

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

Semivolatiles

LDC

## 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, 2009

**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.
- UU 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	Compound	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)	A
M-127BRE	All TCL compounds	10	7	J- (all detects) UJ (all non-detects)	A

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 semivolatiles 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 ( $\geq 0.05$ )	All samples in SDG R0903006	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 .

#### 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	2-Fluorobiphenyl Nitrobenzene-d5 2-Fluorobiphenyl	32 (45-135) 29 (45-135) 31 (45-135)	All TCL compounds	J- (all detects) UJ (all non-detects)	P

## 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)	P

## 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)	A

## 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	X	A

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)	A	Initial calibration (RRF) (c)
R0903006	MC-3BRE EB052709RE M-127BRE FB060409	Pyridine	J (all detects) UJ (all non-detects)	P	Laboratory control samples (%R) (l, ld)
R0903006	MC-3BRE EB052709RE M-127BRE FB060409	1,4-Dioxane	J- (all detects) UJ (all non-detects)	P	Laboratory control samples (%R) (l)
R0903006	MC-3B MC-3BRE EB052709 EB052709RE M-127B M-127BRE FB060409	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (sp)
R0903006	MC-3BRE EB052709RE M-127BRE	All TCL compounds	X	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

Laboratory: Columbia Analytical Services

Date: 9/16/09

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Reviewer: JVC

2nd Reviewer: Q

**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
I.	Technical holding times	SW	Sampling dates: 5/27-28/09, 6/04/09
II.	GC/MS Instrument performance check	A	
III.	Initial calibration	SW	3 RSD
IV.	Continuing calibration/ICV	avg SWA	CV/10V ≤ 25 %
V.	Blanks	A	
VI.	Surrogate spikes	SW	
VII.	Matrix spike/Matrix spike duplicates	N	Client spec
VIII.	Laboratory control samples	SW	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

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

D = Duplicate  
 TB = Trip blank  
 EB = Equipment blank

Validated Samples:

*Water*

1	MC-3B	11	156625 MB	Ext = 88595	21	31
2	MC-3BRE	12	157385 ↓	= 88443	22	32
3	EB052709	13			23	33
4	EB052709RE	14			24	34
5	M-127B	15			25	35
6	M-127BRE	16			26	36
7	FB060409	17			27	37
8		18			28	38
9		19			29	39
10		20			30	40

(no r2)

LDC #: 21445 B2a  
 SDG #: See Cover

**VALIDATION FINDINGS CHECKLIST**

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 Reviewer: [Signature]  
 2nd Reviewer: [Signature]

**Method: Semivolatiles (EPA SW 846 Method 8270C)**

Validation Area	Yes	No	NA	Findings/Comments
<b>I. Technical Holding Times</b>				
All technical holding times were met.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Cooler temperature criteria was met.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<b>II. GC/MS Instrument Performance</b>				
Were the DFTPP performance results reviewed and found to be within the specified criteria?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Were all samples analyzed within the 12 hour clock criteria?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<b>III. Initial Calibration</b>				
Did the laboratory perform a 5 point calibration prior to sample analysis?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Were all percent relative standard deviations (%RSD) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Was a curve fit used for evaluation?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Did the initial calibration meet the curve fit acceptance criteria of $\geq 0.990$ ?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Were all percent relative standard deviations (%RSD) $\leq 30\%$ and relative response factors (RRF) $> 0.05$ ?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<b>IV. Continuing Calibration</b>				
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Were all percent differences (%D) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Were all percent differences (%D) $\leq 25\%$ and relative response factors (RRF) $\geq 0.05$ ?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<b>V. Blanks</b>				
Was a method blank associated with every sample in this SDG?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Was a method blank analyzed for each matrix and concentration?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<b>VI. Surrogate Recovery</b>				
Were all surrogate %R within QC limits?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
If 2 or more base neutral or acid surrogates were outside QC limits, was a reanalysis performed to confirm %R?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
If any %R was less than 10 percent, was a reanalysis performed to confirm %R?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<b>VII. Matrix Spike and Duplicate</b>				
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.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Was a MS/MSD analyzed every 20 samples of each matrix?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
<b>VIII. Laboratory Control Sample</b>				
Was an LCS analyzed for this SDG?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

LDC #: 21495 B2a  
 SDG #: See Cover

**VALIDATION FINDINGS CHECKLIST**

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 Reviewer: JVB  
 2nd Reviewer: [Signature]

Validation Area	Yes	No	NA	Findings/Comments
Was an LCS analyzed per extraction batch?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<b>IX. Regional Quality Assurance and Quality Control</b>				
Were performance evaluation (PE) samples performed?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Were the performance evaluation (PE) samples within the acceptance limits?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
<b>X. Internal standards</b>				
Were internal standard area counts within -50% or +100% of the associated calibration standard?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Were retention times within + 30 seconds from the associated calibration standard?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<b>XI. Target compound identification</b>				
Were relative retention times (RRT's) within + 0.06 RRT units of the standard?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Did compound spectra meet specified EPA "Functional Guidelines" criteria?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Were chromatogram peaks verified and accounted for?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<b>XII. Compound quantitation/CRQLs</b>				
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the compound?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Were compound quantitation and CRQLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<b>XIII. Tentatively identified compounds (TICs)</b>				
Were the major ions (> 10 percent relative intensity) in the reference spectrum evaluated in sample spectrum?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Were relative intensities of the major ions within ± 20% between the sample and the reference spectra?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Did the raw data indicate that the laboratory performed a library search for all required peaks in the chromatograms (samples and blanks)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<b>System performance</b>				
System performance was found to be acceptable.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<b>XV. Overall assessment of data</b>				
Overall assessment of data was found to be acceptable.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<b>Field duplicate pairs</b>				
Field duplicate pairs were identified in this SDG.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Target compounds were detected in the field duplicates.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
<b>XVII. Field blanks</b>				
Field blanks were identified in this SDG.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Target compounds were detected in the field blanks.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	



# 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	TTT. 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-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 #: 21495 B 2a

SDG #: En Way

**VALIDATION FINDINGS WORKSHEET**  
**Technical Holding Times**

Page: 1 of 1

Reviewer: JV6

2nd Reviewer: [Signature]

All circled dates have exceeded the technical holding times.

Y N N/A Were all cooler temperatures within validation criteria? \_\_\_\_\_

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

Sample ID	Matrix	Preserved	Sampling Date	Extraction date	Analysis date	Total # of Days	Qualifier
<u>2, 4</u>	<u>N</u>	<u>N</u>	<u>5/27/09</u>	<u>6/08/09</u>	<u>6/11/09</u>	<u>11</u>	<u>J-N/A</u>
<u>6</u>	↓	↓	<u>5/28/09</u>	↓	↓	<u>10</u>	↓

**TECHNICAL HOLDING TIME CRITERIA**

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

**VALIDATION FINDINGS WORKSHEET**  
Initial Calibration

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Reviewer: JVL  
2nd Reviewer: [Signature]

LDC #: 51545 B 2a  
SDG #: See Cover  
METHOD: GC/MS BNA (EPA SW 846 Method 8270)  
Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

N N/A Did the laboratory conduct an acceptable 5 point calibration prior to sample analysis?  
 N N/A Were percent relative standard deviations (%RSD) and relative response factors (RRF) within method criteria for all CCC's and SPCC's?  
 N N/A Was a curve fit used for evaluation? If yes, what was the acceptance criteria used for evaluation? N/A  
 N N/A Did the initial calibration meet the acceptance criteria?  
 N N/A Were all %RSDs and RRFs within the validation criteria of ≤30 %RSD and ≥0.05 RRF ?

#	Date	Standard ID	Compound	Finding %RSD (Limit: ≤30.0%)	Finding RRF (Limit: ≥0.05)	Associated Samples	Qualifications
	5/22/09	1CAL	UUV		0.048	All + B/K/S	J/M/A (C)





LDC #: 21459 B 26  
 SDG #: Su Gray

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

Page: 1 of 1  
 Reviewer: JVC  
 2nd Reviewer: J

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

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

Y N N/A Was a LCS required?

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

#	Date	LCS/LCSD ID	Compound	LCS %R (Limits)	LCS %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		156625 LCS/P	R/R/R	( )	44 (50-120)	( )	1, 3, 5, 156625 MB	No qual (LCS)
			T/T/T	( )	44 ( )	( )		
				( )	( )	( )		
		157385 LCS/P	R/R/R	37 (50-120)	27 ( )	32 (30)	2, 4, 6, 7, 157385 MB	J/MS/P (LCS)
			T/T/T	43 ( )	47 ( )	( )		J-MS/P (L)
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
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LDC #: 21445 B2a  
 SDG #: See above

**VALIDATION FINDINGS WORKSHEET**  
**Overall Assessment of Data**

Page: 1 of 1  
 Reviewer: JG  
 2nd Reviewer: [Signature]

**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.

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

#	Date	Sample ID	Finding	Associated Samples	Qualifications
		<u>2, 4, 6</u>	<u>Confirmation runs</u> <u>( MB surr outside limits)</u>		<u>X / A</u> <u>(6)</u>

Comments: \_\_\_\_\_

**VALIDATION FINDINGS WORKSHEET**  
**Initial Calibration Calculation Verification**

**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:

$RRF = (A_x)(C_{is}) / (A_{is})(C_x)$   
 average RRF = sum of the RRFs/number of standards  
 $\%RSD = 100 * (S/X)$   
 $A_x$  = Area of compound,  
 $C_x$  = Concentration of compound,  
 $S$  = Standard deviation of the RRFs,  
 $A_{is}$  = Area of associated internal standard  
 $C_{is}$  = Concentration of internal standard  
 $X$  = Mean of the RRFs

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Reported		Recalculated		Reported		Recalculated	
				RRF (1.0 std)	RRF (1.0 std)	RRF (1.0 std)	Average RRF (Initial)	Average RRF (Initial)	%RSD	%RSD	
1	ICAL	5/22/09	Phenol (1st internal standard)	0.666	0.666	0.706	0.706	11.0	11.0		
			Naphthalene (2nd internal standard)	1.008	1.008	1.079	1.079	10.15	10.17		
			Fluorene (3rd internal standard)	1.147	1.147	1.190	1.190	6.07	6.06		
			Pentachlorophthalate (4th internal standard)	0.993	0.993	0.989	0.989	3.79	3.80		
			Bis(2-ethylhexyl)phthalate (5th internal standard)	0.708	0.708	0.743	0.743	3.51	3.51		
			Benzo(a)pyrene (6th internal standard)	1.08	1.08	1.194	1.194	8.42	8.42		
2			Phenol (1st internal standard)								
			Naphthalene (2nd internal standard)								
			Fluorene (3rd internal standard)								
			Pentachlorophthalate (4th internal standard)								
			Bis(2-ethylhexyl)phthalate (5th internal standard)								
			Benzo(a)pyrene (6th internal standard)								
3			Phenol (1st internal standard)								
			Naphthalene (2nd internal standard)								
			Fluorene (3rd internal standard)								
			Pentachlorophthalate (4th internal standard)								
			Bis(2-ethylhexyl)phthalate (5th internal standard)								
			Benzo(a)pyrene (6th internal standard)								

1.4-D = 4.0  
 S = 0.6973  
 NN = 1.193  
 LU = 1.009  
 EEE = 0.746  
 JZZ = 1.254  
 = 0.6613  
 = 1.027  
 = 1.258  
 = 1.013  
 = 0.759  
 = 1.273  
 = 0.6427  
 = 1.028  
 = 1.234  
 = 0.968  
 = 0.746  
 = 1.267

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



**VALIDATION FINDINGS WORKSHEET**  
**Continuing Calibration Results Verification**

**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 =  $100 * (\text{ave. RRF} - \text{RRF}) / \text{ave. RRF}$       Where:      ave. RRF = initial calibration average RRF  
 $\text{RRF} = (A_x)(C_s) / (A_s)(C_x)$       RRF = continuing calibration RRF  
 $A_x$  = Area of compound,       $A_s$  = Area of associated internal standard  
 $C_x$  = Concentration of compound,       $C_s$  = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Average RRF (Initial)	Reported		Recalculated	
					RRF (CC)	%D	RRF (CC)	%D
1	DA456	6/04/09	Phenol (1st internal standard)	0.706	0.708	0.3	0.708	0.3
			Naphthalene (2nd internal standard)	1.079	1.039	3.7	1.039	3.7
			Fluorene (3rd internal standard)	1.190	1.267	6.5	1.267	6.5
			<del>Benzo(a)anthracene</del> (4th internal standard)	0.989	1.048	6.0	1.048	6.0
			Bis(2-ethylhexyl)phthalate (5th internal standard)	0.743	0.748	0.7	0.748	0.7
			Benzo(a)pyrene (6th internal standard)	1.194	1.253	4.9	1.253	4.9
2	DA477	6/11/09	Phenol (1st internal standard)	0.706	0.772	9.3	0.772	9.3
			Naphthalene (2nd internal standard)	1.079	1.044	3.2	1.044	3.2
			Fluorene (3rd internal standard)	1.190	1.230	3.4	1.230	3.4
			<del>Benzo(a)anthracene</del> (4th internal standard)	0.989	0.933	5.7	0.933	5.7
			Bis(2-ethylhexyl)phthalate (5th internal standard)	0.743	0.833	12.1	0.833	12.1
			Benzo(a)pyrene (6th internal standard)	1.194	1.245	4.3	1.245	4.3
3			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 #: 21495 B29  
 SDG #: Sre Cover

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

Page: 1 of 1  
 Reviewer: JVZ  
 2nd reviewer: [Signature]

**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: # 1

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5	2.00	1.89	95	95	0
2-Fluorobiphenyl	↓	1.74	87	87	↓
Terphenyl-d14	↓	1.82	91	91	↓
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					

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					

**VALIDATION FINDINGS WORKSHEET**

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

LCS/LCSD samples: 88 89 90 LCS/D

Compound	Spike Added ( )		Spike Concentration ( )		LCS		LCSD		Percent Recovery		RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc	Reported	Recalc	Reported	Recalc	Reported	Recalculated
Phenol												
N-Nitroso-di-n-propylamine												
4-Chloro-3-methylphenol												
Acenaphthene	4.00	4.00	3.29	3.27	82	82	82	82	1			
Pentachlorophenol	4.00	4.00	3.35	3.55	84	84	84	89	9			
Pyrene												

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 #: 21995 B2a

SDG #: See Cover

### VALIDATION FINDINGS WORKSHEET Sample Calculation Verification

Page: 1 of 1

Reviewer: JTK

2nd reviewer:

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

Y N N/A  
 Y N N/A

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

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

$$\text{Concentration} = \frac{(A_x)(L)(V_i)(DF)(2.0)}{(A_s)(RRF)(V_o)(V_j)(\%S)}$$

A<sub>x</sub> = Area of the characteristic ion (EICP) for the compound to be measured

A<sub>s</sub> = Area of the characteristic ion (EICP) for the specific internal standard

I<sub>s</sub> = Amount of internal standard added in nanograms (ng)

V<sub>o</sub> = Volume or weight of sample extract in milliliters (ml) or grams (g).

