-Nitrosodiphenylamine (1)**	FFF. Di-n-octylphthalate**	uuu Octachlorostyrenc
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.

VALIDATION FINDINGS WORKSHEET

2nd Reviewer:

Page: Reviewer:

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

LUC #: 41713 0%

ta lar

SDG #:

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

Did the laboratory conduct an acceptable 5 point calibration prior to sample analysis?

AN NA

Y N (N/A)

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? 賽 🖊 🗚

Were all %RSDs and RRFs within the validation criteria of ≤30 %RSD and ≥0.05 RRF ? Did the initial calibration meet the acceptance criteria?

Qualifications 89818m 60 344 MB Associated Samples 90162 MB 10 11 8 (Limit: >0.05) Finding RRF 0.948 0 Finding %RSD (Limit: <30.0%) MAN Compound NNN Standard ID 164 60/25/6 Date 17/01/69

21495 E 29 . # DOT

VALIDATION FINDINGS WORKSHEET

Continuing Calibration

SDG #: La Cross METHOD: GC/MS BNA (EPA SW 846 Method 8270C)

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

Reviewer:_ Page:

2nd Reviewer:

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? Z Z

# Date	Standard ID	Compound	Finding %D (Limit: <25.0%)	Finding RRF		
6/24 /ba	DAGRO	11.11.1		(c0,05)	Associated Samples	Qualifications
	70017	222		0.044	2 4-6.	J/45/4
-					-	
6/20/02	DA 733	Иии		0.049	7 10 11 62.11	
						\ \ \
						V
4 7/02/00	4 07 × 00 P	444				\ \ \
,		2		640.0	8	P
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4	نند
DC#	DG#

VALIDATION FINDINGS WORKSHEET

Page: of

Reviewer:__ 2nd Reviewer:__

Blanks

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 8270C)

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

Was a method blank analyzed for each concentration preparation level? Y N N/A

Associated Samples: Y/N N/A Was a method blank associated with every sample? Y/N N/A Was the blank contaminated? If yes, please see qualification below. Blank extraction date: $\frac{b}{\sqrt{25/6}}$ Blank analysis date: $\frac{b}{\sqrt{26}}$ るん

(an) Sample Identification 4010P Blank ID 0.98 Compound Conc. units:

Blank analysis date:_ Blank extraction date: Conc. units:

	tion				
	Sample Identification				
Associated Samples:					
Associat					
	Blank ID				
Conc. units:	Compound				

5x Phthalates 2x all others

LDC # 21 495 E 24 See Care SDG#:

VALIDATION FINDINGS WORKSHEET

Field Blanks

_ 5 Reviewer: NZ Page:__ 2nd Reviewer:_

METHOD: GC/MS BNA (EPA SW 846 Method 8270)
Y N N/A Were field blanks identified in this SDG?

(g)

ų . ė 4.

V N N/A Were field blanks identified in the field blanks?

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

Blank units: 40 /L Associated sample units: 45 /L

Sampling date: 6 /64 /0 Field blank type: (circle one) Field Blank)/ Rinsate / Other:

Sample Identification 1-4 7 Associated Samples: FB060409 Blank ID 0.28 0.12 0.78 11 AHA × × Compound

Associated sample units:_ Blank units:

Sampling date:

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

Sample Identification Associated Samples: Blank ID Compound CROL

5x Phthalates 2x all others

LDC# 21 495 E29 SDG #: 24

VALIDATION FINDINGS WORKSHEET Matrix Spike/Matrix Spike Duplicates

Page: 2nd Reviewer:_ 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".

YA 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. X N/A

	N N/A	Was a MS/MSD analyzed every 20 samples of each I Were the MS/MSD percent recoveries (%R) and the r	alyzed every 2: percent recove		natrix? elative percent differences (RPD) within the QC limits?	es (RPD) within the C	2C limits?		
) *	Date	OI OSW/SW	Compound		MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications	
		11/01	99	13 (27.143)	26 (27.143)	(66) 99	7	No grad (1660 h	<u> </u>
		, ,	Jtt	(411-12)	3 (24-113)	200 ()			\
			7	(051-05) 791	(05/-05) 651			_>	_
			RRR	(1) %	2/ (/)	53 (+)	-	9/NS/4 (m.	$\overline{}$
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				()		1			_
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	Compound	QC Limits (Soil)	RPD (Soll)	QC Limits (Water)	RPD (Water)		Compound	QC Umits (Soil)	RPD (Sell)	QC Limits (Water)	RPD
Ą.	Phenol	26-90%	~32%	12-110%	< 42%	_ອ	Acenaphthene	31-137%	≤ 19%	46-118%	< 31%
ci	C. 2-Chlorophenol	25-102%	< 50%	27-123%	< 40%	=	4-Nitrophenol	11-114%	< 50%	10-80%	< 50%
ш	1,4-Dichlorobenzene	28-104%	< 27%	36-97%	< 28%	X.	2,4-Dinitrotoluene	28-89%	< 47%	24-96%	× 38%
7	N-Nitroso-di-n-propylamine	41-126%	< 38%	41-116%	< 38%	Ë.	Pentachlorophenol	17-109%	< 47%	9-103%	× 50%
œ	1,2,4-Trichlorobenzene	38-107%	< 23%	39-98%	< 28%	77	Pyrene	35-142%	× 36%	26-127%	× 31%
>	4-Chloro-3-methylphenol	26-103%	< 33%	23-97%	< 42%						

LDC#: 21495 #24 SDG #: 24 Com

VALIDATION FINDINGS WORKSHEET Laboratory Control Samples (LCS)

Page: of

Reviewer: 2nd Reviewer: 7

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

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

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

) <u> </u>				<u>.</u>	-/																		
Qualifications	1) 4/2N/m C				5-/45/p (L)	NIGHT (LCSD																			
Associated Samples	1-6. 89818 MB				7. 90162 MB																				
RPD (Limts)	67 (30)	()	()	()	()	()	()	()	()	()	())))	()	(·)	()	()	()	())	())	
LCSD %R (Limits)	33 (90-120)	()	()		(00/-05) 25	()	()	()		(`	(()	()	()	()	()	()	()	()	()	()	()	()	
LCS %R (Limits)	16 (50-120)	()	()	I	34 (50-120)	48 (1)	()	())	()	()	(()	())	()	()	()	()	`	()	()	(^	()
Compound	RRR				RRR	+14																			
CS/CSD ID	89818 165/0	`			10162 LCS/D																				1
Date																									
		\perp	1												丄										

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LDC #:	SDG #:

VALIDATION FINDINGS WORKSHEET Internal Standards

Page: 1 of Reviewer 2nd Reviewer:_

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

N/A/A

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

Were all internal standard area counts within -50 to +100 of the associated calibration standard?

Were the retention times of the internal standards within +/- 30 seconds of the retention times of the associated calibration standard?

							z`	Ł			 				
Qualifications	J/R/A (i)			11	No mal (BC)		CANAL FFF, GGG, HH	V IZI JJJ KKK L							
RT (Limits)	407888)	51/528)	(79880												
Area (Limits)	72 -	969 (127 882-51	121 582 (127 216 - 50 8862		114141	120064									
Internal Standard	PRY	PRY	PRY	, 1											
Sample ID		3	7		10										
Date															
#															

* QC limits are advisory

IS1 (DCB) = 1,4-Dichlorobenzene-d4 IS2 (NPT) = Naphthalene-d8 IS3 (ANT) = Acenaphthene-d10

IS4 (PHN) = Phenanthrene-d10 IS5 (CRY) = Chrysene-d12 IS6 (PRY) = Perylene-d12

SDG# 54 (n)

VALIDATION FINDINGS WORKSHEET Overall Assessment of Data

Page: of L Reviewer: V6

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

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

All available information pertaining to the data were reviewed using professional judgement to compliment the determination of the overall quality of the data.

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

#	Date	Sample ID	Finding	Associated Samples	Qualifications
		2	confirmation for #		X/A (b)
			(I'S outside lingth		
Con	Comments				
)					

LDC Report# 21495F2a

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, 2009 Phase B Investigation,

Henderson, Nevada

Collection Date:

June 5 through June 11, 2009

LDC Report Date:

October 20, 2009

Matrix:

Soil

Parameters:

Semivolatiles

Validation Level:

Stage 2B

Laboratory:

Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0903184

Sample Identification

SA127-0.5BSA134-0.5BSA127-0.5BDLSA127-0.5BMSRSAJ6-0.5BSA127-0.5BMSDRSAJ6-0.5BDLSA55-0.5BMSDRSAK6-0.5BSA55-0.5BMSDRSAK8-0.5BSA201-0.5BMSDRSAL7-0.5BSA201-0.5BMSD

RSAL8-0.5B SA35-0.5B SA55-0.5B SA56-0.5B SA176-0.5B RSAO3-0.5B SA182-0.5B

SA182-0.5BDL SA201-0.5B SA201-0.5BDL SA166-0.5B

RSAK4-0.5B

RSAK4009-0.5B

Introduction

This data review covers 27 soil samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8270C for Semivolatiles.

This review follows the Standard Operating Procedures (SOP) 40, Data Review/Validation (BRC 2009), the Quality Assurance Project Plan Tronox LLC Facility, Henderson, Nevada (June 2009), NDEP guidance (May 2006), and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review (June 2008) as there are no current guidelines for the method stated above.

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

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

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

I. Technical Holding Times

All technical holding time requirements were met.

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

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

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

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
5/22/09	Octachlorostyrene	0.048 (≥0.05)	All samples in SDG R0903184	J (all detects) UJ (all non-detects)	А

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

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

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

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

All of the continuing calibration RRF values were greater than or equal to 0.05 with the following exceptions:

Date	Compound	RRF (Limits)	Associated Samples	Flag	A or P
6/16/09	Octachlorostyrene	0.047 (≥0.05)	SA35-0.5B SA55-0.5B SA56-0.5B SA176-0.5B RSA03-0.5B SA182-0.5B SA201-0.5B SA166-0.5B RSAK4-0.5B RSAK4-0.5B RSAK4009-0.5B SA55-0.5BMS SA55-0.5BMS	J (all detects) UJ (all non-detects)	А

V. Blanks

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

Method Blank ID	Extraction Date	Compound TIC (RT in minutes)	Concentration	Associated Samples
89048MB	6/9/09	Butylbenzylphthalate Di-n-butylphthalate Naphthalene	5.7 ug/Kg 43 ug/Kg 1.3 ug/Kg	SA127-0.5B SA127-0.5BDL RSAJ6-0.5B RSAJ6-0.5BDL RSAK6-0.5B RSAK8-0.5B RSAL7-0.5B RSAL8-0.5B
89404MB	6/15/09	Naphthalene	1.3 ug/Kg	SA182-0.5B SA182-0.5BDL SA201-0.5B SA201-0.5BDL SA166-0.5B RSAK4-0.5B RSAK4009-0.5B SA134-0.5B

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

Sample	Compound TIC (RT in minutes)	Reported Concentration	Modified Final Concentration
SA127-0.5B	Di-n-butylphthalate Naphthalene	96 ug/Kg 1.4 ug/Kg	96U ug/Kg 1.4U ug/Kg
RSAK6-0.5B	Di-n-butylphthalate	76 ug/Kg	76U ug/Kg
RSAL7-0.5B	Di-n-butylphthalate Naphthalene	96 ug/Kg 1.0 ug/Kg	96U ug/Kg 1.0U ug/Kg
RSAL8-0.5B	Di-n-butylphthalate	69 ug/Kg	69U ug/Kg
SA182-0.5BDL (70X)	Naphthalene	170 ug/Kg	170U ug/Kg
SA201-0.5B	Naphthalene	2.1 ug/Kg	2.1U ug/Kg
SA166-0.5B	Naphthalene	1.0 ug/Kg	1.0U ug/Kg
RSAK4-0.5B	Naphthalene	1.0 ug/Kg	1.0U ug/Kg

Sample FB072109-SO (from SDG R0904016) was identified as a field blank. No semivolatile contaminants were found in this blank with the following exceptions:

Field Blank ID	Sampling Date	Compound	Concentration	Associated Samples
FB072109-SO	7/21/09	Bis(2-ethylhexyl)phthalate Butylbenzylphthalate Di-n-butylphthalate Diethylphthalate	1.4 ug/Kg 0.18 ug/Kg 1.5 ug/Kg 0.35 ug/Kg	All samples in SDG R0903184

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

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. Surrogate recoveries (%R) were not within QC limits for several samples. Since these samples were diluted out, no data were qualified.

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 recoveries (%R) and relative percent differences (RPD) were not within QC limits for some compounds, the MSD, LCS, or LCSD 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 LCS/LCSD percent recoveries (%R) and relative percent differences (RPD) were not within QC limits for some compounds, the LCS or LCSD 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.

XI. Target Compound Identifications

Raw data were not reviewed for this SDG.

XII. Project Quantitation Limit

All project quantitation limits were within validation criteria with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
SA127-0.5B	Hexachlorobenzene	Sample result exceeded calibration range.	Reported result should be within calibration range.	J (all detects)	Α
SA182-0.5B SA201-0.5B RSAJ6-0.5B	Hexachlorobenzene Octachlorostyrene	Sample result exceeded calibration range.	Reported result should be within calibration range.	J (all detects) J (all detects)	А

All compounds reported below the PQL were qualified as follows:

Sample	Finding		A or P	
All samples in SDG R0903184	All compounds reported below the PQL.	J (all detects)	Α	

Raw data were not reviewed for this SDG.

XIII. Tentatively Identified Compounds (TICs)

Raw data were not reviewed for this SDG.

XIV. System Performance

Raw data were not reviewed for this SDG.

XV. Overall Assessment

The overall assessment of data was acceptable. In the case where more than one result was reported for an individual sample, the least technically acceptable results were rejected as follows:

Sample	Compound	Flag	A or P
SA127-0.5B	Hexachlorobenzene	x	А
SA127-0.5BDL	All TCL compounds except Hexachlorobenzene	x	А
SA182-0.5B SA201-0.5B RSAJ6-0.5B	Hexachlorobenzene Octachlorostyrene	X X	А
SA182-0.5BDL SA201-0.5BDL RSAJ6-0.5BDL	All TCL compounds except Hexachlorobenzene Octachlorostyrene	х	Α

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

XVI. Field Duplicates

Samples RSAK4-0.5B and RSAK4009-0.5B were identified as field duplicates. No semivolatiles were detected in any of the samples with the following exceptions:

	Concentration (ug/Kg)		RPD	Difference		
Compound	RSAK4-0.5B	RSAK4009-0.5B	(Limits)	(Limits)	Flags	A or P
Chrysene	4.1	3.8	-	0.3 (≤6.8)	-	-
Fluoranthene	3.8	3.1	-	0.7 (≤6.8)	-	-

Revision 1

	Concentration (ug/Kg)		RPD	Difference		
Compound	RSAK4-0.5B	RSAK4009-0.5B	(Limits)	(Limits)	Flags	A or P
Hexachlorobenzene	250	240	4 (≤50)	-	-	-
Naphthalene	1.0	6.8U	•	5.8 (≤6.8)	-	-
Phenanthrene	3.8	3.8	-	0 (≤6.8)	-	-
Pyrene	2.7	2.7	-	0 (≤6.8)	-	-
Octachlorostyrene	50	47	6 (≤50)	-	-	-

*Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles - Data Qualification Summary - SDG R0903184

SDG	Sample	Compound	Flag	A or P	Reason (Code)
	SA127-0.5B SA127-0.5BDL RSAJ6-0.5B RSAJ6-0.5BDL RSAK6-0.5B RSAK8-0.5B RSAL7-0.5B RSAL8-0.5B SA35-0.5B SA35-0.5B SA56-0.5B SA176-0.5B SA176-0.5B SA182-0.5B SA182-0.5B SA182-0.5B SA182-0.5BDL SA201-0.5B SA201-0.5B SA201-0.5BDL SA201-0.5B RSAK4-0.5B RSAK4-0.5B RSAK4-0.5B RSAK4-0.5B	Octachlorostyrene	J (all detects) UJ (all non-detects)	A	Initial calibration (RRF) (c)
R0903184	SA35-0.5B SA55-0.5B SA56-0.5B SA176-0.5B RSAO3-0.5B SA182-0.5B SA201-0.5B SA166-0.5B RSAK4-0.5B RSAK4-0.5B	Octachlorostyrene	J (all detects) UJ (all non-detects)	A	Continuing calibration (RRF) (c)
*R0903184	SA127-0.5B	Hexachlorobenzene	J (all detects)	А	Project Quantitation Limit (e)
*R0903184	SA182-0.5B SA201-0.5B RSAJ6-0.5B	Hexachlorobenzene Octachlorostyrene	J (all detects) J (all detects)	A	Project Quantitation Limit (e)

10

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0903184	SA127-0.5B SA127-0.5BDL RSAJ6-0.5B RSAJ6-0.5BDL RSAK6-0.5B RSAK8-0.5B RSAL7-0.5B RSAL8-0.5B SA35-0.5B SA55-0.5B SA56-0.5B SA176-0.5B RSA03-0.5B SA176-0.5B SA182-0.5B SA182-0.5BDL SA201-0.5B SA201-0.5B SA201-0.5B SA201-0.5BDL SA201-0.5B SA201-0.5BDL SA166-0.5B RSAK4-0.5B RSAK4-0.5B	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (sp)
R0903184	SA127-0.5B	Hexachlorobenzene	Х	А	Overall assessment of data (o)
R0903184	SA127-0.5BDL	All TCL compounds except Hexachlorobenzene	х	А	Overall assessment of data (o)
R0903184	SA182-0.5B SA201-0.5B RSAJ6-0.5B	Hexachlorobenzene Octachlorostyrene	X X	А	Overall assessment of data (o)
R0903184	SA182-0.5BDL SA201-0.5BDL RSAJ6-0.5BDL	All TCL compounds except Hexachlorobenzene Octachlorostyrene	х	А	Overall assessment of data (o)

^{*}Corrected associated samples in table above.

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles - Laboratory Blank Data Qualification Summary - SDG R0903184

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P	Code
R0903184	SA127-0.5B	Di-n-butylphthalate Naphthalene	96U ug/Kg 1.4U ug/Kg	А	bl
R0903184	RSAK6-0.5B	Di-n-butylphthalate	76U ug/Kg	А	bl

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P	Code
R0903184	RSAL7-0.5B	Di-n-butylphthalate Naphthalene	96U ug/Kg 1.0U ug/Kg	A	bl
R0903184	RSAL8-0.5B	Di-n-butylphthalate	69U ug/Kg	А	bl
R0903184	SA182-0.5BDL (70X)	Naphthalene	170U ug/Kg	А	bl
R0903184	SA201-0.5B	Naphthalene	2.1U ug/Kg	А	bl
R0903184	SA166-0.5B	Naphthalene	1.0U ug/Kg	А	bl
R0903184	RSAK4-0.5B	Naphthalene	1.0U ug/Kg	А	bl

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles- Field Blank Data Qualification Summary - SDG R0903184

No Sample Data Qualified in this SDG

Tronox Northqate Henderson

		•	
 VALIDATION	COMPL	ETENESS	WORKSHEET

LDC #: 21495F2a SDG #: R0903184

Laboratory: Columbia Analytical Services

Stage 2B

Reviewer:

2nd Reviewer:

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

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

	Validation Area		Comments
1.	Technical holding times	A	Sampling dates: 6/5-11/69
11.	GC/MS Instrument performance check	A	
111.	Initial calibration	SW	
IV.	Continuing calibration/ICV	SW	COV/10 < 252
V.	Blanks	SW	
VI.	Surrogate spikes	SW	
VII.	Matrix spike/Matrix spike duplicates	SW	
VIII.	Laboratory control samples	SW	vcs/b
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	A	
XI.	Target compound identification	N	
XII.	Compound quantitation/CRQLs	SW	
XIII.	Tentatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data	SW	
XVI.	Field duplicates	SM	b = 19,20
XVII.	Field blanks	SM	D = 19,20 FB FB72109-Sofrom K 6904816

Note:

A = Acceptable

N = Not provided/applicable SW = See worksheet

ND = No compounds detected

R = Rinsate FB = Field blank

D = Duplicate

TB = Trip blank
EB = Equipment blank

Validated Samples:

CAN

		0)		
1_	SA127-0.5B	11 7 SA56-0.5B	21 ³ SA134-0.5B	31 89 048 MB
2	SA127-0.5BDL	12 ⁷ SA176-0.5B	22 SA127-0.5BMS	32 7 89 341
3	NSAJ6-0.5B	13 RSA03-0.5B	23 SA127-0.5BMSD	33 7 89404
4	RSAJ6-0.5BDL	14 3 SA182-0.5B	24 > SA55-0.5BMS	34
5	RSAK6-0.5B	15 3 SA182-0.5BDL	25 SA55-0.5BMSD	35
6	RSAK8-0.5B	16 3 SA201-0.5B	26 3 SA201-0.5BMS	36
7	RSAL7-0.5B	17 3 SA201-0.5BDL	27 3 SA201-0.5BMSD	37
8	RSAL8-0.5B	18 3 SA166-0.5B	28	38
9 :	2 SA35-0.5B	19 3 RSAK4-0.5B D	29	39
10	SA55-0.5B	20 3 RSAK4009-0.5B b	30	40

(# 13 + RSA 03) Wester not #

VALIDATION FINDINGS WORKSHEET

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

A Dhanatt				
The little of th	P. Bis(2-chloroethoxy)methane	EE. 2,6-Dinitrotoluene	TT. Pentachlorophenol**	III. Benzo(a)pyrene**
B. Bis (2-chloroethyl) ether	Q. 2,4-Dichlorophenoi**	FF. 3-Nitroaniline	UU. Phenanthrene	الالراد (1,2,3-cd)pyrene
C. 2-Chlorophenol	R. 1,2,4-Trichlorobenzene	GG. Acenaphthene™	W. 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-butyiphthalate	MMM. Bis(2-Chlorolsopropyl)sther
F. 1,2-Dichlorobenzene	U. Hexachlorobutadiene**	JJ. Dibenzofuran	YY. Fluoranthene**	NNN. Aniline
G. 2-Methylphenol	V. 4-Chloro-3-methylphenoi**	KK. 2,4-Dinitratoluene	ZZ. Pyrene	OOO. N-Nitrosodimethylamine
H. 2,2'-Oxybis(1-chloropropane)	W. 2-Methylnaphthalene	LL. Diethylphthalate	AAA. Butyibenzyiphthalate	PPP. Benzoic Acid
l. 4-Methylphenol	X. Hexachlorocyclopentadiene*	MM. 4-Chlorophenyl-phenyl ether	BBB. 3,3'-Dichlorobenzidine	QQQ. Benzyi alcohol
J. N-Nitroso-di-n-propylamine*	Y. 2,4,6-Trichiorophenoi**	NN. Fluorene	CCC. Benzo(a)anthracene	RRR. Pyridine
K. Hexachloroethane	Z. 2,4,5-Trichlorophenol	00. 4-Nitroaniline	DDD. Chrysene	SSS. Benzidine
L. Nitrobenzene	AA. 2-Chloronaphthalane	PP. 4,6-Dinitro-2-methylphenol	EEE. Bis(2-ethylhexyl)phthalate	TIT. 1.4. D'OXAMO,
M. Isophorone	BB. 2-Nitroaniline	QQ. N-Nitrosodiphenylamine (1)**	FFF. Di-n-octylphthalate**	uuu Oc+a chiresea
N. 2-Nitrophenoi**	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.

VALIDATION FINDINGS WORKSHEET Initial Calibration

Page: Reviewer: 2nd Reviewer:

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A". Did the laboratory conduct an acceptable 5 point calibration prior to sample analysis?

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

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?

# Date			. 11	414 EU.U3 FIRF 7		
eum de	Standard ID	Compound	(Limit: <30.0%)	Finding RRF		
2/22/00	7.87	Min	(0,000	(Limit: ≥ 0.05)	Associated Samples	Olialfilanta
		3.7.7		0.048	11 + 8kc	cadinications
						- JASTA (C)
				-		
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		-				
						-
٠,			-			

INICAL 25

100# 2/495 F2a SDG#:

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

VALIDATION FINDINGS WORKSHEET

Continuing Calibration

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

Was a continuing calibration standard analyzed at least once every 12 hours of sample analysis for each instrument? Were percent differences (%D) and relative response factors (RRF) within method criteria for all CCC's and SPCC's ?

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

2nd Reviewer: Page: Reviewer:

		_	_			 	_	5 ° .		 	 	_	 _				 		 	 	
Oualffeations	CHOMBO	JAN A CC)																			
Associated Samples	1 1 10 00 01 11 10	2 62 77 - 81 01 1	89404 MB	-																	
Finding RRF (Limit: >0.05)	0 047	7:01/																			
Finding %D (Limit: <25.0%)																					
Compound	2 2 2																				
Standard ID	DA 603													-							
# Date	6/11/0																				-

LDC # 21 495 F24

VALIDATION FINDINGS WORKSHEET Blanks

Page: \ of

Reviewer: 2nd Reviewer:

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

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

Was a method blank analyzed for each matrix?

Was a method blank analyzed for each concentration preparation level?

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

Was the blank contaminated? If yes, please see qualification below. n date: 6/1/69 Blank extraction date: 4/04/64 N/N N/A

 ∞ J Associated Samples: Conc. units:

	Compound	Blank ID 890 48 MB		rv	7	SS S	Sample Identification	lion			
26,5%	AAA	5.7									
7	XX	4	11/16	76 /11	11/96	1/69					
2.6	5	,2			70-	4					
•			7 7 7		n/0:-						·
*											
	Blank extraction date: 6/15/09 Blank analysis date: 6/	Blank analys		16/69		7.				()	
	Colle, ullis, we / K			Associa	Associated Samples:	17-41			9	(79)	
	Compound	Blank ID									
						23	Sample Identification	uo	•		

ر م

5x Phthalates 2x all others

LDC#: 21445 F24 SDG #: Se Con

VALIDATION FINDINGS WORKSHEET

Field Blanks

Page: 1 of 1

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

Were target compounds detected in the field blanks? Blank units: いん 人 Associated sample units: いん んち Sampling date: フルットゥ

Were field blanks identified in this SDG?

Y N N/A

Blank units:

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

4=

21:02 AL Sample Identification \$ Associated Samples: ei tru swt 4 = FB 672109-50 Blank ID 0.35 0.18 4 7,5 EEE AAA × コ Compound CRQL 1.7%

7.5

6. 6.0

Associated sample units: Sampling date:_ Blank units:

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

					-		-					
		Sample Identification						-				
Associated Samples:		Š	-									
lank / Rinsate / C	Q										_	
ne) Field B	Blank ID	L	ente.									
Teld Didition type: (Circle one) Field Blank / Rinsate / Othe	Compound	(A) We contain the state that the probability of th									CROL	

21495 FZA LDC#:

SDG#:

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

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

Were percent recoveries (%R) for surrogates within QC limits?

VALIDATION FINDINGS WORKSHEET

Page: Reviewer. 2nd Reviewer:

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

δ N N

Γ		Γ	T		Γ	T	1		T	T	1		T	T	7	 Γ	T	٦		T	T	1	T	T	T	7		T	T	T	
	Qualifications	No couse 0,	1																												OC Limits (Water) 21-100 10-123 33-110*
	mits)	(42-125)			,			7)) (†·	^				`	,	+	7	,	,)		(<u> </u>	<u></u>		^	^ `			OC Limits (Soll) 25-121 19-122 20-130
	AK (Limits)	2																													S5 (2FP)= 2-Fluorophenol S6 (TBP) = 2,4,6-Tribromophenol S7 (2CP) = 2-Chlorophenol-d4 S8 (DCB) = 12-Dichlorophenol-d4
Surrogate	200	Ja J	N BZ	Trail							-																				S5 (2FP)= 2-FI S6 (TBP) = 2.4 S7 (2CP) = 2-C S8 (DCB) = 1-C
	(>	_																											QC Limits (Water) 35-114 43-116 33-141 10-94
Sample ID	4 / 4 (x)		(Z0X)			***************************************																									OC Limits (Soil) QC 23-120 35-1 30-115 43-1 18-137 33-1 24-113 10-9
Date																															* QC limits are advisory S1 (NBZ) = Nitrobenzene-d5 S2 (FBP) = 2-Fluorobiphenyi S3 (TPH) = Terphenyi-d14 11 S4 (PHL) = Phenol-d5
*																															* OC limits S1 (NBZ) = S2 (FBP) = S3 (TPH) = S4 (PHL) = F

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

S5 (2FP)= 2-Fluorophenol S6 (TBP) = 2,4,6-Tribromophenol S7 (2CP) = 2-Chlorophenol-d4 S8 (DCB) = 1,2-Dichlorobenzene-d4

16-110*

LDC #: 21 495 F24 SDG #:

Matrix Spike/Matrix Spike Duplicates VALIDATION FINDINGS WORKSHEET

Page:

2nd Reviewer: Reviewer.

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

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

NATA (2

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

*				SE	COM				ı
	Cate	OI OSMISM	Compound	%R (Limits)	%R (Limits)	/ - Marri I/ COM	•		Γ
		22/23	22	3 (50-15h			Associated Samples	Qualifications	
			2 2 2	\\		()		NO SUAD CASO	١ -
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					\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \)			1
				()		_			
		74/52	KRR	32 (50-150	(es(-15) 5t	35 (20)	7		
I				,		٠,	0	(LCC/DW	
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		26/27	2	1217)			- F '
			,	(05)-05)	(50 (50-150)	,	11. 17		- 5.4
1			ススス	22 -	30	1		W 5794)	
			MMM	70.7		(00) /1		CUEA.	
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	Compound	QC Limits (Soll)	RPD (Soil)	QC Limits	RPD	_		QC Umits	uda	11.00		£==
•	01			(vater)	(Water)		Compound	(Soll)	1 6		RPD	
Ċ	Orac	76-90%	₹35%	12-110%	< 42%	GG AC	Acensohthan		2011	(water)	(Water)	
Ŀ	+							%/51-15	1 19%	46-118%	< 31%	_
ن	2-Chlorophenol	25.402%	, Eng.									
ı		27.0	88	27-123%	×40%	1. 4.h	4-Nitrophenal	70,77,77				
i	1,4-Uichiorobenzene	28-104%	, 970's	20.010			Similar in	11-114%	× 20%	10-80%	× 50%	
-	N. Aller		0//3/	30-97%	< 28%	XX 2.4	2.4-Dinitrotolises	78.909.	, 190,			
1	Parities of the proposition	41-126%	× 38%	41-118%	, 200			6/ 500.03	0//#	24-96%	× 38%	
œ	1.2.4-Trichlorobenzene	701.07.00		2011-11	%8	Pe	Pentachlorophenol	17-109%	< 47%	0.4039/	. 500	
L		%/0L-00	< 23%	39-98%	× 28%	4				8201.6	× 20%	
>	4-Chloro-3-methylphenol	26.103%	7000		†	+	ryrene	35-142%	× 36%	26-127%	/ 340/	
		100/8	× 55%	23-97%	< 42%						07.10	
						-						

LDC#: 21495 FJQ SDG #: In Comy

VALIDATION FINDINGS WORKSHEET Laboratory Control Samples (LCS)

Page: of Reviewer: 2nd Reviewer:

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

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

Was a LCS required?

Y N N/A

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

XX Esq. (50-126)	*	Dete	CSACSD ID	Compound	LCS XR (1 imte)	CSD			
89464 LS 19 XX (Ŀ	RANGE	^			RPD (Limits)	Associated Samples	Qualifications
8 940 + 45.5 p			0/571 0/0/20	X X	(20-150)			1-8 890 d8 MB	
8 9404 L(S /b XX ()) () () () () () () () (T)	(Mal
8 9404 LCS /b XX (T)				
8 9464 L(S /b XX () 174 (Sp.120) 57 (30) 14-21, 89444 MS SS () () 34 () 1 TTT f8 (50-120) () 1 () () () 1 () () 1 () () 1 () () 1 (T				,				
SS () () 34 () 1 ()	T		89404 US/b	××	(1.	ı	
777			-	257			-	4	(45 أ)
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LDC#2448下入 SDG #: 54 Cm

Compound Quantitation and Reported CRQLs VALIDATION FINDINGS WORKSHEET

Page: Reviewer:

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

Y N N/A

Were compound quantitation and CRQLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation? Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N MA

Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the compound?

L					
#	Date	Sample ID	Finding	Associated Samnles	0 - 111 - 1 V
		*	55> ca care		The A 14
			c		
		14 16 3	SS MUN > CLO rance	re	
				3	
	-				

Comments: See sample calculation verification worksheet for recalculations

LDC #. 21495 F29 SDG #: Ca Com

VALIDATION FINDINGS WORKSHEET Overall Assessment of Data

Page:

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

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

All available information pertaining to the data were reviewed using professional judgement to compliment the determination of the overall quality of the data.

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

#	ate C	2.71				
. 11	Date	Sample ID	Finding	Associated Samples	Qualifications	
		ar	SS > cal range		X/A (6)	
		2, 卷	All excent 35 di)			
11						
1						
- 1		14 16 3	55 4NN > C-1	ange		
			į)		
. #		15, 17, 4	All examp 55 NUM	W 4:1		-
- 1			#			
- 1	-					
•	:					
13						
=	Comments:					
- t						
- 1						

LDC #: 21495 = 29 SDG #: Cy Corry

VALIDATION FINDINGS WORKSHEET Field Duplicates

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

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

1	Y	N	N/A
	Y/	N	N/A

Were field duplicate pairs identified in this SDG? Were target compounds identified in the field duplicate pairs?

	Concentrat	ion (ug/kg)	
Compound	19	20	RPD
ДОЬ	4.	3.8	0,3(=6.8 Diff)
УУ	3,8	3.1	5.7
S S	250	240	4 (=503 Rrp)
S	1.0	6.84	5.8 (= 6.8 Diff)
ии	38	3.8	0)
ZZ	2.7	2.7	0
	Concentration		
Compound			RPD
иии	50	47	6 (4502 RPD)
	_		
			·

	Concentrati	on ()	
Compound			RPD

	Concentration (
Compound		RPD

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, 2009 Phase B Investigation,

Henderson, Nevada

Collection Date:

June 19 through June 24, 2009

LDC Report Date:

September 23, 2009

Matrix:

Soil

Parameters:

Semivolatiles

Validation Level:

Stage 2B

Laboratory:

Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0903443

Sample Identification

SA197-0.5B

SA197-0.5BMSD

SA198-0.5B

SA150-0.5BMS

SA64-0.5B

SA150-0.5BMSD

SA104-0.5B

SA53-0.5BMS SA53-0.5BMSD

SA129-0.5B

SA70-0.5B

SA60-0.5B

0,100 0.00

SA150-0.5B

RSAN5-0.5B

SA53-0.5B

SA201-10B

SA201-28B

SA201009-28B

SA43009-0.5B

SA40-0.5B

SA200-0.5B

RSAO6-0.5B

SA51-0.5B

SA43-0.5B

SA197-0.5BMS

1

Introduction

This data review covers 25 soil samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8270C for Semivolatiles.

This review follows the Standard Operating Procedures (SOP) 40, Data Review/Validation (BRC 2009), the Quality Assurance Project Plan Tronox LLC Facility, Henderson, Nevada (June 2009), NDEP guidance (May 2006), and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review (June 2008) as there are no current guidelines for the method stated above.

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

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

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

I. Technical Holding Times

All technical holding time requirements were met.

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

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

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

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
5/22/09	Octachlorostyrene	0.048 (≥0.05)	SA197-0.5B SA198-0.5B SA64-0.5B SA104-0.5B SA129-0.5B SA70-0.5B SA60-0.5B SA53-0.5B SA53-0.5B SA201-28B SA201-28B SA201-28B SA201-099-28B SA43009-0.5B SA40-0.5B SA40-0.5B SA197-0.5B SA197-0.5BMS SA197-0.5BMS SA197-0.5BMS SA150-0.5BMS SA150-0.5BMS SA150-0.5BMS SA150-0.5BMS SA150-0.5BMS SA150-0.5BMS SA150-0.5BMS SA150-0.5BMS SA150-0.5BMS SA53-0.5BMS SA53-0.5BMSD SA53-0.5BMSD SA53-0.5BMSD SA53-0.5BMSD SA9972MB 90095MB	J (all detects) UJ (all non-detects)	A

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

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

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

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

All of the continuing calibration RRF values were greater than or equal to 0.05 with the following exceptions:

Date	Compound	RRF (Limits)	Associated Samples	Flag	A or P
6/24/09	Octachlorostyrene	0.044 (≥0.05)	SA197-0.5B SA197-0.5BMS 89972MB	J (all detects) UJ (all non-detects)	А

5

Date	Compound	RRF (Limits)	Associated Samples	Flag	A or P
6/26/09	Octachlorostyrene	0.049 (≥0.05)	SA198-0.5B SA104-0.5B	J (all detects) UJ (all non-detects)	А

V. Blanks

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

Method Blank ID	Extraction Date	Compound TIC (RT in minutes)	Concentration	Associated Samples
90256MB	6/26/09	Di-n-butylphthalate	74 ug/Kg	RSAN5-0.5B SA53-0.5B SA201-10B SA201-28B SA201009-28B SA43009-0.5B SA40-0.5B SA200-0.5B RSAO6-0.5B SA51-0.5B SA43-0.5B
90095MB	6/24/09	Naphthalene	1.0 ug/Kg	SA60-0.5B SA150-0.5B

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

Sample	Compound TIC (RT in minutes)	Reported Concentration	Modified Final Concentration
RSAN5-0.5B	Di-n-butylphthalate	140 ug/Kg	140U ug/Kg
SA53-0.5B	Di-n-butylphthalate	96 ug/Kg	96U ug/Kg
SA201-28B	Di-n-butylphthalate	130 ug/Kg	130U ug/Kg
SA201009-28B	Di-n-butylphthalate	140 ug/Kg	140U ug/Kg
SA43009-0.5B	Di-n-buty/phthalate	110 ug/Kg	110U ug/Kg
SA200-0.5B	Di-n-buty/phthalate	140 ug/Kg	140U ug/Kg

Sample FB072109-SO (from SDG R0904016) was identified as a field blank. No semivolatile contaminants were found in this blank with the following exceptions:

Field Blank ID	Sampling Date	Compound	Concentration	Associated Samples
FB072109-SO	7/21/09	Bis(2-ethylhexyl)phthalate Butylbenzylphthalate Di-n-butylphthalate Diethylphthalate	1.4 ug/Kg 0.18 ug/Kg 1.5 ug/Kg 0.35 ug/Kg	SA201-10B SA201-28B SA201009-28B

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

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. Surrogate recoveries (%R) were not within QC limits for SA60-0.5B. Since this sample was diluted out, no data were qualified.