V<sub>i</sub> = Volume of extract injected in microliters (ul)

V<sub>t</sub> = 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 account for GPC cleanup

Example:

Sample I.D. # 1,4-Dioxane

$$\text{Conc.} = \frac{(40760)(1)(1\text{ml})(1000)}{(9219)(0.706)(1060\text{ml})} = 0.59 \text{ ug/L}$$

#	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	
RS AK5-0.5B	
RS AK5-0.5BDL	
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	
RS AJ2-0.5B	
RS AJ3-0.5B	
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.
- 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.
- UU 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 semivolatiles 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 ( $\geq 0.05$ )	All samples in SDG R0903051	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
6/9/09	Octachlorostyrene	0.047 ( $\geq 0.05$ )	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)	A
6/10/09	Octachlorostyrene	0.049 ( $\geq 0.05$ )	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 SA189-0.5BMSD	J (all detects) UJ (all non-detects)	A

## 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 RSAK5-0.5B RSAK5-0.5BDL SA76-0.5B SA76009-0.5B RSAL3-0.5B SA100-0.5B RSAM3-0.5B RSAM2-0.5B

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	Di-n-butylphthalate Naphthalene	120 ug/Kg 1.4 ug/Kg	120U ug/Kg 1.4U ug/Kg
SA152-0.5B	Naphthalene	1.4 ug/Kg	1.4U ug/Kg
SA152009-0.5B	Di-n-butylphthalate	39 ug/Kg	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)	A

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	X X	A
RSA12-0.5BDL RSAK5-0.5BDL	All TCL compounds except Hexachlorobenzene Octachlorostyrene	X	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:

Compound	Concentration (ug/Kg)		RPD (Limits)	Difference (Limits)	Flags	A or P
	SA76-0.5B	SA76009-0.5B				
Hexachlorobenzene	17000	13000	27 ( $\leq 50$ )	-	-	-
Octachlorostyrene	5400	7000	26 ( $\leq 50$ )	-	-	-

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

Compound	Concentration (ug/Kg)		RPD (Limits)	Difference (Limits)	Flags	A or P
	SA152-0.5B	SA152009-0.5B				
Naphthalene	1.4	6.8U	-	5.4 ( $\leq 6.8$ )	-	-

**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 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	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 SA88-0.5B SA152-0.5B SA152009-0.5B RSAJ2-0.5B RSAJ3-0.5B SA202-0.5B	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)	A	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 SA88-0.5B SA152-0.5B SA152009-0.5B RSAJ2-0.5B RSAJ3-0.5B SA202-0.5B	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (sp)
R0903051	RSA12-0.5B RSAK5-0.5B	Hexachlorobenzene Octachlorostyrene	X X	A	Overall assessment of data (o)
R0903051	RSA12-0.5BDL RSAK5-0.5BDL	All TCL compounds except Hexachlorobenzene Octachlorostyrene	X	A	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	A	bl
R0903051	RSAM2-0.5B	Di-n-butylphthalate	69U ug/Kg	A	bl
R0903051	SA189-0.5B	Di-n-butylphthalate Naphthalene	120U ug/Kg 1.4U ug/Kg	A	bl
R0903051	SA152-0.5B	Naphthalene	1.4U ug/Kg	A	bl
R0903051	SA152009-0.5B	Di-n-butylphthalate	39U ug/Kg	A	bl
R0903051	SA202-0.5B	Di-n-butylphthalate Naphthalene	89U ug/Kg 1.4U ug/Kg	A	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**

LDC #: 21495C2a      **VALIDATION COMPLETENESS WORKSHEET**  
 SDG #: R0903051      **Stage 2B**  
 Laboratory: Columbia Analytical Services

Date: 9/16/09  
 Page: 1 of 1  
 Reviewer: JVB  
 2nd Reviewer: [Signature]

**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
I.	Technical holding times	A	Sampling dates: <u>6/01-04/09</u>
II.	GC/MS Instrument performance check	A	
III.	Initial calibration	SW	
IV.	Continuing calibration/ICV	SW	<u>CCV/ICV ≤ 25%</u>
V.	Blanks	SW	
VI.	Surrogate spikes	SW	
VII.	Matrix spike/Matrix spike duplicates	SW	
VIII.	Laboratory control samples	SW	<u>LCS / D</u>
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	SW	<u>D<sub>1</sub> = 7, 8      D<sub>2</sub> = 15, 16</u>
XVII.	Field blanks	SW	<u>FB = 20      FB = FB 072109-SD from R0904016</u>

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

Validated Samples:

Soil + Water

1	✓ RSA12-0.5B	S	11	✓ RSAM3-0.5B	S	21	✓ RSA12-0.5BMS	31	✓ <del>157385 MB</del>
2	✓ RSA12-0.5BDL		12	✓ RSAM2-0.5B		22	✓ RSA12-0.5BMSD	32	✓ <del>88783 MB</del>
3	✓ RSA13-0.5B		13	✓ SA189-0.5B		23	✓ SA189-0.5BMS	33	✓ <del>88824 MB</del>
4	✓ RSAJ5-0.5B		14	✓ SA88-0.5B		24	✓ SA189-0.5BMSD	34	
5	✓ RSAK5-0.5B		15	✓ SA152-0.5B	D	25		35	
6	✓ RSAK5-0.5BDL		16	✓ SA152009-0.5B	D	26		36	
7	✓ SA76-0.5B	D	17	✓ RSAJ2-0.5B		27		37	
8	✓ SA76009-0.5B	b	18	✓ RSAJ3-0.5B		28		38	
9	✓ RSAL3-0.5B		19	✓ SA202-0.5B		29		39	
10	✓ SA100-0.5B	✓	20	✓ FB000409	W	30		40	

(#20-reported in R0903005) (no rx)

# 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	TTT. 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-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 #: 21495 C2a  
 SDG #: See Conn

### VALIDATION FINDINGS WORKSHEET

Initial Calibration

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

**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 Did the laboratory conduct an acceptable 5 point calibration prior to sample analysis?  
 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?  
 Y  N  N/A Was a curve fit used for evaluation? If yes, what was the acceptance criteria used for evaluation? NA  
 Y  N  N/A Did the initial calibration meet the acceptance criteria?  
 Y  N  N/A Were all %RSDs and RRFs within the validation criteria of  $\leq 30\%$  RSD and  $\geq 0.05$  RRF ?

#	Date	Standard ID	Compound	Finding %RSD (Limit: <30.0%)	Finding RRF (Limit: >0.05)	Associated Samples	Qualifications
	5/22/09	CAL	UUV		0.048	All 7 Blks	J/VJ/A (c)

# VALIDATION FINDINGS WORKSHEET

## Continuing Calibration

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 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  $\leq 25\%$  %D and  $\geq 0.05$  RRF?

N N/A  
 N N/A  
 Y(N) N/A

#	Date	Standard ID	Compound	Finding %D (Limit: $\leq 25.0\%$ )	Finding RRF (Limit: $\geq 0.05$ )	Associated Samples	Qualifications
	6/09/09	DA 502 (CCV)	NUM		0.047	2-4, 6, 7, 10, 21, 22 88783 MB	J/W/A (C)
	6/10/09	PA 526 (CCV)	NUM		0.049	8, 9, 13-19, 23, 24	

**VALIDATION FINDINGS WORKSHEET**

**Blanks**

LDC #: 21495 C24  
 SDG #: Sy Cms

Page: 1 of 1  
 Reviewer: JMG  
 2nd Reviewer: [Signature]

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

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

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

Blank extraction date: 6/04/09 Blank analysis date: 6/08/09

Conc. units: ug/kg Associated Samples: 1-12

(61)

Compound	Blank ID	Sample Identification																		
[Redacted]	58789 MB	11	12																	
	33	40/U	69/U																	
	XX																			

165

Blank extraction date: 6/08/09 Blank analysis date: 6/09/09  
 Conc. units: ug/kg Associated Samples: 13-19

(61)

Compound	Blank ID	Sample Identification																		
[Redacted]	88824 MB	13	15	16	18 (2x)	19														
	63	120/U	39/U		7.6	89/U														
	1.7	1.4/U	1.4/U			1.4/U														
	XX																			
	S																			

315  
3.4

5x Phthalates  
2x all others





**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.

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

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

#	Date	MS/MSD ID	Compound	MS %R (Limits)	MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		21/22	DDb	225 (10-182)	220 (10-182)	( )	( )	No qual (LSD)
			XX	( )	( )	32 (30)	( )	
			YY	225 (11-188)	215 (11-188)	( )	( )	
			SS	0 (50-150)	0 (50-150)	( )	( )	
			ZZ	213 (10-144)	200 (10-144)	( )	( )	
			RRR	( )	30 (50-150)	55 (30)	( )	
			UUU	995 (50-150)	1042.5 (50-150)	( )	( )	
				( )	( )	( )	( )	
				( )	( )	( )	( )	
				( )	( )	( )	( )	
				( )	( )	( )	( )	
				( )	( )	( )	( )	
				( )	( )	( )	( )	
				( )	( )	( )	( )	
				( )	( )	( )	( )	
				( )	( )	( )	( )	
				( )	( )	( )	( )	
				( )	( )	( )	( )	

A.	Phenol	QC Limits (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)	Compound	QC Limits (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)
		26-90%	≤ 35%	12-110%	≤ 42%	Acenaphthene	31-137%	≤ 19%	46-118%	≤ 31%
		25-102%	≤ 50%	27-123%	≤ 40%	4-Nitrophenol	11-114%	≤ 50%	10-80%	≤ 50%
		28-104%	≤ 27%	36-97%	≤ 28%	2,4-Dinitrotoluene	28-89%	≤ 47%	24-96%	≤ 38%
		41-126%	≤ 38%	41-116%	≤ 38%	Pentachlorophenol	17-109%	≤ 47%	9-103%	≤ 50%
		38-107%	≤ 23%	39-98%	≤ 28%	Pyrene	35-142%	≤ 36%	26-127%	≤ 31%
		26-103%	≤ 33%	23-97%	≤ 42%					



LDC #: 21495 C2a

SDG #: Sa Cmy

# VALIDATION FINDINGS WORKSHEET

## Laboratory Control Samples (LCS)

Page: 1 of 7

Reviewer: SK

2nd Reviewer: C

**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 Was a LCS required?

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

#	Date	LCS/LCSD ID	Compound	LCS %R (Limits)	LCS %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		<del>197385 LCS/D</del>	<del>RRR</del>	<del>37 (50-120)</del>	<del>27 (50-120)</del>	<del>38 (30)</del>	<del>20, 19, 23, 25 MP</del>	<del>J / NJ P (N/A)</del>
			<del>TTT</del>	<del>43 (50-120)</del>	<del>57 (50-120)</del>			<del>J / NJ P (N/A)</del>
		88824 LCS/D	XX	124 (50-120)			13-19, 88824 MP	No qual (LCSD in)

LDC #: 21495 C2a

SDG #: Sec Env

# VALIDATION FINDINGS WORKSHEET Compound Quantitation and Reported CRQLs

Page: 1 of 1

Reviewer: JVG

2nd Reviewer: Q

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

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

#	Date	Sample ID	Finding	Associated Samples	Qualifications
		1, 5	SS, UUM > cal range		JATS/A (e)

Comments: See sample calculation verification worksheet for recalculations

**VALIDATION FINDINGS WORKSHEET**  
**Overall Assessment of Data**

**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
		1, 5	SS, UUU 7 cal range		X/A ↓
		2, 6	All except SS, UUU all		

Comments: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

LDC #: 21495029  
 SDG #: Seaboard

VALIDATION FINDINGS WORKSHEET  
 Field Duplicates

Page: 1 of 1  
 Reviewer: JVL  
 2nd reviewer: [initials]

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	Concentration ( $\mu\text{g/kg}$ )		RPD
	7	8	
SS	1700	1300	27 ( $\leq 50\%$ RPD)
UUU	5400	7000	26 ↓

Compound	Concentration ( $\mu\text{g/kg}$ )		RPD
	15	16	
XX	180U	39	141 ( $\leq 180$ Diff)
S	1.4	6.8U	5.4 ( $\leq 6.8$ Diff)

Compound	Concentration ( )		RPD

Compound	Concentration ( )		RPD

XX - U at MDL not RL (34U)  
 S - 0.85U at MDL not 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.
- 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.
- UU 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 ( $\geq 0.05$ )	All samples in SDG R0903243	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 .

## 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)	P
89818LCS/D (M-29B 89818MB)	Pyridine	16 (50-120)	33 (50-120)	67 ( $\leq 30$ )	J (all detects) UJ (all non-detects)	P

### 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)	A

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)	A	Initial calibration (RRF) (c)
R0903243	M-142B M-130B	Pyridine	J- (all detects) UJ (all non-detects)	P	Laboratory control samples (%R) (l)
R0903243	M-29B	Pyridine	J (all detects) UJ (all non-detects)	P	Laboratory control samples (%R)(RPD) (l,ld)
R0903243	H-28AB AW-BW-02B M-142B M-130B M-29B	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 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

LDC #: 21495D2a **VALIDATION COMPLETENESS WORKSHEET**  
 SDG #: R0903243 Stage 2B  
 Laboratory: Columbia Analytical Services

Date: 9/17/09  
 Page: 1 of 1  
 Reviewer: SV6  
 2nd Reviewer: Q

**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
I.	Technical holding times	A	Sampling dates: 6/09 - 16/09
II.	GC/MS Instrument performance check	A	
III.	Initial calibration	SW	
IV.	Continuing calibration/ICV	NG SW A	CCV/ICV ≤ 25%
V.	Blanks	SW	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	N	Client spec
VIII.	Laboratory control samples	SW	LCS/D
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	A	
XI.	Target compound identification	N	
XII.	Compound quantitation/CRQLs	N	
XIII.	Tentatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data	A	
XVI.	Field duplicates	N	
XVII.	Field blanks	SW	FB = FB060409 from R0903006

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

Validated Samples:

Water

1	H-28AB	11	89336 MB	21	31
2	AW-BW-02B	12	89594 MB	22	32
3	M-142B	13	89818 MB	23	33
4	M-130B	14		24	34
5	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

(no r2)

# 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	TTT. 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-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 #: 1495 J29

SDG #: See Conv

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

Y (N) N/A

Y (N) N/A

Y (N) N/A

Y (N) N/A

VALIDATION FINDINGS WORKSHEET  
Initial Calibration

Did the laboratory conduct an acceptable 5 point calibration prior to sample analysis? NA  
Were percent relative standard deviations (%RSD) and relative response factors (RRF) within method criteria for all CCC's and SPOC'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 ?

#	Date	Standard ID	Compound	Finding %RSD (Limit: ≤30.0%)	Finding RRF (Limit: ≥0.05)	Associated Samples	Qualifications
	5/22/09	ICAL	UUU		0.048	All + Bks	JMS/A (C)

# VALIDATION FINDINGS WORKSHEET

## Blanks

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

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

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

Blank extraction date: 6/17/09 Blank analysis date: 6/17/09

Conc. units: ug/L Associated Samples: 3, 4 (ND)

Compound	Blank ID	Sample Identification
	89594 MB	
AAA	0.18	
XX	1.2	

Blank extraction date: \_\_\_\_\_ Blank analysis date: \_\_\_\_\_  
 Conc. units: \_\_\_\_\_ Associated Samples: \_\_\_\_\_

Compound	Blank ID	Sample Identification

5x Phthalates  
 2x all others



LDC #: 21495 D29  
 SDG #: See Copy

VALIDATION FINDINGS WORKSHEET  
 Field Blanks

Page: of 1  
 Reviewer: JVC  
 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: ug/L Associated sample units: ug/L  
 Sampling date: 6/24/09  
 Field blank type: (circle one) Field Blank Rinsate / Other: (N/A) Associated Samples: 1-4

Compound	Blank ID	Sample Identification
	FB060409	
AAA	0.12	
XX	0.78	
LL	0.28	
CRQL		

(Sx)  
 0.6  
 3.9  
 1.4

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

Compound	Blank ID	Sample Identification
CRQL		

5x Phthalates  
 2x all others

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

**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 Was a LCS required?

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

#	Date	LCS/LCSD ID	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		89336 LCS/D	RRR	( )	27 (50-120)	66 ( 30 )	1, 2, 89336 MB	No qual (LCS/D)
			T+T	48 (50-120)	( )	( )		(LCS/D)
		89594 LCS/D	RRR	35 (50-120)	39 (50-120)	( )	3, 4, 89594 MB	J-WJ/P (L)
				( )	( )	( )		
		89818 LCS/D	RRR	16 (50-120)	33 (50-120)	67 ( 30 )	5, 89818 MB	J-WJ/P (L, D)
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

## 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.
- UU 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 ( $\geq 0.05$ )	M-78B M-78BRE M-128B H-38B M-19B M-34B M-125B M-125BMS M-125BMSD 89818MB 90162MB	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)	M-78BRE H-38B M-19B M-34B	J (all detects) UJ (all non-detects)	A
6/26/09	Octachlorostyrene	0.049 (≥0.05)	M-125B M-125BMS M-125BMSD 90162MB	J (all detects) UJ (all non-detects)	A

#### 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
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 ( $\leq 30$ )	J (all detects) UJ (all non-detects)	A

## VIII. Laboratory Control Samples (LCS)

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

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



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)	P

## 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)	A
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)	A

## 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)	A

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	A

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)	A	Continuing calibration (RRF) (c)
R0903404	M-125B	Pyridine	J (all detects) UJ (all non-detects)	A	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)	P	Laboratory control samples (%R)(RPD) (l,ld)
R0903404	M-125B	Pyridine	J- (all detects) UJ (all non-detects)	P	Laboratory control samples (%R) (l)
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)	A	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)	A	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)	A	Project Quantitation Limit (sp)
R0903404	M-78BRE	All TCL compounds	X	A	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

LDC #: 21495E2a **VALIDATION COMPLETENESS WORKSHEET**

SDG #: R0903404

Laboratory: Columbia Analytical Services

Stage 2B

Date: 9/17/09

Page: 1 of 1

Reviewer: [Signature]

2nd Reviewer: [Signature]

**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
I.	Technical holding times	A	Sampling dates: <u>6/17 - 24/09</u>
II.	GC/MS Instrument performance check	A	
III.	Initial calibration	SW	<u>7% RSD</u> <u>r<sup>2</sup></u>
IV.	Continuing calibration/ICV	SW	<u>COV/ICV ≤ 25%</u>
V.	Blanks	SW	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	SW	
VIII.	Laboratory control samples	SW	<u>LCS / D</u>
IX.	Regional Quality Assurance and Quality Control	N	
X.	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	SW	<u>FB = FB060409 from R0903006</u>

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

1	M-78B	11	M-125BMSD	21	89818 MB	31
2	M-78BRE	12		22	90167 MB	32
3	M-128B	13		23	90344 MB	33
4	H-38B	14		24		34
5	M-19B	15		25		35
6	M-34B	16		26		36
7	M-125B	17		27		37
8	M-22AB	18		28		38
9	M-17AB	19		29		39
10	M-125BMS	20		30		40

(no r<sup>2</sup>)

# 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	TTT. 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-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.

VALIDATION FINDINGS WORKSHEET  
Initial Calibration

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

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

- N N/A Did the laboratory conduct an acceptable 5 point calibration prior to sample analysis?
- N N/A Were percent relative standard deviations (%RSD) and relative response factors (RRF) within method criteria for all CCC's and SPCC's?
- Y N (N/A) Was a curve fit used for evaluation? If yes, what was the acceptance criteria used for evaluation? → N/A
- Y N (N/A) Did the initial calibration meet the acceptance criteria?
- Y N (N/A) Were all %RSDs and RRFs within the validation criteria of ≤30 %RSD and ≥0.05 RRF ?

#	Date	Standard ID	Compound	Finding %RSD (Limit: ≤30.0%)	Finding RRF (Limit: ≥0.05)	Associated Samples	Qualifications
	5/22/09	1CAL	UUA		0.048	1-7, 10, 11, 89818 mg 90162 mg	JAJJA CC
(Linear) (Rsq)	7/6/09	1CAL	UUA		0.049	8, 9, 90344 mg	

LDC #: 21495 E 25  
 SDG #: Sa Green  
 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 Was a continuing calibration standard analyzed at least once every 12 hours of sample analysis for each instrument?  
 Y N N/A Were percent differences (%D) and relative response factors (RRF) within method criteria for all CCC's and SPOC's?  
 Y N N/A Were all %D and RRF's within the validation criteria of  $\leq 25\%$  %D and  $\geq 0.05$  RRF?

## VALIDATION FINDINGS WORKSHEET

### Continuing Calibration

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

#	Date	Standard ID	Compound	Finding %D (Limit: $\leq 25.0\%$ )	Finding RRF (Limit: $\geq 0.05$ )	Associated Samples	Qualifications
	6/24/09	DA682	MUN		0.044	2, 4-6	J/M/A (C)
	6/20/09	DA733	MUN		0.049	7, 10, 11, 90162MB	
	6/7/02/09	DA802	MUN		0.042	8, 9	



VALIDATION FINDINGS WORKSHEET  
Blanks

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

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

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

Blank extraction date: 6/25/09 Blank analysis date: 6/26/09  
 Conc. units: ug/L Associated Samples: 7 (ND)

Compound	Blank ID	Sample Identification
	90167 MB	
<u>XX</u>	0.98	

Blank extraction date: \_\_\_\_\_ Blank analysis date: \_\_\_\_\_  
 Conc. units: \_\_\_\_\_ Associated Samples: \_\_\_\_\_

Compound	Blank ID	Sample Identification

5x Phthalates  
 2x all others

LDC #: 21445E2A  
SDG #: Src Gray

# VALIDATION FINDINGS WORKSHEET Field Blanks

Page: 1 of 1  
Reviewer: DVC  
2nd Reviewer: [Signature]

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: ug/L Associated sample units: ug/L

Sampling date: 6/04/09

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

Associated Samples: 1-4, 7 (ND)

Compound	Blank ID	Sample Identification
	FB060409	
AAA	0.12	
XX	0.78	
LL	0.25	
CRQL		

(5x)  
0.6  
3.9  
1.4

Blank units: \_\_\_\_\_ Associated sample units: \_\_\_\_\_  
Sampling date: \_\_\_\_\_  
Field blank type: (circle one) \_\_\_\_\_ Field Blank / Rinsate / Other: \_\_\_\_\_

Associated Samples: \_\_\_\_\_

Compound	Blank ID	Sample Identification
CRQL		

5x Phthalates  
2x all others

**VALIDATION FINDINGS WORKSHEET**  
**Matrix Spike/Matrix Spike Duplicates**

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

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

N N/A Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.

Y(N)N/A 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
		10/11	DD	13 (27-143)	26 (27-143)	66 (30)	7	No qual (LCS/DH)
			JII	0 (24-113)	3 (24-113)	200 ( )		
			L	164 (50-150)	159 (50-150)	( )		
			RKR	36 ( )	21 ( )	53 ( )		J/N5/A (m,ld)
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

Compound	QC Limits (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)	Compound	QC Limits (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)
A. Phenol	26-90%	≤ 35%	12-110%	≤ 42%	Acenaphthene	31-137%	≤ 19%	46-118%	≤ 31%
C. 2-Chlorophenol	25-102%	≤ 50%	27-123%	< 40%	4-Nitrophenol	11-114%	< 50%	10-80%	< 50%
E. 1,4-Dichlorobenzene	28-104%	< 27%	36-97%	< 28%	2,4-Dinitrotoluene	28-99%	< 47%	24-96%	< 38%
J. N-Nitroso-di-n-propylamine	41-126%	< 38%	41-116%	< 38%	Pentachlorophenol	17-109%	< 47%	9-103%	< 50%
R. 1,2,4-Trichlorobenzene	38-107%	< 23%	39-98%	< 28%	Pyrene	35-142%	< 36%	26-127%	< 31%
V. 4-Chloro-3-methylphenol	26-103%	< 33%	23-97%	< 42%					

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

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

#	Date	LCS/LCSD ID	Compound	LCS %R (Limits)	LCS %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		89818 LCS/D	RRR	16 (50-120)	33 (50-120)	67 (30)	1-6, 89818 MB	J <sup>W</sup> /UJ/P (L, H)
		90162 LCS/D	RRR	34 (50-120)	27 (50-120)		7, 90162 MB	J- /UJ/P (L)
			TTT	48 ( )				No grade (LCSD)

**VALIDATION FINDINGS WORKSHEET**  
**Internal Standards**

LDC #: 2/495 E 2a  
SDG #: See Cover

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

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

#	Date	Sample ID	Internal Standard	Area (Limits)	RT (Limits)	Qualifications
1			PRY	438 (101972 - 407888)		J/R/A (CI)
2			PRY	969 (127882 - 511528)		
7			PRY	121582 (127216 - 508862)		J/UJ/A
10				114141		No qual (DC)
11				126064		
						(Qual FFF, GGG, HHH, III, JJJ, KKK, LLL)

\* 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

**VALIDATION FINDINGS WORKSHEET**  
Overall Assessment of Data

**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
		2	confirmation for #1 (IS outside limits)		X/A (0)

Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

## 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

SA127-0.5B	SA134-0.5B
SA127-0.5BDL	SA127-0.5BMS
RSAJ6-0.5B	SA127-0.5BMSD
RSAJ6-0.5BDL	SA55-0.5BMS
RSAK6-0.5B	SA55-0.5BMSD
RSAK8-0.5B	SA201-0.5BMS
RSAL7-0.5B	SA201-0.5BMSD
RSAL8-0.5B	
SA35-0.5B	
SA55-0.5B	
SA56-0.5B	
SA176-0.5B	
RSO3-0.5B	
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.
- UU 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 ( $\geq 0.05$ )	All samples in SDG R0903184	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
6/16/09	Octachlorostyrene	0.047 ( $\geq 0.05$ )	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 RSAK4009-0.5B SA55-0.5BMS SA55-0.5BMSD 89404MB	J (all detects) UJ (all non-detects)	A

## 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 semivolatle 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)	A
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)	A

All compounds reported below the PQL were qualified as follows:

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

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	A
SA127-0.5BDL	All TCL compounds except Hexachlorobenzene	X	A
SA182-0.5B SA201-0.5B RSAJ6-0.5B	Hexachlorobenzene Octachlorostyrene	X X	A
SA182-0.5BDL SA201-0.5BDL RSAJ6-0.5BDL	All TCL compounds except Hexachlorobenzene Octachlorostyrene	X	A