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 recoveries (%R) and relative percent differences (RPD) were not within QC limits for some compounds, the MS, MSD, LCS, or LCSD 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 LCS/LCSD percent recoveries (%R) were not within QC limits for some compounds, the MS, MSD, or LCSD 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.

XI. Target Compound Identifications

Raw data were not reviewed for this SDG.

XII. Project Quantitation Limit

All compounds reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG R0903443	All compounds reported below the PQL.	J (all detects)	А

Raw data were not reviewed for this SDG.

XIII. Tentatively Identified Compounds (TICs)

Raw data were not reviewed for this SDG.

XIV. System Performance

Raw data were not reviewed for this SDG.

XV. Overall Assessment

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

XVI. Field Duplicates

Samples SA201-28B and SA201009-28B and samples SA43009-0.5B and SA43-0.5B were identified as field duplicates. No semivolatiles were detected in any of the samples with the following exceptions:

	Concentration (ug/Kg)					
Compound	SA43009-0.5B	SA43-0.5B	RPD (Limits)	Difference (Limits)	Flags	A or P
2-Methylnaphthalene	14U	4.3	-	9.7 (≤21)	_	-
Acenaphthylene	4.3	8.7	-	4.4 (≤21)	-	-
Anthracene	7.2	11	*	3.8 (≤21)	-	-
Benzo(a)anthracene	64	130	•	131 (≤21)	J (all detects)	А
Benzo(a)pyrene	100	200	67 (≤50)	-	J (all detects)	Α
Benzo(b)fluoranthene	130	280	73 (≤50)	-	J (all detects)	А
Benzo(g,h,i)perylene	150	260	54 (≤50)	-	J (all detects)	А
Benzo(k)fluoranthene	98	190	64 (≤50)	-	J (all detects)	А
Chrysene	140	300	73 (≤50)	•	J (all detects)	Α

	Concentration (ug/Kg)					
Compound	SA43009-0.5B	SA43-0.5B	RPD Difference (Limits) (Limits)		Flags	A or P
Di-n-butylphthalate	110	550U	-	440 (≤550)	-	-
Dibenzo(a,h)anthracene	30	51	-	21 (≤21)	÷	•
Fluoranthene	160	440	93 (≤50)	-	J (all detects)	А
Hexachlorobenzene	78	80	-	2 (≤21)	-	•
Indeno(1,2,3-cd)-pyrene	110	200	58 (≤50)	-	J (all detects)	А
Naphthalene	6.5	8.7	-	2.2 (≤21)	-	-
Phenanthrene	59	150	-	91 (≤21)	J (all detects)	А
Pyrene	130	350	92 (≤50)	-	J (all detects)	А
Octachlorostyrene	32	26	-	6 (≤21)	-	-

	Concentra	Concentration (ug/Kg)				
Compound	SA201-28B	SA201009-28B	RPD (Limits)	Difference (Limits)	Flags	A or P
Di-n-butylphthalate	130	140	•	10 (≤220)	•	-
Hexachlorobenzene	11	11	•	0 (≤8.4)	-	-
Octachlorostyrene	5.1	8.4U	-	3.3 (≤8.4)	-	<u>.</u>

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles - Data Qualification Summary - SDG R0903443

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0903443	SA197-0.5B SA198-0.5B SA64-0.5B SA104-0.5B SA129-0.5B SA70-0.5B SA60-0.5B SA150-0.5B SA53-0.5B SA201-28B SA201-28B SA201009-28B SA43009-0.5B SA40-0.5B SA200-0.5B SA53-0.5B	Octachlorostyrene	J (all detects) UJ (all non-detects)	A	Initial calibration (RRF) (c)
R0903443	SA197-0.5B SA198-0.5B SA104-0.5B	Octachlorostyrene	J (all detects) UJ (all non-detects)	А	Continuing calibration (RRF) (c)
R0903443	SA197-0.5B SA198-0.5B SA64-0.5B SA104-0.5B SA129-0.5B SA70-0.5B SA60-0.5B SA53-0.5B SA201-10B SA201-10B SA201-28B SA20109-28B SA43009-0.5B SA40-0.5B SA200-0.5B SA200-0.5B SA53-0.5B	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (sp)
R0903443	SA43009-0.5B SA43-0.5B	Benzo(a)anthracene Phenanthrene	J (all detects) J (all detects)	А	Field duplicates (Difference) (fd)
R0903443	SA43009-0.5B SA43-0.5B	Benzo(a)pyrene Benzo(b)fluoranthene Benzo(g,h,i)perylene Benzo(k)fluoranthene Chrysene Fluoranthene Indeno(1,2,3-cd)-pyrene Pyrene	J (all detects)	A	Field duplicates (RPD) (fd)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles - Laboratory Blank Data Qualification Summary - SDG R0903443

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P	Code
R0903443	RSAN5-0.5B	Di-n-butylphthalate	140U ug/Kg	A	bl
R0903443	SA53-0.5B	Di-n-butylphthalate	96U ug/Kg	А	bl
R0903443	SA201-28B	Di-n-butylphthalate	130U ug/Kg	А	bl
R0903443	SA201009-28B	Di-n-butylphthalate	140U ug/Kg	А	bl
R0903443	SA43009-0.5B	Di-n-butylphthalate	110U ug/Kg	А	bl
R0903443	SA200-0.5B	Di-n-butylphthalate	140U ug/Kg	А	bl

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles- Field Blank Data Qualification Summary - SDG R0903443

No Sample Data Qualified in this SDG

Tronox Northgate Henderson

LDC #: 21495G2a VALIDATION COMPLETENESS WORKSHEET

SDG #: R0903443

Stage 2B

Page: 1 of 1

Reviewer: 2nd Reviewer:

Laboratory: Columbia Analytical Services

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

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

	Validation Area		Comments
1.	Technical holding times	A	Sampling dates: 6 / 9 - 24 / 6 9
11.	GC/MS Instrument performance check	A	,
111.	Initial calibration	WZ	2 RSD r> COV/10 € 25 }
IV.	Continuing calibration/ICV	W2	COV/10 = 25?
V.	Blanks	SW	
VI.	Surrogate spikes	SW	
VII.	Matrix spike/Matrix spike duplicates	SW	
VIII.	Laboratory control samples	SN)	US /b
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	A	
XI.	Target compound identification	N	
XII.	Compound quantitation/CRQLs	N	
XIII.	Tentatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data	А	
XVI.	Field duplicates	SN	$D_1 = 12$, 13 $D_2 = 14$, 19
XVII.	Field blanks	SW	$D_1 = 12$, 13 $D_2 = 14$, 19 FB = FBQ72109-SO from R0904016

Note:

A = Acceptable

N = Not provided/applicable SW = See worksheet ND = No compounds detected D = Duplicate

R = Rinsate

TB = Trip blank

FB = Field blank

EB = Equipment blank

Validated Samples:

Soil

	307						
1 !	SA197-0.5B	11 3	SA201-10B	21	SA197-0.5BMSD	31	89972 MB
2 1	SA198-0.5B	12 3	SA201-28B D,	22 y	SA150-0.5BMS	表 >	900 95 MB
3 l	SA64-0.5B	13 7	SA201009-28B D ,	23 7	SA150-0.5BMSD	† 33 3	90256 MB
4 1	SA104-0.5B	14 3	SA43009-0.5B D _V	24 7	SA53-0.5BMS	34	
5 l	SA129-0.5B	15	SA40-0.5B	₂₅ }	SA53-0.5BMSD	35	
6 (SA70-0.5B	16	SA200-0.5B	26		36	
7 7	SA60-0.5B	17 7	RSAO6-0.5B	27		37	
8 Y	SA150-0.5B	18 2	SA51-0.5B	28		38	
9 3	RSAN5-0.5B	19 3	SA43-0.5B D _Y	29	·	39	
10 3	SA53-0.5B	20	SA197-0.5BMS	30		40	

(no rr)

VALIDATION FINDINGS WORKSHEET

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

A. Phenol**	P. Bis(2-chloroethoxy)methane	EE. 2,6-Dinitrotoluene	TT. Pentachlorophenol**	III. Benzo(a)pyrene**
B. Bis (2-chloroethyl) ether	Q. 2,4-Dichlorophenol**	FF. 3-Nitroaniline	UU. Phenanthrene	JJJ. Indeno(1,2,3-cd)pyrene
C. 2-Chlorophenol	R. 1,2,4-Trichlorobenzene	GG. Acenaphthene**	VV. Anthracene	KKK. Dibenz(a,h)anthracene
D. 1,3-Dichlorobenzene	S. Naphthalene	HH. 2,4-Dinitrophenol⁴	WW. Carbazole	LLL. Benzo(g,h,i)perylene
E. 1,4-Dichlorobenzene**	T. 4-Chioroaniline	II. 4-Nitrophenol*	XX. Di-n-butylphthalate	MMM. Bis(2-Chloroisopropyl)ether
F. 1,2-Dichlorobenzene	U. Hexachiorobutadiene**	JJ. Dibenzofuran	YY. Fluoranthene**	NNN. Aniline
G. 2-Methylphenol	V. 4-Chloro-3-methylphenoi**	KK. 2,4-Dinitrotoluene	ZZ. Pyrane	000. N-Ntrosodimethylamine
H. 2,2'-Oxybis(1-chloropropane)	W. 2-Methylnaphthalene	LL. Diethylphthalate	AAA. Butylbenzylphthalate	PPP. Benzoic Acid
I. 4-Methylphenol	X. Hexachlorocyclopentadiene*	MM. 4-Chlorophenyl-phenyl ether	BBB. 3,3'-Dichlorobenzidine	QQQ. Benzyl alcohol
J. N-Nitroso-di-n-propylamine⁴	Y. 2,4,6-Trichlorophenoi**	NN. Fluorene	CCC. Benzo(a)anthracene	RRR. Pyridine
K. Hexachioroethane	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	TT. 1,4. D'OXUNE
M. Isophorone	BB. 2-Nitroaniline	QQ. N-Nitrosodiphenylamine (1)**	FFF. Di-n-octylphthalate™	uuu Octachlorostyrenc
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.

VALIDATION FINDINGS WORKSHEET

Initial Calibration

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

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SDG #:

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

2nd Reviewer:

Page: Reviewer:

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?

# Date Standard ID	Standar	d D	Compound	Finding %RSD (Limit: <30.0%)	Finding RRF		
5/22/60 1/1/1		NN		(%/0°00, """")	(Limit: >0.05)	Associated Samples	Qualifications
7		3			0.048	All PXCAT !!	
						+ All Biks	1) W/24/2
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SDG #: Co CMS BNA (EPA SW 848 Method 8270C) LDC# 21495 GY

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".

N N/A

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

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

	7		1	Т	T	Г	Г		 T	T	T	T	Т	Т	7	 Т	-	Т	_	T	T	- T	—			Ī .	〒	 T	
	Qualifications	3/15/A (C)					→																						
Associated Samples	sedimo name	1 20 89972 MB					7,4																						
Finding RRF (Limit: >0.05)		0.044				070 0																							
Finding %D (Limit: <25.0%)																									-				
Compound	222					иии																							
Standard ID	マムのダン	/cov >				DA 733	(cev)																						
# Date	160/the/5					1/20/21		-															·				+		
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VALIDATION FINDINGS WORKSHEET

Page:

2nd Reviewer:_ Reviewer:

Blanks

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

Was a method blank analyzed for each matrix?

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

Was a method blank analyzed for each concentration preparation level?

Was a method blank associated with every sample?

(PT)

61-6

Associated Samples: YN N/A Was the blank contaminated? If yes, please see qualification below. Blank extraction date: 6/26/09 Blank analysis date: 6/29/09

4 Sample Identification 170/4 7 <u>.</u> 8 9 96 \$ 90256 MB Blank ID 7 Compound Conc. units:

370

Associated Samples: Blank extraction date: $\frac{6/24/61}{2}$ Blank analysis date: $\frac{6/24/6}{2}$ Conc. units: 44/ky

(MD) ∞ ~

Sample Identification 900 95 mg Blank ID Ö Compound

5x Phthalates 2x all others

LDC # 21 495 624 SDG #:

VALIDATION FINDINGS WORKSHEET

Field Blanks

2nd Reviewer:__

Page:__ Reviewer:

Were field blanks identified in this SDG? МЕТНОD: GC/MS BNA (EPA SW 846 Method 8270)

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

Blank units: $\frac{4}{3}$ /L. Associated sample units: $\frac{4}{3}$ /S Sampling date: $\frac{7}{3}$ /6 Field blank type: (circle one) Field Blank/ Rinsate / Other.

MB ٨ 11 /3 Sample Identification ξ SD Associated Samples: either (All Resourts FB072109-50 Blank ID 0.35 0.18 1:5 EEE AAA × Compound

Associated sample units: Blank units:

Sampling date:_________Field Blank / Rinsate / Other:

Field blank type: (circle one) Field Blank / Kinsate / Other:) Field Blank /	Kinsate / Other:	Associated Samples:	S:		
Compound	Blank ID			Sample Identification	tion	
CROL						

5x Phthalates 2x all others

		METHOD: GC/MS BNA (EPA SW 846 Method 8270C)
74		(EPA SW 84
21495 629	7 € €	METHOD: GC/MS BNA (EPA SW 846 Meti
LDC#:	SDG#:	METHOL

VALIDATION FINDINGS WORKSHEET

Page: | of

Reviewer:

Surrogate Recovery

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

Y N N/A N/A Y (MANA

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

4																				
Ousiffications	11.5 01.0																			
	45-1351					, ,	^		(,		(((((((
%R (Limits)	4)		,))		•)	•)))))))))	
Surrogate	+BP	NBZ	TP#																	
Sample ID	(12×1)	· /																		
	7	`																		
*																				

QC Limits (Water) 21-100 10-123 33-110* 16-110*
QC Limits (Soil) 25-121 19-122 20-130*
S5 (2FP)= 2-Fluorophenol S6 (TBP) = 2,4,6-Tribromophenol S7 (2CP) = 2-Chlorophenol-d4 S8 (DCB) = 1,2-Dichlorobenzene-d4
QC Limits (Water) 35-114 43-116 33-141 10-94
QC Limits (Soil) 23-120 30-115 18-137 24-113
* QC limits are advisory S1 (NBZ) = Nitrobenzene-d5 S2 (FBP) = 2-Fluorobipheny S3 (TPH) = Terpheny-d14 S4 (PHL) = Phenol-d5

LDC#: 24 493 GX SDG#: You Carry

VALIDATION FINDINGS WORKSHEET Matrix Spike/Matrix Spike Duplicates

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 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 p

	<u> </u>	M COMPAND THE MONIMON	אראסווי ופראני	3153 (78K) AIN HE IEI	ative percent dinerer	were the maynish percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?	2C limits?		
	Date	DI OSWASM	Compound	MS %R (Limits)	MSD %R (Limits)	RPD (Limits)	Associated Semples	Oualifications	
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		24 /50	RKR	(251-763) 0	39 (SD-150)	260 (30)	10	No mal (LCS/ 10 in)	ريزم
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		QC Limits	RPD	QC LImits	RPD			OC Limits	RPD	OC I imite	Caa
	Compound	(Soil)	(Soff)	(Water)	(Water)		Compound	(Soll)	(Soll)	(Water)	(Water)
٠ċ	Phenol	26-90%	~32 %	12-110%	<u>≤ 42%</u>	99	Acenaphthene	31-137%	<u>< 19%</u>	46-118%	<u><</u> 31%
ij	2-Chlorophenol	25-102%	< 50%	27-123%	< 40%	=	4-Nitrophenol	11-114%	< 50%	10-80%	< 50%
шi	1,4-Dichlorobenzene	28-104%	< 27%	36-97%	< 28%	ξ.	2,4-Dinitrotoluene	28-89%	< 47%	24-96%	< 38%
기	N-Nitroso-di-n-propylamine	41-126%	< 38%	41-116%	< 38%	Ë	Pentachlorophenol	17-109%	< 47%	9-103%	%05 ×
œ	1,2,4-Trichlorobenzene	38-107%	< 23%	39-98%	< 28%	72	Pyrene	35-142%	× 36%	26-127%	<31%
,	4-Chloro-3-methylphenol	26-103%	< 33%	23-97%	< 42%						

SDG #: 24 Gran

VALIDATION FINDINGS WORKSHEET Laboratory Control Samples (LCS)

Page: 1 of

Reviewer:

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

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

Was a LCS required?