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:

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

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

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

SDG	Sample	Compound	Flag	A or P	Reason (Code)
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 RSAO3-0.5B SA182-0.5B SA182-0.5BDL SA201-0.5B SA201-0.5BDL SA166-0.5B RSAK4-0.5B RSAK4009-0.5B SA134-0.5B	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 RSAK4009-0.5B	Octachlorostyrene	J (all detects) UJ (all non-detects)	A	Continuing calibration (RRF) (c)
*R0903184	SA127-0.5B	Hexachlorobenzene	J (all detects)	A	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)



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 RSAO3-0.5B SA182-0.5B SA182-0.5BDL SA201-0.5B SA201-0.5BDL SA166-0.5B RSAK4-0.5B RSAK4009-0.5B SA134-0.5B	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (sp)
R0903184	SA127-0.5B	Hexachlorobenzene	X	A	Overall assessment of data (o)
R0903184	SA127-0.5BDL	All TCL compounds except Hexachlorobenzene	X	A	Overall assessment of data (o)
R0903184	SA182-0.5B SA201-0.5B RSAJ6-0.5B	Hexachlorobenzene Octachlorostyrene	X X	A	Overall assessment of data (o)
R0903184	SA182-0.5BDL SA201-0.5BDL RSAJ6-0.5BDL	All TCL compounds except Hexachlorobenzene Octachlorostyrene	X	A	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	A	bl
R0903184	RSAK6-0.5B	Di-n-butylphthalate	76U ug/Kg	A	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	A	bl
R0903184	SA182-0.5BDL (70X)	Naphthalene	170U ug/Kg	A	bl
R0903184	SA201-0.5B	Naphthalene	2.1U ug/Kg	A	bl
R0903184	SA166-0.5B	Naphthalene	1.0U ug/Kg	A	bl
R0903184	RSAK4-0.5B	Naphthalene	1.0U ug/Kg	A	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 Northgate Henderson**

LDC #: 21495F2a **VALIDATION COMPLETENESS WORKSHEET**  
 SDG #: R0903184 **Stage 2B**  
 Laboratory: Columbia Analytical Services

Date: 9/17/09  
 Page: 1 of 1  
 Reviewer: JVL  
 2nd Reviewer: [Signature]

**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
I.	Technical holding times	A	Sampling dates: <u>6/5-11/09</u>
II.	GC/MS Instrument performance check	A	
III.	Initial calibration	SW	
IV.	Continuing calibration/ICV	SW	<u>CV/IA ≤ 25%</u>
V.	Blanks	SW	
VI.	Surrogate spikes	SW	
VII.	Matrix spike/Matrix spike duplicates	SW	
VIII.	Laboratory control samples	SW	<u>VCS/D</u>
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	SW	<u>b = 19, 20</u>
XVII.	Field blanks	SW	<u>FB FB72109 -so from R 0904016</u>

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

Validated Samples:

Soil

1	SA127-0.5B	11	SA56-0.5B	21	SA134-0.5B	31	89048 MB
2	SA127-0.5BDL	12	SA176-0.5B	22	SA127-0.5BMS	32	89341 ↓
3	RSAJ6-0.5B	13	RSA03-0.5B	23	SA127-0.5BMSD	33	89404 ↓
4	RSAJ6-0.5BDL	14	SA182-0.5B	24	SA55-0.5BMS	34	
5	RSAK6-0.5B	15	SA182-0.5BDL	25	SA55-0.5BMSD	35	
6	RSAK8-0.5B	16	SA201-0.5B	26	SA201-0.5BMS	36	
7	RSAL7-0.5B	17	SA201-0.5BDL	27	SA201-0.5BMSD	37	
8	RSAL8-0.5B	18	SA166-0.5B	28		38	
9	SA35-0.5B	19	RSAK4-0.5B	29		39	
10	SA55-0.5B	20	RSAK4009-0.5B	30		40	

(no r<sup>2</sup>)

(# 13 - RSA03)  
 ↳ letter not #

# 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	TTT. 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-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.



# VALIDATION FINDINGS WORKSHEET

## Continuing Calibration

Page: 1 of 1  
 Reviewer: JYC  
 2nd Reviewer: DC

LDC #: 21495 F2a  
 SDG #: See Lab  
 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 continuing calibration standard analyzed at least once every 12 hours of sample analysis for each instrument?  
 N  N/A  
 Were percent differences (%D) and relative response factors (RRF) within method criteria for all CCC's and SPCC's?  
 N  N/A  
 Were all %D and RRFs within the validation criteria of  $\leq 25\%$  %D and  $\geq 0.05$  RRF?  
 N  N/A

#	Date	Standard ID	Compound	Finding %D (Limit: <25.0%)	Finding RRF (Limit: >0.05)	Associated Samples	Qualifications
	6/16/09	DA603	MUM		0.047	9-14, 16, 18-20, 24, 35, 89404 MB	5/MS/A CC

LDC #: 21495 F29  
SDG #: See Copy

**VALIDATION FINDINGS WORKSHEET**  
**Blanks**

Page: 1 of 1  
Reviewer: JVZ  
2nd Reviewer: J

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

Blank extraction date: 6/09/09 Blank analysis date: 6/11/09  
Conc. units: ug/kg Associated Samples: 1 - 8

(bl)

Compound	Blank ID	Sample Identification
	89043 MB	1 5 7 8
AAA	5.7	
XX	4.3	96/4 76/4 96/4 69/4
S	1.3	1.4/4 1.0/4

28.5  
215  
2.0

Blank extraction date: 6/15/09 Blank analysis date: 6/16/09  
Conc. units: ug/kg Associated Samples: 14 - 21

(bl)

Compound	Blank ID	Sample Identification
	89404 MB	14 (bot) 15 (top)
S	1.3	40 (170) 4 2.1/4 16 18 19 20 1.0/4 1.0/4

2.0

5x Phthalates  
2x all others

LDC #: 21415 F2a  
 SDG #: See Copy

**VALIDATION FINDINGS WORKSHEET**  
**Field Blanks**

Page: 1 of 1  
 Reviewer: AVG  
 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: ug/L Associated sample units: ug/kg

Sampling date: 7/21/09

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

Associated Samples: All soils

Compound	Blank ID	Sample Identification					
	FB672109-S0						
EEE	1.4						
AAA	0.18					( All results either ND or > FB )	
XX	1.5						
LL	0.35						
CRQL							

Blank units: \_\_\_\_\_ Associated sample units: \_\_\_\_\_

Sampling date: \_\_\_\_\_

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

Associated Samples: \_\_\_\_\_

Compound	Blank ID	Sample Identification					
CRQL							



### VALIDATION FINDINGS WORKSHEET

#### Surrogate Recovery

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".

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

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

#	Date	Sample ID	Surrogate	%R (Limits)	Qualifications
		4 (400X)	FBP	0 (45-135)	No qual
		15 (700X)	NBZ	( )	
		17 (100X)	TPH	( )	

\* QC limits are advisory

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

LDC #: 21495 F29  
SDG #: Su Cony

**VALIDATION FINDINGS WORKSHEET**  
**Matrix Spike/Matrix Spike Duplicates**

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

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 percent differences (RPD) within the QC limits?

#	Date	MS/MSD ID	Compound	MS %R (Limits)	MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		22/23	SS	3 (50-150)	( )	( )	1	No qual (MSD m)
			RKR	6 ( )	( )	161 (30)	1	↓
		24/25	RPR	32 (50-150)	45 (50-150)	35 (30)	10	(LCCD m)
				( )	( )	( )		
		26/27	SS	1216 (50-150)	1568 (50-150)	( )	16, 17	(LCS m)
			RKR	32 ( )	20 ( )	47 (30)	1	(LCS m)
			YUU	704 ( )	1711 ( )	36 ( )	1	(LCS m)
				( )	( )	( )		↓
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

Compound	QC Limits (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)	Compound	QC Limits (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)
A. Phenol	26-90%	≤ 35%	12-110%	≤ 42%	Acenaphthene	31-137%	≤ 18%	46-118%	≤ 31%
C. 2-Chlorophenol	25-102%	≤ 50%	27-123%	≤ 40%	4-Nitrophenol	11-114%	≤ 50%	10-80%	≤ 50%
E. 1,4-Dichlorobenzene	28-104%	≤ 27%	36-97%	≤ 28%	2,4-Dinitrotoluene	28-89%	≤ 47%	24-96%	≤ 38%
J. N-Nitroso-di-n-propylamine	41-126%	≤ 38%	41-116%	≤ 38%	Pentachlorophenol	17-109%	≤ 47%	9-103%	≤ 50%
R. 1,2,4-Trichlorobenzene	38-107%	≤ 23%	39-98%	≤ 28%	Pyrene	36-142%	≤ 36%	26-127%	≤ 31%
V. 4-Chloro-3-methylphenol	26-103%	≤ 33%	23-97%	≤ 42%					

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

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

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".  
Y/N/N/A Was a LCS required?  
Y/N/N/A Were the LCS/LCSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?

#	Date	LCS/LCSD ID	Compound	LCS %R (Limits)	LCS %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		89048 LCS/D	XX	139 (50-120)	( )	( )	1-8, 89048 MB	No qual (LCSD in)
		89404 LCS/D	XX	174 (50-120)	57 (30)	( )	14-21, 89404 MB	(LCSD in)
			SS	( )	( )	34 ( )		(LCSD in)
			TTT	48 (50-120)	( )	( )		(LCSD in)
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
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				( )	( )	( )		
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				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

LDC #: 21495 Fm  
 SDG #: *SAC*

# VALIDATION FINDINGS WORKSHEET

## Compound Quantitation and Reported CRQLs

Page: 1 of 1  
 Reviewer: *JYC*  
 2nd Reviewer: *[Signature]*

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

#	Date	Sample ID	Finding	Associated Samples	Qualifications
		<i>1, 2</i>	<i>SS &gt; cal range</i>		<i>JAN/A (e)</i>
		<i>14, 16, 3</i>	<i>SS, NUN &gt; cal range</i>		

Comments: *See sample calculation verification worksheet for recalculations*

LDC #: 21495 F29  
 SDG #: Sa Gov

VALIDATION FINDINGS WORKSHEET  
Overall Assessment of Data

Page: 1 of 1  
 Reviewer: JVG  
 2nd Reviewer: [Signature]

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.

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

#	Date	Sample ID	Finding	Associated Samples	Qualifications
		1, 2	SS > cal range		N/A (C0)
		2, 4	All except SS dil		
		14, 16, 3	SS, UUV > cal range		
		15, 17, 4	All except SS, UUV dil		

Comments:

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LDC #: 21495 F 29  
 SDG #: Sep Comy

**VALIDATION FINDINGS WORKSHEET**  
**Field Duplicates**

Page: 1 of 1  
 Reviewer: DJG  
 2nd reviewer: [Signature]

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	Concentration (ug/kg)		RPD
	19	20	
DDB	4.1	3.8	0.3 (≤ 6.8 Diff)
YY	3.8	3.1	0.7 ↓
SS	250	240	4 (≤ 50% RPD)
S	1.0	6.84	5.8 (≤ 6.8 Diff)
UU	3.8	3.8	0 ↓
ZZ	2.7	2.7	0 ↓
Compound	Concentration ( )		RPD
UUU	50	47	6 (≤ 50% RPD)

Compound	Concentration ( )		RPD

Compound	Concentration ( )		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
SA129-0.5B	SA53-0.5BMSD
SA70-0.5B	
SA60-0.5B	
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	

## 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.
- UU 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 ( $\geq 0.05$ )	SA197-0.5B SA198-0.5B SA64-0.5B SA104-0.5B SA129-0.5B SA70-0.5B SA60-0.5B SA150-0.5B RSAN5-0.5B SA53-0.5B 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 SA197-0.5BMSD SA150-0.5BMS SA150-0.5BMSD SA53-0.5BMS SA53-0.5BMSD 89972MB 90095MB 90256MB	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 ( $\geq 0.05$ )	SA197-0.5B SA197-0.5BMS 89972MB	J (all detects) UJ (all non-detects)	A

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)	A

## 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-butylphthalate	110 ug/Kg	110U ug/Kg
SA200-0.5B	Di-n-butylphthalate	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)	A

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:

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

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

Compound	Concentration (ug/Kg)		RPD (Limits)	Difference (Limits)	Flags	A or P
	SA201-28B	SA201009-28B				
Di-n-butylphthalate	130	140	-	10 ( $\leq 220$ )	-	-
Hexachlorobenzene	11	11	-	0 ( $\leq 8.4$ )	-	-
Octachlorostyrene	5.1	8.4U	-	3.3 ( $\leq 8.4$ )	-	-

**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 RSAN5-0.5B SA53-0.5B SA201-28B SA201009-28B SA43009-0.5B SA40-0.5B SA200-0.5B RSAO6-0.5B SA51-0.5B SA43-0.5B	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)	A	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 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	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)	A	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) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) 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**

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

Laboratory: Columbia Analytical Services

Date: 9/16/09

Page: 1 of 1

Reviewer: JVC

2nd Reviewer: [Signature]

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
I.	Technical holding times	A	Sampling dates: 6/19-24/09
II.	GC/MS Instrument performance check	A	
III.	Initial calibration	SW	% RSD r <sup>2</sup>
IV.	Continuing calibration/ICV	SW	CCV/ICV ≤ 25%
V.	Blanks	SW	
VI.	Surrogate spikes	SW	
VII.	Matrix spike/Matrix spike duplicates	SW	
VIII.	Laboratory control samples	SW	LCS 1D
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 <sub>1</sub> = 12, 13    D <sub>2</sub> = 14, 19
XVII.	Field blanks	SW	FB = FB072109-50 from R0904016

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

Validated Samples: Soil

1	SA197-0.5B	11	SA201-10B	21	SA197-0.5BMSD	31	89972 MB
2	SA198-0.5B	12	SA201-28B    D <sub>1</sub>	22	SA150-0.5BMS	32	90095 MB
3	SA64-0.5B	13	SA201009-28B    D <sub>1</sub>	23	SA150-0.5BMSD	33	90256 MB
4	SA104-0.5B	14	SA43009-0.5B    D <sub>2</sub>	24	SA53-0.5BMS	34	
5	SA129-0.5B	15	SA40-0.5B	25	SA53-0.5BMSD	35	
6	SA70-0.5B	16	SA200-0.5B	26		36	
7	SA60-0.5B	17	RSA06-0.5B	27		37	
8	SA150-0.5B	18	SA51-0.5B	28		38	
9	RSAN5-0.5B	19	SA43-0.5B    D <sub>2</sub>	29		39	
10	SA53-0.5B	20	SA197-0.5BMS	30		40	

(no r<sup>2</sup>)

# 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	TTT. 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-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.

LWC #: 21795 629

**VALIDATION FINDINGS WORKSHEET**

**Initial Calibration**

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".

- 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 SPOC's?
- Was a curve fit used for evaluation? If yes, what was the acceptance criteria used for evaluation? N/A
- Did the initial calibration meet the acceptance criteria?
- Were all %RSDs and RRFs within the validation criteria of  $\leq 30$  %RSD and  $\geq 0.05$  RRF ?

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

#	Date	Standard ID	Compound	Finding %RSD (Limit: $\leq 30.0\%$ )	Finding RRF (Limit: $\geq 0.05$ )	Associated Samples	Qualifications
	5/22/09	1CAL	UUU		0.048	All except 11 + All BIKs	J/WJA (c)
	7/6/09	1CAL	UUU		0.049	+	J/WJA



LDC #: 21495 G2a  
 SDG #: Sa Green

**VALIDATION FINDINGS WORKSHEET**  
**Blanks**

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

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

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

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

Blank extraction date: 6/24/09 Blank analysis date: 6/29/09

Conc. units: ug/kg Associated Samples: 9-19

(6L)

Compound	Blank ID	Sample Identification							
	90250 MB	9	10	12	13	14	16		
XX	74	140/4	96/4	130/4	140/4	110/4	140/4		

370

Blank extraction date: 6/24/09 Blank analysis date: 6/25/09  
 Conc. units: ug/kg Associated Samples: 7, 8 (ND)

Compound	Blank ID	Sample Identification							
	90095 MB								
S	1.0								

5x Phthalates  
 2x all others

LDC #: 21495 G 26  
 SDG #: See Cond

**VALIDATION FINDINGS WORKSHEET**  
**Field Blanks**

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

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: ug/L Associated sample units: ug/L

Sampling date: 7/21/69

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

Associated Samples: 11 - 13

Compound	Blank ID	Sample Identification	
	<u>f8072109-SD</u>		
EEE	<u>1.4</u>	<u>(All) Results</u>	<u>either ND or &gt; MB</u>
AAA	<u>0.18</u>		
XX	<u>1.5</u>		
LL	<u>0.35</u>		
CRQL			

Blank units: \_\_\_\_\_ Associated sample units: \_\_\_\_\_

Sampling date: \_\_\_\_\_

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

Associated Samples: \_\_\_\_\_

Compound	Blank ID	Sample Identification	
CRQL			

5x Phthalates  
 2x all others

**VALIDATION FINDINGS WORKSHEET**

LDC #: 21445 G-2-a

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

Surrogate Recovery

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

#	Date	Sample ID	Surrogate	%R (Limits)	Qualifications
		<u>7</u>	<u>FBP</u>	<u>( 45-135 )</u>	<u>No qual</u>
			<u>NBZ</u>	<u>( )</u>	
			<u>TPH</u>	<u>( )</u>	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
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				( )	
				( )	
				( )	
				( )	
				( )	

\* QC limits are advisory

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



**VALIDATION FINDINGS WORKSHEET**  
**Matrix Spike/Matrix Spike Duplicates**

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.

**Y**  **N**  **N/A**  
Were the 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
		20/21	RRR	( )	( )	39 (30)	1	No qual (MSD in)
		22/23	SS	( )	12 (50-150)	( )	8	No qual (MSD in)
			RRR	( )	142 ( )	( )	↓	
			TTT	( )	( )	38 ( )	↓	
		24/25	RRR	0 (50-150)	39 (50-150)	200 (30)	10	No qual (LCS/in)
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

Compound	QC Limits (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)	Compound	QC Limits (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)
A. Phenol	26-90%	≤ 35%	12-110%	≤ 42%	Acenaphthene	31-137%	≤ 19%	46-118%	≤ 31%
C. 2-Chlorophenol	25-102%	≤ 50%	27-123%	≤ 40%	4-Nitrophenol	11-114%	≤ 50%	10-80%	≤ 50%
E. 1,4-Dichlorobenzene	28-104%	≤ 27%	36-97%	≤ 28%	2,4-Dinitrotoluene	28-89%	≤ 47%	24-96%	≤ 38%
J. N-Nitroso-di-n-propylamine	41-126%	≤ 38%	41-116%	≤ 38%	Pentachlorophenol	17-109%	≤ 47%	9-103%	≤ 50%
R. 1,2,4-Trichlorobenzene	38-107%	≤ 23%	39-98%	≤ 28%	Pyrene	35-142%	≤ 36%	26-127%	≤ 31%
V. 4-Chloro-3-methylphenol	26-103%	≤ 33%	23-97%	≤ 42%					

LDC #: 21495 G2A  
 SDG #: Sy-Gover

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

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

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

#	Date	LCS/LCSD ID	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		89972 LCS/D	FEET	121 (50-120)	( )	( )	1-6, 89972 MB	No qual (LCSD)
		90095 LCS/D	FEET	128 (50-120)	127 (50-120)	( )	7, 8, 90095 MB	No qual (MS, MD, in)
		90256 LCS/D	XX	122 (50-120)	178 (50-150)	( )	9-19, 90256 MB	No qual (MS, MD, in)
			UUY	122 (50-120)	( )	( )		No qual (LCSD, in)
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

**VALIDATION FINDINGS WORKSHEET**  
**Field Duplicates**

**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 (≤ 50%)	Diff	Diff Limits	Quals (Parent Only)
	14	19				
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	Jdcts/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			Jdcts/A
Hexachlorobenzene	78	80		2	≤21	-
Indeno(1,2,3-cd)-pyrene	110	200	58			Jdcts/A
Naphthalene	6.5	8.7		2.2	≤21	-
Phenanthrene	59	150		91	≤21	Jdcts/A
Pyrene	130	350	92			
Octachlorostyrene	32	26		6	≤21	-

Compound Name	Conc ( ug/Kg)		RPD (≤ 50%)	Diff	Diff Limits	Quals (Parent Only)
	12	13				
Di-n-Butylphthalate	130	140		10	≤220	-
Hexachlorobenzene	11	11		0	≤8.4	-
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.
- UU 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 TIC (RT in minutes)	Reported Concentration	Modified Final Concentration
SA45-0.5B (2X)	Di-n-butylphthalate	100 ug/Kg	100U ug/Kg
SA452009-0.5B (2X)	Di-n-butylphthalate Naphthalene	100 ug/Kg 2.1 ug/Kg	100U ug/Kg 2.1U ug/Kg
SA153-0.5B	Di-n-butylphthalate Naphthalene	190 ug/Kg 1.7 ug/Kg	190U ug/Kg 1.7U ug/Kg
SA185-0.5B	Di-n-butylphthalate Naphthalene	53 ug/Kg 1.1 ug/Kg	53U ug/Kg 1.1U ug/Kg
RSAO5-0.5B (2X)	Di-n-butylphthalate Naphthalene	85 ug/Kg 2.1 ug/Kg	85U ug/Kg 2.1U ug/Kg
SA152-10B	Di-n-butylphthalate Naphthalene	160 ug/Kg 1.1 ug/Kg	160U 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 TIC (RT in minutes)	Reported Concentration	Modified Final Concentration
SA50-0.5B	Di-n-butylphthalate Naphthalene	140 ug/Kg 1.8 ug/Kg	140U ug/Kg 1.8U ug/Kg
SA54-0.5B	Di-n-butylphthalate Naphthalene	41 ug/Kg 2.0 ug/Kg	41U 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 Naphthalene	48 ug/Kg 2.5 ug/Kg	48U 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)	A

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:

Compound	Concentration (ug/Kg)		RPD (Limits)	Difference (Limits)	Flags	A or P
	SA45-0.5B	SA452009-0.5B				
Di-n-butylphthalate	100	100	-	0 ( $\leq 300$ )	-	-
Naphthalene	14U	2.1	-	11.9 ( $\leq 14$ )	-	-

**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 RSAO5-0.5B SA152-10B SA152-20B SA152-34B SA50-0.5B SA54-0.5B SA106-0.5B SA102-0.5B SA109-0.5B	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	A	bl
R0903615	SA452009-0.5B (2X)	Di-n-butylphthalate Naphthalene	100U ug/Kg 2.1U ug/Kg	A	bl
R0903615	SA153-0.5B	Di-n-butylphthalate Naphthalene	190U ug/Kg 1.7U ug/Kg	A	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	A	bl
R0903615	SA152-10B	Di-n-butylphthalate Naphthalene	160U ug/Kg 1.1U ug/Kg	A	bl
R0903615	SA152-20B	Di-n-butylphthalate	51U ug/Kg	A	bl
R0903615	SA152-34B	Di-n-butylphthalate	150U ug/Kg	A	bl
R0903615	SA50-0.5B	Di-n-butylphthalate Naphthalene	140U ug/Kg 1.8U ug/Kg	A	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	A	bl
R0903615	SA106-0.5B (50X)	Naphthalene	98U ug/Kg	A	bl
R0903615	SA102-0.5B	Di-n-butylphthalate	110U ug/Kg	A	bl
R0903615	SA109-0.5B	Di-n-butylphthalate Naphthalene	48U ug/Kg 2.5U ug/Kg	A	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

Date: 9/18/09

Page: 1 of 1

Reviewer: JVC

2nd Reviewer: [Signature]

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
I.	Technical holding times	A	Sampling dates: 6/29-30/09
II.	GC/MS Instrument performance check	A	
III.	Initial calibration	A	
IV.	Continuing calibration/ICV	A	CCV/ICV ≤ 25 %
V.	Blanks	SW	
VI.	Surrogate spikes	SW	
VII.	Matrix spike/Matrix spike duplicates	SW	
VIII.	Laboratory control samples	SW	LCS / D
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	A	
XI.	Target compound identification	N	
XII.	Compound quantitation/CRQLs	N	
XIII.	Tentatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data	A	
XVI.	Field duplicates	SW	D = 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	SA45-0.5B	D	11	SA50-0.5B	+	21	1	90598 MB	31
2	SA452009-0.5B	D	12	SA54-0.5B	+	22	✓	90695 MB	32
3	SA187-0.5		13	SA106-0.5B		23			33
4	SA153-0.5B		14	SA102-0.5B		24			34
5	SA186-0.5B		15	SA109-0.5B		25			35
6	SA185-0.5B		16	SA45-0.5BMS		26			36
7	RSAO5-0.5B		17	SA106-0.5BMS		27			37
8	SA152-10B		18	SA106-0.5BMSD		28			38
9	SA152-20B		19			29			39
10	SA152-34B		20			30			40

(no r2)

# 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	TTT. 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-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.

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

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

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

Blank extraction date: 7/01/09 Blank analysis date: 7/08/09

Conc. units: ug/kg Associated Samples: 1-10

(bl)

Compound	Blank ID	Sample Identification									
		1 (2x)	2 (2x)	3 (10x)	4	5 (3x)	6	7 (2x)	8	9	10
	90598 MB	100/u	100/u	190	1.7/u	53/u	85/u	160/u			
XX	37	2.1/u	56	6.3	1.1/u	2.1/u	1.1/u				
S	1.0										

Blank extraction date: 7/07/09 Blank analysis date: 7/07/09  
 Conc. units: ug/kg Associated Samples: 11-15

(bl)

Compound	Blank ID	Sample Identification				
		11	12	13 (5x)	14	15
	90695 MB	140/u	41/u	110/u	48/u	
XX	120	1.8/u	2.0/u	98/u	6.4	2.5/u
S	1.7					

600  
3.4



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:  $\mu\text{g/l}$  Associated sample units:  $\mu\text{g/kg}$

Sampling date: 7/21/09

8-10

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

Associated Samples:

Compound	Blank ID	8	9	10	Sample Identification
	F2072109-50				
EEE	1.4				
AAA	0.18				
XX	1.5	160	51	150	
LL	0.35				
CRQL					

(5x)  
7.0  
0.9  
7.5  
1.75

Blank units: Associated sample units:

Sampling date:

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

Associated Samples:

Compound	Blank ID	Sample Identification				
CRQL						

5x Phthalates  
2x all others



**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.

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

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

#	Date	MS/MSD ID	Compound	MS %R (Limits)	MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		17/18	W	112 (35-108)	( )	( )	13	No qual (MSD in)
			XX	( )	175 (50-150)	( )		(MS in)
			SS	1837 (50-150)	362 (50-150)	( )		(LCS/D in)
			L	( )	( )	33 (30)		(MS/MSD in)
			RRR	0 (50-150)	0 (50-150)	( )		(LCS/D in)
			UUU	375 ( )	( )	( )		(MSD in)
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

Compound	QC Limits (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)	Compound	QC Limits (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)
A. Phenol	26-90%	≤ 35%	12-110%	≤ 42%	Acenaphthene	31-137%	≤ 19%	46-118%	≤ 31%
C. 2-Chlorophenol	25-102%	≤ 50%	27-123%	≤ 40%	4-Nitrophenol	11-114%	≤ 50%	10-80%	≤ 50%
E. 1,4-Dichlorobenzene	28-104%	≤ 27%	36-97%	≤ 28%	2,4-Dinitrotoluene	28-89%	≤ 47%	24-96%	≤ 38%
J. N-Nitroso-di-n-propylamine	41-126%	≤ 38%	41-116%	≤ 38%	Pentachlorophenol	17-109%	≤ 47%	9-103%	≤ 50%
R. 1,2,4-Trichlorobenzene	38-107%	≤ 23%	39-98%	≤ 28%	Pyrene	35-142%	≤ 36%	26-127%	≤ 31%
V. 4-Chloro-3-methylphenol	26-103%	≤ 33%	23-97%	≤ 42%					