Y N N/A

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

1 Other LCSACOD Cumpound Withlines Net LLMD											
### [24] (50-120) () () 1-6,89472MB No gast () 28 (50-120) () () 1 () 1 () 28 (50-120) () 1 (*	Date	CS/CSD ID	Compound	, KR (.cs Limits)		RPD (Limits)	Associated Samples	911000	
### () () () () () () () () ()				括		(20-120)		()	1-6.89472MB		
### 28 (5p.12p) () 7,8,10045, MB No putal () ()						()))		1	<u>`</u>
### 28 (50-130) 17 (50-120) () 7,8,1005MB No puck () ()						_	,				
EFF 28 (52-130) R.7 (50-120) () 7,8, 10095 MB No yucu () ()	(
() () () (doods 100 /p	もたと	128	(50-130)		•	1 .	No real CACA	94)
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LDC#: 21495G2 SDG#:See cover

VALIDATION FINDINGS WORKSHEET

Field Duplicates

Page:	l_of
Reviewer:	NV '
2nd Reviewer:	

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

Y)N NA Y N NA

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

Compound Name	Conc (ug/Kg)	RPD	Diff	Diff Limits	Quals	
Compound Name	14	19	(≤50%)	Dill	Din Linits	(Parent Only)	
2-Methylnaphthalene	14U	4.3		9.7	≤14	_	
Acenaphthylene	4.3	8.7		4.4	≤21	-	
Anthracene	7.2	11		3.8	≤21	-	
Benzo(a)anthracene	64	130		131	≤21	Jdets/A	[fd]
Benzo(a)pyrene	100	200	67				
Benzo(b)fluoranthene	130	280	73				
Benzo(g,h,i)perylene	150	260	54				
Benzo(k)fluoranthene	98	190	64				
Chrysene	140	300	73				
Di-n-butylphthalate	110	550U		440	≤550	-	
Dibenzo(a,h)anthracene	30	51		21	≤21	_	
Fluoranthene	160	440	93			Jdets/A	
Hexachlorobenzene	78	80		2	≤21	1	
Indeno(1,2,3-cd)-pyrene	110	200	58			JACSA	
Naphthalene	6.5	8.7		2.2	≤21	_	
Phenanthrene	59	150		91	≤21	Jack/A	
Pyrene	130	350	92				
Octachlorostyrene	32	26		6	≤21	_	

Compound Name	Conc (ug/Kg)	RPD	Diff	Diff Limits	Quals
osmpound italio	12	13	(≤50%)			(Parent Only)
Di-n-Butylphthalate	130	140		10	≤220	1
Hexachlorobenzene	11	11		0	≤8.4	1
Octachlorostyrene	5.1	8.4U		3.3	≤8.4	

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, 2009 Phase B Investigation,

Henderson, Nevada

Collection Date:

June 29 through June 30, 2009

LDC Report Date:

October 2, 2009

Matrix:

Soil

Parameters:

Semivolatiles

Validation Level:

Stage 2B

Laboratory:

Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0903615

Sample Identification

SA45-0.5B

SA452009-0.5B

SA187-0.5B

SA153-0.5B

SA186-0.5B

SA185-0.5B

RSAO5-0.5B

SA152-10B

SA152-20B

SA152-34B

SA50-0.5B

SA54-0.5B

SA106-0.5B

SA102-0.5B

SA109-0.5B

SA45-0.5BMS

SA106-0.5BMS

SA106-0.5BMSD

Introduction

This data review covers 18 soil samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8270C for Semivolatiles.

This review follows the Standard Operating Procedures (SOP) 40, Data Review/Validation (BRC 2009), the Quality Assurance Project Plan Tronox LLC Facility, Henderson, Nevada (June 2009), NDEP guidance (May 2006), and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review (June 2008) as there are no current guidelines for the method stated above.

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

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

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

I. Technical Holding Times

All technical holding time requirements were met.

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

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

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

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.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

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

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

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

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

V. Blanks

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

Method Blank ID	Extraction Date	Compound TIC (RT in minutes)	Concentration	Associated Samples
90598MB	7/1/09	Di-n-butylphthalate Naphthalene	37 ug/Kg 1.0 ug/Kg	SA45-0.5B SA452009-0.5B SA187-0.5B SA153-0.5B SA186-0.5B SA185-0.5B RSAO5-0.5B SA152-10B SA152-20B SA152-34B
90695MB	7/2/09	Di-n-butylphthalate Naphthalene	120 ug/Kg 1.7 ug/Kg	SA50-0.5B SA54-0.5B SA106-0.5B SA102-0.5B SA109-0.5B

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

Sample	Compound	Reported	Modified Final
	TIC (RT in minutes)	Concentration	Concentration
SA45-0.5B (2X)	Di-n-butylphthalate	100 ug/Kg	100U ug/Kg
SA452009-0.5B (2X)	Di-n-butylphthalate	100 ug/Kg	100U ug/Kg
	Naphthalene	2.1 ug/Kg	2.1U ug/Kg
SA153-0.5B	Di-n-butylphthalate	190 ug/Kg	190U ug/Kg
	Naphthalene	1.7 ug/Kg	1.7U ug/Kg
SA185-0.5B	Di-n-butylphthalate	53 ug/Kg	53U ug/Kg
	Naphthalene	1.1 ug/Kg	1.1U ug/Kg
RSAO5-0.5B (2X)	Di-n-butylphthalate	85 ug/Kg	85U ug/Kg
	Naphthalene	2.1 ug/Kg	2.1U ug/Kg
SA152-10B	Di-n-butylphthalate	160 ug/Kg	160U ug/Kg
	Naphthalene	1.1 ug/Kg	1.1U ug/Kg
SA152-20B	Di-n-butylphthalate	51 ug/Kg	51U ug/Kg
SA152-34B	Di-n-butylphthalate	150 ug/Kg	150U ug/Kg

Sample	Compound	Reported	Modified Final
	TIC (RT in minutes)	Concentration	Concentration
SA50-0.5B	Di-n-butylphthalate	140 ug/Kg	140U ug/Kg
	Naphthalene	1.8 ug/Kg	1.8U ug/Kg
SA54-0.5B	Di-n-butylphthalate	41 ug/Kg	41U ug/Kg
	Naphthalene	2.0 ug/Kg	2.0U ug/Kg
SA106-0.5B (50X)	Naphthalene	98 ug/Kg	98U ug/Kg
SA102-0.5B	Di-n-butylphthalate	110 ug/Kg	110U ug/Kg
SA109-0.5B	Di-n-butylphthalate	48 ug/Kg	48U ug/Kg
	Naphthalene	2.5 ug/Kg	2.5U ug/Kg

Sample FB072109-SO (from SDG R0904016) was identified as a field blank. No semivolatile contaminants were found in this blank with the following exceptions:

Field Blank ID	Sampling Date	Compound	Concentration	Associated Samples
FB072109-SO	7/21/09	Bis (2-ethylhexyl) phthalate Butylbenzylphthalate Di-n-butylphthalate Diethylphthalate	1.4 ug/Kg 0.18 ug/Kg 1.5 ug/Kg 0.35 ug/Kg	SA152-10B SA152-20B SA152-34B

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

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. Surrogate recoveries (%R) were not within QC limits for SA106-0.5B. Since the sample was diluted out, no data were qualified.

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 recoveries (%R) and relative percent differences (RPD) were not within QC limits for some compounds, the MS, MSD, or LCSD 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 LCS/LCSD percent recoveries (%R) were not within QC limits for some compounds, the MS, MSD, or LCS 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.

XI. Target Compound Identifications

Raw data were not reviewed for this SDG.

XII. Project Quantitation Limit

All compounds reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG R0903615	All compounds reported below the PQL.	J (all detects)	А

Raw data were not reviewed for this SDG.

XIII. Tentatively Identified Compounds (TICs)

Raw data were not reviewed for this SDG.

XIV. System Performance

Raw data were not reviewed for this SDG.

XV. Overall Assessment

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

XVI. Field Duplicates

Samples SA45-0.5B and SA452009-0.5B were identified as field duplicates. No semivolatiles were detected in any of the samples with the following exceptions:

	Concentra	ition (ug/Kg)				
Compound	SA45-0.5B	SA452009-0.5B	RPD (Limits)	Difference (Limits)	Flags	A or P
Di-n-butylphthalate	100	100	-	0 (≤300)	-	_
Naphthalene	14U	2.1	-	11.9 (≤14)	-	-

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles - Data Qualification Summary - SDG R0903615

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0903615	SA45-0.5B SA452009-0.5B SA187-0.5B SA153-0.5B SA186-0.5B SA185-0.5B RSA05-0.5B SA152-10B SA152-20B SA152-34B SA50-0.5B SA54-0.5B SA106-0.5B SA102-0.5B SA102-0.5B	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (sp)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles - Laboratory Blank Data Qualification Summary - SDG R0903615

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P	Code
R0903615	SA45-0.5B (2X)	Di-n-butylphthalate	100U ug/Kg	А	bl
R0903615	SA452009-0.5B (2X)	Di-n-butylphthalate Naphthalene	100U ug/Kg 2.1U ug/Kg	А	bl
R0903615	SA153-0.5B	Di-n-butylphthalate Naphthalene	190U ug/Kg 1.7U ug/Kg	А	bl
R0903615	SA185-0.5B	Di-n-butylphthalate Naphthalene	53U ug/Kg 1.1U ug/Kg	A	bl
R0903615	RSAO5-0.5B (2X)	Di-n-butylphthalate Naphthalene	85U ug/Kg 2.1U ug/Kg	А	bl
R0903615	SA152-10B	Di-n-butylphthalate Naphthalene	160U ug/Kg 1.1U ug/Kg	А	bl
R0903615	SA152-20B	Di-n-butylphthalate	51U ug/Kg	А	bl
R0903615	SA152-34B	Di-n-butylphthalate	150U ug/Kg	А	bl
R0903615	SA50-0.5B	Di-n-butylphthalate Naphthalene	140U ug/Kg 1.8U ug/Kg	А	bl

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P	Code
R0903615	SA54-0.5B	Di-n-butylphthalate Naphthalene	41U ug/Kg 2.0U ug/Kg	А	bl
R0903615	SA106-0.5B (50X)	Naphthalene	98U ug/Kg	А	bl
R0903615	SA102-0.5B	Di-n-butylphthalate	110U ug/Kg	Α	bl
R0903615	SA109-0.5B	Di-n-butylphthalate Naphthalene	48U ug/Kg 2.5U ug/Kg	А	bl

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles- Field Blank Data Qualification Summary - SDG R0903615

No Sample Data Qualified in this SDG

Tronox Northgate Henderson

LDC #:	21495H2a	VALIDATION COMPLETENESS WORKSHEET
SDG #:_	R0903615	Stage 2B

Laboratory: Columbia Analytical Services

Reviewer:_344 2nd Reviewer:_

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

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

	Validation Area		Comments
1.	Technical holding times	A	Sampling dates: 6/29- 276/09
11.	GC/MS Instrument performance check	A	<u> </u>
	Initial calibration	A	
IV.	Continuing calibration/ICV	A	CCV/W = 25 D
V.	Blanks	SW	
VI.	Surrogate spikes	SW	
VII.	Matrix spike/Matrix spike duplicates	SW	
VIII.	Laboratory control samples	SM	us/b
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	A	
XI.	Target compound identification	N	
XII.	Compound quantitation/CRQLs	N	
XIII.	Tentatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data	A	
XVI.	Field duplicates	SW	D = 1,2
XVII.	Field blanks	SW	FB = FB072109-50 from R0904016

Note:

A = Acceptable

N = Not provided/applicable SW = See worksheet

ND = No compounds detected

R = Rinsate

FB = Field blank

D = Duplicate

TB = Trip blank

EB = Equipment blank

Validated Samples:

Soil

		1 / 1						
1	SA45-0.5B	D	11 7	SA50-0.5B	21 /	90 598 MB	31	
2 1	SA452009-0.5B	Þ	12 >	SA54-0.5B	22	90695 MB	32	
3 1	SA187-0.5		13 7	SA106-0.5B	23		33	
4 1	SA153-0.5B		14	SA102-0.5B	24		34	
5 Y	SA186-0.5B		15	SA109-0.5B	25		35	
6 1	SA185-0.5B		16 \	SA45-0.5BMS	26		36	
7 1	RSAO5-0.5B		17 7	SA106-0.5BMS	27		37	
8 1	SA152-10B		18 7	SA106-0.5BMSD	28		38	
9 1	SA152-20B		19		29		39	
10 (SA152-34B		20		30		40	

VALIDATION FINDINGS WORKSHEET

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

A Phenol**	P. Bis(2-chloroethoxy)methane	EE. 2,6-Dinitrotoluene	TT. Pentachlorophenol**	III. Benzo(a)pyrene**
B. Bis (2-chloroethyl) ether	Q. 2,4-Dichlorophenol**	FF. 3-Nitroaniline	UU. Phenanthrene	JJJ. Indeno(1,2,3-cd)pyrene
C. 2-Chlorophenol	R. 1,2,4-Trichlorobenzene	GG. Acenaphthene**	W. 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-Chlorolsopropyl)ether
F. 1,2-Dichlorobenzene	U. Hexachlorobutadiene**	JJ. Dibenzofuran	YY, Fluoranthene**	NNN. Aniline
G. 2-Methylphenol	V. 4-Chloro-3-methylphenol**	KK. 2,4-Dinitrotoluene	ZZ. Pyrene	OOO. N-Nitrosodimethylamine
H. 2,2'-Oxybis(1-chloropropane)	W. 2-Methylnaphthalene	LL. Diethylphthalate	AAA. Butylbenzylphthalate	PPP. Benzoic Acid
I. 4-Methylphenol	X. Hexachlorocyclopentadiene*	MM. 4-Chlorophenyl-phenyl ether	BBB. 3,3'-Dichlorobenzidine	QQQ. Benzyl alcohol
J. N-Nitroso-di-n-propylamine⁴	Y. 2,4,6-Trichlorophenof**	NN. Fluorene	CCC. Benzo(a)anthracene	RRR. Pyridine
K. Hexachloroethane	Z. 2,4,5-Trichlorophenol	00. 4-Nitroaniline	DDD. Chrysene	SSS. Benzidine
L. Nitrobenzene	AA. 2-Chloronaphthalene	PP. 4,6-Dinitro-2-methylphenol	EEE. Bis(2-ethylhexyl)phthalate	TT. 1,4. Dioxane
M. Isophorone	BB. 2-Nitroaniline	QQ. N-Nitrosodiphenylamine (1)**	FFF. Di-n-octylphthalate**	uuu Octachlorostyrenc
N. 2-Nitrophenol**	CC. Dimethylphthalate	RR. 4-Bromophenyl-phenylether	GGG. Benzo(b)fluoranthene	WW.
O. 2,4-Dimethyiphenol	DD. Acenaphthylene	SS. Hexachlorobenzene	HHH. Benzo(k)fluoranthene	WWW.

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

LDC# 21495 H2a SDG #: Su Car

VALIDATION FINDINGS WORKSHEET

Page: 1 of /

Reviewer:_ 2nd Reviewer:_

Blanks

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 8270C) YN N/A

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

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

 $\frac{V/N}{N/A}$ Was the blank contaminated? If yes, please see qualification below. Blank extraction date: $\frac{7/63}{69}$ Y N N/A

0-1

Masi 4 (79) OX OX 53/4 Sample Identification 5(3x) 6.3 190 (<u>|</u>0x) Associated Samples: (2) Ψ 2 (2x) z 18/2 (×~) 00/ 90598 MM Blank ID 0 37 **(**) Conc. units: µa /⊏c∠ Compound

Blank extraction date: 7/6 3/9 Blank analysis date: 7/67/69 Conc. units:

၉၀၅

Associated Samples:

(61)

	ample Identification	15	48/4	1757			
STATE OF THE PROPERTY OF THE P	Sample Identification	12	48/4	h/5.2			
		x) 14	110/4	6.4)		
		13 (SBX)	,	n/ 86			
		12	41/4	2.0/4			
		, 11	140/4	N/81			
	Blank ID	90695 MB	120	1.7			
	Compound		XX	S			

5x Phthalates 2x all others

LDC#21495 H2Q SDG#: See Corry

VALIDATION FINDINGS WORKSHEET

Field Blanks

75

Reviewer: 2nd Reviewer:

Page: 1 of 1

Were field blanks identified in this SDG?

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

Y)N N/A

V N N/A Were target compounds detected in the field blanks? Blank units: Wg /L Associated sample units: Wg /kg.

Sampling date: 7/21/69

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

21-8

Sample Identification Associated Samples: (32) 9 0 2 ∞ 9 FB072109-\$0 Blank ID 0.35 0.18 <u>.</u> <u>+</u> EFE AAA × 7 Compound CRQL

1.75

7.7 6.0

٧.

(xs)

Associated sample units:_ Blank units:

rield Dialik type: (clide die) rield blaik / killsate / Otter.	Compound Blank ID				OBO
Associated Samples.	Sar				
	Sample Identification				

5x Phthalates 2x all others

FBLKASC2tronox.wpd

LDC# 21445 4 20 SDG#:

VALIDATION FINDINGS WORKSHEET

Surrogate Recovery

Reviewer: 316 Page: ___of___

2nd Reviewer:__

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

Were percent recoveries (%R) for surrogates within QC limits?

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

*	Date	Sample ID	Surrogate	%R (Limits)	Qualifications
		> (50x)	FBP	(261-24) à	No sux
			NBZ	()	1
			TP44	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	
				()	
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				()	
				()	
				()	
* QC limit	* QC limits are advisory	QC Limits (Soil) QC Limits (Water)	ıter)	OC Limits (Soil)	OC Limits (Water)

* QC limits are advisory	QC Limits (Soil)	OC Limits (Water)		رازحي خواسدا ال	(
C1 (ND7) - Nitrobonzon dE	22 420	25 444	i di	(C) FIIIIIS (SQI)	CO LIMITS (VV ater)
CD-GUSZUSODNINI - (ZONI) I C	021-62	41.1-65	Sp (ZFP)≈ Z-Fluorophenol	25-121	21-100
S2 (FBP) = 2-Fluorobiphenyl	nyl 30-115	43-116	S6 (TBP) = 2.4.6-Tribromophenol	19-122	10-123
S3 (TDH) = Tember 4-414	18_127	32.141		1000	271-01
	2	41.00	3/ (2CF) = 2-Chiorophenol-44	20-130*	33-110*
S4 (THL) = Thenol-d5	24-113	10-94	S8 (DCB) = 1,2-Dichlorobenzene-d4	20-130*	16-110*

LDC#: 21 495 HZ SDG #:

VALIDATION FINDINGS WORKSHEET Matrix Spike/Matrix Spike Duplicates

Page: of 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 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

X/N N/A

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?

· · · · · · · · · · · · · · · · · · ·	Ą			3.1	3.	∖ ∕∕	<u> </u>	_									_
18	(MSDin	(MSin	asni	(MS/MS,in)	(46/201)	asw)											
Qualifications	No qual					Ā											
Associated Samples	(3					Ż											
RPD (Limits)	()	()	()	1 06) 58	()		()		()	()	()		()	()	()	()	,
MSD %R (Limits)	()	(951-05) 561	362 (50-150)	()	(05/-150)		())	()	()	()	()	()	()	()	()	,
MS %R (Limits)	112 (35-108)	()	1837 (50-150)	()	(as/-65) Q	375 (1/ 1)	()	(()	()	(.)	()	()	()	()	()	,
Compound	M	XX		7	RRR	Н											
OI OSWISW	81/21																
Date																	
*																	

	Compound	QC Limits (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)		Compound	QC Limits (Soll)	RPD (Soll)	QC Limits (Water)	RPD (Water)
₹	Phenol	79-90%	%9€ >	12-110%	< 42%	ອອ	Acenaphthene	31-137%	≥ 19%	46-118%	< 31%
ပ	2-Chlorophenol	25-102%	< 50%	27-123%	< 40%	=	4-Nitrophenol	11-114%	< 50%	10-80%	< 50%
пi	1,4-Dichlorobenzene	28-104%	< 27%	36-97%	< 28%	KK.	2,4-Dinitrotoluene	28-89%	< 47%	24-96%	< 38%
٦	N-Nitroso-di-n-propylamine	41-126%	< 38%	41-116%	< 38%	L	Pentachlorophenol	17-109%	< 47%	9-103%	< 50%
α	1,2,4-Trichlorobenzene	38-107%	< 23%	39-98%	< 28%	72	Pyrene	35-142%	× 36%	26-127%	< 31%
>	4-Chloro-3-methylphenol	26-103%	< 33%	23-97%	< 42%						

LDC #: 21 495 Had SDG #: 24 Gray

VALIDATION FINDINGS WORKSHEET Laboratory Control Samples (LCS)

Page: Lof / Reviewer: 2nd Reviewer.

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

K N N/A

Date	LCS/LCSD ID	Compound	LCS %R (Limits)	LCSD %R (Limits)	SPD (1 Imite)	Action of property of		
	90 598 LCC/D	- FEE	140 (50-120)	130 (50-120)		1 10 90508 M		W.C
		ХХ	((, amol ,	W SAN TONK	
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l			()	()	(<u> </u>
	90695 KS/b	333	136 (50-120)	146 (50-120))	11-15 90695MB	No was a Market	<u> </u>
		χχ))			<u> </u>
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LDC #: 21495 H 2a VALIDATION FINDINGS WORKSHEET SDG #: Su Grey Field Duplicates

Page:_	of
Reviewer:_	JV4
2nd reviewer:	

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

Y	N	N/A
$(\mathbf{Y}$	N	N/A

		Concentration		
Compound		1	ing/kgg	RPD
	XΧ	100	100	0 (= 360 Diff)
	S	14 11	2.	11.9 (= 14 Diff)
			· · · · · · · · · · · · · · · · · · ·	
		Concentration	()	
Compound	·			RPD
		·		
		Concentration	<u> </u>	
Compound				RPD
		:		
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		·		·
·				
		Concentration	1	
Compound				RPD
Сопроино				

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

Project/Site Name:

Tronox LLC Facility, 2009 Phase B Investigation,

Henderson, Nevada

Collection Date:

July 1 through July 2, 2009

LDC Report Date:

September 22, 2009

Matrix:

Soil/Water

Parameters:

Semivolatiles

Validation Level:

Stage 2B

RSAK3-31B

SA82-0.5BMS

SA82-0.5BMSD

RSAK3-31BMS

RSAK3-31BMSD

Laboratory:

Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0903678

Sample Identification

EB070109-SO1

SA114-0.5B

SA114009-0.5B

RSAN6-0.5B

SA82-0.5B

SA82-10B

SA82-29B

RSAL3-10B

RSAL3-30B

SA134-10B

SA134-20B

SA134-31B

SA134009-31B

SA88-10B

SA88-20B

SA88-32B

RSAK3-0.5B

RSAK3-0.5BDL

RSAK3-10B

RSAK3-20B

Introduction

This data review covers 24 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 8270C for Semivolatiles.

This review follows the Standard Operating Procedures (SOP) 40, Data Review/Validation (BRC 2009), the Quality Assurance Project Plan Tronox LLC Facility, Henderson, Nevada (June 2009), NDEP guidance (May 2006), and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review (June 2008) as there are no current guidelines for the method stated above.

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

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

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

I. Technical Holding Times

All technical holding time requirements were met.

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

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

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

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.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

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

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

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

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

V. Blanks

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

Method Blank ID	Extraction Date	Compound TIC (RT in minutes)	Concentration	Associated Samples
90847MB	7/8/09	Naphthalene	1.0 ug/Kg	SA114-0.5B SA114009-0.5B RSAN6-0.5B SA82-0.5B SA82-10B SA82-29B RSAL3-10B RSAL3-30B SA134-10B SA134-10B SA134-10B SA134-20B SA134-31B SA134-09-31B SA88-10B SA88-20B SA88-20B SA88-32B RSAK3-20B RSAK3-31B

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

Sample	Compound TIC (RT in minutes)	Reported Concentration	Modified Final Concentration
SA114-0.5B (10X)	Naphthalene	14 ug/Kg	14U ug/Kg
SA114009-0.5B (12X)	Naphthalene	18 ug/Kg	18U ug/Kg
SA82-10B (3X)	Naphthalene	3.2 ug/Kg	3.2U ug/Kg
SA88-20B	Naphthalene	1.4 ug/Kg	1.4U ug/Kg
RSAK3-20B	Naphthalene	1.8 ug/Kg	1.8U ug/Kg

Sample FB072109-SO (from SDG R0904016) was identified as a field blank. No semivolatile contaminants were found in this blank with the following exceptions:

Field Blank ID	Sampling Date	Compound	Concentration	Associated Samples
FB072109-SO	7/21/09	Bis (2-ethylhexyl) phthalate Butylbenzylphthalate Di-n-butylphthalate Diethylphthalate	1.4 ug/Kg 0.18 ug/Kg 1.5 ug/Kg 0.35 ug/Kg	SA82-0.5B SA82-10B SA82-29B RSAL3-10B RSAL3-30B SA134-10B SA134-20B SA134-31B SA134-009-31B SA88-10B SA88-20B SA88-20B SA88-32B RSAK3-0.5B RSAK3-0.5BDL RSAK3-10B RSAK3-10B RSAK3-20B RSAK3-20B RSAK3-31B

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

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. Surrogate recoveries (%R) were not within QC limits for RSAK3-0.5BDL. Since this sample was diluted out, no data were qualified.

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 recoveries (%R) and relative percent differences (RPD) were not within QC limits for some compounds, the MS, MSD, LCS, or LCSD 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. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits with the following exceptions:

LCS ID (Associated Samples)	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Flag	A or P
90766LCS/D (EB070109-SO1	Pyridine	26 (50-120)	25 (50-120)	-	J- (all detects) UJ (all non-detects)	Р
90766MB)	1,4-Dioxane	47 (50-120)	48 (50-120)	-	J- (all detects) UJ (all non-detects)	

LCS ID (Associated Samples)	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Flag	A or P
90956LCS/D (RSAK3-0.5BDL RSAK3-10B 90956MB)	Bis(2-ethylhexyl)phthalate	127 (50-120)	147 (50-120)	•	J+ (all detects)	A

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

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

XI. Target Compound Identifications

Raw data were not reviewed for this SDG.

XII. Project Quantitation Limit

All project quantitation limits were within validation criteria with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
RSAK3-0.5B	Hexachlorobenzene Octachlorostyrene	Sample result exceeded calibration range.	Reported result should be within calibration range.	J (all detects) J (all detects)	А

All compounds reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG R0903678	All compounds reported below the PQL.	J (all detects)	Α

Raw data were not reviewed for this SDG.

XIII. Tentatively Identified Compounds (TICs)

Raw data were not reviewed for this SDG.

XIV. System Performance

Raw data were not reviewed for this SDG.

XV. Overall Assessment

The overall assessment of data was acceptable. In the case where more than one result was reported for an individual sample, the least technically acceptable results were rejected as follows:

Sample	Compound	Flag	A or P
RSAK3-0.5B	Hexachlorobenzene Octachlorostyrene	x x	A
RSAK3-0.5BDL	All TCL compounds except Hexachlorobenzene Octachlorostyrene	x	А

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

XVI. Field Duplicates

Samples SA114-0.5B and SA114009-0.5B and samples SA134-31B and SA134009-31B were identified as field duplicates. No semivolatiles were detected in any of the samples with the following exceptions:

	Concentrat	ion (ug/Kg)		D '''		
Compound	SA114-0.5B	SA114009-0.5B	RPD (Limits)	Difference (Limits)	Flags	A or P
2-Methylnaphthalene	40	35	-	5 (≤87)	-	-
Benzo(a)anthracene	29	35	-	6 (≤87)	-	-
Benzo(g,h,i)perylene	22	87U	-	65 (≤87)	-	-
Chrysene	69	75	•	6 (≤87)	-	-
Fluoranthene	61	61		0 (≤87)	-	-
Hexachlorobenzene	2700	3100	14 (≤50)	-	_	-
Naphthalene	14	18	-	4 (≤87)	-	-
Phenanthrene	65	61	-	4 (≤87)	-	-
Pyrene	170	140	-	30 (≤87)	-	-

	Concentra	tion (ug/Kg)	555	D'#		
Compound	SA114-0.5B	SA114009-0.5B	RPD (Limits)	Difference (Limits)	Flags	A or P
Octachlorostyrene	400	510	24 (≤50)	-	-	-

	Concentrat	ion (ug/Kg)				
Compound	SA134-31B	SA134009-31B	RPD (Limits)	Difference (Limits)	Flags	A or P
Butylbenzylphthalate	260U	11	-	249 (≤260)	-	-
Di-n-Butylphthalate	260U	82	•	178 (≤260)	-	-
Dimethyl phthalate	260U	3.1	-	256.9 (≤260)	•	-
Hexachlorobenzene	4.0	10U	-	6 (≤10)	-	-

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles - Data Qualification Summary - SDG R0903678

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0903678	EB070109-SO1	Pyridine 1,4-Dioxane	J- (all detects) UJ (all non-detects) J- (all detects) UJ (all non-detects)	Р	Laboratory control samples (%R) (I)
R0903678	RSAK3-0.5BDL RSAK3-10B	Bis(2-ethylhexyl)phthalate	J+ (all detects)	Α	Laboratory control samples (%R) (I)
R0903678	RSAK3-0.5B	Hexachlorobenzene Octachlorostyrene	J (all detects) J (all detects)	Α	Project Quantitation Limit (e)
R0903678	EB070109-SO1 SA114-0.5B SA114-0.5B SA114009-0.5B RSAN6-0.5B SA82-0.5B SA82-10B SA82-29B RSAL3-10B RSAL3-30B SA134-10B SA134-20B SA134-31B SA134-09-31B SA88-10B SA88-20B SA88-32B RSAK3-0.5B RSAK3-0.5B RSAK3-10B RSAK3-10B RSAK3-10B RSAK3-10B RSAK3-20B RSAK3-20B RSAK3-31B	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (sp)
R0903678	RSAK3-0.5B	Hexachlorobenzene Octachlorostyrene	X X	А	Overall assessment of data (o)
R0903678	RSAK3-0.5BDL	All TCL compounds except Hexachlorobenzene Octachlorostyrene	Х	A	Overall assessment of data (o)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles - Laboratory Blank Data Qualification Summary - SDG R0903678

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P	Code
R0903678	SA114-0.5B (10X)	Naphthalene	14U ug/Kg	А	bl

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P	Code
R0903678	SA114009-0.5B (12X)	Naphthalene	18U ug/Kg	А	bl
R0903678	SA82-10B (3X)	Naphthalene	3.2U ug/Kg	А	bl
R0903678	SA88-20B	Naphthalene	1.4U ug/Kg	А	bl
R0903678	RSAK3-20B	Naphthalene	1.8U ug/Kg	А	bl

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles- Field Blank Data Qualification Summary - SDG R0903678

No Sample Data Qualified in this SDG

Tronox Northgate Henderson

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VALIDATION	COMPLETENESS	WORKSHEET

SDG #: R0903678 Laboratory: Columbia Analytical Services

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LDC #:___

Stage 2B

Reviewer:

2nd Reviewer:

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

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

	Validation Area		Comments
l.	Technical holding times	A	Sampling dates: 7/01- 02/09
11.	GC/MS Instrument performance check	A	
III.	Initial calibration	A	
IV.	Continuing calibration/ICV	A	CON/101 = 252
V.	Blanks	SW	
VI.	Surrogate spikes	SW	
VII.	Matrix spike/Matrix spike duplicates	SW	
VIII.	Laboratory control samples	SW	us/p
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	A	
XI.	Target compound identification	N	
XII.	Compound quantitation/CRQLs	SW	
XIII.	Tentatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data	SW	
XVI.	Field duplicates	SM)	$b_1 = 2.3$ $D_2 = 12.13$
XVII.	Field blanks	SW	FB=1 FB= FB072109-50 from R0904014

Note:

A = Acceptable

N = Not provided/applicable SW = See worksheet

YND = No compounds detected

R = Rinsate FB = Field blank D = Duplicate TB = Trip blank

EB = Equipment blank

Validated Samples:

<u>-</u> 1	EB070109-SO1	11 SA134-20B	21 7RSAK3-31B	31 90766 MB
2 >	SA114-0.5B \mathcal{D} ,	12 - SA134-31B \mathcal{D}_{γ}	22 ? SA82-0.5BMS	\$2 × 90 847 MB
3 7	SA114009-0.5B \mathcal{D}_{l}	13 SA134009-31B	23 SA82-0.5BMSD	33 90 956 MB
4 2	RSAN6-0.5B	14 ² SA88-10B	24 7 RSAK3-31BMS	34
5 1	SA82-0.5B	15 SA88-20B	25 RSAK3-31BMSD	35
6 7	SA82-10B	16 2 SA88-32B	26	36
7 >	SA82-29B	17 ³ RSAK3-0.5B	27	37
8 7	RSAL3-10B	18 3 RSAK3-0.5BDL	28	38
9	RSAL3-30B	19 3 RSAK3-10B	29	39
10	SA134-10B	20 7 RSAK3-20B	30	40

VALIDATION FINDINGS WORKSHEET

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

A. Phenoi**	P. Bis(2-chloroethoxy)methane	EE. 2,6-Dinitrotoluene	TT. Pentachlorophenoi**	III. Benzo(a)pyrene**
B. Bis (2-chloroethyl) ether	Q. 2,4-Dichlorophenol**	FF. 3-Nitroaniline	UU. Phenanthrene	JJJ. Indeno(1,2,3-cd)pyrene
C. 2-Chlorophenol	R. 1,2,4-Trichlorobenzene	GG. Acenaphthene™	W. 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-butyiphthalate	MMM. Bis(2-Chloroisopropyl)ether
F. 1,2-Dichlorobenzene	U. Hexachlorobutadiene**	JJ. Dibenzofuran	YY. Fluoranthene**	NNN. Aniline
G. 2-Methylphenol	V. 4-Chloro-3-methylphenol**	KK. 2,4-Dinitrotoluene	ZZ. Pyrene	OOO. N-Nitrosodimethylamine
H. 2,2'-Oxybis(1-chloropropane)	W. 2-Methylnaphthalene	LL. Diethylphthalate	AAA. Butylbenzylphthalate	PPP. Benzoic Acid
I. 4-Methylphenol	X. Hexachlorocyclopentadiene*	MM. 4-Chlorophenyl-phenyl ether	BBB. 3,3'-Dichlorobenzidine	QQQ. Benzyl alcohol
J. N-Nitroso-di-n-propylamine*	Y. 2,4,6-Trichlorophenol**	NN. Fluorene	CCC. Benzo(a)anthracene	RRR. Pyridine
K. Hexachloroethane	Z. 2,4,5-Trichlorophenol	00. 4-Nitroaniline	DDD. Chrysene	SSS. Benzidine
L. Nitrobenzene	AA. 2-Chloronaphthalene	PP. 4,6-Dinitro-2-methylphenol	EEE. Bis(2-ethylhexyl)phthalate	TT. 1,4. Dioxane
M. Isophorone	BB. 2-Nitroaniline	QQ. N-Nitrosodiphenylamine (1)**	FFF. Di-n-octylphthalate**	uuu Octachlorostyrene
N. 2-Nitrophenol**	CC. Dimethylphthalate	RR. 4-Bromophenyi-phenylether	GGG. Benzo(b)fluoranthene	W.
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.

21495 I 2a See any LDC #._

VALIDATION FINDINGS WORKSHEET

Page:

2nd Reviewer: Reviewer:

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

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

Was a method blank analyzed for each concentration preparation level?

Was the blank contaminated? If yes, please see qualification below. Was a method blank associated with every sample? Y/N N/A Y N N/A

Blank extraction date: 7/08/07. Blank analysis date: 7/10/69 49/En Conc. units:

Sample Identification 20.21 1.8/4 g 2-16 Associated Samples: 3x) 7 w y (12x) 3 2 (10x) 4 90847MB Blank ID ó Compound

Blank analysis date:_ Blank extraction date:_ Conc. units:

Associated Samples:

Compound	Blank ID	
	IL	Sample Identification
	=	

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

LDC#21495 I 29 SDG#: See Con

VALIDATION FINDINGS WORKSHEET Field Blanks

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Reviewer: TVC Page:

2nd Reviewer:_

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

Y) N N/A Were field blanks identified in this SDG?
Y N N/A Were target compounds detected in the field blanks?
Blank units: "9 /L Associated sample units: "9 /kg. Associated sample units: Mg Akg.

Sampling date: 7/21/69

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

12 - 5

FB Sample Identification 8 2 Associated Samples: einer rew to 4U FB072109-50 Blank ID 0.35 0.18 5 <u>+</u> EEE AAA × コ Compound CROL

1.75

7,7 6.0

7.0

(xs)

Associated sample units:_ Blank units:

Sampling date: Field Blank / Rinsate / Other:

Field blank type: (circle one) Field Blank / Rinsate / Other:	Field Blank	/ Rinsate / Other:	Associa	Associated Samples:				
Compound	Blank ID			Sar	Sample Identification	nc		
CROL								

5x Phthalates 2x all others

LAG	
2/465	
# CDC#	

ž SDG#:

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

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

Were percent recoveries (%R) for surrogates within QC limits?

VALIDATION FINDINGS WORKSHEET

Surrogate Recovery

Page: of

Reviewer: 2nd Reviewer:

If 2 or more base neutral or acid surrogates were outside QC limits, was a reanalysis performed to confirm %R?

If any %R was less than 10 percent, was a reanalysis performed to confirm %R?

# Date	Sample ID	Surrogate	%R (Limits)		Ousiffications
	18 (100x)	FBP	0	145-1951	
		NBZ			
		#41	\	\ \ \ \	
			7	-	
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• QC limits are advisory S1 (NBZ) = Nitrobenzene-d5 S2 (FBP) = 2-Fluorobipheny S3 (TPH) = Terpheny-d14 S4 (PHL) = Phenol-d5	QC Limits (Soll) 23-120 30-115 18-137 24-113	OC Limits (Water) 35-114 35-116 33-116 33-141 S8 (DCB) = 2-	S5 (2FP)= 2-Fluorophenol S6 (TBP) = 2.4.6-Tribromophenol S7 (2CP) = 2-Chlorophenol-44 S8 (DCB) = 1,2-Dichlorobenzene-44	QC Limits (Soil) 25-121 19-122 20-130*	OC Limits (W ater) 21-100 10-123 33-110* 16-110*

LDC#: 21495 ING SDG #:

VALIDATION FINDINGS WORKSHEET Matrix Spike/Matrix Spike Duplicates

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 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 X N/A

MS/MSD. Soil / Water.