VALIDATION FINDINGS WORKSHEET  
 Laboratory Control Samples (LCS)

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

#	Date	LCS/LCSD ID	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		90598 LCS/D	EEE	140 (50-120)	130 (50-120)	( )	1-10 90598 MB	No qual (MS in) ↓ (LCS in) ↓
			XX		157 ( )	( )		
			UUU		127 ( )	( )		
		90695 LCS/b	EEE	136 (50-120)	146 (50-120)	( )	11-15 90695 MB	No qual (MS in) ↓ (MS in) ↓
			XX	139 ( )	136 ( )	( )		

LDC #: 21495 H2a  
 SDG #: Summer

**VALIDATION FINDINGS WORKSHEET**  
**Field Duplicates**

Page: 1 of 1  
 Reviewer: JV  
 2nd reviewer: \_\_\_\_\_

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	Concentration ( <u>ug/kg</u> )		RPD
	1	2	
XX	100	100	0 (≤ 360 Diff)
S	14.1	2.1	11.9 (≤ 14 Diff)

Compound	Concentration ( )		RPD

Compound	Concentration ( )		RPD

Compound	Concentration ( )		RPD

## 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

**Laboratory:** Columbia Analytical Services, Inc.

**Sample Delivery Group (SDG):** R0903678

### Sample Identification

EB070109-SO1	RSAK3-31B
SA114-0.5B	SA82-0.5BMS
SA114009-0.5B	SA82-0.5BMSD
RSAN6-0.5B	RSAK3-31BMS
SA82-0.5B	RSAK3-31BMSD
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.
- UU 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 SA134-20B SA134-31B SA134009-31B SA88-10B 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 SA134009-31B SA88-10B SA88-20B SA88-32B RSAK3-0.5B RSAK3-0.5BDL RSAK3-10B 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 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)	P

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)	A

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)	A

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	A

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:

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

Compound	Concentration (ug/Kg)		RPD (Limits)	Difference (Limits)	Flags	A or P
	SA114-0.5B	SA114009-0.5B				
Octachlorostyrene	400	510	24 ( $\leq 50$ )	-	-	-

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

**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)	P	Laboratory control samples (%R) (I)
R0903678	RSAK3-0.5BDL RSAK3-10B	Bis(2-ethylhexyl)phthalate	J+ (all detects)	A	Laboratory control samples (%R) (I)
R0903678	RSAK3-0.5B	Hexachlorobenzene Octachlorostyrene	J (all detects) J (all detects)	A	Project Quantitation Limit (e)
R0903678	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 RSAK3-31B	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (sp)
R0903678	RSAK3-0.5B	Hexachlorobenzene Octachlorostyrene	X X	A	Overall assessment of data (o)
R0903678	RSAK3-0.5BDL	All TCL compounds except Hexachlorobenzene Octachlorostyrene	X	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	A	bl

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

LDC #: 2149512a **VALIDATION COMPLETENESS WORKSHEET**  
 SDG #: R0903678 Stage 2B  
 Laboratory: Columbia Analytical Services

Date: 9/18/09  
 Page: 1 of 1  
 Reviewer: JK  
 2nd Reviewer: [Signature]

**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
I.	Technical holding times	A	Sampling dates: 7/01-02/09
II.	GC/MS Instrument performance check	A	
III.	Initial calibration	A	
IV.	Continuing calibration/ICV	A	CCV/ICV ≤ 25%
V.	Blanks	SW	
VI.	Surrogate spikes	SW	
VII.	Matrix spike/Matrix spike duplicates	SW	
VIII.	Laboratory control samples	SW	LCS/D
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	SW	D <sub>1</sub> = 2, 3      D <sub>2</sub> = 12, 13
XVII.	Field blanks	SW	*EB = 1      FB = FB072109-50 from R0904016

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

Validated Samples:

1	EB070109-SO1	11	SA134-20B	21	RSK3-31B	31	90766 MB
2	SA114-0.5B      D <sub>1</sub>	12	SA134-31B      D <sub>2</sub>	22	SA82-0.5BMS	32	90847 MB
3	SA114009-0.5B      D <sub>1</sub>	13	SA134009-31B      D <sub>1</sub>	23	SA82-0.5BMSD	33	90956 MB
4	RSAN6-0.5B	14	SA88-10B	24	RSK3-31BMS	34	
5	SA82-0.5B	15	SA88-20B	25	RSK3-31BMSD	35	
6	SA82-10B	16	SA88-32B	26		36	
7	SA82-29B	17	RSK3-0.5B	27		37	
8	RSAL3-10B	18	RSK3-0.5BDL	28		38	
9	RSAL3-30B	19	RSK3-10B	29		39	
10	SA134-10B	20	RSK3-20B	30		40	

(no r<sup>2</sup>)

# 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	TTT. 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-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 #: 21495 I 2a  
SDG #: SCC Gray

### VALIDATION FINDINGS WORKSHEET

#### Blanks

Page: 1 of 1  
Reviewer: SVZ  
2nd Reviewer: [Signature]

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

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

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

**Blank extraction date:** 7/08/07 **Blank analysis date:** 7/10/09

**Conc. units:** ug/lb **Associated Samples:** 2-16, 20, 21 (61)

Compound	Blank ID	Sample Identification												
	90847MS	2 (10x)	3 (12x)	6 (3x)	15	20								
S	1.0	14/u	18/u	3.2/u	1.4/u	1.8/u								

**Blank extraction date:** \_\_\_\_\_ **Blank analysis date:** \_\_\_\_\_

**Conc. units:** \_\_\_\_\_ **Associated Samples:** \_\_\_\_\_

Compound	Blank ID	Sample Identification												

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

**VALIDATION FINDINGS WORKSHEET**  
**Field Blanks**

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: ug/L Associated sample units: ug/kg

Sampling date: 7/21/09

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

Associated Samples: 5 - 21

Compound	Blank ID	Sample Identification						
	FB072109-06							
EEE	1.4							(All results either MD or > FB)
AAA	0.18							
XX	1.5							
LL	0.35							
CRQL								

(sx) 7.0  
0.9  
7.5  
1.75

Blank units: \_\_\_\_\_ Associated sample units: \_\_\_\_\_  
 Sampling date: \_\_\_\_\_  
 Field blank type: (circle one) Field Blank / Rinsate / Other: \_\_\_\_\_

Associated Samples: \_\_\_\_\_

Compound	Blank ID	Sample Identification						
CRQL								

5x Phthalates  
2x all others

VALIDATION FINDINGS WORKSHEET

Surrogate Recovery

LDC #: 21495 I21  
 SDG #: SA 6m

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?

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
		18 (100%)	FBP	0 (45-135)	No qual
			NBZ	↓	
			TPH	↓	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	

\* QC limits are advisory

S1 (NBZ) = Nitrobenzene-d5      23-120      QC Limits (Soil)      21-100      QC Limits (Water)

S2 (FBP) = 2-Fluorobiphenyl      30-115      35-114      21-100

S3 (TPH) = Terphenyl-d14      18-137      43-116      10-123

S4 (PHL) = Phenol-d5      24-113      33-141      33-110\*

S5 (2FP) = 2-Fluorophenol      25-121      19-122      16-110\*

S6 (TBP) = 2,4,6-Tribromophenol      20-130\*      20-130\*

S7 (2CP) = 2-Chlorophenol-d4      20-130\*

S8 (DCB) = 1,2-Dichlorobenzene-d4      20-130\*

**VALIDATION FINDINGS WORKSHEET**  
**Matrix Spike/Matrix Spike Duplicates**

LDC #: 21445 I 24  
 SDG #: See Com

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

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

N N/A Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.

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

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
		<u>22/23</u>	<u>EEF</u>	<u>151 (50-150)</u>	<u>( ) ( )</u>	<u>( ) ( )</u>	<u>5</u>	<u>No issue (MSD in)</u>
			<u>SS</u>	<u>-155 (50-150)</u>	<u>-89 (50-150)</u>	<u>( ) ( )</u>		
			<u>RRR</u>	<u>11 ( )</u>	<u>0 ( )</u>	<u>200 (30)</u>		<u>(CCS/Dm)</u>
				<u>( ) ( )</u>	<u>( ) ( )</u>	<u>( ) ( )</u>		
				<u>( ) ( )</u>	<u>( ) ( )</u>	<u>( ) ( )</u>		
		<u>24/25</u>	<u>RRR</u>	<u>( )</u>	<u>26 (50-150)</u>	<u>94 (30)</u>	<u>2</u>	<u>(MS in)</u>
				<u>( ) ( )</u>	<u>( ) ( )</u>	<u>( ) ( )</u>		
				<u>( ) ( )</u>	<u>( ) ( )</u>	<u>( ) ( )</u>		
				<u>( ) ( )</u>	<u>( ) ( )</u>	<u>( ) ( )</u>		
				<u>( ) ( )</u>	<u>( ) ( )</u>	<u>( ) ( )</u>		
				<u>( ) ( )</u>	<u>( ) ( )</u>	<u>( ) ( )</u>		
				<u>( ) ( )</u>	<u>( ) ( )</u>	<u>( ) ( )</u>		
				<u>( ) ( )</u>	<u>( ) ( )</u>	<u>( ) ( )</u>		
				<u>( ) ( )</u>	<u>( ) ( )</u>	<u>( ) ( )</u>		
				<u>( ) ( )</u>	<u>( ) ( )</u>	<u>( ) ( )</u>		

	Compound	QC Limits (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)	Compound	QC Limits (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)
A.	Phenol	26-90%	≤ 35%	12-110%	≤ 42%	GG Acenaphthene	31-137%	≤ 19%	46-118%	≤ 31%
C.	2-Chlorophenol	25-102%	≤ 50%	27-123%	≤ 40%	II. 4-Nitrophenol	11-114%	≤ 50%	10-80%	≤ 50%
E.	1,4-Dichlorobenzene	28-104%	≤ 27%	36-97%	≤ 28%	KK. 2,4-Dinitrotoluene	28-89%	≤ 47%	24-96%	≤ 38%
J.	N-Nitroso-di-n-propylamine	41-126%	≤ 38%	41-116%	≤ 38%	TT. Pentachlorophenol	17-109%	≤ 47%	9-103%	≤ 50%
R.	1,2,4-Trichlorobenzene	38-107%	≤ 23%	39-98%	≤ 28%	ZZ. Pyrene	35-142%	≤ 36%	26-127%	≤ 31%
V.	4-Chloro-3-methylphenol	26-103%	≤ 33%	23-97%	≤ 42%					

LDC #: 21495 I 29

SDG #: See below

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

Page: 1 of 1

Reviewer: Svlc

2nd Reviewer: D

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

#	Date	LCS/LCSD ID	Compound	LCS %R (Limits)	LCS %R (Limits)	LCS %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		10766 LCS/d	RRR	26 (50-120)	25 (50-120)	25 (50-120)	( )	1, 90766 MB	J-SWJP (J)
			TTT	47 ( )	48 ( )	48 ( )	( )		
		90847 LCS/d	EEE	137 (50-120)	145 (50-120)	145 (50-120)	( )	2-16, 20, 21, 90847 MB	NO qual (MSDin)
		90956 LCS/d	EEE	127 (50-120)	147 (50-120)	147 (50-120)	( )	18, 19, 90956 MB	J+dets/A (J)

LDC #: 21495 I 29  
SDG #: Su Com

**VALIDATION FINDINGS WORKSHEET**  
**Compound Quantitation and Reported CRQLs**

Page: 1 of 1  
Reviewer: JVG  
2nd Reviewer: J

**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  
Y N 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?

#	Date	Sample ID	Finding	Associated Samples	Qualifications
		17	SS > cal range		J dets / A (e)

Comments: See sample calculation verification worksheet for recalculations



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
		17	SS, UNID CW range		X/A (O)
		18	All except SS, dil		

Comments:  
 \_\_\_\_\_  
 \_\_\_\_\_

**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 (≤ 50%)	Diff	Diff Limits	Quals (Parent Only)
	2	3				
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			
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 (≤ 50%)	Diff	Diff Limits	Quals (Parent Only)
	12	13				
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	

## 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.
- UU 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)	P
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)	P

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)	P
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)	P

### 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)	A



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)	A
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)	A

### 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)	A

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	X	A

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:

Compound	Concentration (ug/L)		RPD (Limits)	Difference (Limits)	Flags	A or P
	M-13AB	M-13009AB				
1,4-Dioxane	9.0	9.6	-	0.6 ( $\leq 1.9$ )	-	-

**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)	P	Laboratory control samples (%R) (l)
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) (l)
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)	A	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 I-ARBRE	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (sp)
R0903561	M-111ABRE M-110BRE I-ARBRE	All TCL compounds	X	A	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**

LDC #: 21495J2a

**VALIDATION COMPLETENESS WORKSHEET**

SDG #: R0903561

Stage 2B

Laboratory: Columbia Analytical Services

Date: 9/22/09

Page: 1 of 1

Reviewer: SVL

2nd Reviewer: Q

**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
I.	Technical holding times	A	Sampling dates: <u>6/25 - 7/01/09</u>
II.	GC/MS Instrument performance check	A	
III.	Initial calibration	A	<u>% RSD r2</u>
IV.	Continuing calibration/ICV	A	<u>CCV/ICV ≤ 25%</u>
V.	Blanks	A	
VI.	Surrogate spikes	SW	
VII.	Matrix spike/Matrix spike duplicates	N	<u>client spec</u>
VIII.	Laboratory control samples	SW	<u>LCS / b</u>
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	SW	
XI.	Target compound identification	N	
XII.	Compound quantitation/CRQLs	<del>SW</del> N	
XIII.	Tentatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data	SW	
XVI.	Field duplicates	SW	<u>D = 2, 3</u>
XVII.	Field blanks	SW	<u>EB = 7</u>