1K	N N N	MS/MSD. Soil / Water. Was a MS/MSD analyzed every 20 samples of each Were the MS/MSD percent recoveres (9, D) and the	ir. yzed every 20 ament remove		matrix?		Ç		
					MSD	Ses (APD) within the C	SC IIIMIS ?		Г
*	Date	MS/MSD ID	Compound	%R (Limits)	%R (Limits)	RPD (Limits)	Associated Samples	Qualifications	
		22/23	七七七		()	()	S	No sales	Ľ
		,	SS	-/IT (20-120)	051-05) 68 -)			
			RRR	(1)	(1) 0	200 (30)	^		1
				()	()	()			1
				()	()	(Γ
		24/28	RRR	,	1051-05) 97	1 0% / 46	2	MS.	T:
				()	()	() ,			abla
				()		(Τ
				(T
				()	()	()			Π
				()		,			\overline{T}
				(()				Π
				()	()	(I
- 1				()	()	()			T
				()	()	`			T
				()	()	<u> </u>			T
)					T

	Compound	QC Limits (Soll)	RPD (Soll)	QC Limits (Water)	RPD (Water)		Compound	QC Umits (Soil)	RPD (Soll)	QC Limits (Water)	RPD
Α.	A. Phenol	26-90%	~32%	12-110%	< 42%	၅၅	Acenaphthene	31-137%	≥ 19%	46-118%	≥31%
ij	C. 2-Chlorophenol	25-102%	< 50%	27-123%	< 40%	≡	4-Nitrophenol	11-114%	< 50%	10-80%	× 60%
шi	1,4-Dichlorobenzene	28-104%	< 27%	% 2 6-9£	< 28%	Ķ.	2,4-Dinitrotoluene	28-89%	< 47%	24-96%	< 38%
-;	N-Nitroso-di-n-propylamine	41-126%	< 38%	41-116%	< 38%	Ë	Pentachlorophenol	17-109%	< 47%	9-103%	%05 ×
œ	1,2,4-Trichlorobenzene	38-107%	< 23%	39-98%	< 28%	727	Pyrane	35-142%	× 36%	26-127%	< 31%
>	4-Chloro-3-methylphenol	26-103%	< 33%	23-97%	< 42%						

LDC#: 21495 Ing SDG #: _____

VALIDATION FINDINGS WORKSHEET Laboratory Control Samples (LCS)

Page: __lof___ Reviewer.

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

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

Was a LCS required?

Y (N)N/A

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

				90						Γ
*	Dete	LCS/LCSD ID	Compound	%R (Limits)		LCSD %R (Limits)	RPD (Limits)	Associated Samples	Ouslifteetions	
		10766 LCS/B	RRR	s1-0s) 97	20)	25 (50-130)		411 27L6 112	J. /47 6 (1)	
			777	1) 4	-	1	()		1/2/	$\overline{\lambda}$
)	$ \cdot $,			*	T
				¥	-	()	()			Т
		90847 LCS/6	399	(01-05) [27	8	145 (50-120)	()	2-16.2021	NO GUES (MSDi	T-\$
				~	^	()	()			Ì
)	<u> </u>	()	()			T
		90956 165/b	七百年	127 (50-1	(<i>a</i> x	147 (50-120)	()	18 19 909ct MR	T+ det /A (1)	17
				,	1	1	()			<u>T</u>
				`	_	()	()			Г
				J		()	(T
				J	1	()				Т
				J	7	()	(T
)	7	()	()			Т
					1	()	()			T
)	^	()	()			T
)	1					T
)	1		()			T
				ì		()	()			T
7)	$\overline{}$	()	•			T
7				•	^	()	()			T
)	^	()				T
)	-	())			Т
1				`	<u></u>	()	()			Т
		-		_	_		,			Т

LDC# 21495 I 29 SDG# In Gray

VALIDATION FINDINGS WORKSHEET Compound Quantitation and Reported CRQLs

Reviewer: 3/6

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

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

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

Qualifications	J dets /A (e)								
Associated Samples									
Finding	18 cm 2 cm 55								
Sample ID	21								
Date									
#									

Comments: See sample calculation verification worksheet for recalculations

1DC#: 21495 129 SDG#: Su Crr

VALIDATION FINDINGS WORKSHEET Overall Assessment of Data

Page: Reviewer: 2nd Reviewer:

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

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

All available information pertaining to the data were reviewed using professional judgement to compliment the determination of the overall quality of the data.

YN N/A

Was the overall quality and usability of the data acceptable?

#	Date	Sample ID	Finding	Associated Samples	Qualifications
		21	SS WHY CU ran	38	X/A (6)
		×C	All exent 35 di)	dud di)	
Con	Comments:				

LDC#: 2149512 VALIDATION FINDINGS WORKSHEET

SDG#:See cover

Field Duplicates

Page:	<u></u> of <u> </u>
Review	rer: 3/6
2nd Reviewer	:

METHOD: GC/MS SVOA (EPA SW 846 Method 8270C)
Y N NA
Were field duplicate pairs identified in this SDG?
Were target analytes detected in the field duplicate pairs?

Compound Name	Conc (t	ug/Kg)	RPD	Diff	Diff Limits	Quals
Compound Marie	2	3	(≤50%)	Dill		(Parent Only)
2-Methylnaphthalene	40	35		5	≤87	
Benzo(a)anthracene	29	35		6	≤87	
Benzo(g,h,i)perylene	22	87U		65	≤87	
Chrysene	69	75		6	≤87	
Fluoranthene	61	61		0	≤87	
Hexachiorobenzene	2700	3100	14			
Naphthalene	14	18		4	≤87	
Phenanthrene	65	61		4	≤87	:
Pyrene	170	140		30	≤87	
Octachlorostyrene	400	510	24			

Compound Name	Conc (ug/Kg)	RPD	Diff	Diff Limits	Quals
Compound Hame	12	13	(≤50%)	J		(Parent Only)
Butyl benzylphthalate	260U	11		249	≤260	
Di-n-Butylphthalate	260U	82		178	≤260	
Dimethyl phthalate	260U	3.1		256.9	≤260	
Hexachlorobenzene	4.0	10U		6	≤10	

V:\FIELD DUPLICATES\21495I2.wpd

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, 2009 Phase B Investigation,

Henderson, Nevada

Collection Date:

June 25 through July 7, 2009

LDC Report Date:

September 25, 2009

Matrix:

Water

Parameters:

Semivolatiles

Validation Level:

Stage 2B

Laboratory:

Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0903561

Sample Identification

M-75B

M-13AB

M-13009AB

M-64B

M-111AB

M-111ABRE

EB062909-GW1

M-25B

M-12AB

M-110B

M-110BRE

I-ARB

I-ARBRE

Introduction

This data review covers 13 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8270C for Semivolatiles.

This review follows the Standard Operating Procedures (SOP) 40, Data Review/Validation (BRC 2009), the Quality Assurance Project Plan Tronox LLC Facility, Henderson, Nevada (June 2009), NDEP guidance (May 2006), and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review (June 2008) as there are no current guidelines for the method stated above.

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

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

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

I. Technical Holding Times

All technical holding time requirements were met.

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

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

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

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.

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.

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.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

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

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

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

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

V. Blanks

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

Sample EB062909-GW1 was identified as an equipment blank. No semivolatile contaminants were found in this blank with the following exceptions:

Equipment Blank ID	Sampling Date	Compound	Concentration	Associated Samples
EB062909-GW1	6/29/09	Diethylphthalate	0.22 ug/L	No associated samples in this SDG

VI. Surrogate Spikes

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

VII. Matrix Spike/Matrix Spike Duplicates

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

VIII. Laboratory Control Samples (LCS)

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

LCS ID (Associated Samples)	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Flag	A or P
90344LCS/D (M-75B M-13AB M-13009AB 90344MB)	Pyridine	30 (50-120)	28 (50-120)	-	J- (all detects) UJ (all non-detects)	Р
90457LCS/D (M-64B M-111AB M-111ABRE EB062909-GW1 90457MB)	Pyridine	34 (50-120)	44 (50-120)	-	J- (all detects) UJ (all non-detects)	Р

LCS ID (Associated Samples)	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Flag	A or P
90703LCS/D (M-25B M-12AB 90703MB)	Pyridine	36 (50-120)	36 (50-120)	•	J- (all detects) UJ (all non-detects)	Р
90766LCS/D (M-110B M-110BRE I-ARB I-ARBRE 90766MB)	Pyridine 1,4-Dioxane	26 (50-120) 47 (50-120)	25 (50-120) 48 (50-120)	-	J- (all detects) UJ (all non-detects) J- (all detects) UJ (all non-detects)	Р

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

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

Sample	Internal Standards	Area (Limits)	Compound	Flag	A or P
M-111AB	Perylene-d12	823 (113164-452654)	Di-n-octylphthalate Benzo (b)fluoranthene Benzo (k)fluoranthene Benzo (a) pyrene Indeno (1,2,3-cd) pyrene Dibenz (a, h) anthracene Benzo (g, h, i) perylene	J (all detects) R (all non-detects)	A
M-110B	Perylene-d12	2769 (268630-1074518)	Di-n-octylphthalate Benzo(b)fluoranthene Benzo(k)fluoranthene Benzo(a)pyrene Indeno(1,2,3-cd)pyrene Dibenz(a,h)anthracene Benzo(g,h,i)perylene	J (all detects) R (all non-detects)	A
I-ARB	Perylene-d12	382 (276398-1105592)	Di-n-octylphthalate Benzo(b)fluoranthene Benzo(k)fluoranthene Benzo(a)pyrene Indeno(1,2,3-cd)pyrene Dibenz(a,h)anthracene Benzo(g,h,i)perylene	J (all detects) R (all non-detects)	А

Sample	Internal Standards	Area (Limits)	Compound	Flag	A or P
M-111ABRE	Perylene-d12	19920 (105262-421048)	Di-n-octylphthalate Benzo (b)fluoranthene Benzo (k)fluoranthene Benzo (a) pyrene Indeno (1,2,3-cd) pyrene Dibenz (a,h) anthracene Benzo (g,h,i) perylene	J (all detects) R (all non-detects)	A
M-110BRE	Perylene-d12	1046 (290058-1160230)	Di-n-octylphthalate Benzo(b)fluoranthene Benzo(k)fluoranthene Benzo(a)pyrene Indeno(1,2,3-cd)pyrene Dibenz(a,h)anthracene Benzo(g,h,i)perylene	J (all detects) R (all non-detects)	А
I-ARBRE	Perylene-d12	689 (290058-1160230)	Di-n-octylphthalate Benzo(b)fluoranthene Benzo(k)fluoranthene Benzo(a)pyrene Indeno(1,2,3-cd)pyrene Dibenz(a,h)anthracene Benzo(g,h,i)perylene	J (all detects) R (all non-detects)	А

XI. Target Compound Identifications

Raw data were not reviewed for this SDG.

XII. Project Quantitation Limit

All compounds reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG R0903561	All compounds reported below the PQL.	J (all detects)	Α

Raw data were not reviewed for this SDG.

XIII. Tentatively Identified Compounds (TICs)

Raw data were not reviewed for this SDG.

XIV. System Performance

Raw data were not reviewed for this SDG.

XV. Overall Assessment

The overall assessment of data was acceptable. In the case where more than one result was reported for an individual sample, the least technically acceptable results were rejected as follows:

Sample	Compound	Flag	A or P
M-111ABRE M-110BRE I-ARBRE	All TCL compounds	×	А

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

XVI. Field Duplicates

Samples M-13AB and M-13009AB were identified as field duplicates. No semivolatiles were detected in any of the samples with the following exceptions:

	Concentr	ation (ug/L)				
Compound	M-13AB	M-13009AB	RPD (Limits)	Difference (Limits)	Flags	A or P
1,4-Dioxane	9.0	9.6	-	0.6 (≤1.9)	-	-

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles - Data Qualification Summary - SDG R0903561

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0903561	M-75B M-13AB M-13009AB M-64B M-111AB M-111ABRE EB062909-GW1 M-25B M-12AB	Pyridine	J- (all detects) UJ (all non-detects)	Р	Laboratory control samples (%R) (I)
R0903561	M-110B M-110BRE I-ARB I-ARBRE	Pyridine 1,4-Dioxane	J- (all detects) UJ (all non-detects) J- (all detects) UJ (all non-detects)	P	Laboratory control samples (%R) (I)
R0903561	M-111AB M-110B I-ARB M-111ABRE M-110BRE I-ARBRE	Di-n-octylphthalate Benzo(b)fluoranthene Benzo(k)fluoranthene Benzo(a)pyrene Indeno(1,2,3-cd)pyrene Dibenz(a,h)anthracene Benzo(g,h,i)perylene	J (all detects) R (all non-detects)	А	Internal standards (area) (i)
R0903561	M-75B M-13AB M-13009AB M-64B M-111AB M-111ABRE EB062909-GW1 M-25B M-12AB M-110B M-110BRE I-ARB	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (sp)
R0903561	M-111ABRE M-110BRE I-ARBRE	All TCL compounds	х	А	Overall assessment of data (o)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles - Laboratory Blank Data Qualification Summary - SDG R0903561

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles- Field Blank Data Qualification Summary - SDG R0903561

No Sample Data Qualified in this SDG

Tronox Northgate Henderson

VALIDATION COMPLETENESS WORKSHEET LDC #: 21495J2a R0903561 Stage 2B SDG #:

Laboratory: Columbia Analytical Services

Reviewer: 2nd Reviewer:

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

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

	Validation Area		Comments
1.	Technical holding times	ð	Sampling dates: 6 /25 - 7/61 /69
11.	GC/MS Instrument performance check	A	'
III.	Initial calibration	A	7 RSD rx
IV.	Continuing calibration/ICV	A	ca/101 ≤ 25 3
V.	Blanks	A	
VI.	Surrogate spikes	SW)	
VII.	Matrix spike/Matrix spike duplicates	N	Client spec
VIII.	Laboratory control samples	SW	ics /b
IX.	Regional Quality Assurance and Quality Control	N	
Χ.	Internal standards	SW	
XI.	Target compound identification	N	
XII.	Compound quantitation/CRQLs	SLA+ N	
XIII.	Tentatively identified compounds (TICs)	N	·
XIV.	System performance	N	
XV.	Overall assessment of data	SW	
XVI.	Field duplicates	SW	D = 2,3
XVII.	Field blanks	SW	5B = 7

Note:

A = Acceptable

N = Not provided/applicable

SW = See worksheet

ND = No compounds detected

R = Rinsate

FB = Field blank

D = Duplicate

TB = Trip blank

EB = Equipment blank

Validated Samples:

Water

	Water					
1 1	M-75B	114	M-110B DL RE	21		31
2)	м-13AB <i>р</i>	12 4	I-ARB	22 1		7 + 7/2 ₁ 32
3	м-13009AB <i>b</i>	13 ¢	I-ARBOL RE	23 3	90703	33
₄ >	M-64B	14		24 4	90766	34
5 7	M-111AB	15		25		35
₆ →	M-111ABRE	16		26		36
7 7	EB062909-GW1	17		27		37
83	M-25B	18		28		38
1	M-12AB	19		29		39
10 4	M-110B	20		30		40

VALIDATION FINDINGS WORKSHEET

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

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

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

LDC# 21 495 J 24 Ly Correy SDG #:

VALIDATION FINDINGS WORKSHEET

Page:

2nd Reviewer:_ Reviewer:_

Field Blanks

Were target compounds detected in the field blanks? We $\frac{1}{2}$ Associated sample units: $\frac{1}{2}$ Were field blanks identified in this SDG? **МЕ**̀ТНОD: GC/MS BNA (EPA SW 846 Method 8270)

Y N N/A

Blank units:

Sampling date: 6/24/61 Field blank type: (circle one) Field Blank / Rinsate / Other:

_:

Associated Samples:

田

None

	ion						
	Sample Identification						
	Sa						
V-000000000000000000000000000000000000							
		4	0.48/4-	, ,			
	Blank ID	7	0.22				
***************************************	pun		11				
	Compound						CROL

Associated sample units: Blank units:

Sampling date: Field Blank / Rinsate / Other: Field blank / Rinsate / Other:

Associated Samples:

Compound	Blank ID		Sa	Sample Identification	on		
		-					
					:		
CROL							

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VALIDATION FINDINGS WORKSHEET

Surrogate Recovery

Page: __of_

2nd Reviewer: Reviewer:

Prese see qualification below for all questions answered "N". Not applicable questions are identified as "N/A". SDG# ような Constant (EPA SW 846 Method 8270C)

Were percent recoveries (%R) for surrogates within QC limits?

V N N/A

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

*	Date	Sample ID	Surrogate	%R (Limits)	Qualifications
		9	FBP	899 (45-135)	No grad (my)
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				()	
				()	
* OC lim	* QC limits are advisory	QC Limits (Soil) QC Limits (Water)	ater)	QC Limits (Soil)	QC Limits (Water)

QC Limits (Water) 21-100 10-123 33-110*
QC Limits (Soil) 25-121 19-122 20-130*
S5 (2FP)= 2-Fluorophenol S6 (TBP) = 2,4,6-Tribromophenol S7 (2CP) = 2-Chlorophenol-d4 S8 (DCB) = 1,2-Dichlorobenzene-d4
QC Limits (Water) 35-114 43-116 33-141 10-94
QC Limits (Soil) 23-120 30-115 18-137 24-113
* QC limits are advisory S1 (NBZ) = Nitrobenzene-d5 S2 (FBP) = 2-Fluorobiphenyl S3 (TPH) = Terphenyl-d14 S4 (PHL) = Phenol-d5

LDC#: 21495 J29

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

Reviewer: ____ Page:

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

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

Was a LCS required?

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

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VALIDATION FINDINGS WORKSHEET Internal Standards

Page: of 2nd Reviewer: Reviewer.

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

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

Were all internal standard area counts within -50 to +100 of the associated calibration standard?

Were the retention times of the internal standards within +/- 30 seconds of the retention times of the associated calibration standard?

1.00 1.
Date Sample ID Internal Area (Limits) 10 PRY 829 (13.164-45.2) 12 PRY 829 (28.64-45.2) 12 2769 (28.650-1) 13 14 19 10 10 10 10 10 10 10
Date Sample ID 2
Date
##

IS1 (DCB) = 1,4-Dichlorobenzene-d4 IS2 (NPT) = Naphthalene-d8 IS3 (ANT) = Acenaphthene-d10 * QC limits are advisory

IS4 (PHN) = Phenanthrene-d10 IS5 (CRY) = Chrysene-d12 IS6 (PRY) = Perylene-d12

LDC#: 21495 J29 SDG #: 54 Con

VALIDATION FINDINGS WORKSHEET Overall Assessment of Data

Page:

2nd Reviewer: Reviewer:

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

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

All available information pertaining to the data were reviewed using professional judgement to compliment the determination of the overall quality of the data.

(Y N N/A

Was the overall quality and usability of the data acceptable?

#	Date	Sample ID	Finding	Associated Samples	Qualifications
		6.11.13	Continution runs		(°)
			(Is ortise limits)		
Son	Comments:				

LDC #: 21495 J29 SDG #: Su Com

VALIDATION FINDINGS WORKSHEET Field Duplicates

Page:	<u>of</u>
Reviewer:	275
2nd reviewer:	V

METHOD: GC/MS BNA (EPA SW 84	6 Method 827	70)		
Y N N/A Were field duplicate production with the work of the work	pairs identifie nds identified	d in this SDG? in the field duplicat	e pairs?	
		Concentration	10 (49/L)	
Compound		2	3	RPD
T	TT	9.0	9.6	0,6 (£1,9 Diff)
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	 	Concentratio	<u> </u>	
Compound				RPD
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Compound				RPD
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	Concentration (
Compound			RPD
·		·	

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

Project/Site Name:

Tronox LLC Facility, 2009 Phase B Investigation,

Henderson, Nevada

Collection Date:

June 25 through June 30, 2009

LDC Report Date:

September 25, 2009

Matrix:

Soil/Water

Parameters:

Semivolatiles

Validation Level:

Stage 2B

Laboratory:

Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0903584

Sample Identification

SA202-10B

RSAJ2-33B

SA202-28B

RSAJ2009-33B

RSAI3-10B

EB062609-SO

RSAI3-10BDL

SA202-10BMS

RSAI3-20B

SA202-10BMSD

RSAI3-32B

SA188-0.5BMS

RSAI3-32BRE

SA188-0.5BMSD

SA188-0.5B

SA172-0.5B

SA41-0.5B

SA44-0.5B

SA42-0.5B

RSAI2-10B

RSAI2-10BDL

RSAI2009-10B

RSAI2009-10BDL

RSAI2-20B

RSAI2-31B

RSAJ2-10B

RSAJ2-20B

Introduction

This data review covers 26 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 8270C for Semivolatiles.

This review follows the Standard Operating Procedures (SOP) 40, Data Review/Validation (BRC 2009), the Quality Assurance Project Plan Tronox LLC Facility, Henderson, Nevada (June 2009), NDEP guidance (May 2006), and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review (June 2008) as there are no current guidelines for the method stated above.

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

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

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

I. Technical Holding Times

All technical holding time requirements were met.

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

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

Percent relative standard deviations (%RSD) were less than or equal to 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.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

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

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

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

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

V. Blanks

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

Method Blank ID	Extraction Date	Compound TIC (RT in minutes)	Concentration	Associated Samples
90350MB	6/29/09	Di-n-butylphthalate	33 ug/Kg	SA202-10B SA202-28B RSAI3-10B RSAI3-10BDL RSAI3-20B RSAI3-32B RSAI3-32BRE
90454MB	6/30/09	Di-n-butylphthalate	90 ug/Kg	SA188-0.5B SA172-0.5B SA41-0.5B SA44-0.5B SA42-0.5B RSA12-10B RSA12-10BDL RSA12009-10B RSA12009-10BDL RSA12-20B RSA12-31B RSA12-31B RSAJ2-10B RSAJ2-10B RSAJ2-33B RSAJ2-33B

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

Sample	Compound TIC (RT in minutes)	Reported Concentration	Modified Final Concentration
SA202-10B	Di-n-butylphthalate	43 ug/L	43U ug/Kg
SA172-0.5B	Di-n-butylphthalate	130 ug/Kg	130U ug/Kg
RSAI2-31B	Di-n-butylphthalate	56 ug/Kg	56U ug/Kg
RSAJ2-10B	Di-n-butylphthalate	95 ug/Kg	95U ug/Kg
RSAJ2-20B	Di-n-butylphthalate	50 ug/Kg	50U ug/Kg
RSAJ2-33B	Di-n-butylphthalate	86 ug/Kg	86U ug/Kg
RSAJ2009-33B	Di-n-butylphthalate	170 ug/Kg	170U ug/Kg

Sample EB062609-SO was identified as an equipment blank. No semivolatile contaminants were found in this blank with the following exceptions:

Equipment Blank ID	Sampling Date	Compound	Concentration	Associated Samples
EB062609-SO	6/26/09	Bis(2-ethylhexyl)phthalate 1,4-Dioxane	1,3 ug/L 0.15 ug/L	RSAI2-10B RSAI2-10BDL RSAI2009-10B RSAI2009-10BDL RSAI2-20B RSAI2-31B RSAJ2-10B RSAJ2-20B RSAJ2-33B RSAJ2009-33B

Sample FB072109-SO (from SDG R0904016) was identified as a field blank. No semivolatile contaminants were found in this blank with the following exceptions:

Field Blank ID	Sampling Date	Compound	Concentration	Associated Samples
FB072109-SO	7/21/09	Bis (2-ethylhexyl) phthalate Butylbenzylphthalate Di-n-butylphthalate Diethylphthalate	1.4 ug/L 0.18 ug/L 1.5 ug/L 0.35 ug/L	SA202-10B SA202-28B RSAI3-10B RSAI3-10BDL RSAI3-20B RSAI3-32B RSAI3-32BRE RSAI2-10B RSAI2-10BDL RSAI2009-10B RSAI2009-10BDL RSAI2-20B RSAI2-31B RSAJ2-10B RSAJ2-31B RSAJ2-33B RSAJ2-33B

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

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. Surrogate recoveries (%R) were not within QC limits for several samples. Since the samples were diluted out, no data were qualified.

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable. Although the MSD percent recoveries (%R) were not within QC limits for some compounds, the MS 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 LCS/LCSD percent recoveries (%R) were not within QC limits for one compound, the MS, and 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
RSAI3-32B	Perylene-d12	100325 (113164-452654)	Di-n-octylphthalate Benzo(b)fluoranthene Benzo(k)fluoranthene Benzo(a)pyrene Indeno(1,2,3-cd)pyrene Dibenz(a,h)anthracene Benzo(g,h,i)perylene	J (all detects) UJ (all non-detects)	A
RSAI3-32BRE	Perylene-d12	67341 (113164-452654)	Di-n-octylphthalate Benzo(b)fluoranthene Benzo(k)fluoranthene Benzo(a)pyrene Indeno(1,2,3-cd)pyrene Dibenz(a,h)anthracene Benzo(g,h,i)perylene	J (all detects) UJ (all non-detects)	А

XI. Target Compound Identifications

Raw data were not reviewed for this SDG.

XII. Project Quantitation Limit

All project quantitation limits were within validation criteria with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
RSAI3-10B RSAI2-10B RSAI2009-10B	Hexachlorobenzene	Sample result exceeded calibration range.	Reported result should be within calibration range.	J (all detects)	А

All compounds reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG R0903584	All compounds reported below the PQL.	J (all detects)	А

Raw data were not reviewed for this SDG.

XIII. Tentatively Identified Compounds (TICs)

Raw data were not reviewed for this SDG.

XIV. System Performance

Raw data were not reviewed for this SDG.

XV. Overall Assessment

The overall assessment of data was acceptable. In the case where more than one result was reported for an individual sample, the least technically acceptable results were rejected as follows:

Sample	Compound	Flag	A or P
RSAI3-10B RSAI2-10B RSAI2009-10B	Hexachlorobenzene	х	А
RSAI3-10BDL RSAI2-10BDL RSAI2009-10BDL	All TCL compounds except Hexachlorobenzene	x	Α
R\$Al3-32BRE	All TCL compounds	Х	А

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

XVI. Field Duplicates

Samples RSAI2-10B and RSAI2009-10B, samples RSAI2-10BDL and RSAI2009-10BDL, and samples RSAJ2-33B and RSAJ2009-33B were identified as field duplicates. No semivolatiles were detected in any of the samples with the following exceptions:

Concentration (ug/Kg)		tion (ug/Kg)	222	D.W.		
Compound	nd RSAI2-10B RSAI2009-10B		RPD (Limits)	Difference (Limits)	Flags	A or P
Chrysene	10	11	-	1 (≤50)	-	-
Fluoranthene	50U	11	-	39 (≤50)	-	-
Hexachlorobenzene	6900	7100	3 (≤50)	-	-	-
Naphthalene	13	6.5	-	6.5 (≤50)	-	-
Pyrene	13	11	-	2 (≤50)	-	•
Octachlorostyrene	1200	1100	9 (≤50)	-	-	-

	Concentration (ug/Kg) Compound RSAI2-10BDL RSAI2009-10BDL		222	D.W.		
Compound			RPD (Limits)	Difference (Limits)	Flags	A or P
Hexachlorobenzene	5000	5400	8 (≤50)	-	-	-
Naphthalene	76	430U	-	354 (≤430)	•	-
Octachlorostyrene	1100	840		260 (≤500)	-	-

	Concentra	tion (ug/Kg)	2000	D:#		
Compound	Compound RSAJ2-33B RSAJ200		RPD (Limits)	Difference (Limits)	Flags	A or P
Di-n-butylphthalate	86	170	-	84 (≤300)	•	-
Naphthalene	1.7 1.8	1.8	-	0.1 (≤12)	-	-
Phenanthrene	3.4	12U	-	8.6 (≤12)	-	-

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles - Data Qualification Summary - SDG R0903584

SDG	Sample	Compound	Floa	A == D	Bassay (Osda)
R0903584	RSAI3-32B RSAI3-32BRE	Di-n-octylphthalate Benzo(b)fluoranthene Benzo(k)fluoranthene Benzo(a)pyrene Indeno(1,2,3-cd)pyrene Dibenz(a,h)anthracene Benzo(g,h,i)perylene	J (all detects) UJ (all non-detects)	A or P	Reason (Code) Internal standards (area) (i)
R0903584	RSAI3-10B RSAI2-10B RSAI2009-10B	Hexachlorobenzene	J (all detects)	А	Project Quantitation Limit (e)
R0903584	SA202-10B SA202-28B RSAI3-10B RSAI3-10BDL RSAI3-20B RSAI3-32B RSAI3-32BRE SA172-0.5B SA41-0.5B SA41-0.5B SA42-0.5B RSAI2-10BDL RSAI2-10BDL RSAI2-10BDL RSAI2-10BDL RSAI2-20B RSAI2-31B RSAI2-31B RSAI2-31B RSAI2-33B RSAI2-33B RSAI2-33B RSAI2-33B RSAI2-33B RSAI2-33B	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (sp)
R0903584	RSAI3-10B RSAI2-10B RSAI2009-10B	Hexachlorobenzene	х	Α	Overall assessment of data (o)
R0903584	RSAI3-10BDL RSAI2-10BDL RSAI2009-10BDL	All TCL compounds except Hexachlorobenzene	х	A	Overall assessment of data (o)
R0903584	RSAI3-32BRE	All TCL compounds	х	А	Overall assessment of data (o)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles - Laboratory Blank Data Qualification Summary - SDG R0903584

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P	Code
R0903584	SA202-10B	Di-n-butylphthalate	43U ug/Kg	А	bl
R0903584	SA172-0.5B	Di-n-butylphthalate 130U ug/Kg		Α	bl
R0903584	RSAI2-31B	Di-n-butylphthalate	56U ug/Kg	Α	bl
R0903584	RSAJ2-10B	Di-n-butylphthalate	95U ug/Kg	А	bl
R0903584	RSAJ2-20B	Di-n-butylphthalate	50U ug/Kg	А	bl
R0903584	RSAJ2-33B	Di-n-butylphthalate	86U ug/Kg	А	bl
R0903584	RSAJ2009-33B	Di-n-butylphthalate	170U ug/Kg	Α	bl

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles- Field Blank Data Qualification Summary - SDG R0903584

No Sample Data Qualified in this SDG

Tronox Northgate Henderson

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VALIDATION	COMPLETE	NESS WORKS	HEET

SDG #: R0903584 Laboratory: Columbia Analytical Services

21495K2a

LDC #:

Stage 2B

Reviewer

2nd Reviewer:

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

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

	Validation Area		Comments
1.	Technical holding times	A	Sampling dates: 6/25 - 30/69
11.	GC/MS Instrument performance check	A	,
111.	Initial calibration	Sto A	7. RSD r~
IV.	Continuing calibration/ICV	A	car/101 = 25 2
V.	Blanks	SW	
VI.	Surrogate spikes	SN)	
VII.	Matrix spike/Matrix spike duplicates	SW	
VIII.	Laboratory control samples	SW	VCS /p
IX.	Regional Quality Assurance and Quality Control	N	
Χ.	Internal standards	SM	
XI.	Target compound identification	N	
XII.	Compound quantitation/CRQLs	SW	
XIII.	Tentatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data	SW)	
XVI.	Field duplicates	SW	$D_1 = 13$, 15 $D_2 = 14$, 16 $D_3 = 21$, 22 EB = 23 $FB = FB 072109-50$ from $R0904$
XVII.	Field blanks	SM	EB = 23 FB = FB 072109-50 from R09041

Note:

A = Acceptable

N = Not provided/applicable SW = See worksheet

ND = No compounds detected

R = Rinsate

FB = Field blank

D = Duplicate

TB = Trip blank

EB = Equipment blank

Valida	ted Samples:	soil +	water							
1 1	SA202-10B	8 11 5	SA44-0.5B	S	21 7	RSAJ2-33B	D3 5	31 1	90350 MB	(7/02)
2 1	SA202-28B	12	SA42-0.5B		22 1	RSAJ2009-33B	D _X	32 1	90350 MB	(7/217
3 1	RSAI3-10B	13	RSAI2-10B DI		23 3	EB062609-SO	Ŋ) 33 Y	90454 MB	
4 1	RSAI3-10BDL	14 ?	RSAI2-10BDL D1	<u>ا</u>	24	SA202-10BMS	S	34 3	90585 Mb	
5	RSAI3-20B	15	RSAI2009-10B D		25 \	SA202-10BMSD		35		
6 1	RSAI3-32B	16 2	RSAI2009-10BDL D.	~	26 >	SA188-0.5BMS		36		
7	RSAI3-32BRE	17	RSAI2-20B		27	SA188-0.5BMSD		37		
8 7	SA188-0.5B	18 ว	RSAI2-31B		28			38		
9 Z	SA172-0.5B	19 1	RSAJ2-10B		29			39		
10 🗸	SA41-0.5B	J 20 ^	RSAJ2-20B	لأ	30			40		

VALIDATION FINDINGS WORKSHEET

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

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

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

LDC#: 21495 K29 SDG #:

VALIDATION FINDINGS WORKSHEET

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Page:__ Reviewer:_ 2nd Reviewer:

Blanks

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 8270C)

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

Was a method blank analyzed for each concentration preparation level? Was a method blank associated with every sample? Y N N/A

Was the blank contaminated? If yes, please see qualification below. Y/N N/A A/Z Z/

Blank extraction date: 6/29/69 Blank analysis date: 7/6 2/69

1

Sample Identification Associated Samples: 25 4 90350 MB Blank ID ራ Compound Conc. units: らな

Blank extraction date: 6/30/61 Blank analysis date: 7/62/09

Associated Samples:

8-22

Conc. units: 4g /kg

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	en e							

	tion	22	170/1					
	Sample Identification	2	h/98					
	Ś	20	h/28 h/05					
		19	95/11					
		- 8	n/ 25					
		6	130/4					
	Blank ID	90454 MB	90					
1	o Jd		××					
	Compound							
	<u> </u>		\$	<u> </u>	<u> </u>	<u></u>	<u>L</u>	 1

5x Phthalates 2x all others

LDC # 21495 K2A SDG#: See Corr

VALIDATION FINDINGS WORKSHEET

Field Blanks

Reviewer: 376 2nd Reviewer:

Page: __of_

Were field blanks identified in this SDG? METHOD: GC/MS BNA (EPA SW 846 Method 8270) Y)N N/A

Vere target compounds detected in the field blanks? Blank units: 140 /kg.

Blank units: ^{M9 /L} Associated sample units: Mg /kg. Sampling date: 7/21/8 g

13-22 HB Sample Identification Associated Samples: 1-7 ξ rither csults Ā Field blank type: (circle one)(Field Blank / Rinsate / Other FB072109-50 Blank ID 0.35 0.18 <u>.</u> 4 EEE AAA × 7 Compound CROL

1.75

7.7 6.0

7.0

(XS)

Associated sample units: 49/kg Sampling date: 1 Blank units: 49/L

(MA)								
22	cation							
: - 81 MM ::	Sample Identification							
Associated Samples: WIT IS - 22	3.5							
EB								
/ Rinsate / Other:								
وع) Field Blank)	Blank ID	23	1.3	51'0				
Sampling date: 16/26/09 Field blank type: (circle one) Field Blank / Rinsate / Other:	Compound		EEE	十十十				CROL
Sa Fi			<u> </u>	L	L	<u> </u>	<u> </u>	Ö

5x Phthalates 2x all others

FBLKASC2tronox.wpd

LDC# 21495 KX SDG#:

VALIDATION FINDINGS WORKSHEET

Surrogate Recovery

Page: of

Reviewer. 2nd Reviewer:___

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

Were percent recoveries (%R) for surrogates within QC limits?

K N N/A

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

*	Date	Sa	Surrogate	%R (Limits)	Qualifications
		3 (20x)	4(1	(45-136)	N 0 (V
		4 (1m)			
		11 (20x)			
		(xgr) 71)	
		16 (60x))	
			/)	
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)	
* QC limit S1 (NBZ) S2 (FBP) S3 (TPH) S4 (PHL)	* QC limits are advisory S1 (NBZ) = Nitrobenzene-d5 S2 (FBP) = 2-Fluorobiphenyl S3 (TPH) = Terphenyl-d14 S4 (PHL) = Phenol-d5	OC Limits (Soil) OC Limits (Water) 23-120 35-114 30-115 43-116 18-137 33-141 24-113 10-94		S5 (2FP)= 2-Fluorophenol 25-121 S6 (TBP) = 2,4,6-Tribromophenol 19-122 S7 (2CP) = 2-Chlorophenol-d4 20-130* S8 (DCB) = 1,2-Dichlorobenzene-d4 20-130*	QC Limits (W ater) 21-100 10-123 33-110*

LDC # 21 495 KZA SDG #: Su Carry

Matrix Spike/Matrix Spike Duplicates VALIDATION FINDINGS WORKSHEET

Page: of 2nd Reviewer: Reviewer:

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

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

Y N N/A

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 matrix?

Was a MS/MSD analyzed every 20 samples of each matrix?

Y N N/A

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

*	Date	MS/MSD ID	Compound	MS %R (Limits)	MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		26/27	W	()	109 (35-108)	()	8	No rued (MSin)
		/ ,	44	()	194 (11-188)	()	•	, 1
				()	()	()		
				()	()	()		
				()	()	()		
				(,	,		
				()	•	()		
				()	()	()		
				()	()	()		
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				(.)	()	()		
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				()	()	()		
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				()	()	()		
				()	()	()		
				()	()		

	Compound	QC Limits (Soil)	RPD (Soll)	QC Limits (Water)	RPD (Water)		Compound	QC Limits (Soll)	RPD (Soll)	QC Limits (Water)	RPD (Water)
κ̈	Phenol	26-90%	~32% ~	12-110%	<u>≤ 42%</u>	99	Acenaphthene	31-137%	<u>≤ 19%</u>	46-118%	s 31%
ပ	2-Chlorophenol	25-102%	> 50%	27-123%	< 40%	=:	4-Nitrophenol	11-114%	< 50%	10-80%	< 50%
шi	1,4-Dichlorobenzene	28-104%	< 27%	36-97%	< 28%	X.	2,4-Dinitrotoluene	28-89%	< 47%	24-96%	< 38%
٦	N-Nitroso-di-n-propylamine	41-126%	< 38%	41-116%	< 38%	Ë	Pentachiorophenol	17-109%	< 47%	9-103%	< 50%
α	1,2,4-Trichlorobenzene	38-107%	< 23%	39-98%	< 28%	73	Pyrene	35-142%	< 36%	26-127%	< 31%
	4-Chloro-3-methylphenol	26-103%	< 33%	23-97%	< 42%						

LDC#: 21 495 /2a SDG #: (100 Con-

VALIDATION FINDINGS WORKSHEET Laboratory Control Samples (LCS)

Page: of

2nd Reviewer: Reviewer:

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

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

N N/A

Was a LCS required?