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

1	M-75B	11 <sup>4</sup>	M-110B <del>RE</del>	21	90344 MB	31
2	M-13AB	12 <sup>4</sup>	I-ARB	22	90457	32 <sup>7/7/01</sup>
3	M-13009AB	13 <sup>4</sup>	I-ARB <del>RE</del>	23	90703	33
4	M-64B	14		24 <sup>4</sup>	90766	34
5	M-111AB	15		25		35
6	M-111ABRE	16		26		36
7	EB062909-GW1	17		27		37
8	M-25B	18		28		38
9	M-12AB	19		29		39
10	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-butylphthalate	MMM. Bis(2-Chloroisopropyl)ether
F. 1,2-Dichlorobenzene	U. Hexachlorobutadiene**	JJ. Dibenzofuran	YY. Fluoranthene**	NNN. Aniline
G. 2-Methylphenol	V. 4-Chloro-3-methylphenol**	KK. 2,4-Dinitrotoluene	ZZ. Pyrene	OOO. N-Nitrosodimethylamine
H. 2,2'-Oxybis(1-chloropropane)	W. 2-Methylnaphthalene	LL. Diethylphthalate	AAA. Butylbenzylphthalate	PPP. Benzoic Acid
I. 4-Methylphenol	X. Hexachlorocyclopentadiene*	MM. 4-Chlorophenyl-phenyl ether	BBB. 3,3'-Dichlorobenzidine	QQQ. Benzyl alcohol
J. N-Nitroso-di-n-propylamine*	Y. 2,4,6-Trichlorophenol**	NN. Fluorene	CCC. Benzo(a)anthracene	RRR. Pyridine
K. Hexachloroethane	Z. 2,4,5-Trichlorophenol	OO. 4-Nitroaniline	DDD. Chrysene	SSS. Benzidine
L. Nitrobenzene	AA. 2-Chloronaphthalene	PP. 4,6-Dinitro-2-methylphenol	EEE. Bis(2-ethylhexyl)phthalate	TTT. 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-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.



# VALIDATION FINDINGS WORKSHEET

## Surrogate Recovery

LDC #: 21445 J2a  
 SDG #: 34 Gray

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".

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

#	Date	Sample ID	Surrogate	%R (Limits)	Qualifications
		<u>6</u>	<u>FBP</u>	<u>899</u> ( <u>45-135</u> )	<u>No qual (only 1 out)</u>
				( )	
				( )	
				( )	
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\* QC limits are advisory

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

LDC #: 21495 J2a

SDG #: 54 Cm

# VALIDATION FINDINGS WORKSHEET

## Laboratory Control Samples (LCS)

Page: 1 of 1  
Reviewer: JVG  
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?

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

#	Date	LCS/LCSD ID	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		90344 LCS/D	R R R	30 (50-120)	28 (50-120)	( ) ( )	1-3, 90344 MB	J-MS/P (1)
			T T T	( ) ( )	43 ( )	( ) ( )		No qual (LCS m)
		90457 LCS/D	R R R	34 ( )	44 ( )	( ) ( )	4-7, 90457 MB	J-MS/P (2)
			T T T	( ) ( )	48 ( )	( ) ( )	↓	Nequal (LCS m)
		90703 LCS/D	R R R	36 ( )	36 ( )	( ) ( )	8-9, 90703 MB	J-MS/P (2)
			T T T	47 ( )	( )	( ) ( )	↓	No qual (LCS m)
		90706 LCS/D	R R R	36 ( )	25 ( )	( ) ( )	10-13, 90706 MB	J-MS/P (1)
			T T T	47 ( )	48 ( )	( ) ( )	↓	↓



**VALIDATION FINDINGS WORKSHEET**  
Internal Standards

Page: 1 of 1  
Reviewer: JG  
2nd Reviewer: J

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 Were all internal standard area counts within -50 to +100 of the associated calibration standard?  
Y (Y) N/A Were the retention times of the internal standards within +/- 30 seconds of the associated calibration standard?

#	Date	Sample ID	Internal Standard	Area (Limits)	RT (Limits)	Qualifications
0.4%		5	PRY	823 (113164 - 452657)		J/R/A (i)
0.5%		10		2769 (268630 - 1074518)		
0.07%		12		382 (276398 - 1105592)		
0.5%		6		19920 (105262 - 421048)		
0.2%		11		1046 (290058 - 1160230)		
0.1%		13		689		
						qual: (FFF, GGG, HHH, III, JJJ, KKK, LLL)

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

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

**VALIDATION FINDINGS WORKSHEET**  
**Overall Assessment of Data**

LDC #: 21415 J2a  
 SDG #: See cover

Page: 1 of 1  
 Reviewer: MC  
 2nd Reviewer: AC

**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.

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

#	Date	Sample ID	Finding	Associated Samples	Qualifications
		6, 11, 13	Confirmation runs (IS outside limits)		X/A (0)

Comments: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

LDC #: 21495 J2a  
 SDG #: See Copy

**VALIDATION FINDINGS WORKSHEET**  
**Field Duplicates**

Page: 1 of 1  
 Reviewer: SVG  
 2nd reviewer:

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	Concentration ( $\mu\text{g/L}$ )		RPD
	2	3	
TTT	9.0	9.6	0.6 ( $\leq 1.9$ Diff)

Compound	Concentration ( )		RPD

Compound	Concentration ( )		RPD

Compound	Concentration ( )		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
RSI3-10B	EB062609-SO
RSI3-10BDL	SA202-10BMS
RSI3-20B	SA202-10BMSD
RSI3-32B	SA188-0.5BMS
RSI3-32BRE	SA188-0.5BMSD
SA188-0.5B	
SA172-0.5B	
SA41-0.5B	
SA44-0.5B	
SA42-0.5B	
RSI2-10B	
RSI2-10BDL	
RSI2009-10B	
RSI2009-10BDL	
RSI2-20B	
RSI2-31B	
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.
- UU 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 RSAI2-10B RSAI2-10BDL RSAI2009-10B RSAI2009-10BDL RSAI2-20B RSAI2-31B RSAJ2-10B RSAJ2-20B RSAJ2-33B RSAJ2009-33B

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 RSAJ2-20B RSAJ2-33B RSAJ2009-33B

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)	A

## 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)	A

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)	A

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	X	A
RSAI3-10BDL RSAI2-10BDL RSAI2009-10BDL	All TCL compounds except Hexachlorobenzene	X	A
RSAI3-32BRE	All TCL compounds	X	A

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:

Compound	Concentration (ug/Kg)		RPD (Limits)	Difference (Limits)	Flags	A or P
	RSAI2-10B	RSAI2009-10B				
Chrysene	10	11	-	1 ( $\leq 50$ )	-	-
Fluoranthene	50U	11	-	39 ( $\leq 50$ )	-	-
Hexachlorobenzene	6900	7100	3 ( $\leq 50$ )	-	-	-
Naphthalene	13	6.5	-	6.5 ( $\leq 50$ )	-	-
Pyrene	13	11	-	2 ( $\leq 50$ )	-	-
Octachlorostyrene	1200	1100	9 ( $\leq 50$ )	-	-	-

Compound	Concentration (ug/Kg)		RPD (Limits)	Difference (Limits)	Flags	A or P
	RSAI2-10BDL	RSAI2009-10BDL				
Hexachlorobenzene	5000	5400	8 ( $\leq 50$ )	-	-	-
Naphthalene	76	430U	-	354 ( $\leq 430$ )	-	-
Octachlorostyrene	1100	840	-	260 ( $\leq 500$ )	-	-

Compound	Concentration (ug/Kg)		RPD (Limits)	Difference (Limits)	Flags	A or P
	RSAJ2-33B	RSAJ2009-33B				
Di-n-butylphthalate	86	170	-	84 ( $\leq 300$ )	-	-
Naphthalene	1.7	1.8	-	0.1 ( $\leq 12$ )	-	-
Phenanthrene	3.4	12U	-	8.6 ( $\leq 12$ )	-	-

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

SDG	Sample	Compound	Flag	A or P	Reason (Code)
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	Internal standards (area) (i)
R0903584	RSAI3-10B RSAI2-10B RSAI2009-10B	Hexachlorobenzene	J (all detects)	A	Project Quantitation Limit (e)
R0903584	SA202-10B SA202-28B RSAI3-10B RSAI3-10BDL RSAI3-20B RSAI3-32B RSAI3-32BRE 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 RSAJ2-33B RSAJ2009-33B EB062609-SO	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (sp)
R0903584	RSAI3-10B RSAI2-10B RSAI2009-10B	Hexachlorobenzene	X	A	Overall assessment of data (o)
R0903584	RSAI3-10BDL RSAI2-10BDL RSAI2009-10BDL	All TCL compounds except Hexachlorobenzene	X	A	Overall assessment of data (o)
R0903584	RSAI3-32BRE	All TCL compounds	X	A	Overall assessment of data (o)

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

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

LDC #: 21495K2a **VALIDATION COMPLETENESS WORKSHEET**  
 SDG #: R0903584 **Stage 2B**  
 Laboratory: Columbia Analytical Services

Date: 9/21/09  
 Page: 1 of 1  
 Reviewer: [Signature]  
 2nd Reviewer: [Signature]

**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
I.	Technical holding times	A Sampling dates: <u>6/25 - 30/09</u>
II.	GC/MS Instrument performance check	A
III.	Initial calibration	<del>SW</del> A <u>0% RSD</u> ✓
IV.	Continuing calibration/ICV	A <u>COV/ICV ≤ 25 %</u>
V.	Blanks	SW
VI.	Surrogate spikes	SW
VII.	Matrix spike/Matrix spike duplicates	SW
VIII.	Laboratory control samples	SW <u>ICS 10</u>
IX.	Regional Quality Assurance and Quality Control	N
X.	Internal standards	SW
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 <u>D<sub>1</sub> = 13, 15    D<sub>2</sub> = 14, 16    D<sub>3</sub> = 21, 22</u>
XVII.	Field blanks	SW <u>EB = 23    FB = FB072109-50 from 20904016</u>

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

Validated Samples:

Soil + water

1	SA202-10B	S	11	SA44-0.5B	S	21	RSAJ2-33B	D <sub>3</sub>	S	31	90350 MB (7/02)
2	SA202-28B		12	SA42-0.5B		22	RSAJ2009-33B	D <sub>3</sub>		32	90350 MB (7/02)
3	RSAI3-10B		13	RSAI2-10B	D <sub>1</sub>	23	EB062609-SO		W	33	90452 MB
4	RSAI3-10BDL		14	RSAI2-10BDL	D <sub>2</sub>	24	SA202-10BMS		S	34	90585 MB
5	RSAI3-20B		15	RSAI2009-10B	D <sub>1</sub>	25	SA202-10BMSD			35	
6	RSAI3-32B		16	RSAI2009-10BDL	D <sub>2</sub>	26	SA188-0.5BMS			36	
7	RSAI3-32BRE		17	RSAI2-20B		27	SA188-0.5BMSD			37	
8	SA188-0.5B		18	RSAI2-31B		28				38	
9	SA172-0.5B		19	RSAJ2-10B		29				39	
10	SA41-0.5B		20	RSAJ2-20B		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-butylphthalate	MMM. Bis(2-Chloroisopropyl)ether
F. 1,2-Dichlorobenzene	U. Hexachlorobutadiene**	JJ. Dibenzofuran	YY. Fluoranthene**	NNN. Aniline
G. 2-Methylphenol	V. 4-Chloro-3-methylphenol**	KK. 2,4-Dinitrotoluene	ZZ. Pyrene	OOO. N-Nitrosodimethylamine
H. 2,2'-Oxybis(1-chloropropane)	W. 2-Methylnaphthalene	LL. Diethylphthalate	AAA. Butylbenzylphthalate	PPP. Benzoic Acid
I. 4-Methylphenol	X. Hexachlorocyclopentadiene*	MM. 4-Chlorophenyl-phenyl ether	BBB. 3,3'-Dichlorobenzidine	QQQ. Benzyl alcohol
J. N-Nitroso-di-n-propylamine*	Y. 2,4,6-Trichlorophenol**	NN. Fluorene	CCC. Benzo(a)anthracene	RRR. Pyridine
K. Hexachloroethane	Z. 2,4,5-Trichlorophenol	OO. 4-Nitroaniline	DDD. Chrysene	SSS. Benzidine
L. Nitrobenzene	AA. 2-Chloronaphthalene	PP. 4,6-Dinitro-2-methylphenol	EEE. Bis(2-ethylhexyl)phthalate	TTT. 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-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.