Y N/A

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

52 124 (50-120) 126 (50-120) (((((((((((((((((() (() (()	*	Date	TCS/TCSD ID	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
	$\frac{1}{1}$		90 454 115/p	77				8-22, 90454 MA	M. SALL CACAGO.
					()))		
	-				())			
	-				()	()			
	-				()))		
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	-				()		()		
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	-				()				
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21495Km	0.0
LDC #:_	# COS

VALIDATION FINDINGS WORKSHEET Internal Standards

Reviewer:__ 2nd Reviewer:__ Page:

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

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

アプド エエエ 999 555 Qualifications MS/A 777 JIJ 千斤千 RT (Limits) 113164-492654 Area (Limits) 100 325 67.34 Internal Standard アスメ Sample ID Date # (23 (c)

* QC limits are advisory IS1 (DCB) = 1,4-Dichlorobenzene-d4 IS2 (NPT) = Naphthalene-d8 IS3 (ANT) = Acenaphthene-d10

IS4 (PHN) = Phenanthrene-d10 IS5 (CRY) = Chrysene-d12 IS6 (PRY) = Perylene-d12

LDC#: 21 445 K2K SDG#: Sre Corr

VALIDATION FINDINGS WORKSHEET Compound Quantitation and Reported CRQLs

Reviewer: 10f L

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

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

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 N N/A

#	Date	Sample ID	Finding	Associated Samples	Qualifications
		31, 81, 8	55 > al range		Johns /A (e)

Comments: See sample calculation verification worksheet for recalculations

LDC #: 21495 k24 SDG #: See Garay

VALIDATION FINDINGS WORKSHEET Overall Assessment of Data

Page: Of A

Reviewer: Tre

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

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

All available information pertaining to the data were reviewed using professional judgement to compliment the determination of the overall quality of the data.

Y M N/A Was

Was the overall quality and usability of the data acceptable?

#	Date	Sample ID	Finding	Associated Samples	Qualifications	
		3, 13, 15	SS > CA range		$\forall \mathcal{X}$	(0)
		↓				\
		4 14 16	All except SS dil			
		7 (A11 TCV)		7#		\
			(Strain mercano SI)			
Comp	Comments					

LDC #: 21495 / 21 SDG #: Su Goral

VALIDATION FINDINGS WORKSHEET Field Duplicates

Page:_	_of
Reviewer:_	11/0
2nd reviewer:	a)

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

YN N/A

Were field duplicate pairs identified in this SDG? Were target compounds identified in the field duplicate pairs?

		Concentration	ng ug/kgg	Parent
Compound		13	15	RPD only
	מטט	10	17	1 (±50 0iff)
	YY	50 U	η.	39
·	نګ	6900	7100	3 (50 2 RPD)
·	2	13	6,5	6.5 (£ 50 Diff)
	ZZ	13	11	2
	Uuy	1200	1100	9 (4502 RPD)
		Concentratio	n1 4g/tg)	Paren
Compound	-	14	16	RPD Mly
	کک	5000	5400	8 (=507 RPD)
	S	76	430 U	354 (£ \$30 Diff)
	444	1100.	840	260 (£ 500 Diff)
		·		

Compound	Concentratio	22	RPD	Parint only
ХХ	86	170	84 (= 300 piff)	<i>J</i>
	1.7	1.8	0.1 (£ 12 piff)	
. 44	3.4	124	8.6	
	• 1			
·				

	Concentration ()	
Compound		RPD

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, 2009 Phase B Investigation,

Henderson, Nevada

Collection Date:

July 6 through July 7, 2009

LDC Report Date:

September 25, 2009

Matrix:

Soil

Parameters:

Semivolatiles

Validation Level:

Stage 2B

Laboratory:

Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0903729

Sample Identification

SA206-0.5B

SA206-10B

SA206-25B

SA206-30B

RSAK4-10B

RSAK4-20B

RSAK4-31B

RSAL4-0.5B

RSAL4009-0.5B

RSAL4-10B

RSAL4-28B

SA100-10B

SA100-30B

SA69-0.5B

SA69-10B

SA69-29B

SA206-30BMS

SA206-30BMSD

SA69-10BMS

SA69-10BMSD

Introduction

This data review covers 20 soil samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8270C for Semivolatiles

This review follows the Standard Operating Procedures (SOP) 40, Data Review/Validation (BRC 2009), the Quality Assurance Project Plan Tronox LLC Facility, Henderson, Nevada (June 2009), NDEP guidance (May 2006), and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review (June 2008) as there are no current guidelines for the method stated above.

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

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

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

I. Technical Holding Times

All technical holding time requirements were met.

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

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

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

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.

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 .

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.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

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

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

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

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

V. Blanks

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

Method Blank ID	Extraction Date	Compound TIC (RT in minutes)	Concentration	Associated Samples
91016MB	7/9/09	Di-n-butylphthalate	38 ug/Kg	RSAL4-0.5B RSAL4-009-0.5B RSAL4-10B RSAL4-28B SA100-10B SA100-30B SA69-0.5B SA69-10B SA69-29B

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

Sample	Compound TIC (RT in minutes)	Reported Concentration	Modified Final Concentration
RSAL4-0.5B	Di-n-butylphthalate	39 ug/L	39U ug/L
RSAL4009-0.5B	Di-n-butylphthalate	42 ug/Kg	42U ug/Kg
RSAL4-28B	Di-n-butylphthalate	67 ug/Kg	67U ug/Kg
SA100-10B	Di-n-butylphthalate	63 ug/Kg	63U ug/Kg
SA100-30B	Di-n-butylphthalate	56 ug/Kg	56U ug/Kg

Sample FB072109-SO (from SDG R0904016) was identified as a field blank. No semivolatile contaminants were found in this blank with the following exceptions:

Field Blank ID	Sampling Date	Compound	Concentration	Associated Samples
FB072109-SO	7/21/09	Bis(2-ethylhexyl)phthalate Butylbenzylphthalate Di-n-butylphthalate Diethylphthalate	1.4 ug/L 0.18 ug/L 1.5 ug/L 0.35 ug/L	All samples in SDG R0903729

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

VI. Surrogate Spikes

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

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable. Although the MS percent recoveries (%R) and MS/MSD relative percent difference (RPD) were not within QC limits for some compounds, the 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 LCS/LCSD percent recoveries (%R) were not within QC limits for one compound, the MS, or 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.

XI. Target Compound Identifications

Raw data were not reviewed for this SDG.

XII. Project Quantitation Limit

All compounds reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG R0903729	All compounds reported below the PQL.	J (all detects)	Α

Raw data were not reviewed for this SDG.

XIII. Tentatively Identified Compounds (TICs)

Raw data were not reviewed for this SDG.

XIV. System Performance

Raw data were not reviewed for this SDG.

XV. Overall Assessment

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

XVI. Field Duplicates

Samples RSAL4-0.5B and RSAL4009-0.5B were identified as field duplicates. No semivolatiles were detected in any of the samples with the following exceptions:

	Concentra	tion (ug/Kg)				
Compound	RSAL4-0.5B	RSAL4009-0.5B	RPD (Limits)	Difference (Limits)	Flags	A or P
Chrysene	1.0	1.1	-	0.1 (≤6.9)	-	-
Di-n-butylphthalate	39	42	-	3 (≤180)		_
Fluoranthene	1.7	1.8	-	0.1 (≤6.9)	-	-
Hexachlorobenzene	87	86	1 (≤50)	-	-	-
Naphthalene	1.4	1.4	-	0 (≤6.9)	-	-
Phenanthrene	2.1	2.5	-	0.4 (≤6.9)	-	-
Pyrene	1.4	1.1	-	0.3 (≤6.9)	-	-
Octachlorostyrene	14	13	-	1 (≤6.9)	-	-

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles - Data Qualification Summary - SDG R0903729

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0903729	SA206-0.5B SA206-10B SA206-25B SA206-30B RSAK4-10B RSAK4-20B RSAK4-31B RSAL4-0.5B RSAL4-0.5B RSAL4-10B RSAL4-10B RSAL4-10B RSAL4-28B SA100-10B SA100-30B SA69-0.5B SA69-10B SA69-29B	All compounds reported below the PQL.	J (all detects)	Α	Project Quantitation Limit (sp)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles - Laboratory Blank Data Qualification Summary - SDG R0903729

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P	Code
R0903729	RSAL4-0.5B	Di-n-butylphthalate	39U ug/L	А	bl
R0903729	RSAL4009-0.5B	Di-n-butylphthalate	42U ug/Kg	А	bl
R0903729	RSAL4-28B	Di-n-butylphthalate	67U ug/Kg	Α	bl
R0903729	SA100-10B	Di-n-butylphthalate	63U ug/Kg	Α	bl
R0903729	SA100-30B	Di-n-butylphthalate	56U ug/Kg	А	bl

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles- Field Blank Data Qualification Summary - SDG R0903729

No Sample Data Qualified in this SDG

Tronox Northgate Henderson VALIDATION COMPLETENESS WORKSHEET

LDC #: 21495L2a Stage 2B SDG #: R0903729

Laboratory: Columbia Analytical Services

Reviewer: 2nd Reviewer:

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

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

	Validation Area		Comments
l.	Technical holding times	A	Sampling dates: 7/06 - 07/09
II.	GC/MS Instrument performance check	A	
III.	Initial calibration	À	2 KSD M
IV.	Continuing calibration/ICV	A	2 RSD M COV/101 525 3
V.	Blanks	SW	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	SW	
VIII.	Laboratory control samples	SW	ics /p
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	A	
XI.	Target compound identification	N	
XII.	Compound quantitation/CRQLs	N	
XIII.	Tentatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data	A	
XVI.	Field duplicates	SW	5 = 8 9
XVII.	Field blanks	SW	FB = FB072109-SD from R0904016

Note:

A = Acceptable

N = Not provided/applicable

SW = See worksheet

ND = No compounds detected

R = Rinsate

FB = Field blank

D = Duplicate

TB = Trip blank

EB = Equipment blank

Validated Samples:

	Soil Soil			
1	SA206-0.5B	11 > RSAL4-28B	21 90 956 MB	31
2]	SA206-10B	12 3 SA100-10B	t 4 9006 l	32
3 1	SA206-25B	13 7 SA100-30B	23	33
4 1	SA206-30B	14 ³ SA69-0.5B	24	34
5 1	RSAK4-10B	15 7 SA69-10B	25	35
6	RSAK4-20B)16 SA69-29B	26	36
7 1	RSAK4-31B	17 SA206-30BMS	27	37
8 Y	RSAL4-0.5B	18 SA206-30BMSD	28	38
9 4	RSAL4009-0.5B	19 SA69-10BMS	29	39
10 Y	RSAL4-10B	20 SA69-10BMSD	30	40

VALIDATION FINDINGS WORKSHEET

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

A. Phenol**	P. Bis(2-chloroethoxy)methane	EE. 2,6-Dinitrotoluene	TT. Pentachlorophenoi™	III. Benzo(a)pyrene**
B. Bis (2-chloroethyl) ether	Q. 2,4-Dichlorophenol**	FF. 3-Nitroaniline	UU. Phenanthrene	JJJ. Indeno(1,2,3-cd)pyrene
C. 2-Chlorophenol	R. 1,2,4-Trichlorobenzene	GG. Acenaphthene™	VV. Anthracene	KKK. Dibenz (a,h)anthracene
D. 1,3-Dichlorobenzene	S. Naphthalene	HH. 2,4-Dinitrophenol*	WW. Carbazole	LLL. Benzo(g,h,i)perylene
E. 1,4-Dichlorobenzene⁴	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. Ariline
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-Ntroso-di-n-propylamine⁴	Y. 2,4,6-Trichlorophenol**	NN. Fluorene	CCC. Benzo(a)anthracene	RRR. Pyridine
K. Hexachloroethane	Z. 2,4,5-Trichlorophenol	00. 4-Nitroaniline	DDD. Chrysene	SSS. Benzidine
L. Nitrobenzene	AA. 2-Chloronaphthalene	PP. 4,6-Dinitro-2-methylphenol	EEE. Bis(2-ethylhexyl)phthalate	III. 1,4. D'OXANE
M. Isophorone	BB. 2-Nitroaniline	QQ. N-Nitrosodiphenylamine (1)**	FFF. Di-n-octylphthalate**	uuu Octachlorostyrunc
N. 2-Nitrophenol**	CC. Dimethylphthalate	RR. 4-Bromophenyl-phenylether	GGG. Benzo(b)fluoranthene	WV.
O. 2,4-Dimethylphenol	DD. Acenaphthylene	SS. Hexachlorobenzene	HHH. Benzo(k)fluoranthene	www.

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

LDC # 21 4 95 L22 Se Care SDG #:__

VALIDATION FINDINGS WORKSHEET

Reviewer:_ 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 8270C)

Was a method blank analyzed for each concentration preparation level? Was a method blank analyzed for each matrix?

Y N N/A

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

Was the blank contaminated? If yes, please see qualification below. Blank extraction date: 7/७५/६५ Blank analysis date: 7/15/७१ Y N N/A

(19) Sample Identification 8 - 16 G 7 ίλ C Associated Samples: 67 4 91016 MB Blank ID $\frac{\gamma}{\infty}$ 爻 Conc. units: ५५ /६८ Compound

Blank analysis date:_ Blank extraction date: Conc. units:

Associated Samples:

Compound	Blank ID	
		Sample Identification
,		

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

BLANKS1.wpd

LDC# 2/495 L29 SDG#: 24 Cm

VALIDATION FINDINGS WORKSHEET

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Field Blanks

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

Y N/A Were field blanks identified in this SDG?

Were target compounds detected in the field blanks? Blank units: $\frac{\sqrt{L}}{\sqrt{2}}$ Associated sample units: $\frac{\sqrt{S}}{\sqrt{L}}$ Sampling date: $\frac{\sqrt{L}}{\sqrt{2}}$ / $\frac{\sqrt{S}}{\sqrt{L}}$ Y N N/A

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

=

2 Sample Identification DD DD Associated Samples: e ther ちまなな <u>-</u> FB 672169-50 Blank ID 26,0 ø, <u>1</u>8 ら A A A EFE X Compound (5X)

1.75

0. 6.0 Associated sample units: Blank units:

Sampling date:

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

Associated Samples:

Sample Identification Blank ID Compound

CRal

LDC#: 21495 122 SDG#: 50 Cm

Matrix Spike/Matrix Spike Duplicates VALIDATION FINDINGS WORKSHEET

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

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

MS/MSD. Soil / Water.

R	Y N NA	MS/MSD. Soil / Water. Was a MS/MSD analyzed every 20 samples of each Were the MS/MSD percent recoveries (%R) and the	er. lyzed every 2 ercent recove	20 samples eries (%R)		matrix? relative percent differer	matrix? relative percent differences (RPD) within the QC limits?	OC limits?		
*	Date	DI DEWEND ID	Compound	AR (I		MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications	
Ш		17/18	1486	153	(50-150)	()	34 (30)	4	No grass	(MSBi
					()	())		<i>></i>	-
					()				_
		19/20	RRR	49	(52-153)	())	7	→	_
		,			()	())			
					7	(,			
					()	()				
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					7	()	(
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					()	()	()	_		
					()	()	()			
					~	()	,			

	Compound	QC Limits (Soil)	RPD (Soll)	QC Limits (Water)	RPD		Tailor and	QC Limits	RPD	QC Limits	RPD
κ	Phenol	26-90%	≥ 35%	12-110%	< 42%	99	Acenaphthene	31-137%	(30ff) 2 19%	46-118%	(vale)) ≤31%
ΰ	2-Chlorophenol	25-102%	< 50%	27-123%	< 40%	. =	4-Nitrophenol	11-114%	< 50%	10-80%	< 50%
ш	1,4-Dichlorobenzene	28-104%	< 27%	36-97%	< 28%	Κ Έ	2,4-Dinitrotoluene	28-83%	< 47%	24-96%	< 38%
٦	N-Nitroso-di-n-propylamine	41-126%	< 38%	41-116%	< 38%	Ή.	Pentachlorophenol	17-109%	< 47%	9-103%	× 50%
œ	1,2,4-Trichlorobenzene	38-107%	< 23%	39-98%	< 28%	72.	Pyrene	35-142%	× 36%	26-127%	< 31%
>	4-Chloro-3-methylphenol	26-103%	< 33%	%29-62	< 42%						

LDC #: 2/495 L2a SDG #:

VALIDATION FINDINGS WORKSHEET Laboratory Control Samples (LCS)

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Reviewer:

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

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

Y N N/A

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

# Date	CS/CSD ID	Compound	%R	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
	90956 155/2	333	127	(50-120)	147 (50-120)	()	1-7, 90952 MB	No and (1185) in
			`	()	()	()		
				()	()	()		
				~	()	()		
	91016 LCS/D	344	187	(51-120)	(20-120)	()	8-16 91016 MB	No man CMCACO
				()	()	()		
				()	()	()		
				()	()	()		
	_			,		()		
				^ _	()	()		
				()		()		
				(()	(
				^	()	()		
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LDC#: 21495L2 SDG#:See cover

VALIDATION FINDINGS WORKSHEET

Field Duplicates

Page:	:l_of <i>_</i>
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METHOD: GC/MS SVOA (EPA SW 846 Method 8270C)
Y) N NA Were field duplicate pairs identified in this SDG?

Y N NA

Were target analytes detected in the field duplicate pairs?

Commound Name	Conc (ug/Kg)	RPD	Diff	Diff Limits	Quals
Compound Name	8	9	(≤50%)	Dill	Dill Entites	(Parent Only)
Chrysene	1.0	1.1		0.1	≤6.9	
Di-n-butylphthalate	39	42		3	≤180	r
Fluoranthene	1.7	1.8		0.1	≤6.9	
Hexachlorobenzene	87	86	1			
Naphthalene	1.4	1.4		0	≤6.9	
Phenanthrene	2.1	2.5		0.4	≤6.9	
Pyrene	1.4	1.1		0.3	≤6.9	
Octachlorostyrene	14	13		1	≤6.9	

V:\FIELD DUPLICATES\21495L2.wpd