SDG #: See copy

Reviewer: JYC

2nd Reviewer: J

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: ug/L Associated sample units: ug/kg

Sampling date: 7/21/09

Field blank type: (circle one) Field Blank / Rinsate / Other: Associated Samples: 1-7 13-22

Compound	Blank ID	Sample Identification			
	FB072109-50 b				
EEE	1.4				
AAA	0.18				
XX	1.5				
LL	0.35				
CRQL					

(5x) 7.0 0.9 7.5 1.75

(All results either ND or > FB)

Blank units: ug/L Associated sample units: ug/kg

Sampling date: 8/26/09

Field blank type: (circle one) Field Blank / Rinsate / Other: EB Associated Samples: 13-22 (ND)

Compound	Blank ID	Sample Identification			
	23				
EEE	1.3				
TTT	0.15				
CRQL					

5x Phthalates 2x all others

**VALIDATION FINDINGS WORKSHEET**  
**Surrogate Recovery**

LDC #: 21495 kzc  
 SDG #: Su Gray  
 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?  
 N/A  Y  
 If 2 or more base neutral or acid surrogates were outside QC limits, was a reanalysis performed to confirm %R?  
 N/A  Y  
 If any %R was less than 10 percent, was a reanalysis performed to confirm %R?  
 N/A  Y

#	Date	Sample ID	Surrogate	%R (Limits)	Qualifications
		3 (20x)	All	0	No qual
		4 (100)		( )	
		11 (20x)		( )	
		14 (70x)		( )	
		16 (60x)		( )	
				( )	
			( )		
			( )		
			( )		
			( )		
			( )		
			( )		
			( )		
			( )		
			( )		
			( )		
			( )		
			( )		
			( )		
			( )		
			( )		

\* QC limits are advisory

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

**VALIDATION FINDINGS WORKSHEET**  
**Matrix Spike/Matrix Spike Duplicates**

**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.

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

#	Date	MS/MSD ID	Compound	MS %R (Limits)	MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		26/27	W	( )	109 (35-108)	( )	8	No Qual (MS in)
			YY	( )	194 (11-88)	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
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				( )	( )	( )		

Compound	QC Limits (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)	Compound	QC Limits (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)
A. Phenol	26-90%	≤ 35%	12-110%	≤ 42%	Acenaphthene	31-137%	≤ 19%	46-118%	≤ 31%
C. 2-Chlorophenol	25-102%	≤ 50%	27-123%	< 40%	4-Nitrophenol	11-114%	≤ 50%	10-80%	< 50%
E. 1,4-Dichlorobenzene	28-104%	≤ 27%	36-97%	< 28%	2,4-Dinitrotoluene	28-89%	≤ 47%	24-96%	< 38%
J. N-Nitroso-di-n-propylamine	41-126%	≤ 38%	41-116%	< 38%	Pentachlorophenol	17-109%	≤ 47%	9-103%	< 50%
R. 1,2,4-Trichlorobenzene	38-107%	≤ 23%	39-98%	< 28%	Pyrene	35-142%	≤ 36%	26-127%	< 31%
V. 4-Chloro-3-methylphenol	26-103%	≤ 33%	23-97%	< 42%					



**VALIDATION FINDINGS WORKSHEET**  
**Internal Standards**

LDC #: 21495620  
 SDG #: See cover

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

#	Date	Sample ID	Internal Standard	Area (Limits)	RT (Limits)	Qualifications
6			PRY ↓	100325 (113164 - 452654) ↓		J/V/A (i) ↓
7				67341 ↓		qual: (FFF GGG, HHH, IIJ JJJ, KKK, LLL)

\* 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

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

#	Date	Sample ID	Finding	Associated Samples	Qualifications
		3, 13, 15	SS > cal range		J Metb / A (e)

Comments: See sample calculation verification worksheet for recalculations

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

#	Date	Sample ID	Finding	Associated Samples	Qualifications
		3, 13, 15	SS > CW range		X / A (o)
		4, 14, 16	All except SS dil		
		7 (ALL TCL)	Confirmation run for #6 (IS outside limits)		↓

Comments: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_



LDC #: 21495k2a  
 SDG #: Du Canal

**VALIDATION FINDINGS WORKSHEET**  
**Field Duplicates**

Page: 1 of 1  
 Reviewer: JLP  
 2nd reviewer: [Signature]

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	Concentration (ug/kg)		RPD	Parent only
	13	15		
DDD	10	11	1 ( $\leq 50$ Diff)	
YY	500	11	39	↓
SS	6900	7100	3 ( $\leq 50$ 2 RPD)	
S	13	6.5	6.5 ( $\leq 50$ Diff)	
ZZ	13	11	2	↓
UUU	1200	1100	9 ( $\leq 50$ 2 RPD)	

  

Compound	Concentration (ug/kg)		RPD	Parent only
	14	16		
SS	5000	5400	8 ( $\leq 50$ 2 RPD)	
S	76	4300	354 ( $\leq 430$ Diff)	
UUU	1100	840	260 ( $\leq 500$ Diff)	

Compound	Concentration (ug/kg)		RPD	Parent only
	21	22		
XX	86	170	84 ( $\leq 300$ Diff)	
S	1.7	1.8	0.1 ( $\leq 12$ Diff)	
UU	3.4	124	8.6	↓

Compound	Concentration ( )		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.
- UU 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 RSAL4009-0.5B 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)	A

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:

Compound	Concentration (ug/Kg)		RPD (Limits)	Difference (Limits)	Flags	A or P
	RSAL4-0.5B	RSAL4009-0.5B				
Chrysene	1.0	1.1	-	0.1 ( $\leq 6.9$ )	-	-
Di-n-butylphthalate	39	42	-	3 ( $\leq 180$ )	-	-
Fluoranthene	1.7	1.8	-	0.1 ( $\leq 6.9$ )	-	-
Hexachlorobenzene	87	86	1 ( $\leq 50$ )	-	-	-
Naphthalene	1.4	1.4	-	0 ( $\leq 6.9$ )	-	-
Phenanthrene	2.1	2.5	-	0.4 ( $\leq 6.9$ )	-	-
Pyrene	1.4	1.1	-	0.3 ( $\leq 6.9$ )	-	-
Octachlorostyrene	14	13	-	1 ( $\leq 6.9$ )	-	-



**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 RSAL4009-0.5B RSAL4-10B RSAL4-28B SA100-10B SA100-30B SA69-0.5B SA69-10B SA69-29B	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 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	A	bl
R0903729	RSAL4009-0.5B	Di-n-butylphthalate	42U ug/Kg	A	bl
R0903729	RSAL4-28B	Di-n-butylphthalate	67U ug/Kg	A	bl
R0903729	SA100-10B	Di-n-butylphthalate	63U ug/Kg	A	bl
R0903729	SA100-30B	Di-n-butylphthalate	56U ug/Kg	A	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

Stage 2B

LDC #: 21495L2a

SDG #: R0903729

Laboratory: Columbia Analytical Services

Date: 9/23/09

Page: 1 of 1

Reviewer: [Signature]

2nd Reviewer: [Signature]

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
I.	Technical holding times	A	Sampling dates: 7/06 - 07/09
II.	GC/MS Instrument performance check	A	
III.	Initial calibration	A	2 RSD ✓
IV.	Continuing calibration/ICV	A	CCV/ICV ≤ 25 %
V.	Blanks	SW	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	SW	
VIII.	Laboratory control samples	SW	LCS 1/D
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	A	
XI.	Target compound identification	N	
XII.	Compound quantitation/CRQLs	N	
XIII.	Tentatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data	A	
XVI.	Field duplicates	SW	b = 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

1	SA206-0.5B	11	RSAL4-28B	21	90956 MB	31
2	SA206-10B	12	SA100-10B	22	90016 ↓	32
3	SA206-25B	13	SA100-30B	23		33
4	SA206-30B	14	SA69-0.5B	24		34
5	RSAK4-10B	15	SA69-10B	25		35
6	RSAK4-20B	16	SA69-29B	26		36
7	RSAK4-31B	17	SA206-30BMS	27		37
8	RSAL4-0.5B b	18	SA206-30BMSD	28		38
9	RSAL4009-0.5B b	19	SA69-10BMS	29		39
10	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. Pentachlorophenol**	III. Benzo(a)pyrene**
B. Bis (2-chloroethyl) ether	Q. 2,4-Dichlorophenol**	FF. 3-Nitroaniline	UU. Phenanthrene	JJJ. Indeno(1,2,3-cd)pyrene
C. 2-Chlorophenol	R. 1,2,4-Trichlorobenzene	GG. Acenaphthene**	VV. Anthracene	KKK. Dibenz(a,h)anthracene
D. 1,3-Dichlorobenzene	S. Naphthalene	HH. 2,4-Dinitrophenol*	WW. Carbazole	LLL. Benzo(g,h,i)perylene
E. 1,4-Dichlorobenzene**	T. 4-Chloroaniline	II. 4-Nitrophenol*	XX. Di-n-butylphthalate	MMM. Bis(2-Chloroisopropyl)ether
F. 1,2-Dichlorobenzene	U. Hexachlorobutadiene**	JJ. Dibenzofuran	YY. Fluoranthene**	NNN. Aniline
G. 2-Methylphenol	V. 4-Chloro-3-methylphenol**	KK. 2,4-Dinitrotoluene	ZZ. Pyrene	OOO. N-Nitrosodimethylamine
H. 2,2'-Oxybis(1-chloropropane)	W. 2-Methylnaphthalene	LL. Diethylphthalate	AAA. Butylbenzylphthalate	PPP. Benzoic Acid
I. 4-Methylphenol	X. Hexachlorocyclopentadiene*	MM. 4-Chlorophenyl-phenyl ether	BBB. 3,3'-Dichlorobenzidine	QQQ. Benzyl alcohol
J. N-Nitroso-di-n-propylamine*	Y. 2,4,6-Trichlorophenol**	NN. Fluorene	CCC. Benzo(a)anthracene	RRR. Pyridine
K. Hexachloroethane	Z. 2,4,5-Trichlorophenol	OO. 4-Nitroaniline	DDD. Chrysene	SSS. Benzidine
L. Nitrobenzene	AA. 2-Chloronaphthalene	PP. 4,6-Dinitro-2-methylphenol	EEE. Bis(2-ethylhexyl)phthalate	TTT. 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-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 #: 21495 L2c  
SDG #: See Case

**VALIDATION FINDINGS WORKSHEET**

**Blanks**

Page: 1 of 1  
Reviewer: D/L  
2nd Reviewer: D

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

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

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

Blank extraction date: 7/06/09 Blank analysis date: 7/15/09

Conc. units: ug/kg Associated Samples: 8-16

(6L)

Compound	Blank ID	Sample Identification																		
		8	9	11	12	13														
XX	91016 MB 38	39/4	42/4	67/4	63/4	56/4														

Blank extraction date: \_\_\_\_\_ Blank analysis date: \_\_\_\_\_  
Conc. units: \_\_\_\_\_ Associated Samples: \_\_\_\_\_

Compound	Blank ID	Sample Identification																		

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

LDC #: 21495 L29  
SDG #: See Cover

# VALIDATION FINDINGS WORKSHEET

## Field Blanks

Page: 1 of 1  
Reviewer: JVZ  
2nd Reviewer: D

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: ug/L Associated sample units: ug/kg

Sampling date: 7/21/07

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

Associated Samples: All

Compound	Blank ID	Sample Identification			
(SX)	FB072101-50				
7.0	EEE 1.4	(All results	either	ND	or > FB)
0.9	AAA 0.18				
7.5	XX 1.5				
1.75	LL 0.35				
CRQL					

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

Compound	Blank ID	Sample Identification			
CRQL					

LDC #: 24495 L2a  
SDG #: See cover

**VALIDATION FINDINGS WORKSHEET**  
**Matrix Spike/Matrix Spike Duplicates**

Page: 1 of 1  
Reviewer: JVG  
2nd Reviewer: [Signature]

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

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

N N/A Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.

N N/A Were 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
		17/18	EEE	153 (50-150)	( ) ( )	34 (30)	4	No qual (MSD in)
		19/20	RRR	49 (50-150)	( ) ( )	( ) ( )	15	↓
				( ) ( )	( ) ( )	( ) ( )		
				( ) ( )	( ) ( )	( ) ( )		
				( ) ( )	( ) ( )	( ) ( )		
				( ) ( )	( ) ( )	( ) ( )		
				( ) ( )	( ) ( )	( ) ( )		
				( ) ( )	( ) ( )	( ) ( )		
				( ) ( )	( ) ( )	( ) ( )		
				( ) ( )	( ) ( )	( ) ( )		
				( ) ( )	( ) ( )	( ) ( )		
				( ) ( )	( ) ( )	( ) ( )		
				( ) ( )	( ) ( )	( ) ( )		
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				( ) ( )	( ) ( )	( ) ( )		
				( ) ( )	( ) ( )	( ) ( )		
				( ) ( )	( ) ( )	( ) ( )		
				( ) ( )	( ) ( )	( ) ( )		

Compound	QC Limits (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)	Compound	RPD (Soil)	QC Limits (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)
A. Phenol	26-90%	≤ 35%	12-110%	≤ 42%	Acenaphthene	≤ 19%	31-137%	≤ 19%	46-118%	≤ 31%
C. 2-Chlorophenol	25-102%	< 50%	27-123%	< 40%	4-Nitrophenol	< 50%	11-114%	< 50%	10-80%	< 50%
E. 1,4-Dichlorobenzene	28-104%	< 27%	36-97%	< 28%	2,4-Dinitrotoluene	< 47%	28-99%	< 47%	24-96%	< 38%
J. N-Nitroso-di-n-propylamine	41-126%	< 38%	41-116%	< 38%	Pentachlorophenol	< 47%	17-109%	< 47%	9-103%	< 50%
R. 1,2,4-Trichlorobenzene	38-107%	< 23%	39-98%	< 28%	Pyrene	< 36%	35-142%	< 36%	26-127%	< 31%
V. 4-Chloro-3-methylphenol	26-103%	< 33%	23-97%	< 42%						

LDC #: 21495 L2a  
 SDG #: Sue Conrad

# VALIDATION FINDINGS WORKSHEET

## Laboratory Control Samples (LCS)

Page: 1 of 1  
 Reviewer: JVB  
 2nd Reviewer: C

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/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?

#	Date	LCS/LCSD ID	Compound	LCS %R (Limits)	LCS D %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		90956 LCS/D	EFE	127 (50-120)	147 (50-120)	( )	1-7, 90956 MB	No qual (MSD in)
		91016 LCS/D	EFE	137 (50-120)	131 (50-120)	( )	8-16, 91016 MB	No qual (MSD in)

**VALIDATION FINDINGS WORKSHEET**  
**Field Duplicates**

**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?

Compound Name	Conc ( ug/Kg)		RPD (≤50%)	Diff	Diff Limits	Quals (Parent Only)
	8	9				
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			
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	